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**Site Management Plan
for the Hempstead Intersection Street
Former Manufactured Gas Plant Site
Villages of Hempstead & Garden City
Nassau County, New York**



Prepared for:

National Grid

175 East Old Country Road
Hicksville, New York 11801

Prepared by:

URS Corporation - New York

257 West Genesee Street, Suite 400
Buffalo, New York 14202-2657

**Hempstead Intersection Street
Former Manufactured Gas Plant Site
Villages of Hempstead and Garden City**

NASSAU COUNTY, NEW YORK

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Prepared for:

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FEBRUARY 2017

**SITE MANAGEMENT PLAN
HEMPSTEAD INTERSECTION STREET FORMER MGP SITE**

TABLE OF CONTENTS

<u>Section</u>	<u>Description</u>	<u>Page</u>
CERTIFICATION STATEMENT		
1.0	INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM	1-1
1.1	Introduction.....	1-1
	1.1.1 General.....	1-1
	1.1.2 Purpose.....	1-2
	1.1.3 Revisions.....	1-4
1.2	Site Background.....	1-4
	1.2.1 Site Location and Description.....	1-4
	1.2.2 Site History	1-5
	1.2.3 Geologic Conditions	1-5
	1.2.3.1 Topography.....	1-5
	1.2.3.2 Pre-Remediation Stratigraphy.....	1-6
	1.2.3.3 Post-Remediation Stratigraphy	1-7
	1.2.3.4 Groundwater Flow	1-7
1.3	Summary of Previous Investigation Findings.....	1-8
1.4	Summary of Remedial Actions.....	1-10
	1.4.1 Removal of Contaminated Materials from the Site	1-11
	1.4.2 On-Site and Off-Site Treatment Systems	1-13
	1.4.2.1 NAPL Recovery Wells	1-13
	1.4.2.2 ISS.....	1-13
	1.4.2.3 Oxygen Delivery	1-13
	1.4.3 MGP-Related Residuals.....	1-14
	1.4.3.1 Soil.....	1-14
	1.4.3.2 Groundwater	1-15
	1.4.4 Engineering and Institutional Controls.....	1-15
2.0	ENGINEERING AND INSTITUTIONAL CONTROL PLAN.....	2-1
2.1	Introduction.....	2-1
	2.1.1 General.....	2-1
	2.1.2 Purpose.....	2-1
2.2	Engineering Controls	2-2
	2.2.1 Engineering Control Systems	2-2
	2.2.2 Criteria for Completion of Remediation/ Termination of Remedial Systems.....	2-3
	2.2.2.1 ISS.....	2-3
	2.2.2.2 Cover Systems	2-3

	2.2.2.3	Oxygen Delivery	2-3
	2.2.2.4	NAPL Recovery	2-4
2.3		Institutional Controls	2-4
	2.3.1	Excavation Work Plan	2-6
	2.3.2	Soil Vapor Intrusion Evaluation	2-7
2.4		Inspections and Notifications.....	2-8
	2.4.1	Inspections	2-8
	2.4.2	Notifications.....	2-9
2.5		Contingency Plan.....	2-10
	2.5.1	Emergency Telephone Numbers.....	2-10
	2.5.2	Map and Directions to Nearest Health Facility.....	2-10
	2.5.3	Response Procedures	2-11
	2.5.4	Spill Response Plan and Notification	2-11
3.0		MONITORING PLAN	3-1
3.1		Introduction.....	3-1
	3.1.1	General.....	3-1
	3.1.2	Purpose and Schedule	3-1
3.2		Cover System Monitoring.....	3-2
	3.2.1	Monitoring Schedule.....	3-3
	3.2.2	Repair Schedule	3-3
3.3		Groundwater Monitoring	3-4
	3.3.1	Sampling Protocol.....	3-4
	3.3.2	Monitoring Well Repairs, Replacement and Decommissioning.....	3-5
3.4		Oxygen Delivery System	3-5
3.5		NAPL Recovery	3-6
3.6		Site and Off-Site Inspection	3-6
3.7		Monitoring Quality Assurance/Quality Control	3-7
3.8		Monitoring Reporting Requirements	3-8
4.0		OPERATION AND MAINTENANCE PLAN	4-1
5.0		SITE MANAGEMENT REPORTING PLAN	5-1
5.1		Site Inspections	5-1
	5.1.1	Inspection Frequency	5-1
	5.1.2	Inspection/Monitoring Forms	5-1
	5.1.3	Evaluation of Records and Reporting.....	5-1
5.2		Certification of Engineering and Institutional Controls.....	5-2
5.3		Periodic Review Report	5-3
5.4		Corrective Measures Plan	5-5
6.0		References	

List of Appendices

- A Environmental Easement, Survey, Metes and Bounds
- B Excavation Work Plan
- C HASP and CAMP Examples (on CD)
- D Institutional and Engineering Control Inspection Forms
- E Field Sampling and Analysis Plan
- F Quality Assurance Project Plan

List of Tables

- 1 Matrix of Responsibilities
- 2 Emergency Contact and Other Numbers
- 3 Monitoring Programs Schedule
- 4 Monitoring Well Construction Details
- 5 Water Level Measurements, NAPL Thickness Measurements, and Water Quality Sampling Schedule

List of Figures

- 1 Site Location Map
- 2 Pre-Construction Site Plan
- 3 Groundwater Monitoring Well Locations and Oxygen Delivery Systems
- 4 Excavation and ISS Areas
- 5 Elevation of Top of ISS Monolith
- 6 Bottom of ISS Contour Map
- 7 Groundwater Contaminant Plume Prior to Remediation
- 8 Groundwater Contaminant Plume June 2016
- 9 Locations of MGP Source Material Not Treated by Solidification
- 10 Locations of Cover Systems
- 11 Typical Cover System Details (Sheet 1 of 2)
- 12 Typical Cover System Details (Sheet 2 of 2)
- 13 Hospital Route Map

List of Acronyms

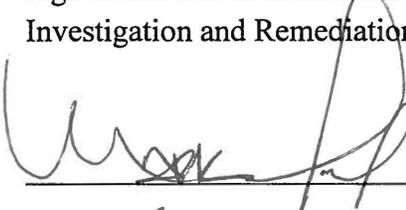
AES	Atlantic Environmental Services, Inc.
ASP	Analytical Services Protocol
bgs	below ground surface
BOD	Basis of Design
BTEX	benzene, toluene, ethylbenzene, and xylenes
C/D	construction and demolition (debris)
CAMP	Community Air Monitoring Plan
CFR	code of federal regulations
cm/sec	centimeters per second
DER	Division of Environmental Remediation
D&BC	Dvirka & Bartilucci Consulting Engineers
DNAPL	dense non-aqueous phase liquid
DO	dissolved oxygen
DUSR	data usability summary report
ECL	Environmental Conservation Law
ECs	Engineering Controls
EWP	Excavation Work Plan
FER	Final Engineering Report
ft/ft	foot per foot
FS/RAP	Feasibility Study/Remedial Action Plan
HASP	Health and Safety Plan
ICs	Institutional Controls
IRM	interim remedial measure
ISS	in-situ solidification
lbs	pounds
LILCO	Long Island Lighting Company
LIRR	Long Island Railroad
mg/kg	milligram per kilogram
MGP	manufactured gas plant
NAD	North American Datum
NAPL	non-aqueous phase liquid
NAVD	North American Vertical Datum
NRC	National Response Center
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PDI	pre-design investigation
POB	Professional Office Building
PS&S	Paulus, Sokolowski and Sartor
PVC	poly-vinyl chloride
QA/QC	Quality Assurance/Quality Control

QAPP Quality Assurance Project Plan
List of Acronyms

RI	remedial investigation
ROD	Record of Decision
ROW	Right-of-Way
SCGs	standards, criteria and guidance
SCOs	soil clean-up objectives
SMP	Site Management Plan
SVI	soil vapor intrusion
SW	solid waste
TAL	target analyte list
TCL	target compound list
UCS	unconfined compression strength
ug/L	micrograms per liter
URS	URS Corporation
USEPA	United States Environmental Protection Agency

CERTIFICATION STATEMENT

I Mark Lang certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).



P.E.

OCT 10 2016

DATE



1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 Introduction

This document is a required element of the remedial program for the National Grid Hempstead Intersection Street Former Manufactured Gas Plant Site. The Site was remediated in accordance with the Order on Consent Index #D1-0001-98-11 with New York State Department of Environmental Conservation (NYSDEC).

1.1.1 General

National Grid's corporate predecessor, KeySpan Corporation, entered into an Order on Consent with the NYSDEC to remediate the Site, which is located in the Villages of Hempstead and Garden City, in the Town of Hempstead, Nassau County, New York. This Order on Consent required the investigation and remediation of manufactured gas plant (MGP) related residuals at the Site and surrounding areas. The term "Site" as described in this Plan, shall be understood to refer to all areas that were subjected to soil remediation via excavation removal/backfill and in-situ solidification (ISS), as follows:

- The Hempstead Intersection Street Former Manufactured Gas Plant area within the confines of the National Grid property, also referred to herein as the "plant site";
- The Village of Garden City municipal property that is adjacent to and west of the National Grid property;
- The parking lot of the Plaza 230 Professional Office Building (POB) that is south of the National Grid property;
- Intersection Street that is between the National Grid property and the POB parking lot;
- The Long Island Railroad (LIRR) Right-of-Way (ROW) that is adjacent to and east of the National Grid property; and
- Oswego Oil Storage Terminal that is just north of Intersection Street and east of the National Grid property.

Off-Site Remedial Features include the oxygenation systems that address groundwater remediation through oxygen delivery to the subsurface. Additionally, monitoring wells are considered to be off-site features. A map showing the Site location and boundaries of the Site is provided as Figure 1. The boundaries of the Site are more fully described in the metes and bounds Site description that will accompany the Environmental Easement (Appendix A).

This Site Management Plan (SMP) was prepared by URS Corporation (URS), on behalf of National Grid, in accordance with the requirements in NYSDEC DER-10 “Technical Guidance for Site Investigation and Remediation,” dated May 2010 (NYSDEC 2010a), and the guidelines provided by NYSDEC. This SMP identifies the Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Environmental Easement for the Site.

After completion of the remedial work described in the August 2011 Basis of Design Report for In-Situ Solidification (URS 2011), some MGP-related residuals were left in the subsurface at this Site. This SMP was prepared to help manage MGP-related residuals at the Site in accordance with Environmental Conservation Law (ECL) Article 71, Title 36. All reports associated with the Site can be viewed by contacting the NYSDEC or any successor agency managing environmental issues in New York State.

1.1.2 Purpose

As contemplated by the NYSDEC-approved Remedial Action Work Plan, the Site has MGP-residuals remaining after the completion of the remedial actions. ECs have been incorporated into the Site remedy to control exposure to remaining impacts during the use of the Site to ensure protection of public health and the environment. An Environmental Easement will be recorded with the Nassau County Clerk for the National Grid-owned property, to supplement this SMP and all ECs and ICs placed on the plant Site. For the MGP-related residuals within the off-Site areas, compliance with this SMP and all ECs and ICs for the off-Site areas will be addressed via access agreements. The ICs place restrictions on Site use, and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP specifies the methods necessary to ensure compliance with all ECs and ICs required by the grantor of the

Environmental Easement(s) or Access Agreement for the MGP-related residuals. This SMP has been approved by the NYSDEC, and compliance with this SMP is required by the access agreements and/or the grantor of the Environmental Easement and the grantor's successors and assigns for the Site. This SMP may only be revised with the approval of the NYSDEC.

This SMP provides a detailed description of all procedures required to manage remaining impacts at the Site after completion of the Remedial Action, including: (1) implementation and management of all ECs and ICs; (2) implementation of Site and off-Site media monitoring; (3) operation and maintenance of all treatment, collection, containment, or recovery systems; (4) performance of periodic inspections, certification of results and submittal of Periodic Review Reports to the NYSDEC; and (5) defining criteria for termination of treatment system operations. This SMP also describes which party (property owner, National Grid, or NYSDEC) is responsible for each of these requirements. This SMP does not address the allocation of costs for any additional work or costs necessitated by development of the Site; that is a private matter to be worked out as necessary between National Grid and the developer/property owner.

To address these needs, this SMP includes four plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site and off-Site monitoring; (3) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to the NYSDEC; and (4) an Operation and Maintenance Plan for operation of the oxygen delivery systems.

This plan also includes a description of Periodic Review Reports for the periodic submittal of data, information, recommendations, and certifications to the NYSDEC.

It is important to note the following:

- This SMP details the Site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion;

- The SMP also details specific implementation procedures for the off-Site areas that are recommended by the NYSDEC. This SMP may be implemented on the off-Site areas via access agreements executed between National Grid and owner(s) of the properties comprising the off-Site areas;
- Noncompliance with this SMP is also a violation of ECL, 6 NYCRR Part 375 and the Order on Consent (Index # D1-0001-98-11) for the Site, and thereby subject to applicable penalties; and
- At the time this SMP was prepared, the SMP and all Site documents related to remedial investigation and remedial action are maintained at the NYSDEC Central Office in Albany, New York, and the NYSDEC - Region 1 Office in Stony Brook, New York and at public repositories at the Garden City Public Library (60 Seventh St. Garden City, NY 11530) and the Hempstead Public Library (115 Nichols Ct. Hempstead, NY 11550).

1.1.3 Revisions

Any proposed revisions to this plan shall be made in writing to the NYSDEC's project manager. In accordance with the Environmental Easement for the Site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.2 Site Background

1.2.1 Site Location and Description

The Site is located in the Villages of Hempstead and Garden City, in the Town of Hempstead, Nassau County, New York and encompasses multiple properties including that owned by National Grid, as described previously. The majority of the approximately 8-acre Site is located within the Village of Garden City. The remainder is in the Village of Hempstead. Residences and commercial businesses are located around National Grid's former MGP portion

of the Site. The former MGP portion of the Site is bordered to the north by Second Street, east by a LIRR inactive railroad ROW, south by Intersection Street, and west by a municipal property owned by the Village of Garden City. Other surrounding areas, some portions of which are included in the Site, include a Professional Office Building to the southwest, the POB parking lot to the south, and an active oil storage terminal (Oswego Oil) to the southeast. An active National Grid natural gas regulator station is located within the northwestern portion of the Site as shown on Figure 2. Figures 3 and 4 show where remedial activities have been implemented.

1.2.2 Site History

The Nassau and Suffolk Lighting Company operated the manufactured gas plant starting in the early 1900s. The facility originally produced coal gas but was converted to a carbureted water gas process sometime after 1910. The Long Island Lighting Company (LILCO) acquired an ownership share of the plant site in the early 1930s. Following the arrival of natural gas, the plant site served as a peak/emergency facility to ensure gas supply until all MGP operations ceased in the mid-1950s. The plant was demolished shortly afterward. In 1998, the property was acquired by KeySpan Corporation when LILCO merged with Brooklyn Union Gas. The property was then acquired by National Grid in 2008, during the acquisition of KeySpan.

Since demolition of the plant in the 1950s, the majority of the plant site has been inactive with the exception of the active National Grid natural gas regulator station in the northwestern portion of the plant site. Prior to the remediation work, the plant site was undeveloped and secured by a perimeter fence.

Following initial site investigations in the 1990s, a Remedial Investigation was performed in the 2000s, and a Feasibility Study was completed in 2008. A Voluntary Cleanup Program Decision Document describing the selected remedy was issued by NYSDEC in 2008.

1.2.3 Geologic Conditions

1.2.3.1 Topography

The plant site and surrounding area are generally flat with an approximate elevation of 63 to 71 feet North American Vertical Datum (NAVD) 88 datum, with the ground surface gently sloping to the west, northwest, and southwest. The plant site is predominantly covered with crushed stone and secured with a perimeter fence. Areas surrounding the plant site are generally covered with asphalt, concrete, or topsoil and grass. Some grass, shrubs and trees provide a buffer across the northern and western fence lines of the plant site. Other than gas piping in the regulator station and plant site security fences, there are no permanent aboveground structures on the plant site.

1.2.3.2 Pre-Remediation Stratigraphy

The four primary geologic units present at the Site, in descending order from ground surface down through the subsurface are: fill/topsoil, glacial outwash, upper Magothy, and lower Magothy formations.

Fill/Topsoil

The fill/topsoil unit was present in the northern and northwestern portions of the Site. Fill was present over much of the remainder of the Site and was highly variable in composition, consisting of brown to black sands, silts and gravels with varying amounts of concrete, brick, coal, bluestone, clinker, vesicular slag and wood. The unit was not continuous throughout the Site and ranged in thickness from approximately 0.5 to 16 feet where present. A thin surface layer of gravel was spread throughout much of the Site. In some areas, concrete foundations from the former MGP structures were present beneath the gravel.

Glacial Sediments

Glacial sediments beneath the Site consist of three primary units: glacial outwash, the upper Magothy Formation, and the lower Magothy Formation, as described below.

Glacial Outwash

The uppermost glacial deposit beneath the Site is a relatively porous glacial outwash deposit consisting of yellow to light brown, fine to coarse sand with varying amounts of gravel. These sediments underlie the fill/topsoil and range in thickness from 60 to 70 feet within the Site to more than 95 feet south of the Site. Intermittent zones and lenses of silty sand and silt are present in the glacial unit and appear to limit the vertical movement of groundwater and non-aqueous phase liquid (NAPL).

Upper Magothy Formation

Underlying the glacial outwash sediments is the upper subunit of the Magothy Formation, which is characterized by a sequence of sand, silt, and clay layers. Its thickness ranges between 50 and 110 feet at the Site.

Lower Magothy Formation

The lower subunit of the Magothy Formation, which is found at approximately 120 feet below ground surface (bgs) and below, is characterized by a low permeability silty fine sand and stiff clay. Due to the high clay content of the lower subunit, it acts as an effective confining layer limiting the vertical migration of groundwater and NAPL.

1.2.3.3 Post-Remediation Stratigraphy

The fill/topsoil and glacial outwash geologic units at the site have been modified by remediation. In the remediated areas where the ISS monolith is located, backfill is present from the top of the monolith to the surface elevations presented on Figure 5. The bottom of the monolith is presented on Figure 6. Cross-sections indicating monolith elevations are presented in figures in the Final Engineering Report (FER).

1.2.3.4 Groundwater Flow

In general, hydraulic conductivities of the Upper Glacial aquifer and the upper subunit of the Magothy Formation were estimated to be approximately 1×10^{-1} centimeter per second (cm/sec) and 1×10^{-2} cm/sec to 5×10^{-2} cm/sec, respectively (McClymonds and Franke, 1972).

Prior to remediation by ISS across the Site area, the water table occurred within the glacial outwash sediments (Upper Glacial aquifer) at depths ranging from approximately 25 to 30 feet bgs. Groundwater flow within the glacial outwash was in a south-southwesterly direction, with a hydraulic gradient of approximately 0.001 foot/foot (ft/ft).

ISS at the Site generated a solidified monolith with a hydraulic conductivity less than 1×10^{-6} cm/sec. The monolith is therefore relatively impermeable to groundwater flow. Groundwater flow conditions are generally in a southerly direction at an average gradient of approximately 0.005-0.006 ft/ft for the shallow water bearing zones and approximately 0.002 ft/ft for intermediate and deep water bearing zones.

1.3 Summary of Previous Investigation Findings

Previous investigations conducted at the Site were performed to identify the presence of MGP impacts, determined the presence and extent of off-Site MGP impacts, characterized the hydrogeology of the area, and established interim remedial measures (IRM) boundaries. The findings of the previous investigations can be found in the following documents and are summarized below:

- Preliminary Investigation for Site of Former Hempstead Gas Plant, December 1990, AES;
- Weston, R.F., Final Field Investigation Report – Hempstead Gas Plant, October, 1992a;
- DBC, Remedial Investigation Report, March, 2003; and
- PS&S, Final Remedial Investigation Report, November, 2006.

There are two areas of known contamination adjacent to the Site not related to the former MGP site. An adjacent oil storage terminal (Oswego Oil) that has had some petroleum releases is located immediately east of the plant site beyond the inactive LIRR ROW. Petroleum storage and distribution activities are conducted at this location. The Mollineaux Brothers Fuel Company operated a fuel loading and storage facility immediately southeast of the plant site that is now inactive. Historical documentation indicates that a petroleum release occurred at the Mollineaux facility.

A remedial investigation (RI) report prepared in 2006 (PS&S, 2006) described MGP site-related impacts to soil and groundwater. Pre-Design Investigation (PDI) activities were performed by URS in 2008 and 2009 that focused on collecting data to support the design for the ISS remediation and groundwater remediation systems.

The impacted materials included coal tar and related constituents that are expected to be found at a former MGP site. The MGP impacts ranged from dissolved-phase contamination in the groundwater; to an immiscible fluid that is denser than water (dense non-aqueous phase liquid [DNAPL]); and tar-coated soils.

The typical MGP-related chemical constituents are principally benzene, toluene, ethylbenzene, and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs) that are found in the soil, groundwater, and NAPL. The RI and PDI results indicated that the majority of MGP impacts and/or DNAPL were located in two intervals beneath the plant site, shallow soils in the upper 8 feet at locations near the former MGP structures or operations, and near the water table interface at approximately 24 to 34 feet bgs.

DNAPL extended approximately 450 feet south of the plant site beneath the POB parking lot. During Fourth Quarter 2012 sampling (prior to ISS treatment), DNAPL was observed in 13 of the existing wells within the POB parking lot.

Site-related impacts have migrated south from the site with the flow of groundwater. The extent of a dissolved-phase BTEX and PAH plume prior to remediation was approximately 600 feet wide by approximately 3,000 feet long as indicated on Figure 7. As presented on Figure 8 and in the June 2016 Quarterly Groundwater Sampling, NAPL Monitoring, and Groundwater Treatment Performance Report, the downgradient boundary of the plume, as defined by total BTEX or PAH concentrations greater than 100 microgram per liter (ug/L), has been reduced in size and currently extends approximately 400 feet south of the plant site boundary. The concentrations of BTEX and PAHs decrease significantly further from the Site. Oxygenation treatment systems No. 1 and No. 2 are providing dissolved oxygen to augment biodegradation of dissolved phase MGP compounds in groundwater and thus are reducing the size of the plume.

Based on the RI, there were no current or potential exposure pathways through which individuals on or near the site could be exposed to potentially hazardous materials related to the former MGP Site. The MGP contaminants have not adversely impacted drinking water supplies in the community. The previous investigations have determined that the site is located outside of the groundwater capture zones for adjacent water supply wells operated by the Village of Garden City and water supply wells operated by the Village of Hempstead at Clinton Street. In addition, soil vapor intrusion testing did not identify volatile organic compounds related to the MGP plant site in nearby buildings or in soil vapor monitoring points located in the vicinity of the dissolved phase groundwater plume.

1.4 Summary of Remedial Actions

Prior to the remedial actions, four IRMs were conducted in accordance with the NYSDEC-approved IRM Work Plans. The IRMs that have been implemented at the Site are summarized below.

1. 1999-2000: Underground piping associated with historic MGP operations was located, cut, drained, and plugged to limit the potential for any off-Site migration of MGP-related constituents.
2. 2008: Shallow MGP-source material was excavated from the plant site and NAPL from groundwater was recovered. The excavation took place in areas where no future remediation would be necessary and to support future Site-wide remediation activities by providing clean areas for support facilities, vehicle parking, and the staging of equipment and materials.
3. 2007-2011: Thirty-one product recovery wells were installed to recover DNAPL present on and downgradient of the plant site.
4. 2010 – 2011: Two groundwater oxygenation systems were installed downgradient of the plant site. These systems deliver oxygen to the groundwater plume to allow naturally occurring bacteria to consume and eliminate dissolved phase hydrocarbons originating from the plant site.

The remedial actions were performed from 2011 to 2014 and completed in accordance with the 2007 Decision Document and the NYSDEC-approved Basis of Design Report (BOD) dated August 2011 (URS 2011). The following is a summary of the Remedial Actions performed at the Site as part of the ISS remedial action.

- Excavated remnants of MGP structures and shallow targeted MGP source material from the MGP plant site. Clean shallow soil that was excavated was stockpiled and the used as backfilled.
- Solidified targeted MGP source material beneath the former MGP plant site, the Village of Garden City municipal property, and the adjacent Oswego Oil Storage Terminal property using deep soil mixing. The targeted source material included soil: saturated with NAPL with a thickness of at least 6 inches; concentrations of PAHs greater than 1,000 mg/kg, or concentrations of BTEX were greater than 50 mg/kg.
- Construction and maintenance of a soil cover system using at least 4 feet of clean backfill. This includes covering solidified material with 4 or more feet of backfill.
- Construction of a soil-crete retaining wall around the POB parking lot (constructed in portions of Wendell Street, Intersection Street, and adjacent to the LIRR ROW) and solidification deeper targeted MGP source material located inside the wall.
- Installation of an oxygen delivery system to treat groundwater downgradient of areas where solidification could not take place due to accessibility limitations such as: under the POB, near utilities, and drainage/sewer lines.
- Execution and recording of an Environmental Easement and access agreements to restrict land use and prevent future exposure to any contamination remaining at National Grid plant site.
- Development and implementation of a Site Management Plan for long-term management of MGP-related residuals as required by the Environmental Easement, which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance, and (4) reporting.

1.4.1 Removal of Contaminated Materials from the Site

Implementation of the IRMs and Remedial Actions resulted in the removal of several different types of waste: concrete and debris, spoils from soil mixing, soils impacted with MGP-related residuals, waste water generated during construction, and NAPL.

During the 2008 IRM, A total of 4,432 cubic yards of MGP source material and construction/demolition debris was taken off-Site for treatment and disposal. A total of 9,493 gallons of liquid was also taken off-Site for treatment and disposal (URS, 2009c).

Soil, concrete, holder foundations and former MGP piping were excavated during the remedial activities including A total of 50,267 tons of such material were sent to Bay Shore Soil Management, a permitted waste disposal facility located in Keasbey, New Jersey, for thermal treatment.

The solidification process generated solidification spoils that required off-Site disposal. Approximately 17,409 tons of spoils were transported off-Site to Bay Shore Soil Management, for thermal treatment.

Some excavated soil was determined to be suitable for reuse as described below. Suitability was determined by visual and olfactory evaluation by the Engineer and the NYSDEC had a representative on-site during the work. These soils came from the following areas:

- Certain areas on the plant site (location and depth varied, and were determined on a case-by-case basis by visual and olfactory inspection);
- Soil from the POB parking lot area and the adjacent Wendell and Intersection Streets;

This reusable excavated material was used as backfill according to the following placement location guidelines:

- Materials excavated from the plant site property was reused as backfill only within the National Grid's former MGP plant site property limits;

- Materials excavated from outside the former MGP plant site property were reused anywhere within project construction limits as backfill;
- The reused soil was not used within 2 vertical feet of final cover surface. Within that 2-foot zone, clean imported material was used as backfill for all excavations including final surface cover.

The type and quantity of backfill imported from off-Site sources included: general fill (44,183 tons), topsoil (520 cubic yards), and select stone fill (5,199 tons). All material met restricted residential criteria in accordance with the project work plan.

1.4.2 On-Site and Off-Site Treatment Systems

1.4.2.1 NAPL Recovery Wells

Approximately 745 gallons of NAPL was recovered between April 2007 and July 2011 when recovery was temporarily suspended during ISS operations. All but one of the recovery wells were decommissioned as part of the ISS work. Currently the one remaining recovery well is gauged on a monthly basis and NAPL is manually removed from the well periodically. Since ISS has been completed, approximately 43 gallons of NAPL has been recovered from this well.

1.4.2.2 ISS

ISS is a remedial action that mixes grout into the subsurface soil to the target depth. ISS was performed by mixing grout with in-situ soil via 6- or 8-foot diameter augers. The grout consisted of cement, slag, bentonite and water. The ISS was performed within the former MGP site property, areas in the POB parking lot, Village of Garden City municipal property, Intersection Street, Wendell Street, LIRR ROW, and Oswego Oil property.

The top of the ISS monolith was designed and constructed so that subsurface precipitation infiltration would slowly drain to the outer perimeter of the monolith as shown by the grading contours on Figure 5. Within the POB parking lot portion of the ISS area, the top of the ISS monolith is approximately at 4 feet below final grade along the “soil-crete” retaining

wall and about 13 to 17 feet below final grade within that perimeter soil-crete wall. Five vertical drains (8-inch diameter with 5-feet of screen into native soil below the ISS monolith) were installed to prevent water accumulation on the monolith surface within the POB area.

1.4.2.3 Oxygen Delivery

The downgradient groundwater plume is being remediated by oxygenation systems. System No. 1 was brought on line in April 2011 and is located immediately south of the Site and runs generally east-west from Hilton Ave to the west to Sealy Ave to the east, in a neighborhood that includes residential and light commercial spaces, as well as a portion of the LIRR ROW. System No. 2 was brought on line in October 2010 and is located in a primarily residential neighborhood about 500 feet to the south of System No. 1, running from Mirschel Park to the east to Kensington Court to the west. Two additional oxygenation systems may be installed immediately south of the solidified monolith, depending on the results of ongoing monitoring of the dissolved phase groundwater plume.

The primary objective of the off-Site groundwater oxygenation treatment systems is to increase the level of dissolved oxygen (DO) in the groundwater to provide a means for reduction of the groundwater plume via aerobic bioremediation. As contaminated groundwater flows through the treatment areas, the increased DO levels in the groundwater provide support for biodegradation. This aerobic bioremediation, in conjunction with ISS which solidified the contaminant source, accelerates the rate at which the dissolved contaminant mass is oxidized and lead to decreased contaminant concentrations in the entire plume.

1.4.3 MGP-Related Residuals

1.4.3.1 Soil

Remediation (excavation and ISS) was performed within the delineated limits of MGP source material, as approved by the NYSDEC. As indicated on Figure 9, ISS was not extended

under buildings or under the overhead electric lines areas along the LIRR ROW. Figure 9 also shows the limited areas where ISS did not solidify soils to the full extent of the source area; specifically, that figure shows areas where untreated source material was located at depths that were too deep to reach. These deep areas are located below the solidified monolith.

ISS treatment met the Site-specific performance criteria throughout the vast majority of the target ISS zone as determined by laboratory testing performed during the duration of the ISS work. Both unconfined compression strength (UCS) and hydraulic conductivity were measured and the results of these tests are in the FER.

Within the former MGP plant site property and the POB parking lot, excavations were backfilled both with clean off-Site material meeting restricted residential criteria in accordance with the project work plan and unimpacted (no visual evidence of contamination or odors) on-Site excavated soil. The on-Site unimpacted material was used as backfill up to 2 feet below final grade; the remaining 2 feet to grade was then backfilled with clean off-Site backfill meeting unrestricted use criteria. Outside the former MGP plant site property all excavations above the top of ISS were backfilled exclusively with clean off-Site backfill meeting restricted residential criteria.

1.4.3.2 Groundwater

Groundwater contamination above the NYSDEC Class GA Groundwater Criteria is present throughout the Site. Groundwater contamination as of June 2016 is shown on Figure 8. As presented in the 2015 Annual Groundwater Sampling, NAPL Monitoring, and Groundwater Treatment Performance Report (URS 2016), the downgradient boundary of the plume has been reduced in size and currently extends approximately 400 feet south of the plant site boundary. The concentrations of BTEX and PAHs decrease significantly further from the Site.

1.4.4 Engineering and Institutional Controls

Since MGP-related residuals are present at the Site and off-Site areas, the following ECs and ICs have been implemented:

- A cover system consisting of one of the following: asphalt pavement, concrete sidewalks, concrete slabs, select stone (gravel), or topsoil. Including cover material thickness and clean off site soil immediately underlying the cover, a minimum of two feet of clean material covers all work areas;
- Continued collection of NAPL from one passive DNAPL recovery well (HIMW-21) located next to the parking lot; and
- Groundwater oxygenation treatment systems.

A series of ICs are required to implement, maintain and monitor these ECs. The Environmental Easement for the plant site requires compliance with these ICs and access agreements for the off-Site areas recommend compliance with these ICs, to ensure that the following are achieved:

- All ECs are operated and maintained as specified in this SMP;
- All ECs on the Site and off-Site areas are inspected and certified at a frequency and in a manner defined in this SMP;
- Groundwater and other environmental monitoring are performed as defined in this SMP;
- Data and information pertinent to management of the Site and off-Site areas will be reported at the frequency and in a manner defined in this SMP; and
- Site and off-Site area environmental monitoring including but not limited to, groundwater monitoring wells and oxygen injection points, must be maintained to ensure continued functioning in the manner specified in this SMP.

In addition, the Environmental Easement and access agreements provide the mechanism for implementing the SMP at the Site and off-Site areas. The restrictions are detailed in Section 2 of this SMP.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 Introduction

2.1.1 General

Remedial activities completed at the Site were conducted in accordance with the NYSDEC-approved March 2008 Final Decision Document (NYSDEC 2008) and the NYSDEC-approved 2011 BOD (URS 2011).

Since solidified material and remaining impacted soil and groundwater exists beneath the Site, ECs and ICs exist to protect human health and the environment. This Engineering and Institutional Control Plan describes the procedures for the implementation and management of all EC/ICs at the Site and off-Site areas. The EC/IC Plan is one component of the SMP and is subject to revision by NYSDEC.

2.1.2 Purpose

The purpose of this EC/IC Plan is to provide the following:

- A description of all EC/ICs on the Site;
- The basic implementation and intended role of each implemented EC/IC;
- A description of the key components of the ICs created as stated in the Environmental Easement/access agreement;
- A description of the features to be evaluated during each periodic inspection and compliance certification period;
- A description of plans and requirements to be followed for implementation of EC/ICs, such as the implementation of the EWP for the safe handling of MGP-related

residuals that may be disturbed during maintenance or redevelopment work on the Site; and

- Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the Site remedy, as determined by the NYSDEC.

2.2 Engineering Controls

2.2.1 Engineering Control Systems

Contact with MGP-related residuals in soil and solidified material at the Site is prevented by multiple cover systems across the Site. Locations of the various cover systems are provided on Figure 10; cover details are provided on Figures 11 and 12. The cover systems, exclusive of any underlying fill that was described earlier in Section 1.4.4, are comprised of asphalt pavement, concrete sidewalks, concrete slabs, select stone (gravel), or vegetated topsoil.

The EWP that appears in Appendix B outlines the requirements to be implemented in the event a cover system is breached, penetrated or temporarily removed, and any underlying MGP-related residuals within soil or the ISS monolith is disturbed. Requirements for the inspection and maintenance of the cover systems are provided in the Monitoring Plan included in Section 3.0 of this SMP.

DNAPL is gauged and manually collected periodically from one well in the off-site area. The collected DNAPL is transferred to a collection drum stored on-Site, and properly disposed of off-Site.

Remediation of the dissolved phase groundwater plume is addressed through the continued operation of the oxygenation treatment systems. Oxygen delivery is comprised of systems that deliver oxygen to the groundwater at rates determined to be sufficient to maintain aerobic conditions in the aquifer. Aerobic conditions allow naturally occurring bacteria to oxidize contaminants to water and carbon dioxide. Systems are inspected on a monthly basis. During each monthly inspection, repairs and routine operation and maintenance activities are

performed and the dissolved oxygen levels are measured in monitoring wells installed adjacent to the delivery points in order to confirm that aerobic conditions are present.

2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when effectiveness monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.6 of NYSDEC DER-10.

2.2.2.1 ISS

ISS was considered completed when the performance criteria of hydraulic conductivity $\leq 1 \times 10^{-6}$ cm/sec at 28 days; and UCS at 28 days ≥ 50 psi and $<1,000$ psi were met. Solidified soil at this Site has a minimum 4-foot thick soil cover and is below the frost line. Solidified material at the Site is a permanent control and the quality and integrity of the solidified material will be protected by the cover soils.

2.2.2.2 Cover Systems

The cover systems provide another control mechanism and the quality and integrity of the systems will be inspected at defined, regular intervals.

2.2.2.3 Oxygen Delivery

Groundwater monitoring activities to assess the effectiveness of the Oxygenation Systems will continue, as determined by the NYSDEC, until groundwater concentrations are reduced sufficiently to satisfy NYSDEC standards or have become asymptotic at an acceptable level over an extended period. Monitoring will continue until permission to discontinue the oxygen delivery is granted by the NYSDEC.

2.2.2.4 NAPL Recovery

DNAPL gauging and recovery will continue until DNAPL is no longer present in the well and permission to discontinue is granted in writing by the NYSDEC.

2.3 Institutional Controls

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to MGP-related residuals by controlling disturbances of the subsurface contamination; and (3) limit the use and development of the Site to restricted residential use, as indicated in the Environmental Easement unless other future uses are approved by the NYSDEC. These ICs are as follows:

- Compliance with the Environmental Easement by the Grantor and the Grantor's successors and assigns with all elements of this SMP;
- Compliance with the Access Agreement;
- All ECs must be operated and maintained as specified in this SMP by National Grid;
- All ECs must be inspected and certified by National Grid or a contractor of National Grid at a frequency and in a manner defined in the SMP;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP; and
- Data and information pertinent to Site management must be reported by National Grid at the frequency and in a manner defined in this SMP.

ICs may not be discontinued without an amendment to or extinguishment of the Environmental Easement.

The Site has a series of ICs in the form of Site restrictions. Adherence to these ICs is required by the Environmental Easement on the National Grid plant site. Site restrictions that apply to the Site are as follows:

- Use of the National Grid plant site property within the Site will be for restricted residential use. Any specific future development must comply with local laws and regulations.
- Use of groundwater underlying the Site property is prohibited without treatment to ensure it is safe for the intended use.
- All future activities on the property that will disturb contaminated and/or solidified material must not be conducted unless they are conducted in accordance with this SMP and accompanying EWP.
- Implementation of a Health and Safety Plan (HASP) and EWP prior to any ground intrusive activity including utility work, boring completion, monitoring well installation, and excavation; with the exception of normal landscaping (to a maximum of 24 inches below ground surface or top of the groundwater table, whichever is shallower).
- The potential for vapor intrusion must be evaluated for any new buildings proposed on the plant site, and any potential impacts that are identified must be monitored or mitigated.
- Written notification at least 60 days in advance for changes in use at the Site must be submitted to NYSDEC as per Part 375 and DER-10.
- Vegetable gardens and farming on the former MGP property are prohibited.
- National Grid will submit to NYSDEC a written statement that certifies that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment

or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow and will be made by an expert that the NYSDEC finds acceptable.

This SMP requires various actions that will be required by the property owner(s), National Grid, and the NYSDEC. Table 1 includes a list of items that will trigger the various actions, identifies the parties responsible for implementing these actions, and provides a brief description of these actions.

2.3.1 Excavation Work Plan

Other than within the areas of identified on Figure 9 as not being treated by solidification, the National Grid former MGP plant site portion of the overall remediation has been remediated for restricted residential use. An Environmental Easement for the National Grid property will be provided in the Final FER. Any future intrusive work (e.g., through drilling, trenching, excavation) that will penetrate, encounter or disturb the cover systems, or encounter or disturb solidified material and/or MGP-related residuals including any modifications or repairs to the existing cover systems, will be performed in compliance with the EWP that is attached as Appendix B to this SMP. Should the monolith be breached, removed monolith material will be disposed off-Site as contaminated material, and provisions will be made to avoid ponding on the breached monolith surface. Adherence to these ICs on the National Grid plant site is required by the Environmental Easement and will be implemented under this Site Management Plan.

Any work conducted pursuant to the EWP must also be conducted in accordance with a HASP and Community Air Monitoring Plan (CAMP) prepared for the Site, in accordance with DER-10, 29 CFR 1910, 29 CFR 1926, and all other applicable Federal, State and local regulations. Any intrusive construction work will be performed in compliance with the EWP, HASP and CAMP, and will be included in the periodic inspection and certification reports submitted under the Site Management Reporting Plan (See Section 5.0). The attached HASP and

CAMP (Appendix C) shall be considered the most up-to-date examples for a HASP and CAMP that a remedial Contractor shall utilize and modify to create documents they will develop and implement.

The affected property owner(s) and the contractor performing the excavation work are completely responsible for the safe performance of all invasive work, the structural integrity of excavations, the identification of any buried utilities within the excavation area and for structures that may be affected by excavations (such as building foundations and footings), and control of runoff from open excavations onto solidified material and/or MGP-related residuals. In addition, the property owner(s) will ensure that Site development activities will not interfere with, or otherwise impair or compromise, the ECs described in this SMP.

2.3.2 Soil Vapor Intrusion Evaluation

Prior to the construction of any new enclosed structures on the Site, a soil vapor intrusion (SVI) evaluation will be performed to determine whether any mitigation measures are necessary to eliminate potential exposure to vapors in the proposed structure. The design of a new building foundation will also be considered in this type of evaluation. Alternatively, an SVI mitigation system can be installed as an element of the building foundation without first conducting an investigation. The mitigation system would potentially include a vapor barrier and passive sub-slab venting system that is capable of being converted to an active system.

Prior to conducting an SVI investigation or installing a mitigation system, a work plan would be developed and submitted to the NYSDEC and New York State Department of Health (NYSDOH) for approval. This work plan would be developed in accordance with the most recent NYSDOH “Guidance for Evaluating Vapor Intrusion in the State of New York.” Measures to be employed to mitigate potential vapor intrusion will be evaluated, selected, designed, installed, and maintained based on the SVI evaluation, the NYSDOH guidance, and construction details of the proposed structure.

Preliminary SVI sampling data will be forwarded to the NYSDEC and NYSDOH by National Grid for initial review and interpretation. Upon validation, the final data will be transmitted to the agencies, along with a recommendation for follow-up action. Validated indoor air data will also be transmitted to the property owner(s) within 30 days of validation. If any indoor air test results exceed New York State Department of Health guidelines, relevant New York State Department of Health fact sheets will be provided to all tenants and occupants of the properties within 15 days of receipt of validated data.

SVI sampling results, evaluations, and follow-up actions will also be summarized in the subsequent Periodic Review Report (see Section 5.0).

2.4 Inspections and Notifications

2.4.1 Inspections

Inspections of all remedial components at the Site and all ECs present at Site areas will be conducted at the frequency specified in the SMP Monitoring Plan schedule. A comprehensive Site-wide inspection will be conducted annually, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement/Access Agreement;
- Achievement of remedial performance criteria for groundwater;
- Sampling and analysis of appropriate media during monitoring events;
- If Site records are complete and up to date; and
- Changes, or needed changes, to the ECs.

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3.0). The reporting requirements are outlined in the Periodic Review Reporting section of this plan (Section 5.0).

If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs, an inspection of the Site by a qualified environmental professional will be conducted within 5 days of the event to verify the effectiveness of the EC/ICs implemented at the Site or off-Site areas. If there are observed issues they will be documented.

2.4.2 Notifications

The following notifications will be submitted by the property owner(s) to National Grid and the NYSDEC as needed for the following reasons:

- 60-day advance notice of any proposed changes in Site use that are required under the terms of the Order on Consent, 6 NYCRR Part 375, and/or ECL.
- 15-day advance notice of any proposed ground-intrusive activities pursuant to the EWP.
- Notice within 48 hours of any damage or defect to the foundations or structures that reduces or has the potential to reduce the effectiveness of other ECs and likewise any action to be taken to mitigate the damage or defect.
- Notice within 48 hours of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, including a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to National Grid and the NYSDEC within 45 days and shall describe and document actions taken to restore the effectiveness of the ECs.

- National Grid will review and provide comments as appropriate on all planned ground-intrusive activities proposed on properties located within the limits of the areas covered by SMP. National Grid must have a full-time representative on-Site per the Order on Consent during any ground-intrusive work activities and document compliance with this SMP.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, National Grid and the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser has been provided with a copy of the SMP, Access Agreement, and all approved work plans and reports.
- Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing.

2.5 Contingency Plan

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions.

2.5.1 Emergency Telephone Numbers

In the event of any environmentally related situation or unplanned occurrence requiring assistance, the property Owner or Owner's representative(s) should contact the appropriate party from the contact list as provided in Table 2. For emergencies, appropriate emergency response personnel should be contacted. These emergency contact lists must be maintained in an easily accessible location at the site.

2.5.2 Map and Directions to Nearest Health Facility

Site Location: Hempstead Intersection Street Former MGP Site

Nearest Hospital Name: Winthrop University Hospital

Hospital Location: 259 First Street, Mineola, New York 11501

Hospital Telephone: 516-663-0333

Directions to Hospital:

- From the Site, head east to North Franklin Street.
- Turn left on North Franklin Street toward 2nd Street.
- Travel 1.6 miles and continue onto Mineola Boulevard.
- Continue 0.2 miles.
- Turn left onto 1st Street.
- Continue 0.03 miles.
- The hospital is located on the left.

Total Distance: 2.1 miles

Total Estimated Time: 7 minutes

A map depicting the route to the hospital is provided as Figure 13.

2.5.3 Response Procedures

As appropriate, the Fire Department and other emergency response group will be notified immediately by telephone of the emergency. The emergency telephone number list can be found in Table 2. The list will also be posted prominently at the plant site and made readily available to all personnel at all times.

2.5.4 Spill Response Plan and Notification

Spill response will be handled similarly to other emergencies, with calls to NYSDEC and National Grid's project manager.

3.0 MONITORING PLAN

3.1 Introduction

3.1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the Site, including all ECs and all affected site media. ECs at the Site include soil backfill, various cover systems, and the ISS monolith. Since the ISS monolith is at least 4 feet below ground surface and is overlain by the soil backfill and cover, monitoring of the cover will be sufficient for monitoring the ISS monolith. This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for the following:

- Sampling and analysis of groundwater;
- Assessing compliance with applicable NYSDEC Class GA groundwater standards, criteria and guidance, particularly ambient groundwater standards;
- Monitoring oxygen concentration near the oxygenation treatment systems;
- Assessing achievement of the remedial performance criteria;
- Evaluating Site and off-Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment; and
- Preparing the necessary reports for the various monitoring activities.

To adequately address these issues, this Monitoring Plan provides information on the following:

- Cover inspection and Site-wide inspection and evaluation;
- Groundwater sampling locations, protocol, and frequency;

- Analytical groundwater sampling program requirements;
- Quality Assurance/Quality Control (QA/QC) requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures;
- Reporting requirements; and
- Annual site-wide inspection and periodic certification.

Quarterly and annual monitoring of the performance of the remedy on-Site and off-Site will be conducted for the first 5 years following the completion of the ISS. The frequency thereafter will be determined in coordination with the NYSDEC. Following the inspection, the integrity of the cover systems and ISS monolith will be evaluated, and recommendations provided for any needed maintenance and/or additional remediation (i.e., cover repairs, surface drainage modifications). Trends in contaminant levels in groundwater in the affected areas will be evaluated to determine if the remedy continues to be effective in achieving remedial goals. Monitoring programs are summarized in Table 3 and outlined in detail in Sections 3.2 and 3.3 below.

3.2 Cover System Monitoring

The Cover System Engineering Control will be inspected annually by a NYS licensed professional engineer or qualified environmental professional to confirm that the cover systems are intact, remain unchanged, and continue to be protective of human health and the environment. The inspection will be completed by an individual who is familiar with the cover systems and the Site and off-Site area. The annual inspections will be documented on the Annual Inspection and Certification Checklist provided in Appendix D. The form provides a checklist to document if there are any changes since the previous year's inspection and that the EC continues to operate as intended. A survey of the cover will be completed if changes in the cover occur during the year or if changes are noted in the annual inspection. The survey will be completed by the New York State licensed surveyor and referenced NAVD 88 vertical datum to an accuracy of $0.01 \pm$ foot and referenced to North American Datum (NAD 83).

If an emergency, such as a natural disaster or unforeseen failure of ECs occurs, an inspection of the affected property will be conducted by a qualified environmental professional within fifteen business days of the event to verify the effectiveness of the cover.

3.2.1 Monitoring Schedule

As provided in Table 3, the inspection frequency for the cover systems will be on an annual basis. Inspection will consist of a visual observation of the cover systems to ensure they remain in place and have not been disturbed. Disturbances can include non-backfilled excavations, stone/gravel cover that has been rutted to beneath the stone thickness, areas which do not show a uniform stand of vegetative cover, areas which appear to be ponding and/or eroding, and deteriorating paved surfaces. In addition, the inspection of the former plant site area will also include visual observation of the stone/gravel cover system runoff drainage contours to ensure nothing is impeding the system and it has not been disturbed.

Inspection frequency is subject to change with the approval of the NYSDEC. Unscheduled inspections may take place when a suspected failure of the cover system has been reported or an emergency occurs that is deemed likely to affect the operation of the system.

3.2.2 Repair Schedule

Details of the cover systems are provided on Figures 11 and 12. If after the completion of the inspections of the cover systems a deficiency is noted, it shall be repaired by the affected property site owner in a timely manner, integrating appropriate engineering evaluation as necessary. Repair of the cover system will consist of repair and/or replacement in kind of what the original cover system consisted of, including one or more of the following:

- Removal of damaged cover material;

- Placement of a clean off-site fill, or re-placement of disturbed on-site fill if the fill meets original specifications, to disturbed depth below grade;
- Placement of clean cover material satisfying restricted residential soil cleanup objectives or unrestricted soil cleanup objectives per Appendix B, such as stone/gravel, 6 inches of topsoil, asphalt, concrete, etc. to design final grade; and
- For topsoil areas, seeding and/or the placement of sod in restored area, watering and mowing of restored areas to ensure a uniform stand of vegetation is produced.

All repairs completed will be verified by the qualified environmental professional as part of their inspection of the ECs (see Section 5.0).

As necessary, due to ponding and/or eroding of the cover, an evaluation of surface water drainage may be conducted. Recommendations of the evaluation will be presented to the NYSDEC for potential site regrading/cover modification.

3.3 Groundwater Monitoring

Groundwater monitoring is being performed quarterly to assess the effectiveness of the ISS, the DNAPL recovery, and the oxygenation treatment systems on groundwater plume contaminant concentrations. A network of monitoring wells, shown in Figure 3, has been installed to monitor upgradient, side gradient, and downgradient groundwater conditions at the Site. The well construction details are included in Table 4. The current groundwater monitoring schedule is presented in Table 5.

The sampling frequency may be modified with the approval of the NYSDEC. The SMP will be appended to reflect changes in sampling plans approved by the NYSDEC. Deliverables for the groundwater monitoring program are specified below.

3.3.1 Sampling Protocol

All monitoring well sampling activities will be recorded in a field book and a groundwater sampling log presented in Appendix D. Other observations (e.g., well integrity,

etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network. Each sample will be collected utilizing low flow groundwater sampling collection methods provided in the Field Sampling and Analytical Plan (Appendix E). Each groundwater sample will be analyzed for BTEX by USEPA Method SW8260B and PAHs by USEPA Method SW8270C by a NYSDOH environmental laboratory approval program - certified laboratory. The groundwater samples will also be collected, handled, and analyzed according to the example Quality Assurance Project Plan (Appendix F).

3.3.2 Monitoring Well Repairs, Replacement and Decommissioning

If biofouling or silt accumulation occurs in the monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced (as per the Monitoring Plan), if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance. The NYSDEC will be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent periodic report. Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures". Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC.

3.4 **Oxygen Delivery System**

The monitoring points for each system are monitored for DO levels once per month and reported to the NYSDEC on a quarterly basis. Dissolved oxygen is measured using a probe inserted into each monitoring point, and the reading recorded upon stabilization.

Repairs and/or replacement of oxygen delivery wells in the delivery well network will be performed based on assessments of structural integrity and overall performance. The NYSDEC will be notified prior to any repair - or decommissioning of delivery wells for the purpose of replacement - and the repair, decommissioning and replacement processes will be documented in the appropriate subsequent periodic report. Delivery well decommissioning without replacement will be done only with the prior approval of NYSDEC. Delivery well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures". Oxygen delivery wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available and appropriate location, unless otherwise approved by the NYSDEC.

3.5 NAPL Recovery

Prior to each DNAPL collection effort, the depth of DNAPL is first gauged using a weighted cotton string. The depth of DNAPL is determined by the length of DNAPL staining on the string, and will be reported to NYSDEC in quarterly reports along with the DNAPL thickness and the amount of DNAPL collected.

Repairs and/or replacement of NAPL recovery wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance. The NYSDEC will be notified prior to any repair or decommissioning of NAPL recovery wells for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent periodic report. Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures". Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available and appropriate location, unless otherwise approved by the NYSDEC

3.6 Site and Off-Site Inspection

Site-wide inspections will be performed on a regular schedule at a minimum of once a year. Site-wide inspections will also be performed after all severe weather conditions that may affect the ECs or groundwater monitoring wells. During these inspections, an inspection form will be completed (Appendix D). The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site and off-Site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;
- The Site and off-Site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that Site and off-Site records are up to date.

3.7 Monitoring Quality Assurance/Quality Control

All sampling and analyses will be performed in accordance with the requirements of the QAPP prepared for the Site during the investigative phase of the project. Main components of the QAPP include the following:

- Quality Assurance/Quality Control Objectives for Data Measurement;
- Sampling Program:
 - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.

- Sample holding times will be in accordance with the NYSDEC Analytical Services Protocol (ASP) requirements.
- Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.
- Sample Tracking and Custody;
- Calibration Procedures:
 - All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.
 - The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.
- Analytical Procedures;
- Preparation of a Data Usability Summary Report (DUSR), which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method;
- Preventative Maintenance Procedures and Schedules;
- Corrective Action Measures;
- Internal QC and checks; and
- Quality Assurance performance and system audits.

3.8 Monitoring Reporting Requirements

Forms and any other information generated during regular monitoring events and inspections will be kept on file at a central location. All forms, and other relevant reporting formats used during the monitoring/inspection events will be (1) subject to approval by NYSDEC, and, (2) submitted at the time of the Periodic Review Report, as specified in the Reporting Plan of this SMP. Data will be reported in hard copy or digital format as determined by NYSDEC.

A quarterly report will be prepared subsequent to each sampling event. All monitoring results will be reported to NYSDEC in the quarterly reports and referenced in the Periodic Review Report. The quarterly report will include, at a minimum, the following:

- Date of event;
- Personnel conducting sampling;
- Description of the activities performed;
- Monitoring wells sampled;
- Groundwater levels and flow direction;
- Potentiometric surface map(s) of groundwater levels measured;
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all groundwater samples (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether groundwater flow conditions or groundwater quality conditions have changed since the last reporting event.

Data will be reported in hard copy or digital format as determined by NYSDEC. A summary of the monitoring program deliverables are summarized in Table 3.

4.0 OPERATION AND MAINTENANCE PLAN

Maintenance for the Oxygenation Treatment Systems will be performed in accordance with the requirements of the Operation and Maintenance Manuals provided by Construction Contractor (Operation & Maintenance Manual System #1, May 2011 and Operation & Maintenance Manual System #2, October, 2010). These manuals describe the ongoing requirements needed for operation of these systems and are held by the contractor responsible for the operation and maintenance of the systems. The monthly inspection and maintenance Forms are included in Appendix D. All reports and forms will be made available to the NYSDEC upon request.

5.0 SITE MANAGEMENT REPORTING PLAN

5.1 Site Inspections

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in the Monitoring Plan section of this SMP. At a minimum, a Site-wide inspection will be conducted annually. Inspections of remedial components will also be conducted whenever a severe condition has taken place, such as an erosion or flooding event that may affect the ECs.

5.1.2 Inspection/Monitoring Forms

All inspections and monitoring events will be recorded on the forms which are contained in Appendix D. Additionally, those provisions include a general Site-wide inspection form that will be completed during the Site-wide inspection. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including all media sampling data and system maintenance reports, generated for the Site and off-Site areas during the reporting period will be provided in electronic format and included in the Periodic Review Report.

5.1.3 Evaluation of Records and Reporting

The results of the inspection and Site monitoring data will be evaluated as part of the EC/IC certification to confirm that the following are achieved:

- EC/ICs are in place, are performing properly, and remain effective;
- The Monitoring Plan is being implemented;
- Operation and maintenance activities are being conducted properly;

- EC repair activities are being conducted properly; and,
- The Site remedy continues to be protective of public health and the environment and is performing as designed.

5.2 Certification of Engineering and Institutional Controls

Information on the EC/ICs can be found in the Engineering and Institutional Control Plan portion of the SMP. Inspection of the EC/ICs will occur at a frequency described in Section 3 Monitoring Plan. After the last inspection of the reporting period, a qualified environmental professional or Professional Engineer licensed to practice in New York State will prepare the following certification:

For each institutional and engineering control identified for the Site, I certify that all of the following statements are true:

- The inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;
- The ECs/ICs employed at this Site are still in place and unchanged from the date the control was put in place, or last approved by the Department; Nothing has occurred that would impair the ability of the controls to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any SMP for this control;
- Access to the Site will continue to be provided to the Department NYSDEC and NYSDOH to evaluate the remedy, including access to evaluate the continued maintenance of such controls;
- Site use is compliant with the Environmental Easement/Access Agreements;

- The EC systems are performing as designed and are effective;
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the Site remedial program;
- The information presented is accurate and complete; and
- I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name] of [business address], am certifying as [Owner or Owner’s Designated Site Representative]: [I have been authorized and designated by all site owners to sign this certification] for the site.

The signed certification will be included in the Periodic Review Report described below.

5.3 Periodic Review Report

A Periodic Review Report will be submitted to the NYSDEC every year, beginning 18 months after the Certificate of Completion is issued. The Periodic Review Report will be prepared in accordance with the New York State Department of Environmental Conservation DER-10 “Technical Guidance for Site Investigation and Remediation” requirements. The frequency of submittal of the Periodic Review Report may be modified with the approval of the NYSDEC. This report will include the following:

- Identification of all ECs/ICs required by the Remedial Design/Remedial Action Work Plan for the Site and off-Site areas;
- An assessment of the effectiveness of all ECs/ICs for the Site and off-Site areas;
- A Site evaluation, which includes the following:
 - The compliance of the remedy with the requirements of the Site-specific Decision Document;

- The condition of all ECs, including identification of any needed repairs or modifications;
 - Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring Plan;
 - Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and
 - The overall performance and effectiveness of the remedy.
- An evaluation of the Engineering and Institutional Control Plan and the Monitoring Plan for adequacy in meeting remedial goals;
 - Results of the required annual Site and off-Site area inspections and severe condition inspections, if any;
 - A compilation of all deliverables generated during the reporting period, as specified in Section 2 Engineering Controls/Institutional Controls Plan and the Section 3 Monitoring Plan; and
 - Certification of the ECs/ICs.

A single Periodic Review Report will be prepared for the Site and off-Site areas.

Groundwater Monitoring Reports will continue to be submitted to the NYSDEC on a quarterly basis. The report will be prepared in accordance with NYSDEC DER-10 and will include the following:

- Data summary tables and graphical representations of groundwater contaminants of concern which includes a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends; and
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format.

The Periodic Review and the Groundwater Monitoring Reports will be submitted, in hard-copy format, to the NYSDEC - Region 1 Office, and in electronic format to NYSDEC Central Office and the NYSDOH Bureau of Environmental Exposure Investigation.

5.4 Corrective Measures Plan

If any component of the remedy is found to be compromised, or if the periodic certification cannot be provided due to an issue with an institutional or engineering control, a Corrective Measures Plan will be submitted to the NYSDEC for approval. This Plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Plan until it is approved by the NYSDEC.

6.0 References

- Atlantic Environmental Services, Inc., 1990. Preliminary Investigation for Site of Former Hempstead Gas Plant, December.
- Dvirka & Bartilucci Consulting Engineers, 2003. Remedial Investigation Report, March.
- Fenley & Nicol Environmental, Inc., 2010. Operation & Maintenance Manual System #2 – Off-site Groundwater Treatment Systems Installation, October.
- Fenley & Nicol Environmental, Inc., 2011. Operation & Maintenance Manual System #1 – Revision #1 – Off-site Groundwater Treatment Systems Installation, May.
- Grosser, P.W., 1995. Containment Fate Report – Hempstead Gas Plant, May.
- H2M, 2006. Village of Garden City and Village of Hempstead Clinton Street Water Supply Wells; Capture Zone Analysis Reports, November.
- New York State Department of Environmental Conservation (NYSDEC), 2008. Final Decision Document, March.
- NYSDEC, 2010a. NYSDEC DER-10 “Technical Guidance for Site Investigation and Remediation,” May.
- NYSDEC, 2010b. Draft DER-10 Technical Guidance for Site Investigation and Remediation. December.
- PS&S, 2006. Final Remedial Investigation Report, November.
- URS, 2007. IRM Remedial Action Work Plan.
- URS, 2008a. Feasibility Study/Remedial Action Plan (FS/RAP).
- URS, 2008b. Pre-Design Investigation Work Plan for In-Situ Solidification and Off-Site Groundwater Treatment.
- URS, 2009c. IRM Excavation Completion Report – Interim Remedial Measures for the Hempstead Intersection Street Former MGP Site, Villages of Hempstead and Garden City, Nassau County, New York, May.
- URS, 2010. Pre-Design Investigation Report for In-Situ Solidification and Off-Site Groundwater Treatment, Hempstead Intersection Street Former Manufactured Gas Plant Site, Draft, February.

URS, 2011, Basis of Design Report for In-Situ Solidification, Hempstead Intersection Street
Former Manufactured Gas Plant Site, August.

URS, 2016, 2015 Annual Groundwater Sampling and NAPL Monitoring/Recovery Report,
August.

Weston, R.F., 1992a. Final Field Investigation Report – Hempstead Gas Plant, October.

Weston, R.F., 1992b. Final Baseline Risk Assessment Report LILCO – Hempstead Gas Plant,
July.

Weston, R.F., 1993. Remedial Alternatives and Feasibility Analysis, November.

TABLES

Table 1
Matrix of Responsibilities
Hempstead Intersection Street Former MGP Site

Responsible Party →	NYSDEC	National Grid	Property Owner	Action		
				NYSDEC	National Grid	Property Owner
Trigger ↓						
Access Agreement (AA)		x	x		AA will be executed between the Property Owner and National Grid for SMP implementation including maintaining engineering controls, following restrictions and institutional controls, annual inspection and groundwater monitoring (as needed).	AA will be executed between the Property Owner and National Grid for SMP implementation including maintaining engineering controls, following restrictions and institutional controls, annual inspection and groundwater monitoring.
Annual Report		x			Report will be completed by National Grid and Submitted to NYSDEC. Report will include results of GW Monitoring.	
Emergency Response	x	x	x	Review and Comment, as necessary.	National Grid will notify NYSDEC of any event and associated changes within 15 days. National Grid will review emergency activities, conduct maintenance or repair (if necessary) and submit update to NYSDEC with Annual Inspection Report.	Property Owner or Lessee have to provide details of emergency work to National Grid and NYSDEC within 48 hours of emergency.
Environmental Easement (National Grid Property Only)	x	x		EE will be executed between the Property Owner (National Grid) and the NYSDEC.	EE will be executed between National Grid (Property Owner) and the NYSDEC.	
Future Property Development	x	x	x	Review and Comment, as necessary.	National Grid to review and decide if oversight is required upon notification by the Property Owner. If new building, decision on indoor air sampling will be evaluated. Following development, National Grid to update SMP and submit to NYSDEC with Annual Inspection Report.	Property Owner has to provide at a minimum 60 business days notice to National Grid and NYSDEC. Restrictions on type of development activities should be followed.
Ground Intrusion Work		x	x	Review and Comment, as necessary.	National Grid will notify DEC of any event and associated changes within 15 days of notification by the Property Owner. National Grid to review and decide if oversight is required. Following development, National Grid to update SMP and submit to NYSDEC with Annual Inspection Report.	Property Owner has to provide at a minimum 15 business days notice to National Grid and NYSDEC. All ground intrusive activities shall be pursuant to the SMP.
Groundwater Use			x			Removed groundwater shall be managed pursuant to the SMP.
HASP Development		x	x		National Grid will aid in the development of task-specific HASP.	Develop a Site specific HASP for any subsurface work deeper than 4 feet below ground surface or top of groundwater table whichever is shallower.
Inspections		x	x		Annual Site-wide inspection of Engineering Controls and Institutional Controls.	Annual Site-wide inspection of Engineering Controls and Institutional Controls.
Interviews		x	x		National Grid to discuss annually with the Property Owner and Lessee.	National Grid to discuss annually with the Property Owner and Lessee.
Survey for Environmental Easement		x			National Grid will perform a Metes and Bounds (or similar) Survey to include in the SMP and EE.	
Monitoring		x	x		Monitoring will be completed by National Grid quarterly, semi-annually, or annually or as needed. Indoor air monitoring will be completed for any building modification or new buildings.	Property Owner shall provide National Grid with access to monitoring locations.
Property Ownership Change		x	x		National Grid to notify NYSDEC of any event and associated changes within 15 days of notification by the Property Owner. National Grid will submit update to NYSDEC with Annual Inspection Report.	Property Owner shall provide at a minimum 60 days notice to National Grid and NYSDEC.
Property Use Change	x	x	x	Review and Comment, as necessary.	National Grid will notify NYSDEC of any event and associated changes within 15 days of notification by the Property Owner. National Grid to review and confer with NYSDEC if SMP revision and/or additional ECs/ICs are required. Following use change, National Grid to update SMP and submit to NYSDEC with Annual Inspection Report.	Property Owner has to provide at a minimum 60 days notice to National Grid and NYSDEC.
SMP Requirements		x	x		Follow the SMP for any ground intrusive work that will disturb cover system.	Follow the SMP for any ground intrusive work that will disturb cover system.

Table 2

**Emergency Contact and Other Numbers
Hempstead Intersection Street Former MGP Site**

Agency	Phone Number*	Address
Medical, Fire, and Police:	911	
Hospital: Winthrop University Hospital	(516) 663-0333	259 First Street Mineola, NY 11501
One Call Center:	(800) 962-7962	
Region 2 EPA Hotline	(800) 424-8802	
Poison Control Center:	(800) 292-6678	
National Response Center for Oil/Chemical Spills	(800) 424-8802	
NYSDEC Spills Hotline	(800) 457-7362	
NYSDEC Project Manager: John Spellman	(518) 402-9686	625 Broadway Albany, NY 12233-7014
NYSDOH Project Manager: Jaquelyn Nealon	(800) 458-1158 ext 27880	547 River Street Room 300 Troy, NY 12180-2216
National Grid Project Manager: Patrick Van Rossem	(516) 545-2578	175 East Old Country Road Hicksville, NY 11801

Table 3
Monitoring Programs Schedule
Hempstead Intersection Street Former MGP Site

Monitoring/Inspection	Frequency*	Analysis	Reporting Frequency
Cover System: Former MGP Area and LIRR ROW	Annually	none	Annually
Cover System: Village of Garden City Property	Annually	none	Annually
Cover System: Active oil storage terminal Area	Annually	none	Annually
Cover System: Restored Roadway Areas	Annually	none	Annually
Cover System: POB Parking Lot	Annually	none	Annually
Groundwater Monitoring	Quarterly	Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) by USEPA Method 8260C and polycyclic aromatic hydrocarbons (PAHs) by USEPA Method 8270D	Quarterly/Annually
Groundwater level measurements and Potentiometric surface map(s)	Quarterly	N/A	Quarterly/Annually
DNAPL Depth Gauging	Monthly	Depth	Quarterly/ Annually
Treatment System Monitoring	Monthly	Dissolved Oxygen	Quarterly/Annually

*The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH.

Table 4
Monitoring Well Construction Details
Hempstead Intersection Street Former MGP Site

Well ID	Date Installed	Top of Riser	Well Depth	Depth to Water (6/2014)	Depth to top of Screen bgs	Length of Screen	Aquifer Screened (S, I, or D)	Location of MW (up, side, or downgradient)
		[ft amsl]	[ft]	[ft]	[ft]	[ft]		
HIMW-003S	9/7/2000	65.00	34.50	17.59	23	10	S	side
HIMW-003I	9/7/2000	64.94	85.15	17.92	80.5	10	I	side
HIMW-003D	9/7/2000	65.26	142.71	18.67	133	10	D	side
HIMW-004S	9/22/2000	72.74	41.61	25.94	30	10	S	side
HIMW-004I	9/22/2000	72.78	90.51	26.10	80	10	I	side
HIMW-004D	9/22/2000	72.65	177.0	26.81	167	10	D	side
HIMW-005S	9/11/2000	67.19	38.92	20.26	27	10	S	side
HIMW-005I	9/11/2000	67.22	90.65	20.49	80	10	I	side
HIMW-005D	9/11/2000	67.22	136.3	21.21	130	10	D	side
HIMW-008S	11/13/2000	65.04	36.95	18.51	25	10	S	down
HIMW-008I	11/13/2000	65.14	75.01	18.69	63	10	I	down
HIMW-008D	11/13/2000	64.93	114.61	18.51	102	10	D	down
HIMW-009S	11/1/2000	70.03	39.61	23.03	28	10	S	side
HIMW-009I	11/1/2000	69.93	80.44	23.00	70	10	I	side
HIMW-009D	11/1/2000	69.96	122.86	23.12	113	10	D	side
HIMW-010S	9/20/2000	71.60	39.21	23.67	28	10	S	side
HIMW-010I	9/20/2000	71.47	89.72	23.49	80.5	10	I	side
HIMW-011S	10/24/2000	71.62	40.21	24.07	28	10	S	side
HIMW-011I	10/24/2000	71.43	93.25	23.94	80	10	I	side
HIMW-011D	10/24/2000	71.39	122.30	24.95	109	10	D	side
HIMW-012S	1/2/2001	61.58	33.20	16.21	22	10	S	down
HIMW-012I	1/2/2001	61.59	74.55	16.09	63	10	I	down
HIMW-012D	1/2/2001	61.82	128.16	18.69	117	10	D	down
HIMW-013S	12/21/2000	72.83	48.70	29.31	38	10	S	down
HIMW-013I	12/21/2000	72.60	81.63	29.08	70	10	I	down
HIMW-013D	12/21/2000	72.53	122.03	29.08	110	10	D	down
HIMW-014I	12/10/2001	71.71	95.88	28.15	85	10	I	down
HIMW-014D	12/10/2001	71.59	151.95	31.72	140	10	D	down
HIMW-015I	12/20/2001	64.18	92.69	23.91	80	10	I	down
HIMW-015D	12/20/2001	63.96	152.36	26.50	141.5	10	D	down
HIMW-017S	11/16/2003	grnd 66.4	37.00	NA	25	10	S	down
HIMW-020S	1/27/2009	70.43	36.83	24.39	25	10	S	down
HIMW-020I	1/26/2009	70.30	74.89	24.25	63	10	I	down
HIMW-021	NA	NA	45.3	18.74	25	10	S	down
HIMW-022	5/3/2011	74.07	64.4	29.29	54	10	I	down
HIMW-023	4/29/2011	74.41	75.48	29.46	66	10	I	down
HIMW-024	4/28/2011	59.83	54.93	14.98	44.6	10	NA	down
HIMW-025	4/28/2011	62.75	52.25	16.40	42	10	NA	down
HIMW-26I	3/26/2014	NA	84.85	22.21	65	20	I	side
HIMW-26D	3/26/2014	NA	137.49	22.34	115	20	D	side
HIMW-27S	3/21/2014	NA	41.57	23.26	20	20	S	side
HIMW-27I	3/21/2014	NA	70.31	22.69	50	20	I	side
HIMW-28S	3/20/2014	NA	41.39	23.63	20	20	S	side
HIMW-28I	3/20/2014	NA	71.61	23.30	50	20	I	side
PZ-02	NA	72.96	35.45	24.79	26	10	S	up
PZ-03	NA	64.58	29.89	16.73	20	10	S	up
OSMW-02	2/28/2008	71.59	45.05	24.27	10	30	S	side
OSMW-03	2/29/2008	71.39	44.68	24.06	9	30	S	side

Notes: NA - not available
S - shallow zone of aquifer
I - intermediate zone of aquifer
D - deep zone of aquifer
Q - quarter
amsl - above mean sea level
grnd - ground surface elev.
bgs - below ground surface

Table 5

Water Level Measurements, NAPL Thickness Measurements, and Water Quality Sampling
Hempstead Intersection Street Former MGP Site

Well ID	First Quarter ^(1,2)			Second Quarter ^(1,2)			Third Quarter ^(1,2)			Fourth Quarter ^(1,2)		
	Water Level	NAPL Thickness	Water Quality	Water Level	NAPL Thickness	Water Quality	Water Level	NAPL Thickness	Water Quality	Water Level	NAPL Thickness	Water Quality
HIMW-003S	X	X	X	X	X		X	X	X	X	X	
HIMW-003I	X	X	X	X	X		X	X	X	X	X	
HIMW-003D	X	X	X	X	X		X	X	X	X	X	
HIMW-004S	X	X		X	X		X	X		X	X	X
HIMW-004I	X	X		X	X		X	X		X	X	X
HIMW-004D	X	X		X	X		X	X		X	X	
HIMW-005S	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-005I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-005D	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-008S	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-008I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-008D	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-009S	X	X		X	X		X	X		X	X	
HIMW-009I	X	X		X	X		X	X		X	X	
HIMW-009D	X	X		X	X		X	X		X	X	
HIMW-010S	X	X		X	X		X	X		X	X	X
HIMW-010I	X	X		X	X		X	X		X	X	X
HIMW-011S	X	X		X	X		X	X		X	X	X
HIMW-011I	X	X					X	X		X	X	X
HIMW-011D	X	X		X	X		X	X		X	X	X
HIMW-012S	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-012I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-012D	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-013S	X	X	X	X	X		X	X	X	X	X	
HIMW-013I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-013D	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-014I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-014D	X	X	X	X	X		X	X	X	X	X	
HIMW-015I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-015D	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-020S	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-020I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-21	X	X		X	X		X	X		X	X	
HIMW-22	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-23	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-24	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-25	X	X	X	X	X	X	X	X	X	X	X	X
PZ-02							X	X		X	X	
PZ-03							X	X		X	X	
OSMW-02							X	X		X	X	X
OSMW-03							X	X		X	X	X

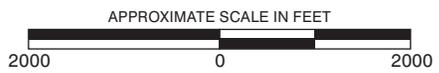
Notes:

- (1) Field marked with "X" indicates that the activity was performed.
- (2) Blank field indicates that the activity was not performed.

FIGURES



Source: Google Earth Pro - © 2012 Google



AG20840-1117-6098-030513-GCM



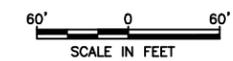
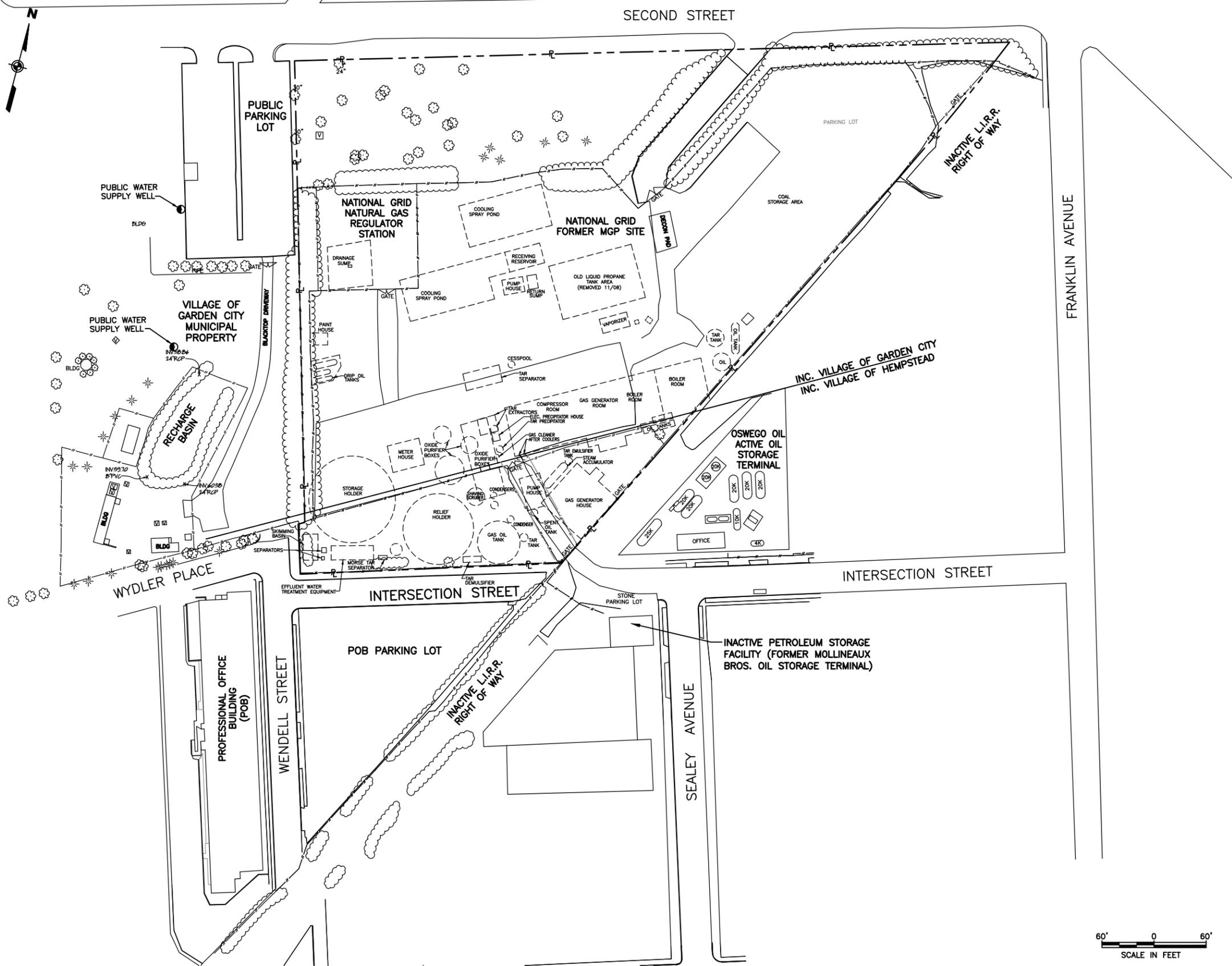
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
SITE LOCATION MAP

FIGURE 1

NOTES:

1. LOCATIONS SHOWN FOR FORMER MGP FEATURES WERE TAKEN FROM FINAL REMEDIAL INVESTIGATION REPORT DATED NOVEMBER 2006 BY PAULUS, SOKOLOWSKI AND SARTOR ENGINEERING, P.C. REFERENCE RI FIGURE 1-4. BASE MAP AND FORMER MGP SITE FEATURES IN RI WAS PREPARED BY DVIRKA AND BARTOLUCCI CONSULTING ENGINEERS, A DIVISION OF WILLIAM F COSULICHI ASSOCIATES, P.C.

LEGEND	
	FENCE
	FORMER MGP SITE BOUNDARY AND APPROXIMATE PROPERTY LINE
	APPROXIMATE LOCATION OF FORMER MGP STRUCTURE
	LOCATION OF EXISTING STRUCTURE
	DECIDUOUS TREE
	CONIFER TREE
	APPROXIMATE TREE LINE



J:\Projects\1175065\00000\CAD\DRAWING\TASK2\HEMPSTEAD\SS SITE MANAGEMENT PLAN\JUNE 2015 SUBMITTAL\FIGURE 2.dwg, PAPER, 1:2, 1/19/15 -1-RAL

URS Corporation

NATIONAL GRID
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
HEMPSTEAD/GARDEN CITY, NY

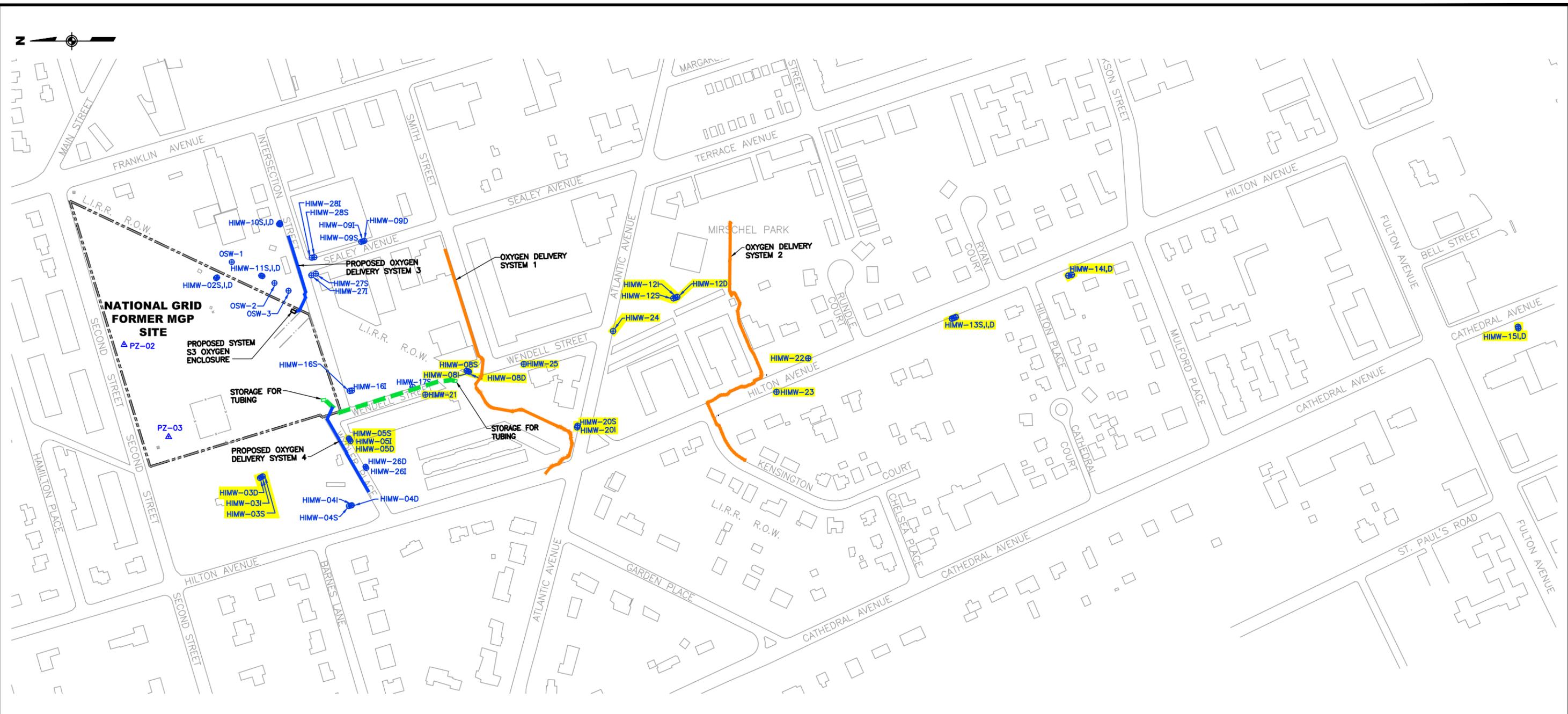
IN-SITU SOLIDIFICATION
SITE MANAGEMENT PLAN

PRE-CONSTRUCTION SITE PLAN

DATE: JUNE 2015

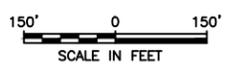
FIGURE 2

J:\Projects\11175065\0000\CAD\DRAWING\TASK2\HEMPSTEAD\ISS SITE MANAGEMENT PLAN\JUNE 2015 SUBMITTAL\FIGURE 3.dwg 5/28/15 - 1 RAL



- LEGEND:**
- HIMW-13 ⊕ MONITORING WELL
 - PZ-03 ▲ PIEZOMETER
 - MONITORING WELL TO BE SAMPLED AS PART OF MONITORING PLAN
 - EXISTING HOUSE OR BUILDING
 - NATIONAL GRID PROPERTY BOUNDARY
 - EXISTING OXYGEN DELIVERY SYSTEM
 - POTENTIAL FUTURE OXYGEN DELIVERY SYSTEM
 - OXYGEN DELIVERY TUBING FOR OXYGEN DELIVERY SYSTEM 4

THIS FIGURE CONTAINS FEATURES INTENDED TO BE PRINTED IN COLOR. REPRODUCTION IN BLACK AND WHITE MAY OBSCURE THE INTENDED EFFECT OF THE COLOR FEATURES.



URS Corporation

NATIONAL GRID
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
HEMPSTEAD/GARDEN CITY, NY

IN-SITU SOLIDIFICATION
SITE MANAGEMENT PLAN

**GROUNDWATER MONITORING WELL
LOCATIONS AND OXYGEN DELIVERY SYSTEMS**

DATE: JUNE 2015

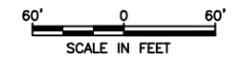
FIGURE 3

\\Projects\1175065\00000\CAD\DRAWING\TASK2\HEMPSTEAD\SS SITE MANAGEMENT PLAN\JUNE 2015 SUBMITTAL\FIGURE 4.dwg, PAPER, 1:2, 1/19/15 -1-BAL



- LEGEND:**
- P — EXISTING PROPERTY LINE
 - - - 65 - - - POST-EXCAVATION CONTOURS, DATED 9/17/13
 - 71 — PRE-CONSTRUCTION GROUND SURFACE CONTOUR
 - ⊙ EXISTING SANITARY MANHOLE
 - ⊙ EXISTING STORM MANHOLE
 - ⊗ EXISTING MANHOLE (UNKNOWN)
 - ⊕ EXISTING MONITORING WELL
 - EXCAVATION AND ISS AREAS
 - IRM EXCAVATION AREAS. SOURCE: FIGURE 2-2 FROM THE IRM CONSTRUCTION COMPLETION REPORT, DATED MARCH 31, 2009.
 - — — — — LIMIT OF MGP SOURCE MATERIAL ISS TREATMENT

THIS FIGURE CONTAINS FEATURES INTENDED TO BE PRINTED IN COLOR. REPRODUCTION IN BLACK AND WHITE MAY OBSCURE THE INTENDED EFFECT OF THE COLOR FEATURES.



URS Corporation

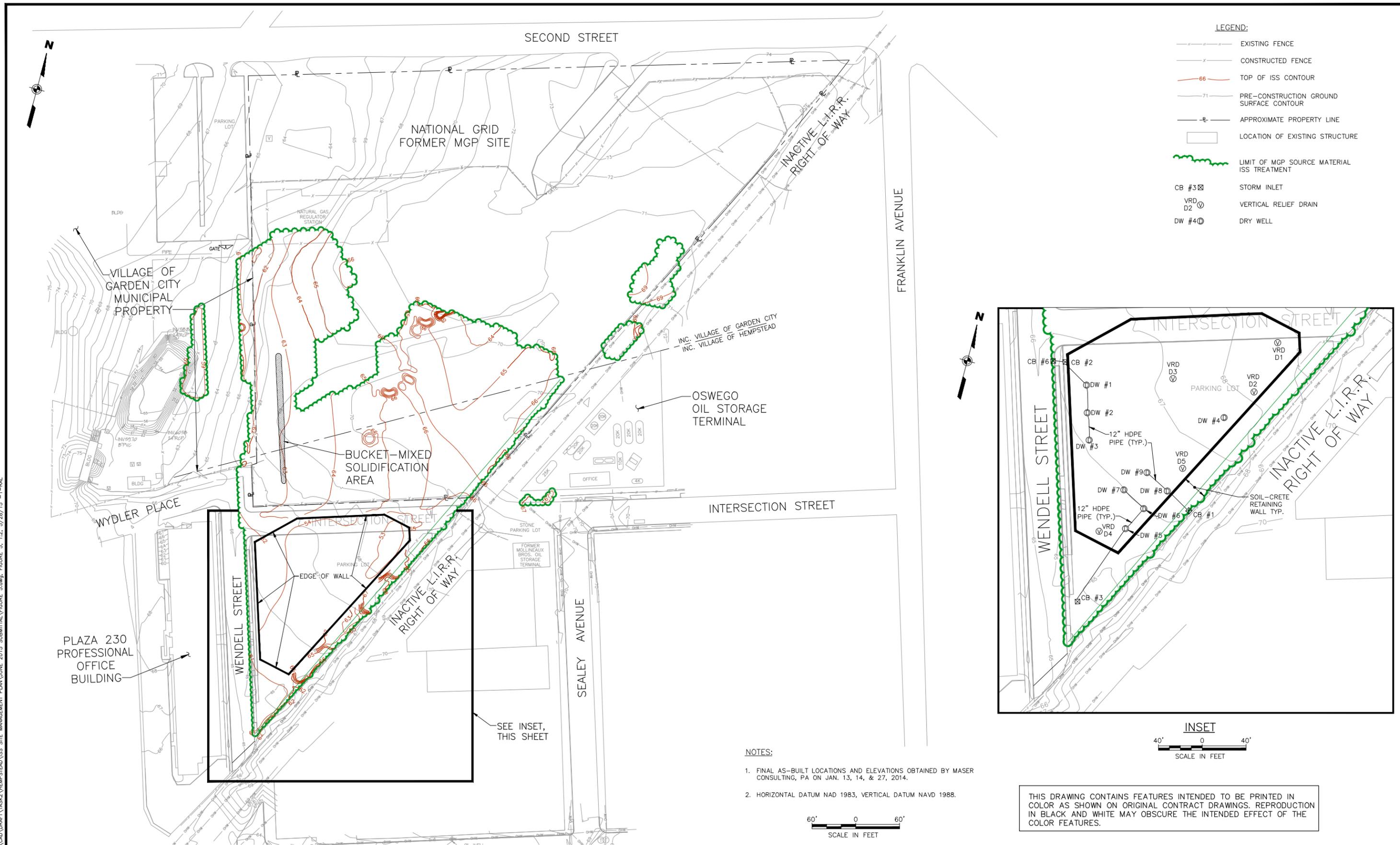
NATIONAL GRID
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
HEMPSTEAD/GARDEN CITY, NY

IN-SITU SOLIDIFICATION
SITE MANAGEMENT PLAN

DATE: JUNE 2015

FIGURE 4

J:\Projects\1175065\00000\CAD\DRAWING\HEMPSTEAD\SS SITE MANAGEMENT PLAN\JUNE 2015 SUBMITTAL\FIGURE 5.dwg, FIGURE 5, 1:2, 5/28/15 -1-RAL

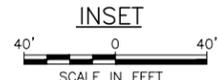
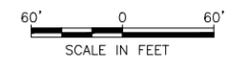


LEGEND:

	EXISTING FENCE
	CONSTRUCTED FENCE
	TOP OF ISS CONTOUR
	PRE-CONSTRUCTION GROUND SURFACE CONTOUR
	APPROXIMATE PROPERTY LINE
	LOCATION OF EXISTING STRUCTURE
	LIMIT OF MGP SOURCE MATERIAL ISS TREATMENT
	CB #3
	VRD D2
	DW #4



- NOTES:**
1. FINAL AS-BUILT LOCATIONS AND ELEVATIONS OBTAINED BY MASER CONSULTING, PA ON JAN. 13, 14, & 27, 2014.
 2. HORIZONTAL DATUM NAD 1983, VERTICAL DATUM NAVD 1988.



THIS DRAWING CONTAINS FEATURES INTENDED TO BE PRINTED IN COLOR AS SHOWN ON ORIGINAL CONTRACT DRAWINGS. REPRODUCTION IN BLACK AND WHITE MAY OBSCURE THE INTENDED EFFECT OF THE COLOR FEATURES.

URS Corporation

NATIONAL GRID
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
HEMPSTEAD/GARDEN CITY, NY

IN-SITU SOLIDIFICATION
SITE MANAGEMENT PLAN

ELEVATION OF TOP OF ISS MONOLITH

DATE: JUNE 2015

FIGURE 5

\\Projects\1175065\00000\CAD\DRAWING\TASK2\HEMPSTEAD\ISS SITE MANAGEMENT PLAN\JUNE 2015 SUBMITTAL\FIGURE 6.dwg, FIG. 6, 1:2, 5/28/15 -1-RAL



- LEGEND:**
- EXISTING FENCE
 - x- CONSTRUCTED FENCE
 - 35- BOTTOM OF ISS CONTOUR
 - 71- PRE-CONSTRUCTION GROUND SURFACE CONTOUR
 - E- APPROXIMATE PROPERTY LINE
 - LOCATION OF EXISTING STRUCTURE
 - LIMIT OF MGP SOURCE MATERIAL ISS TREATMENT

- NOTES:**
1. FINAL AS-BUILT LOCATIONS AND ELEVATIONS OBTAINED BY MASER CONSULTING, PA ON JAN. 13, 14, & 27, 2014.
 2. HORIZONTAL DATUM NAD 1983, VERTICAL DATUM NAVD 1988.

THIS DRAWING CONTAINS FEATURES INTENDED TO BE PRINTED IN COLOR AS SHOWN ON ORIGINAL CONTRACT DRAWINGS. REPRODUCTION IN BLACK AND WHITE MAY OBSCURE THE INTENDED EFFECT OF THE COLOR FEATURES.



URS Corporation

NATIONAL GRID
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
HEMPSTEAD/GARDEN CITY, NY

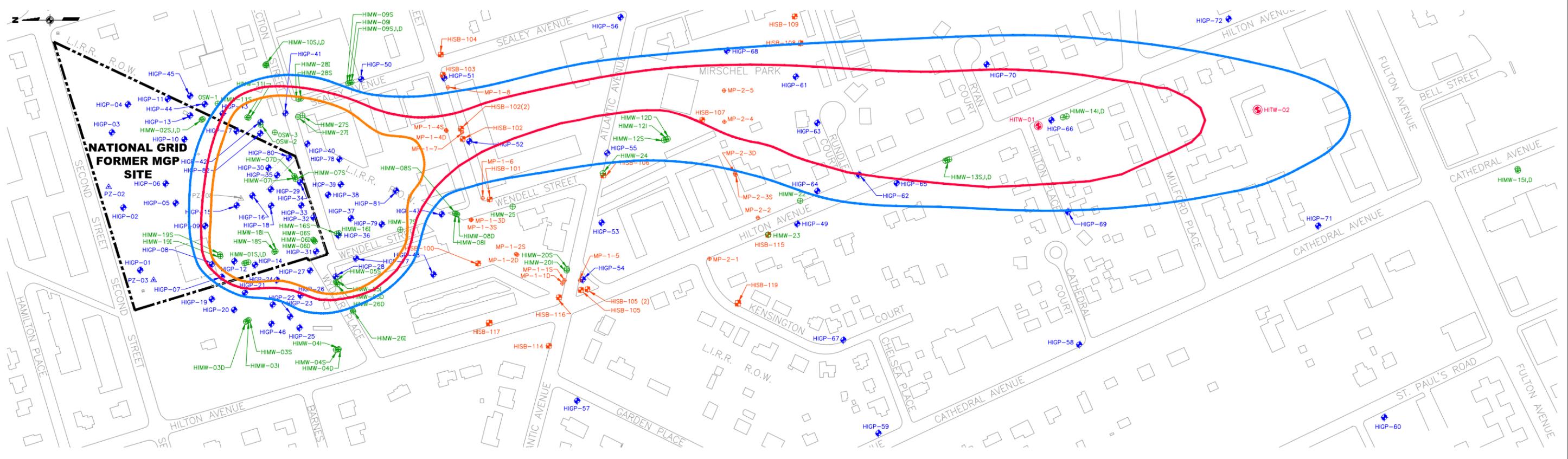
IN-SITU SOLIDIFICATION
SITE MANAGEMENT PLAN

BOTTOM OF ISS CONTOUR MAP

DATE: JUNE 2015

FIGURE 6

J:\Projects\1175065.00000\CAD\DRAWING\TASK2\HEMPSTEAD\ISS SITE MANAGEMENT PLAN\JUNE 2015 SUBMITTAL\FIGURE 7.dwg 5/28/15 - 1.ELB



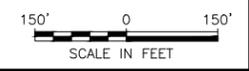
**NATIONAL GRID
FORMER MGP
SITE**

LEGEND:

- | | | | |
|----------|---|----------|---------------------------------------|
| HITW-02 | TEMPORARY GROUNDWATER MONITORING WELL
(TAKEN FROM RI REPORT, 2006) | [Symbol] | EXISTING HOUSE OR BUILDING |
| HIGP-53 | TEMPORARY GROUNDWATER SAMPLE LOCATION
(TAKEN FROM RI REPORT, 2006) | [Symbol] | NATIONAL GRID PROPERTY BOUNDARY |
| MP-2-1 | OXYGEN SYSTEM MONITORING WELL | [Symbol] | BTEX/PAH ISOCONCENTRATION LINE (PPB): |
| HIMW-13 | MONITORING WELL | [Symbol] | |
| PZ-02 | PIEZOMETER | [Symbol] | |
| PZ-08 | ABANDONED PIEZOMETER | [Symbol] | 50 |
| HISB-114 | TEMPORARY GROUNDWATER SAMPLE LOCATION
(URS, 2008-2009) | [Symbol] | 100 |
| ND | NOT DETECTED | [Symbol] | 1,000 |
- APRIL 4 THROUGH 17, 2007

* SOME LOCATIONS ON SITE AND ADJACENT TO SITE ARE NOT SHOWN FOR FIGURE CLARITY.

THIS FIGURE CONTAINS FEATURES INTENDED TO BE PRINTED IN COLOR. REPRODUCTION IN BLACK AND WHITE MAY OBSCURE THE INTENDED EFFECT OF THE COLOR FEATURES.



URS Corporation

NATIONAL GRID
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
HEMPSTEAD/GARDEN CITY, NY

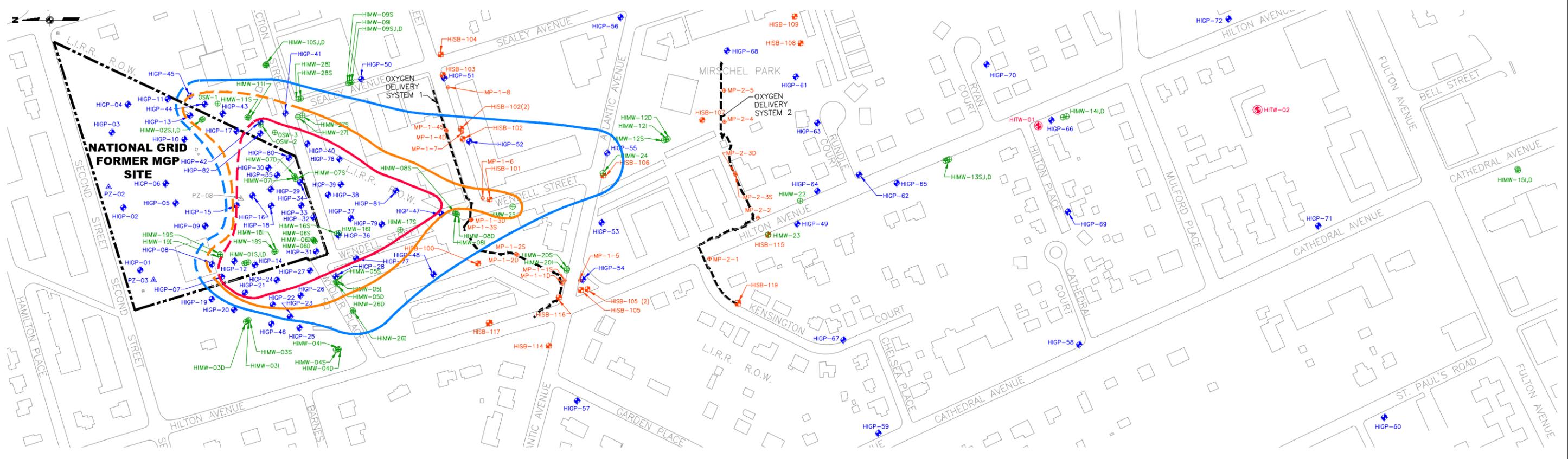
IN-SITU SOLIDIFICATION
SITE MANAGEMENT PLAN

GROUNDWATER CONTAMINANT PLUME
PRIOR TO REMEDIATION

DATE: JUNE 2015

FIGURE 7

J:\Projects\1175065.00000\CAD\DRAWING\TASK2\HEMPSTEAD\SS SITE MANAGEMENT PLAN\JUNE 2015 SUBMITTAL\FIGURE 8.dwg 5/28/15 - 1 .JVS

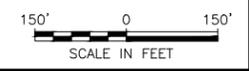


**NATIONAL GRID
FORMER MGP
SITE**

- LEGEND:**
- ⊕ HITW-02 TEMPORARY GROUNDWATER MONITORING WELL (TAKEN FROM RI REPORT, 2006)
 - ⊕ HIGP-53 TEMPORARY GROUNDWATER SAMPLE LOCATION (TAKEN FROM RI REPORT, 2006)
 - ⊕ MP-2-1 OXYGEN SYSTEM MONITORING WELL
 - ⊕ HIMW-13 MONITORING WELL
 - △ PZ-02 PIEZOMETER
 - △ PZ-08 ABANDONED PIEZOMETER
 - ⊕ HISB-114 TEMPORARY GROUNDWATER SAMPLE LOCATION (URS, 2008-2009)
 - ND NOT DETECTED
 - EXISTING HOUSE OR BUILDING
 - NATIONAL GRID PROPERTY BOUNDARY
 - ESTIMATED EXTENT OF GROUNDWATER PLUME AS DEFINED BY TOTAL BTEX OR TOTAL PAH CONCENTRATIONS EQUAL TO OR GREATER THAN 5,000 ug/L
 - ESTIMATED EXTENT OF GROUNDWATER PLUME AS DEFINED BY TOTAL BTEX OR TOTAL PAH CONCENTRATIONS EQUAL TO OR GREATER THAN 1,000 ug/L
 - ESTIMATED EXTENT OF GROUNDWATER PLUME AS DEFINED BY TOTAL BTEX OR TOTAL PAH CONCENTRATIONS EQUAL TO OR GREATER THAN 100 ug/L
 - ESTIMATED EXTENT OF GROUNDWATER PLUME AS DEFINED BY TOTAL BTEX OR TOTAL PAH CONCENTRATIONS. DASHED LINES REPRESENT CONTAMINATION CONCENTRATIONS THAT ARE LIKELY INFLUENCED BY THIRD PARTY SOURCES.
 - OXYGEN DELIVERY SYSTEM

* SOME LOCATIONS ON SITE AND ADJACENT TO SITE ARE NOT SHOWN FOR FIGURE CLARITY.

THIS FIGURE CONTAINS FEATURES INTENDED TO BE PRINTED IN COLOR. REPRODUCTION IN BLACK AND WHITE MAY OBSCURE THE INTENDED EFFECT OF THE COLOR FEATURES.



URS Corporation

NATIONAL GRID
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
HEMPSTEAD/GARDEN CITY, NY

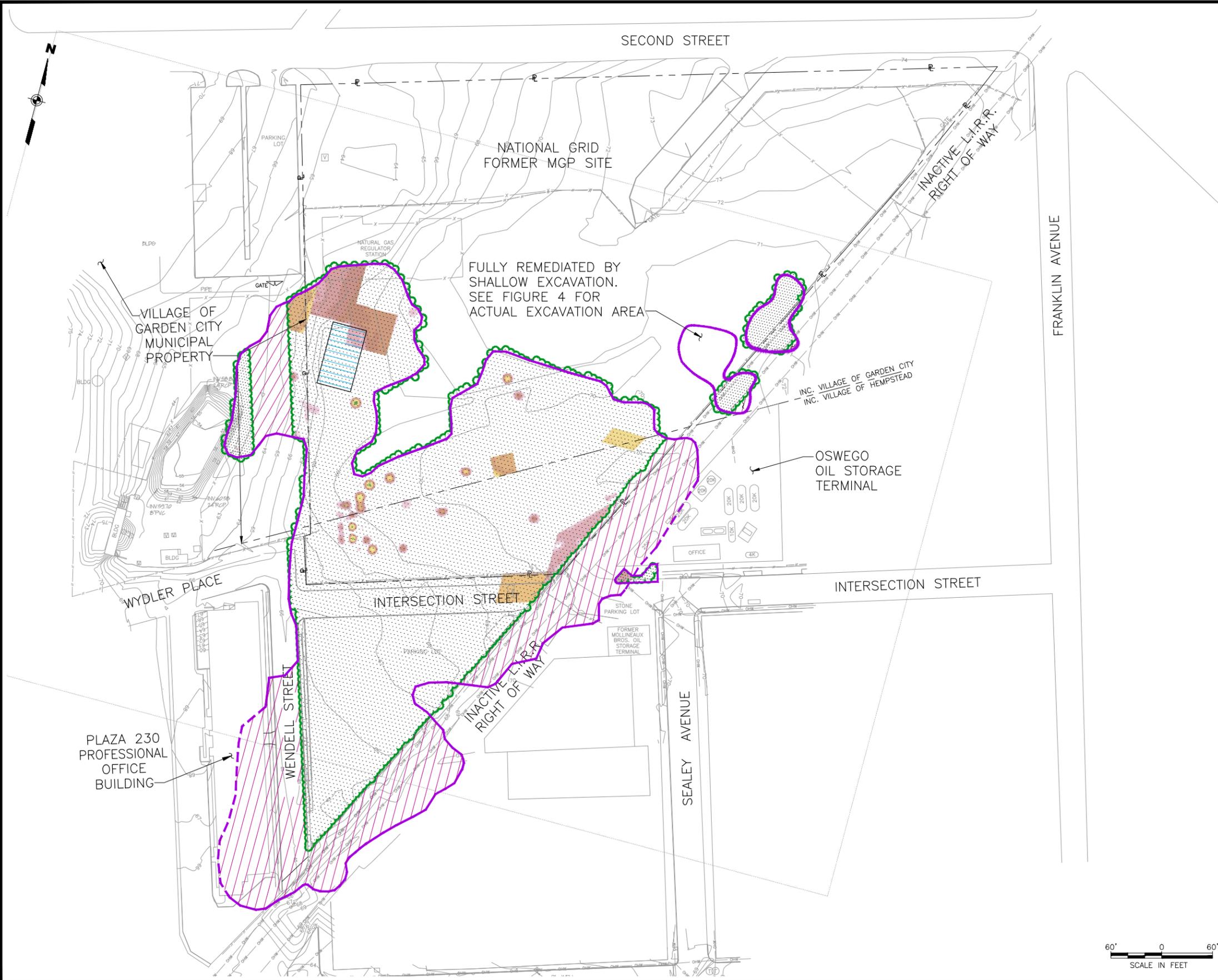
IN-SITU SOLIDIFICATION
SITE MANAGEMENT PLAN

GROUNDWATER CONTAMINANT PLUME
JUNE 2014

DATE: JUNE 2015

FIGURE 8

U:\Projects\1175685\0000\CAD\DRFT\TASK2\HEMPSTEAD\ISS SITE MANAGEMENT PLAN\SEPT 2015 REVISIONS\FIGURE 9.dwg, FIGURE 9, 1/2, 9/9/15 -1-RAL

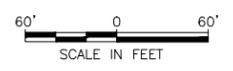


LEGEND:

- EXISTING FENCE
- CONSTRUCTED FENCE
- SOLIDIFIED CONTAMINATED MATERIAL
- REMAINING MGP SOURCE MATERIAL NOT TREATED BY SOLIDIFICATION
- DEEP POCKET SOURCE MATERIAL NOT TREATED BY SOLIDIFICATION AT ELEVATIONS 2 TO 10 FEET AMSL (EXISTING GRADE APPROX. ELEV. 68)
- PRE-CONSTRUCTION GROUND SURFACE CONTOUR
- APPROXIMATE PROPERTY LINE
- LOCATION OF EXISTING STRUCTURE
- DELINEATED LIMIT OF MGP SOURCE MATERIAL
- APPROXIMATE LIMITS OF MGP SOURCE MATERIAL
- LIMIT OF MGP SOURCE MATERIAL ISS TREATMENT

DEPTH OF UNTREATED SOURCE MATERIAL BELOW MONOLITH

0, 4, 8, 12, 16, 20, 24



THIS FIGURE CONTAINS FEATURES INTENDED TO BE PRINTED IN COLOR. REPRODUCTION IN BLACK AND WHITE MAY OBSCURE THE INTENDED EFFECT OF THE COLOR FEATURES.

URS Corporation

NATIONAL GRID
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
HEMPSTEAD/GARDEN CITY, NY

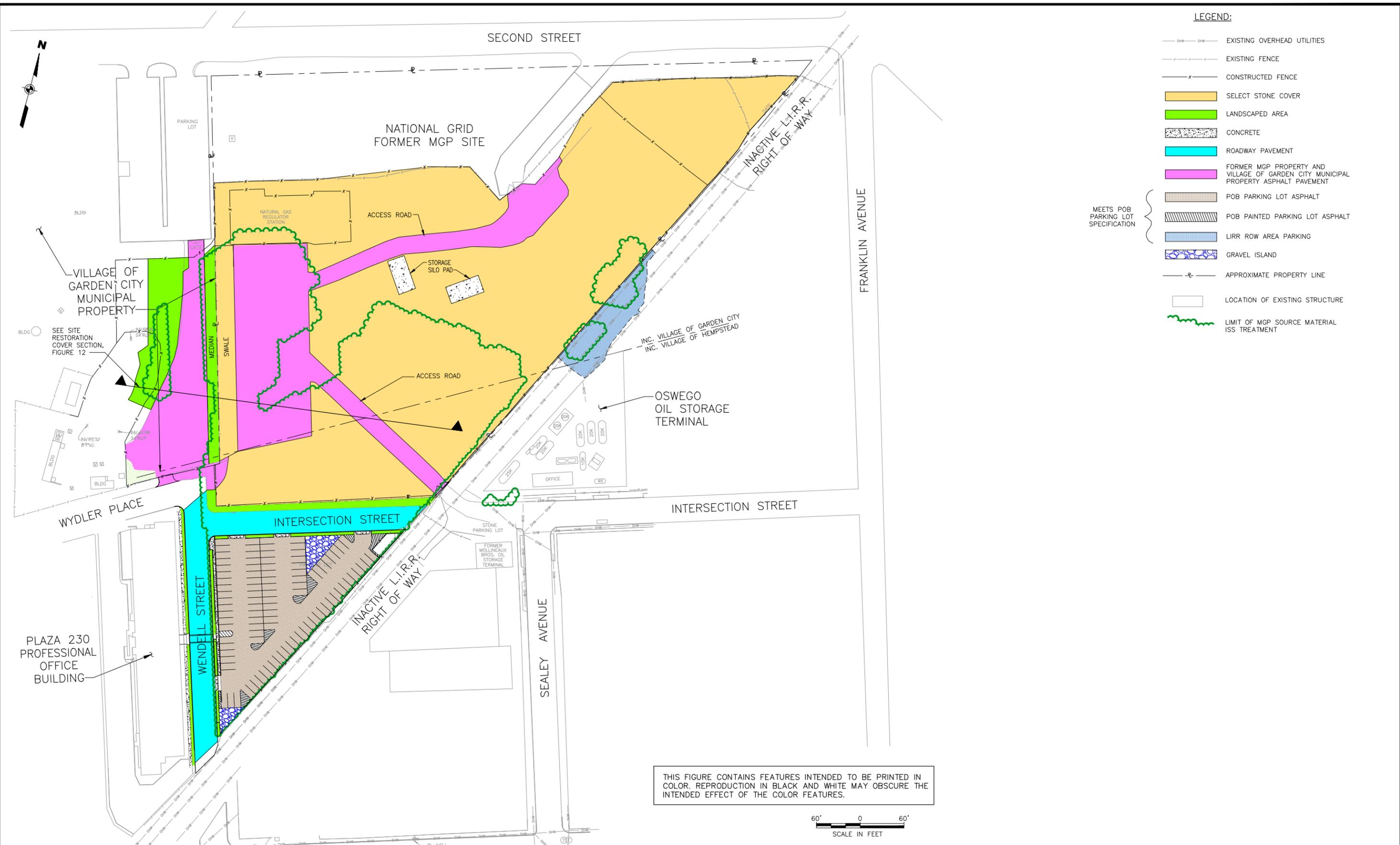
IN-SITU SOLIDIFICATION
SITE MANAGEMENT PLAN

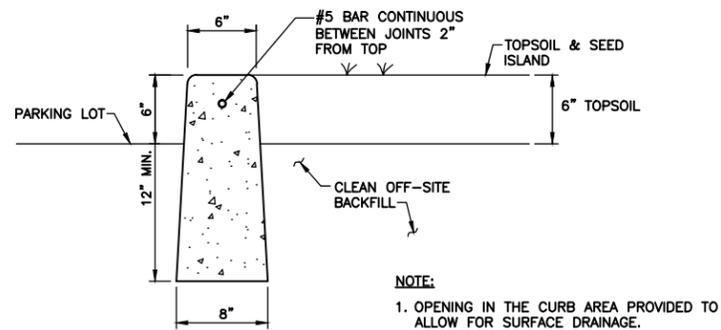
LOCATIONS OF MGP SOURCE MATERIAL
NOT TREATED BY SOLIDIFICATION

DATE: JUNE 2015

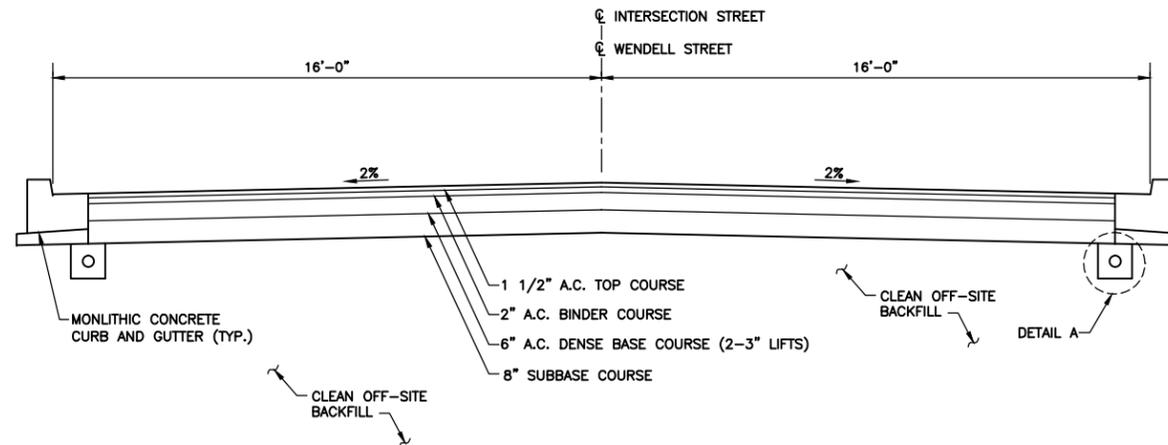
FIGURE 9

\\Projects\1175065.00000\CAD\DRAWING\TASK2\HEMPSTEAD\SS SITE MANAGEMENT PLAN\JUNE 2015 SUBMITTAL\FIGURE 10.dwg, FIGURE 10, 1,2, 1/19/15 -1-RAL

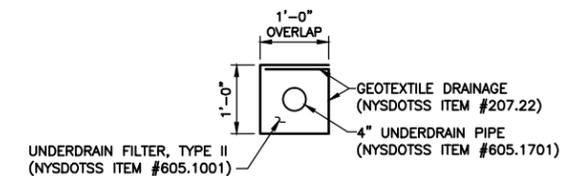
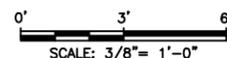




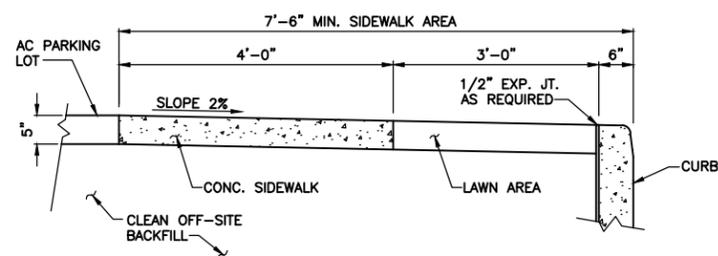
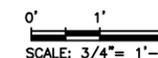
PARKING LOT CURB ISLAND
NOT TO SCALE



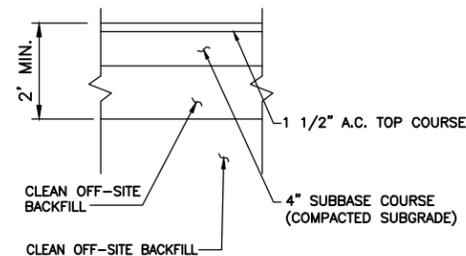
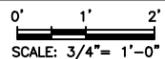
RESTORED ROADWAY AREA



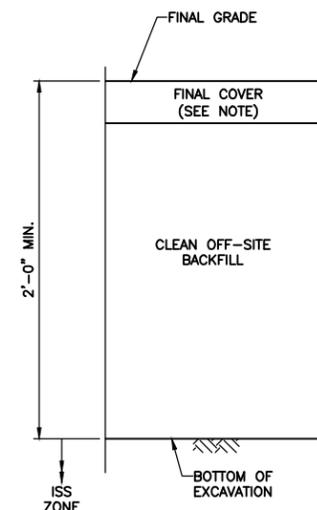
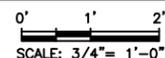
DETAIL A
(CONNECT TO STORM DRAIN SYSTEM)



CONCRETE SIDEWALK DETAIL



**FORMER MGP PROPERTY
AND VILLAGE OF GARDEN CITY
MUNICIPAL PROPERTY PAVEMENT SECTION**



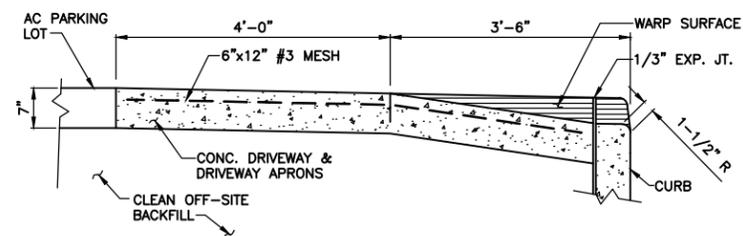
**BACKFILL DETAIL OUTSIDE
FORMER MGP PROPERTY**

NOT TO SCALE

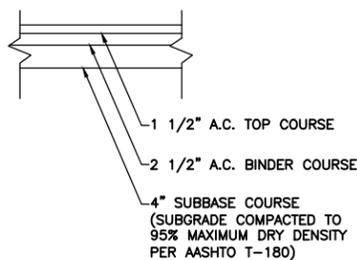
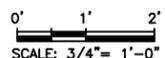
NOTE:

SELECTION OF FINAL COVER MATERIAL AS SHOWN ON SITE RESTORATION COVER SECTION, FIGURE 11:

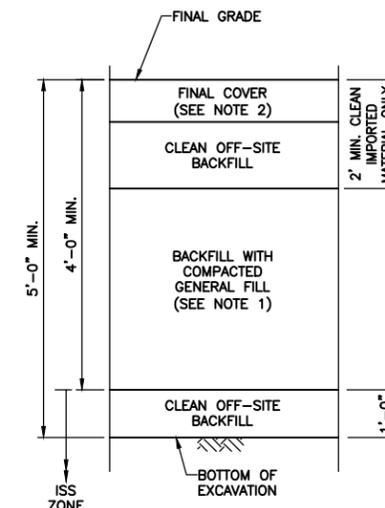
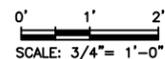
- MIN. 6" TOPSOIL, VEGETATED; OR
- MIN 4" SELECT STONE COVER; OR
- ASPHALT, MIN. THICKNESS AS SHOWN THIS SHEET; OR
- 6" DECORATIVE GRAVEL AT 2 GRAVEL ISLANDS.



**CONCRETE DRIVEWAY &
DRIVEWAY APRONS DETAIL**



**OSWEGO OIL STORAGE TERMINAL AREA
AND PLAZA 230 PARKING LOT
PAVEMENT SECTION**



**BACKFILL DETAIL
FORMER MGP PROPERTY**

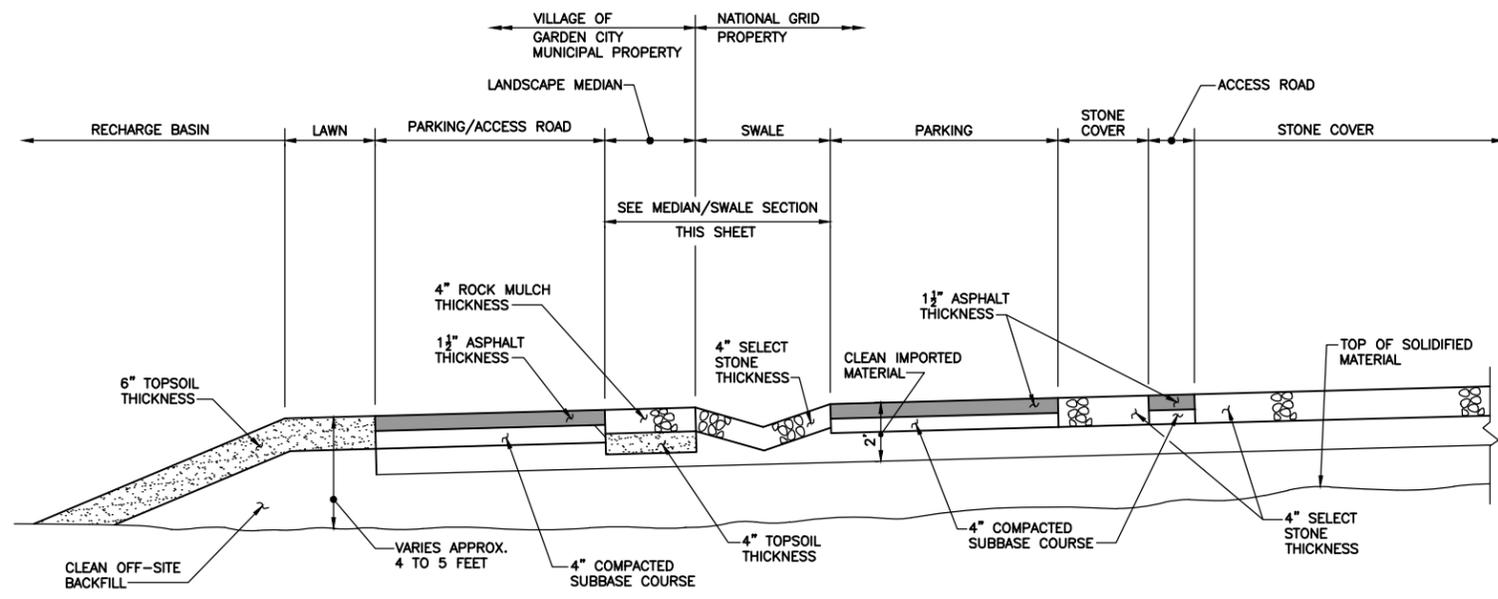
NOT TO SCALE

NOTES:

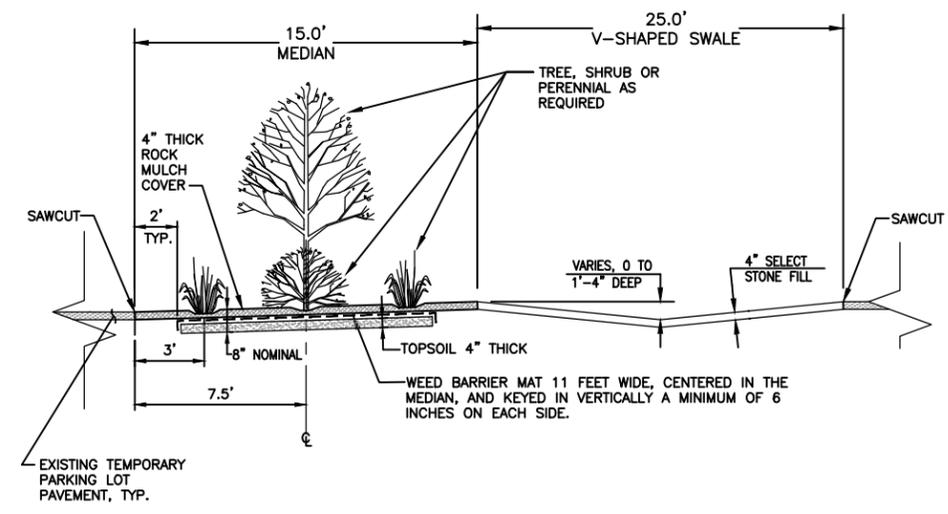
- ON-SITE EXCAVATED SOIL WAS USED AS BACKFILL BUT NO CLOSER THAN TWO (2) FEET FROM FINAL GRADE, PROVIDED IT WAS NOT CLASSIFIED AS SOURCE MATERIAL.
- SELECTION OF FINAL COVER MATERIAL AS SHOWN ON SITE RESTORATION COVER SECTION, FIGURE 11:
 - MIN. 6" TOPSOIL, VEGETATED; OR
 - MIN 4" SELECT STONE COVER; OR
 - ASPHALT, MIN. THICKNESS AS SHOWN THIS SHEET

J:\Projects\1175065\00000\CAD\DRAWING\TASK2\HEMPSTEAD\ISS SITE MANAGEMENT PLAN\JUNE 2015 SUBMITAL\FIGURE 11.dwg, FIGURE 11, 12, 5/28/15 -1-RAL

J:\Projects\1175065.00000\CAD\DRAWING\HEMPSTEAD\SS SITE MANAGEMENT PLAN\JUNE 2015 SUBMITTAL\FIGURE 12.dwg, FIGURE 12, 1:2, 5/28/15 -1-RAL



SITE RESTORATION COVER SECTION
(FROM FIGURE 10)
NOT TO SCALE



MEDIAN/SWALE SECTION
(FROM SITE RESTORATION COVER SECTION, THIS SHEET)
NOT TO SCALE

URS Corporation

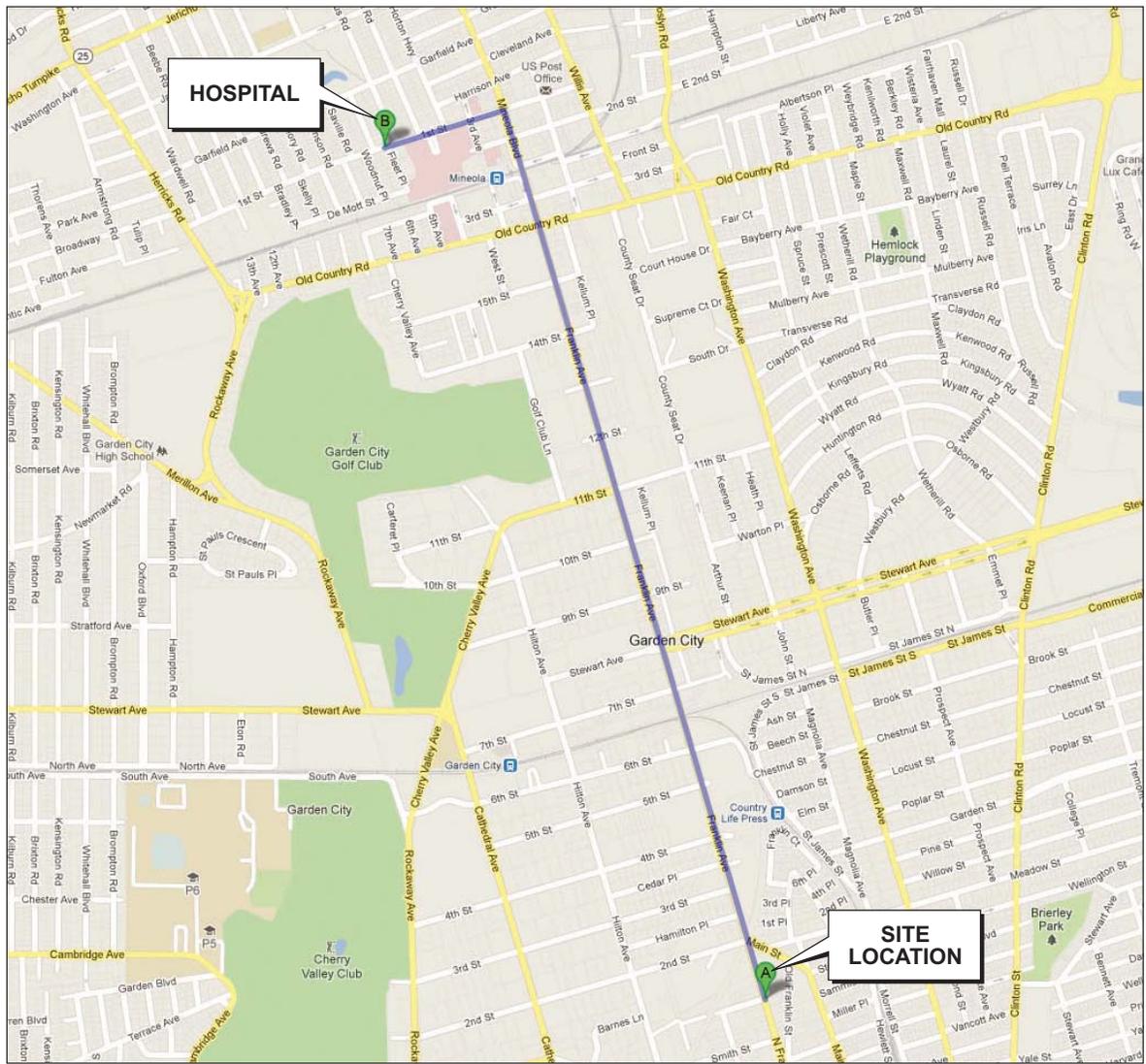
NATIONAL GRID
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
HEMPSTEAD/GARDEN CITY, NY

IN-SITU SOLIDIFICATION
SITE MANAGEMENT PLAN

TYPICAL COVER SYSTEM DETAILS
(SHEET 2 OF 2)

DATE: JUNE 2015

FIGURE 12



Map Data: © 2012 Google



1. Head north on North Franklin Street toward 2nd Street. Go 1.6 miles.
2. Continue onto Mineola Boulevard. Go 0.2 miles.
3. Turn left onto 1st Street. Go 0.3 miles. Destination will be on the left.

Estimated Travel Time: 7 Minutes
 Estimated Travel Distance: 2.1 Miles

Winthrop University Hospital
 259 1st Street
 Mineola, NY 11501
 Phone: (516) 663-0333

AG20841A-11176098-110414-GCM



**HEMPSTEAD INTERSECTION STREET
 FORMER MGP SITE
 HOSPITAL ROUTE MAP**

APPENDIX A

**ENVIRONMENTAL EASEMENT,
SURVEY, METES AND BOUNDS**

BARCLAY DAMON^{LLP}

Courtney M. Merriman
Partner

July 1, 2016

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Bureau of Remediation
Office of General Counsel, 14th Floor
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233-1500



Re: Hempstead Intersection Street MGP - Environmental Easement
Address: Sec. 34, Blk. 174, Lots 1, 208A & 209A, Village of Garden City, NY
 Sec. 34, Blk. 174, Lots 208B & 209B, Village of Hempstead, NY
Owner: KeySpan Gas East Corporation
Site No.: 1-30-086

Dear Ladies and Gentlemen:

Enclosed please find the following documentation pertaining to the above-referenced matter:

1. Photocopy of the filing receipt from the Nassau County Clerk for the filing of the Environmental Easement;
2. Proof of mailing of the municipality notification letter to the Mayor of the Village of Hempstead;
3. Proof of mailing of the municipality notification letter to the Superintendent of the Building Department of the Village of Hempstead;
4. Proof of mailing of the municipality notification letter to the Mayor of the Village of Garden City;
5. Proof of mailing of the municipality notification letter to the Building Department of the Village of Garden City.

Bureau of Remediation
July 1, 2016
Page 2

I trust this satisfies the final requirements related to the Environmental Easement at this location. Should you require any further information, please do not hesitate to contact me.

Very truly yours,

A handwritten signature in black ink that reads "Courtney M. Merriman". The signature is written in a cursive style with a long, sweeping tail on the final letter.

Courtney M. Merriman

CMM:jml
Enclosures

cc: Bradford Burns, Esq.

Nassau County
 Maureen O'Connell
 County Clerk
 Mineola, NY 11501



Instrument Number: 2016- 00054222

As

D06 - AGREEMENT

Recorded On: June 02, 2016

Parties: KEYSpan GAS EAST CORP

TO PEOPLE OF THE STATE OF NEW YORK

Recorded By: ALL STATE ABST

Billable Pages: 9

Num Of Pages: 10

Comment:

**** Examined and Charged as Follows: ****

D06 - AGREEMENT	90.00	Blocks - Deeds - \$300	300.00	Tax Affidavit TP 584	5.00
Recording Charge:	395.00				
	Amount	Consideration Amount	RS#/CS#		
Tax-Transfer	0.00	0.00	RE 21350	Basic	0.00 Spec ASST 0.00
HEMPSTEAD				Local NY CITY	0.00 Spec ADDL SONYMA 0.00
				Additional MTA	0.00 Transfer 0.00
Tax Charge:	0.00				

Property Description:

Line	Section	Block	Lot	Unit	Town Name
1	34	174	1		HEMPSTEAD
2	34	174	208A		HEMPSTEAD
3	34	174	208B		HEMPSTEAD
4	34	174	209A		HEMPSTEAD
5	34	174	209B		HEMPSTEAD

**** THIS PAGE IS PART OF THE INSTRUMENT ****

I hereby certify that the within and foregoing was recorded in the Clerk's Office For: Nassau County, NY

File Information:

Document Number: 2016- 00054222
 Receipt Number: 281695
 Recorded Date/Time: June 02, 2016 02:19:09P
 Book-Vol/Pg: Bk-D VI-13368 Pg-705
 Cashier / Station: 0 SDS / NCCL-HBFD1

Record and Return To:

BARCLAY DAMON LLP
 ONE PARK PL
 300 SOUTH STATE ST
 SYRACUSE NY 13202



Maureen O'Connell

County Clerk Maureen O'Connell

BARCLAY DAMON ^{LLP}

Courtney M. Merriman
Partner

June 21, 2016

VIA CERTIFIED MAIL

Honorable Nicholas P. Episcopia
Village of Garden City
Village Hall
341 Stewart Avenue
Garden City, NY 11530

Re: Hempstead Intersection Street MGP - Environmental Easement
Address: Sec. 34, Blk. 174, Lots 1, 208A & 209A, Village of Garden City, New York
Sec. 34, Blk. 174, Lots 208B & 209B, Village of Hempstead, New York
Owner: KeySpan Gas East Corporation
Site No.: 1-30-086

Dear Mayor Episcopia:

Attached please find a copy of an environmental easement granted to the New York State Department of Environmental Conservation ("Department")

on May 2, 2016,
by KeySpan Gas East Corporation
for property at : Sec. 34, Blk. 174, Lots 1, 208A & 209A, Village of Garden City, New York
Sec. 34, Blk. 174, Lots 208B & 209B, Village of Hempstead, New York
Tax Map No. 34-174-1
DEC Site No: 1-30-086

This Environmental Easement restricts future use of the above-referenced property to restricted residential, commercial or industrial use. Any on-site activity must be done in accordance with the Environmental Easement and the Site Management Plan which is incorporated into the Environmental Easement. Department approval is also required prior to any groundwater use.

Article 71, Section 71-3607 of the New York State Environmental Conservation Law requires that:

June 21, 2016

Page 2

1. Whenever the department is granted an environmental easement, it shall provide each affected local government with a copy of such easement and shall also provide a copy of any documents modifying or terminating such environmental easement.
2. Whenever an affected local government receives an application for a building permit or any other application affecting land use or development of land that is subject to an environmental easement and that may relate to or impact such easement, the affected local government shall notify the department and refer such application to the department. The department shall evaluate whether the application is consistent with the environmental easement and shall notify the affected local government of its determination in a timely fashion, considering the time frame for the local government's review of the application. The affected local government shall not approve the application until it receives approval from the department.

An electronic version of every environmental easement that has been accepted by the Department is available to the public at: <http://www.dec.ny.gov/chemical/36045.html>. Please forward this notice to your building and/or planning departments, as applicable, to ensure your compliance with these provisions of New York State Environmental Conservation Law. If you have any questions or comments regarding this matter, please do not hesitate to contact me.

Very truly yours,



Courtney M. Merriman

CMM/jml
Attachment

cc: Andrew Frame, Building Inspector (w/attachment)

CERTIFIED MAIL



7015 0640 0003 3483 2165
7015 0640 0003 3483 2165

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OFFICIAL USE

Certified Mail Fee

Extra Services & Fees (check box, add fee as appropriate)

- Return Receipt (hardcopy) \$ _____
- Return Receipt (electronic) \$ _____
- Certified Mail Restricted Delivery \$ _____
- Adult Signature Required \$ _____
- Adult Signature Restricted Delivery \$ _____

Postmark
Here

Postage

JML
3073024

Total Postage and Fees

Sent to
Hon. Nicholas P. Episcopia
Village of Garden City, Village Hall
341 Stewart Avenue
Garden City, NY 11530

PS Form 3800, April 2015 PSN 7550-02-000-9047 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:
Hon. Nicholas P. Episcopia
Village of Garden City, Village
Hall
341 Stewart Avenue
Garden City, NY 11530



9590 9403 0673 5196 5957 22

2. Article Number (Transfer from service label)

7015 0640 0003 3483 2165

PS Form 3811, April 2014 B0117000 0000 0000

COMPLETE THIS SECTION ON DELIVERY

- A. Signature
 - Signature
 - Agent
- B. Received by (Printed Name) _____
- C. Date of Delivery _____
- D. Is delivery address different from item 1? Yes
If YES, enter delivery address below. No

#3073024

3. Service Type
- Adult Signature
 - Adult Signature Restricted Delivery
 - Certified Mail®
 - Certified Mail Restricted Delivery
 - Collect on Delivery
 - Collect on Delivery Restricted Delivery
 - Mail Restricted Delivery
 - Priority Mail Express®
 - Registered Mail™
 - Registered Mail Restricted Delivery
 - Return Receipt for Merchandise
 - Signature Confirmation™
 - Signature Confirmation Restricted Delivery

FROM: BARCLAY DAMON^{LLP}
ONE PARK PLACE
300 SOUTH STATE STREET
SYRACUSE, NEW YORK 13202

5MM 3073024

TO:
Hon. Nicholas P. Episcopia
Village of Garden City
Village Hall

U.S. Postal Service™
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Certified Mail Fee

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Extra Services & Fees (check box, add fee as appropriate)

- Return Receipt (hardcopy) \$
- Return Receipt (electronic) \$
- Certified Mail Restricted Delivery \$
- Adult Signature Required \$
- Adult Signature Restricted Delivery \$

Postage

\$

Total Postage and Fees

\$



Sent To

Hon. Nicholas P. Episcopia
 Village of Garden City, Village Hall
 341 Stewart Avenue
 Garden City, NY 11530

PS Form 3800, April 2015 PSN 7530-02-000-9047

See Reverse for Instructions

5912 ERHE E000 0490 5102

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Hon. Nicholas P. Episcopia
 Village of Garden City, Village Hall
 341 Stewart Avenue
 Garden City, NY 11530



9590 9403 0673 5196 5357 22

2. Article Number (Transfer from service label)

7015 0640 0003 3483 2165

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X

- Agent
- Addressee

B. Received By (Printed Name)

C. Date of Delivery

D. Is delivery address different from item 1? Yes
 If YES, enter delivery address below: No

#3073024

3. Service Type

- Adult Signature
- Adult Signature Restricted Delivery
- Certified Mail®
- Certified Mail Restricted Delivery
- Collect on Delivery
- Collect on Delivery Restricted Delivery
- Mail Restricted Delivery
- Priority Mail Express®
- Registered Mail™
- Registered Mail Restricted Delivery
- Return Receipt for Merchandise
- Signature Confirmation™
- Signature Confirmation Restricted Delivery

PS Form 3811, April 2015 PSN 7530-02-000-9053

Domestic Return Receipt

CERTIFIED MAIL



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7015 0640 0003 3483 1724

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Certified Mail Fee

Extra Services & Fees (check box, add fee as appropriate)

- Return Receipt (hardcopy) \$ _____
- Return Receipt (electronic) \$ _____
- Certified Mail Restricted Delivery \$ _____
- Adult Signature Required \$ _____
- Adult Signature Restricted Delivery \$ _____

Postmark
Here

Total Postage and Fees \$ _____

JML
3073024

Sent To
Andrew Frame, Building Inspector
Building Dept., Village Hall
352 Stewart Avenue, 2nd Floor
Garden City, NY 11530

PS Form 3800, April 2015 PSN 7510-02-000-9047 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

1 Complete items 1-7 and 13
 2 Print your home and address on the reverse so that we can return the card to you
 3 Attach the card to the back of the envelope or on the front if space permits
 4 Article weight: _____
 5 Article frame, Building Inspector
 Building Dept., Village Hall
 352 Stewart Avenue, 2nd Floor
 Garden City, NY 11530



9590 9409 0673 5196 5357 39

2 Article Number (transfer from service label)
7015 0640 0003 3483 1724

COMPLETE THIS SECTION ON DELIVERY

6 Signature _____
 7 Is this receipt for *RESTRICTED MAIL*? YES NO
 8 YES, please give address below: _____
 9 3073024

10 Signature Required Return Receipt (hardcopy) Return Receipt (electronic) Certified Mail Restricted Delivery Adult Signature Required Adult Signature Restricted Delivery Signature ConfirmationTM Restricted Delivery

FROM: BARCLAY DAMON^{LLP}

ONE PARK PLACE
300 SOUTH STATE STREET
SYRACUSE, NEW YORK 13202

3073024

CMM
TO:

Andrew Frame, Building Inspector
Building Department
Village Hall
352 Stewart Avenue, 2nd Floor

U.S. Postal Service™
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OFFICIAL USE

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Certified Mail Fee
\$ _____

Extra Services & Fees (check box, add fee as appropriate)

Return Receipt (hardcopy) \$ _____

Return Receipt (electronic) \$ _____

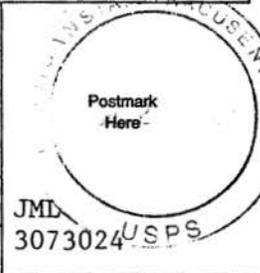
Certified Mail Restricted Delivery \$ _____

Adult Signature Required \$ _____

Adult Signature Restricted Delivery \$ _____

Postage
\$ _____

Total Postage and Fees
\$ _____



Sent To
Andrew Frame, Building Inspector
 Building Dept., Village Hall
 351 Stewart Avenue, 2nd Floor
 Garden City, NY 11530

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

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- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:
Andrew Frame, Building Inspector
Building Dept., Village Hall
351 Stewart Avenue, 2nd Floor
Garden City, NY 11530



2. Article Number (Transfer from service label)
7015 0640 0003 3483 1724

COMPLETE THIS SECTION ON DELIVERY

A. Signature

 Agent
 Addressee

B. Received by (Printed Name) _____ C. Date of Delivery _____

D. Is delivery address different from item 1? Yes
 If YES, enter delivery address below: No

#3073024

3. Service Type

Adult Signature Priority Mail Express®

Adult Signature Restricted Delivery Registered Mail™

Certified Mail® Registered Mail Restricted Delivery

Certified Mail Restricted Delivery Return Receipt for Merchandise

Collect on Delivery Signature Confirmation™

Collect on Delivery Restricted Delivery Signature Confirmation Restricted Delivery

Nassau County
 Maureen OConnell
 County Clerk
 Mineola, NY 11501



Instrument Number: 2016- 00054222

As

D06 - AGREEMENT

Recorded On: June 02, 2016

Parties: KEYSpan GAS EAST CORP

TO PEOPLE OF THE STATE OF NEW YORK

Recorded By: ALL STATE ABST

Billable Pages: 9

Num Of Pages: 10

Comment:

**** Examined and Charged as Follows: ****

D06 - AGREEMENT	90.00	Blocks - Deeds - \$300	300.00	Tax Affidavit TP 584	5.00
Recording Charge:	395.00				
	Amount	Consideration Amount	RS#/CS#		
Tax-Transfer	0.00	0.00	RE 21350	Basic	0.00 Spec ASST 0.00
HEMPSTEAD				Local NY CITY	0.00 Spec ADDL SONYMA 0.00
				Additional MTA	0.00 Transfer 0.00
Tax Charge:	0.00				

Property Description:

Line	Section	Block	Lot	Unit	Town Name
1	34	174	1		HEMPSTEAD
2	34	174	208A		HEMPSTEAD
3	34	174	208B		HEMPSTEAD
4	34	174	209A		HEMPSTEAD
5	34	174	209B		HEMPSTEAD

**** THIS PAGE IS PART OF THE INSTRUMENT ****

I hereby certify that the within and foregoing was recorded in the Clerk's Office For: Nassau County, NY

File Information:

Document Number: 2016- 00054222
 Receipt Number: 281695
 Recorded Date/Time: June 02, 2016 02:19:09P
 Book-Vol/Pg: Bk-D VI-13368 Pg-705
 Cashier / Station: 0 SDS / NCCL-HBFD1

Record and Return To:

BARCLAY DAMON LLP
 ONE PARK PL
 300 SOUTH STATE ST
 SYRACUSE NY 13202



Maureen O'Connell

County Clerk Maureen O'Connell

RTR
19#1
506
TP

Barclay/Damon LLP, One Park Pl - 300 South State St., Syracuse NY

13202

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36
OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 2ND day of May, 2016, between Owner(s) KeySpan Gas East Corporation d/b/a National Grid, having an office at 175 East Old Country Road, Hicksville, New York 11530, County of Nassau, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of Intersection Street in the Town of Hempstead, County of Nassau and State of New York, known and designated on the tax map of the County Clerk of Nassau as tax map parcel numbers: Section 34 Block 174 Lots 1, 208A, 208B, 209A and 209B, being the same as that property conveyed to Grantor by deeds dated May 27, 1998 and August 27, 2008 and recorded in the Nassau County Clerk's Office in Liber and Page 10926/0966 and 12430/0634, respectively. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 7.58 +/- acres, and is hereinafter more fully described in the Land Title Survey dated January 18, 2016 prepared by Kenny L. Kennon, P.L.S., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation

34
174
1
208A
208B
209B
209A

established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Order on Consent Index Number: D1-0001-98-11, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. **Purposes.** Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. **Institutional and Engineering Controls.** The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

**Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii),
Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial
as described in 6 NYCRR Part 375-1.8(g)(2)(iv)**

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Nassau County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

**This property is subject to an Environmental Easement held
by the New York State Department of Environmental Conservation**

pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:
(i) are in-place;
(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

KeySpan Gas East Corporation d/b/a National Grid:

By: Charles Willard 

Print Name: Charles Willard

Title: Authorized Rep Date: 4/6/2016

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Onondaga)

On the 6th day of April, in the year 2016 before me, the undersigned, personally appeared Charles Willard, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(~~s~~) whose name is (~~are~~) subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ capacity(~~ies~~), and that by his/~~her/their~~ signature(~~s~~) on the instrument, the individual(~~s~~), or the person upon behalf of which the individual(~~s~~) acted, executed the instrument.

Gayl Lynn Franssen
Notary Public - State of New York

G
GAYL LYNN FRANSSEN
Notary Public, State of New York
No. 01FR6220451
Qualified in Onondaga County
Commission Expires Apr. 12, 2018

SCHEDULE "A" PROPERTY DESCRIPTION

PROPERTY DESCRIPTION
&
ENVIRONMENTAL EASEMENT
SECTION 34, BLOCK 174, LOTS 1, 208A, & 209A
VILLAGE OF GARDEN CITY
TOWN OF HEMPSTEAD
&
SECTION 34, BLOCK 174, LOTS 208B & 209B
VILLAGE OF HEMPSTEAD
TOWN OF HEMPSTEAD
NASSAU COUNTY, NEW YORK

A TRACT OF LAND BEING SECTION 34, BLOCK 174, LOTS 1, 208A, & 209A, IN THE VILLAGE OF GARDEN CITY & SECTION 34, BLOCK 174, LOTS 208B & 209B IN THE VILLAGE OF HEMPSTEAD IN THE TOWN OF HEMPSTEAD, NASSAU COUNTY, NEW YORK AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE SOUTHERLY LINE OF SECOND STREET AND THE WESTERLY LINE OF THE LONG ISLAND RAIL ROAD; THENCE,

1. ALONG SAID WESTERLY LINE ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 2833.93' WITH AN ARC LENGTH OF 199.83', A CENTRAL ANGLE OF 04° 02' 24" WHOSE CHORD BEARS SOUTH 24° 15' 05" WEST 199.79'; THENCE,
2. CONTINUING ALONG SAID WESTERLY LINE SOUTH 26° 16' 17" WEST 589.92' TO THE NORTHERLY LINE OF INTERSECTION STREET; THENCE,
3. ALONG SAID NORTHERLY LINE SOUTH 72° 35' 17" WEST 301.31' TO THE EASTERLY LINE OF WENDELL STREET; THENCE,
4. ALONG SAID EASTERLY LINE NORTH 17° 24' 43" WEST 57.43'; THENCE,
5. NORTH 60° 01' 17" EAST 7.89' TO THE EASTERLY LINE OF CEDAR VALLEY AVENUE; THENCE,
6. ALONG SAID EASTERLY LINE NORTH 16° 15' 43" WEST 530.00' TO THE SOUTHERLY LINE OF THE AFOREMENTIONED SECOND STREET THENCE,
7. ALONG SAID SOUTHERLY LINE NORTH 73° 30' 17" EAST 823.33' THE POINT OF BEGINNING OF THE HEREIN DESCRIBED TRACT CONTAINING 7.58 ACRES MORE OR LESS.

INTENDING AND BEING THE SAME PROPERTY AS THAT DESCRIBED IN DEED DATED MAY 27, 1998 FROM LONG ISLAND LIGHTING COMPANY TO MARKETSPAN GAS CORPORATION, RECORDED IN LIBER 10926 AT PAGE 966 AT THE NASSAU COUNTY CLERK'S OFFICE ON JULY 1, 1998.

ALSO INTENDING AND BEING THE SAME PROPERTY AS THAT DESCRIBED IN DEED DATED AUGUST 27, 2008 FROM BURNS-PEARSON REALTY CORPORATION TO KEYSpan GAS EAST CORPORATION, RECORDED IN LIBER 12430 AT PAGE 634 AT THE NASSAU COUNTY CLERK'S OFFICE ON SEPTEMBER 5, 2008.

BARCLAY DAMON ^{LLP}

Courtney M. Merriman
Partner

June 21, 2016

VIA CERTIFIED MAIL

Honorable Wayne J. Hall, Sr.
Village of Hempstead
99 Nichols Ct.
Hempstead, NY 11550

Re: Hempstead Intersection Street MGP - Environmental Easement
Address: Sec. 34, Blk. 174, Lots 1, 208A & 209A, Village of Garden City, New York
Sec. 34, Blk. 174, Lots 208B & 209B, Village of Hempstead, New York
Owner: KeySpan Gas East Corporation
Site No.: 1-30-086

Dear Mayor Hall:

Attached please find a copy of an environmental easement granted to the New York State Department of Environmental Conservation ("Department")

on May 2, 2016,
by KeySpan Gas East Corporation
for property at : Sec. 34, Blk. 174, Lots 1, 208A & 209A, Village of Garden City, New York
Sec. 34, Blk. 174, Lots 208B & 209B, Village of Hempstead, New York
Tax Map No. 34-174-1
DEC Site No: 1-30-086

This Environmental Easement restricts future use of the above-referenced property to restricted residential, commercial or industrial use. Any on-site activity must be done in accordance with the Environmental Easement and the Site Management Plan which is incorporated into the Environmental Easement. Department approval is also required prior to any groundwater use.

Article 71, Section 71-3607 of the New York State Environmental Conservation Law requires that:

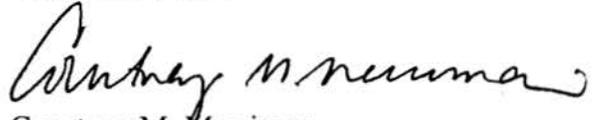
1. Whenever the department is granted an environmental easement, it shall provide each affected local government with a copy of such easement and shall

also provide a copy of any documents modifying or terminating such environmental easement.

2. Whenever an affected local government receives an application for a building permit or any other application affecting land use or development of land that is subject to an environmental easement and that may relate to or impact such easement, the affected local government shall notify the department and refer such application to the department. The department shall evaluate whether the application is consistent with the environmental easement and shall notify the affected local government of its determination in a timely fashion, considering the time frame for the local government's review of the application. The affected local government shall not approve the application until it receives approval from the department.

An electronic version of every environmental easement that has been accepted by the Department is available to the public at: <http://www.dec.ny.gov/chemical/36045.html>. Please forward this notice to your building and/or planning departments, as applicable, to ensure your compliance with these provisions of New York State Environmental Conservation Law. If you have any questions or comments regarding this matter, please do not hesitate to contact me.

Very truly yours,



Courtney M. Merriman

CMM/jml
Attachment

cc: Joe Simone, Superintendent (w/attachment)



7015 0640 0003 3483 1731
7015 0640 0003 3483 1731

U.S. Postal Service™
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Certified Mail Fee \$	Postmark Here
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<input type="checkbox"/> Return Receipt (hardcopy) \$	
<input type="checkbox"/> Return Receipt (electronic) \$	
<input type="checkbox"/> Certified Mail Restricted Delivery \$	
<input type="checkbox"/> Adult Signature Required \$	
<input type="checkbox"/> Adult Signature Restricted Delivery \$	
Postage \$	JML 3073024
Total Postage and Fees \$	
Sent To Hon. Wayne J. Hall, Sr. Village of Hempstead 99 Nichols Ct. Hempstead, NY 11550	

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

FROM: BARCLAY DAMON^{LLP}
 ONE PARK PLACE
 300 SOUTH STATE STREET
 SYRACUSE, NEW YORK 13202

3073024

CMM

TO:

Hon. Wayne J. Hall, Sr.
 Village of Hempstead
 99 Nichols Ct.
 Hempstead, NY 11550

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:
 Hon. Wayne J. Hall, Sr.
 Village of Hempstead
 99 Nichols Ct.
 Hempstead, NY 11550



9590 9403 0673 5196 5357 46

2. Article Number (Transfer from service label)
 7015 0640 0003 3483 1731

COMPLETE THIS SECTION ON DELIVERY

A. Signature
 [Signature] Agent Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? Yes
 If YES, enter delivery address below: No

#3073024

3. Service Type
- | | |
|--|---|
| <input type="checkbox"/> Adult Signature | <input type="checkbox"/> Priority Mail Express® |
| <input type="checkbox"/> Adult Signature Restricted Delivery | <input type="checkbox"/> Registered Mail™ |
| <input checked="" type="checkbox"/> Certified Mail® | <input type="checkbox"/> Registered Mail Restricted Delivery |
| <input type="checkbox"/> Certified Mail Restricted Delivery | <input checked="" type="checkbox"/> Return Receipt for Merchandise |
| <input type="checkbox"/> Collect on Delivery | <input type="checkbox"/> Signature Confirmation™ |
| <input type="checkbox"/> Collect on Delivery Restricted Delivery | <input type="checkbox"/> Signature Confirmation Restricted Delivery |
| <input type="checkbox"/> All Restricted Delivery | |

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.

OFFICIAL USE

7015 0640 0003 3483 1731

Certified Mail Fee	\$
Extra Services & Fees (check box, add fee as appropriate)	
<input type="checkbox"/> Return Receipt (hardcopy)	\$
<input type="checkbox"/> Return Receipt (electronic)	\$
<input type="checkbox"/> Certified Mail Restricted Delivery	\$
<input type="checkbox"/> Adult Signature Required	\$
<input type="checkbox"/> Adult Signature Restricted Delivery	\$
Postage	\$
Total Postage and Fees	\$
Sent To Hon. Wayne J. Hall, Sr. Village of Hempstead 99 Nichols Ct. Hempstead, NY 11550	

Postmark Here
 SYRACUSE NY 13201
 JML
 3073024

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
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- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:
Hon. Wayne J. Hall, Sr.
Village of Hempstead
99 Nichols Ct.
Hempstead, NY 11550



9590 9403 0673 5196 5357 46

2. Article Number (Transfer from service label)
 7015 0640 0003 3483 1731

COMPLETE THIS SECTION, ON DELIVERY

A. Signature X <i>[Signature]</i>	<input type="checkbox"/> Agent <input type="checkbox"/> Addressee
B. Received by (Printed Name) <i>[Signature]</i>	C. Date of Delivery 6/29/16
D. Is delivery address different from item 1? <input type="checkbox"/> Yes If YES, enter delivery address below: <input checked="" type="checkbox"/> No	
#3073024	

3. Service Type	<input type="checkbox"/> Priority Mail Express®
<input type="checkbox"/> Adult Signature	<input type="checkbox"/> Registered Mail™
<input type="checkbox"/> Adult Signature Restricted Delivery	<input type="checkbox"/> Registered Mail Restricted Delivery
<input checked="" type="checkbox"/> Certified Mail®	<input checked="" type="checkbox"/> Return Receipt for Merchandise
<input type="checkbox"/> Certified Mail Restricted Delivery	<input type="checkbox"/> Signature Confirmation™
<input type="checkbox"/> Collect on Delivery	<input type="checkbox"/> Signature Confirmation Restricted Delivery
<input type="checkbox"/> Collect on Delivery Restricted Delivery	
<input type="checkbox"/> all Restricted Delivery	



7015 0640 0003 3483 1748
7015 0640 0003 3483 1748

U.S. Postal Service™
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Domestic Mail Only

For delivery information, visit our website at www.usps.com

OFFICIAL USE

Certified Mail Fee	\$
Extra Services & Fees (check box, add fee as appropriate)	
<input type="checkbox"/> Return Receipt (hardcopy)	\$
<input type="checkbox"/> Return Receipt (electronic)	\$
<input type="checkbox"/> Certified Mail Restricted Delivery	\$
<input type="checkbox"/> Adult Signature Required	\$
<input type="checkbox"/> Adult Signature Restricted Delivery	\$

Postmark
Here

Postage	\$
Total Postage and Fees	\$

JML
3073024

Sept To
Joe Simone, Superintendent
Street and Apt. No., or PO Box No.
202 Jackson Street
City, State, ZIP+4®
Hempstead, NY 11550

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

FROM: BARCLAY DAMON LLP
ONE PARK PLACE
300 SOUTH STATE STREET
SYRACUSE, NEW YORK 13202

3073024

CMM

TO:

Joe Simone, Superintendent
202 Jackson Street
Hempstead, NY 11550

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:
Joe Simone, Superintendent
202 Jackson Street
Hempstead, NY 11550



9590 9403 0673 5196 5357 53

2. Article Number (Transfer from service label)
7015 0640 0003 3483 1748

COMPLETE THIS SECTION ON DELIVERY

A. Signature Agent Addressee

B. Received by (Printed Name) _____

C. Date of Delivery _____

D. Is delivery address different from item 1? Yes
If YES, enter delivery address below: No

#3073024

3. Service Type

<input type="checkbox"/> Adult Signature	<input type="checkbox"/> Priority Mail Express®
<input type="checkbox"/> Adult Signature Restricted Delivery	<input type="checkbox"/> Registered Mail™
<input checked="" type="checkbox"/> Certified Mail®	<input type="checkbox"/> Registered Mail Restricted Delivery
<input type="checkbox"/> Certified Mail Restricted Delivery	<input checked="" type="checkbox"/> Return Receipt for Merchandise
<input type="checkbox"/> Collect on Delivery	<input type="checkbox"/> Signature Confirmation™
<input type="checkbox"/> Collect on Delivery Restricted Delivery	<input type="checkbox"/> Signature Confirmation Restricted Delivery
<input type="checkbox"/> Restricted Delivery	

U.S. Postal Service™
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OFFICIAL USE

7015 0640 0003 3483 1748

Certified Mail Fee		
\$		
Extra Services & Fees (check box, add fee as appropriate)		
<input type="checkbox"/>	Return Receipt (hardcopy) \$	
<input type="checkbox"/>	Return Receipt (electronic) \$	
<input type="checkbox"/>	Certified Mail Restricted Delivery \$	
<input type="checkbox"/>	Adult Signature Required \$	
<input type="checkbox"/>	Adult Signature Restricted Delivery \$	
Postage		
\$		
Total Postage and Fees		
\$		
Sent To Joe Simone, Superintendent Street and Apt. No., or PO Box No. 202 Jackson Street City, State, ZIP+4® Hempstead, NY 11550		
PS Form 3800, April 2015 PSN 7530-02-000-9047		See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

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- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:
Joe Simone, Superintendent
202 Jackson Street
Hempstead, NY 11550



9590 9403 0673 5196 5357 53

2. Article Number (Transfer from service label)
7015 0640 0003 3483 1748

COMPLETE THIS SECTION OF DELIVERY

A. Signature
 Agent
 Addressee

B. Received by (Printed Name)
 C. Date of Delivery
 6/24/16

D. Is delivery address different from item 1? Yes
 If YES, enter delivery address below: No

#3073024

3. Service Type

<input type="checkbox"/> Adult Signature	<input type="checkbox"/> Priority Mail Express®
<input type="checkbox"/> Adult Signature Restricted Delivery	<input type="checkbox"/> Registered Mail™
<input checked="" type="checkbox"/> Certified Mail®	<input type="checkbox"/> Registered Mail Restricted Delivery
<input type="checkbox"/> Certified Mail Restricted Delivery	<input checked="" type="checkbox"/> Return Receipt for Merchandise
<input type="checkbox"/> Collect on Delivery	<input type="checkbox"/> Signature Confirmation™
<input type="checkbox"/> Collect on Delivery Restricted Delivery	<input type="checkbox"/> Signature Confirmation Restricted Delivery

1 Restricted Delivery

Nassau County
 Maureen O'Connell
 County Clerk
 Mineola, NY 11501



60 2016 00054222

Instrument Number: 2016- 00054222

As

D06 - AGREEMENT

Recorded On: June 02, 2016

Parties: KEYSpan GAS EAST CORP

TO PEOPLE OF THE STATE OF NEW YORK

Recorded By: ALL STATE ABST

Billable Pages: 9

Num Of Pages: 10

Comment:

**** Examined and Charged as Follows: ****

D06 - AGREEMENT	90.00	Blocks - Deeds - \$300	300.00	Tax Affidavit TP 584	5.00
Recording Charge:	395.00				
		Consideration			
	Amount	Amount	RS#/CS#		
Tax-Transfer	0.00	0.00	RE 21350	Basic	0.00 Spec ASST 0.00
HEMPSTEAD				Local NY CITY	0.00 Spec ADDL SONYMA 0.00
				Additional MTA	0.00 Transfer 0.00
Tax Charge:	0.00				

Property Description:

Line	Section	Block	Lot	Unit	Town Name
1	34	174	1		HEMPSTEAD
2	34	174	208A		HEMPSTEAD
3	34	174	208B		HEMPSTEAD
4	34	174	209A		HEMPSTEAD
5	34	174	209B		HEMPSTEAD

**** THIS PAGE IS PART OF THE INSTRUMENT ****

I hereby certify that the within and foregoing was recorded in the Clerk's Office For: Nassau County, NY

File Information:

Document Number: 2016- 00054222
 Receipt Number: 281695
 Recorded Date/Time: June 02, 2016 02:19:09P
 Book-Vol/Pg: Bk-D VI-13368 Pg-705
 Cashier / Station: 0 SDS / NCCL-HBFD1

Record and Return To:

BARCLAY DAMON LLP
 ONE PARK PL
 300 SOUTH STATE ST
 SYRACUSE NY 13202



Maureen O'Connell
 County Clerk Maureen O'Connell

County: Nassau Site No: 130086 Order on Consent Index : D1-0001-98-11

RTR
19#1
D06
TP

Barclay/Damon LLP, One Park Pl - 300 South State St., Syracuse NY

13202

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36
OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 2ND day of May, 2016, between Owner(s) KeySpan Gas East Corporation d/b/a National Grid, having an office at 175 East Old Country Road, Hicksville, New York 11530, County of Nassau, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of Intersection Street in the Town of Hempstead, County of Nassau and State of New York, known and designated on the tax map of the County Clerk of Nassau as tax map parcel numbers: Section 34 Block 174 Lots 1, 208A, 208B, 209A and 209B, being the same as that property conveyed to Grantor by deeds dated May 27, 1998 and August 27, 2008 and recorded in the Nassau County Clerk's Office in Liber and Page 10926/0966 and 12430/0634, respectively. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 7.58 +/- acres, and is hereinafter more fully described in the Land Title Survey dated January 18, 2016 prepared by Kenny L. Kennon, P.L.S., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation

34
174
1
208A
208B
209B
209A

established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Order on Consent Index Number: D1-0001-98-11, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. **Purposes.** Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.
2. **Institutional and Engineering Controls.** The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.
 - A. (1) The Controlled Property may be used for:

**Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii),
Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial
as described in 6 NYCRR Part 375-1.8(g)(2)(iv)**
 - (2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);
 - (3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;
 - (4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Nassau County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
 - (5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;
 - (6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation

pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:
(i) are in-place;
(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to: Site Number: 130086
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to: Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and

communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

KeySpan Gas East Corporation d/b/a National Grid:

By: Charles Willard 

Print Name: Charles Willard

Title: Authorized Rep. Date: 4/6/2016

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Onondaga)

On the 6th day of April, in the year 20 16 before me, the undersigned, personally appeared Charles Willard, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(~~s~~) whose name is (~~are~~) subscribed to the within instrument and acknowledged to me that he/~~she~~/~~they~~ executed the same in his/~~her~~/~~their~~ capacity(~~ies~~), and that by his/~~her~~/~~their~~ signature(~~s~~) on the instrument, the individual(~~s~~), or the person upon behalf of which the individual(~~s~~) acted, executed the instrument.

Gayl Lynn Franssen
Notary Public - State of New York

G
GAYL LYNN FRANSSEN
Notary Public, State of New York
No. 01FR6220451
Qualified in Onondaga County
Commission Expires Apr. 12, 2018

SCHEDULE "A" PROPERTY DESCRIPTION

PROPERTY DESCRIPTION
&
ENVIRONMENTAL EASEMENT
SECTION 34, BLOCK 174, LOTS 1, 208A, & 209A
VILLAGE OF GARDEN CITY
TOWN OF HEMPSTEAD
&
SECTION 34, BLOCK 174, LOTS 208B & 209B
VILLAGE OF HEMPSTEAD
TOWN OF HEMPSTEAD
NASSAU COUNTY, NEW YORK

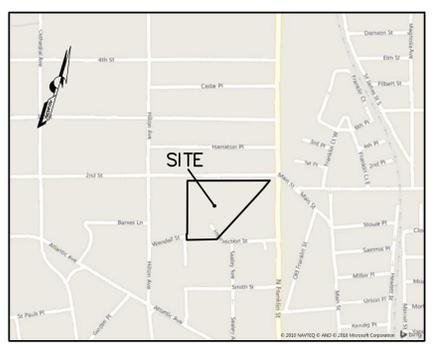
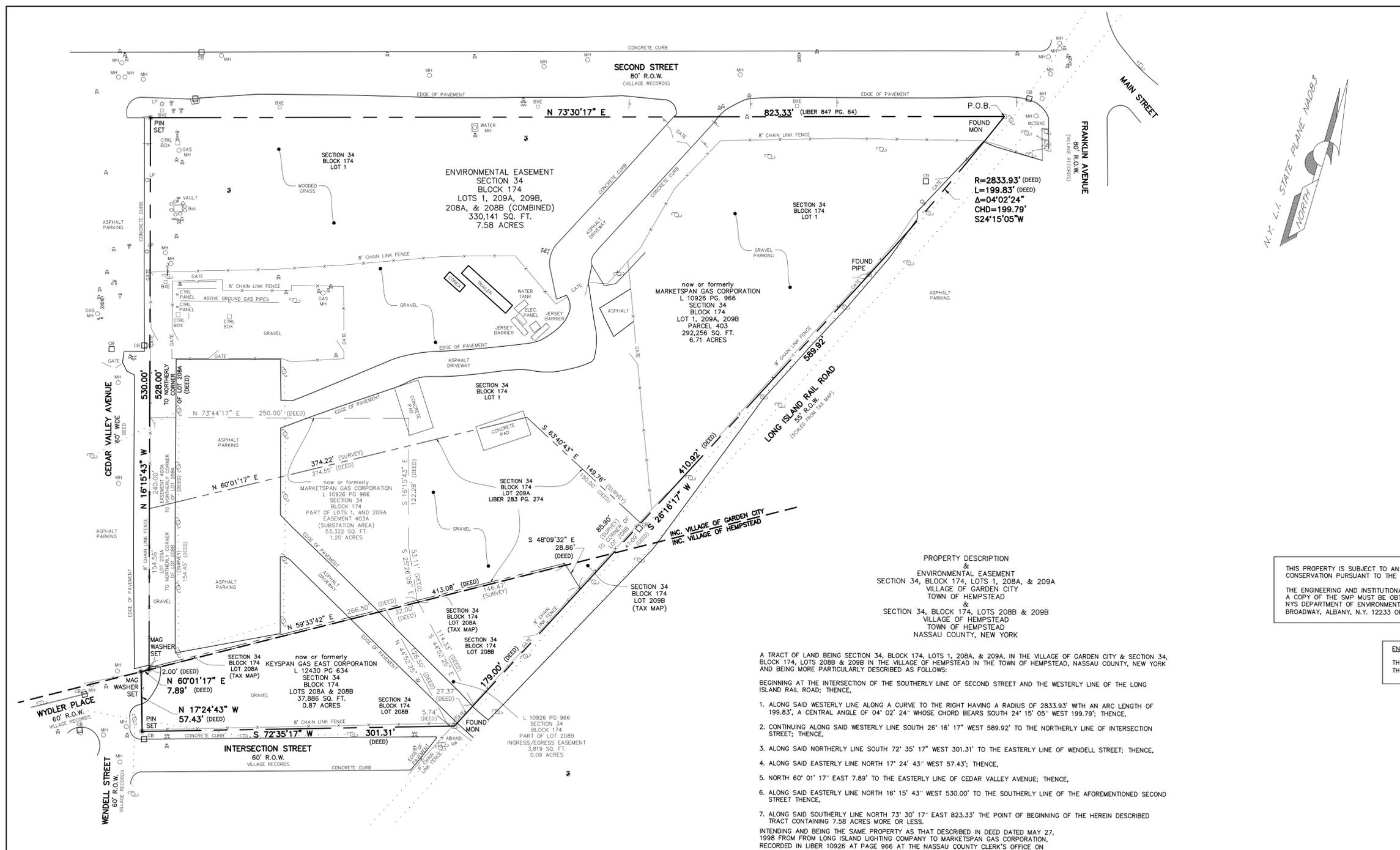
A TRACT OF LAND BEING SECTION 34, BLOCK 174, LOTS 1, 208A, & 209A, IN THE VILLAGE OF GARDEN CITY & SECTION 34, BLOCK 174, LOTS 208B & 209B IN THE VILLAGE OF HEMPSTEAD IN THE TOWN OF HEMPSTEAD, NASSAU COUNTY, NEW YORK AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE SOUTHERLY LINE OF SECOND STREET AND THE WESTERLY LINE OF THE LONG ISLAND RAIL ROAD; THENCE,

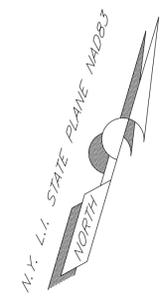
1. ALONG SAID WESTERLY LINE ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 2833.93' WITH AN ARC LENGTH OF 199.83', A CENTRAL ANGLE OF 04° 02' 24" WHOSE CHORD BEARS SOUTH 24° 15' 05" WEST 199.79'; THENCE,
2. CONTINUING ALONG SAID WESTERLY LINE SOUTH 26° 16' 17" WEST 589.92' TO THE NORTHERLY LINE OF INTERSECTION STREET; THENCE,
3. ALONG SAID NORTHERLY LINE SOUTH 72° 35' 17" WEST 301.31' TO THE EASTERLY LINE OF WENDELL STREET; THENCE,
4. ALONG SAID EASTERLY LINE NORTH 17° 24' 43" WEST 57.43'; THENCE,
5. NORTH 60° 01' 17" EAST 7.89' TO THE EASTERLY LINE OF CEDAR VALLEY AVENUE; THENCE,
6. ALONG SAID EASTERLY LINE NORTH 16° 15' 43" WEST 530.00' TO THE SOUTHERLY LINE OF THE AFOREMENTIONED SECOND STREET THENCE,
7. ALONG SAID SOUTHERLY LINE NORTH 73° 30' 17" EAST 823.33' THE POINT OF BEGINNING OF THE HEREIN DESCRIBED TRACT CONTAINING 7.58 ACRES MORE OR LESS.

INTENDING AND BEING THE SAME PROPERTY AS THAT DESCRIBED IN DEED DATED MAY 27, 1998 FROM LONG ISLAND LIGHTING COMPANY TO MARKETSPAN GAS CORPORATION, RECORDED IN LIBER 10926 AT PAGE 966 AT THE NASSAU COUNTY CLERK'S OFFICE ON JULY 1, 1998.

ALSO INTENDING AND BEING THE SAME PROPERTY AS THAT DESCRIBED IN DEED DATED AUGUST 27, 2008 FROM BURNS-PEARSON REALTY CORPORATION TO KEYSpan GAS EAST CORPORATION, RECORDED IN LIBER 12430 AT PAGE 634 AT THE NASSAU COUNTY CLERK'S OFFICE ON SEPTEMBER 5, 2008.



VICINITY MAP
NOT TO SCALE



THIS PROPERTY IS SUBJECT TO AN ENVIRONMENTAL EASEMENT BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION PURSUANT TO THE TITLE 36 OF ARTICLE 71 OF THE NEW YORK ENVIRONMENTAL CONSERVATION LAW.

THE ENGINEERING AND INSTITUTIONAL CONTROLS FOR THIS EASEMENT ARE SET FORTH IN THE SITE MANAGEMENT PLAN (SMP). A COPY OF THE SMP MUST BE OBTAINED BY ANY PARTY WITH INTEREST IN THE PROPERTY. THE SMP CAN BE OBTAINED FROM NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION, DIVISION OF ENVIRONMENTAL REMEDIATION, SITE CONTROL SECTION, 625 BROADWAY, ALBANY, N.Y. 12233 OR AT "DERWEB@GW.DEC.NY.US".

ENVIRONMENTAL EASEMENT AREA ACCESS

THE DEC OR THEIR AGENT MAY ACCESS THE ENVIRONMENTAL EASEMENT AREA AS SHOWN HEREON THROUGH ANY EXISTING STREET ACCESS OR BUILDING INGRESS/EGRESS ACCESS POINT.

PROPERTY DESCRIPTION
&
ENVIRONMENTAL EASEMENT
SECTION 34, BLOCK 174, LOTS 1, 208A, & 209A
VILLAGE OF GARDEN CITY
TOWN OF HEMPSTEAD
&
SECTION 34, BLOCK 174, LOTS 208B & 209B
VILLAGE OF HEMPSTEAD
TOWN OF HEMPSTEAD
NASSAU COUNTY, NEW YORK

A TRACT OF LAND BEING SECTION 34, BLOCK 174, LOTS 1, 208A, & 209A, IN THE VILLAGE OF GARDEN CITY & SECTION 34, BLOCK 174, LOTS 208B & 209B IN THE VILLAGE OF HEMPSTEAD IN THE TOWN OF HEMPSTEAD, NASSAU COUNTY, NEW YORK AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE SOUTHERLY LINE OF SECOND STREET AND THE WESTERLY LINE OF THE LONG ISLAND RAIL ROAD; THENCE,

1. ALONG SAID WESTERLY LINE ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 2833.93' WITH AN ARC LENGTH OF 199.83', A CENTRAL ANGLE OF 04° 02' 24" WHOSE CHORD BEARS SOUTH 24° 15' 05" WEST 199.79'; THENCE,
2. CONTINUING ALONG SAID WESTERLY LINE SOUTH 26° 16' 17" WEST 589.92' TO THE NORTHERLY LINE OF INTERSECTION STREET; THENCE,
3. ALONG SAID NORTHERLY LINE SOUTH 72° 35' 17" WEST 301.31' TO THE EASTERLY LINE OF WENDELL STREET; THENCE,
4. ALONG SAID EASTERLY LINE NORTH 17° 24' 43" WEST 57.43'; THENCE,
5. NORTH 60° 01' 17" EAST 7.89' TO THE EASTERLY LINE OF CEDAR VALLEY AVENUE; THENCE,
6. ALONG SAID EASTERLY LINE NORTH 16° 15' 43" WEST 530.00' TO THE SOUTHERLY LINE OF THE AFOREMENTIONED SECOND STREET THENCE,
7. ALONG SAID SOUTHERLY LINE NORTH 73° 30' 17" EAST 823.33' THE POINT OF BEGINNING OF THE HEREIN DESCRIBED TRACT CONTAINING 7.58 ACRES MORE OR LESS.

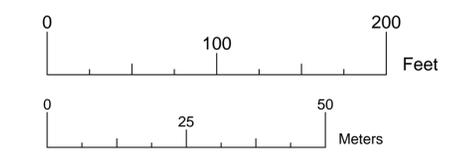
INTENDING AND BEING THE SAME PROPERTY AS THAT DESCRIBED IN DEED DATED MAY 27, 1998 FROM FROM LONG ISLAND LIGHTING COMPANY TO MARKETSPAN GAS CORPORATION, RECORDED IN LIBER 10926 AT PAGE 966 AT THE NASSAU COUNTY CLERK'S OFFICE ON JULY 1, 1998.

ALSO INTENDING AND BEING THE SAME PROPERTY AS THAT DESCRIBED IN DEED DATED AUGUST 27, 2008 FROM FROM BURNS-PEARSON REALTY CORPORATION TO KEYSpan GAS EAST CORPORATION, RECORDED IN LIBER 12430 AT PAGE 634 AT THE NASSAU COUNTY CLERK'S OFFICE ON SEPTEMBER 5, 2008.

SURVEY CERTIFICATION

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE "2011 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/ACSM LAND TITLE SURVEYS," JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS AND INCLUDES ITEMS 1, 7, 8, AND 20(b) OF TABLE A THEREOF. PURSUANT TO THE ACCURACY STANDARDS AS ADOPTED BY ALTA AND NSPS AND IN EFFECT ON THE DATE OF THIS CERTIFICATION, UNDERSIGNED FURTHER CERTIFIES THAT IN MY PROFESSIONAL OPINION, AS A LAND SURVEYOR REGISTERED IN THE STATE OF NEW YORK, THE RELATIVE POSITIONAL ACCURACY OF THIS SURVEY DOES NOT EXCEED THAT WHICH IS SPECIFIED THEREIN.

KENNY L. KENNON DATE
NEW YORK PROFESSIONAL LAND SURVEYOR LICENSE NO. 50171



KENNY L. KENNON, P.L.S.
NEW YORK PROFESSIONAL LAND SURVEYOR LICENSE NO. 50171

ALTA/ACSM LAND TITLE SURVEY
SECTION 34 - BLOCK 174 - LOT 1, 208A, & 209A
VILLAGE OF GARDEN CITY
TOWN OF HEMPSTEAD
&
SECTION 34 - BLOCK 174 - LOT 208B, & 209B
VILLAGE OF HEMPSTEAD
TOWN OF HEMPSTEAD
NASSAU COUNTY, NEW YORK

KSS KENNON SURVEYING SERVICES INC.
5 POWDER HORN DRIVE, SUITE 4
P.O. BOX 4477
WARREN, NEW JERSEY 07059

PHONE: 732-564-1818 EMAIL: KSS@KENNONSURVEYING.COM
DATE: 01-18-16 SCALE: 1" = 50' PROJ. NO.: 2664 SHEET: 1 OF 1

- LEGEND**
- BOUNDARY LINE & ENVIRONMENTAL EASEMENT LIMITS
 - INTERNAL LOT LINE
 - VILLAGE LINE
 - EASEMENT LINE
 - CURB LINE
 - EDGE OF PAVEMENT LINE
 - ABOVE GROUND GAS PIPE
 - FENCE LINE
 - OVERHEAD WIRES
 - FOUND MONUMENT
 - FOUND PIPE
 - SET PIN
 - CB CATCH BASIN
 - MH MANHOLE
 - CO CLEAN OUT
 - W WATER VALVE
 - G GAS VALVE
 - M GAS MARKER
 - F FIRE HYDRANT
 - BXE ELECTRIC BOX
 - MW MONITORING WELL
 - Bol BOLLARD
 - F FENCE POST
 - L LIGHT POLE
 - U UTILITY POLE
 - S SIGN

NOTES

1. THE FOLLOWING INFORMATION WAS UTILIZED IN THE PREPARATION OF THIS SURVEY:
A. THE LAND & TAX MAP OF SEC. 34 BLK. 174, NASSAU COUNTY, NEW YORK.
B. VARIOUS DEEDS FOR THE SUBJECT AND ADJACENT PROPERTIES.
C. "FINAL AS-BUILT SURVEY" PREPARED BY MASER CONSULTING P.A. DATED 2/10/2014, LAST REVISED 8/22/2014.
2. NEW YORK LONG ISLAND STATE PLANE COORDINATE SYSTEM (NAD83, 2011 - HORIZONTAL, AND NAVD88 - VERTICAL, GEOID12) ESTABLISHED FROM RTK GPS OBSERVATIONS.
3. IMPROVEMENTS SHOWN HEREON FROM ACTUAL FIELD MEASUREMENTS PERFORMED BY THIS FIRM THROUGH 09/11/2015.
4. NO WETLAND DELINEATION AND/OR LOCATION WAS PERFORMED AS A PART OF THIS SURVEY.
5. PROPERTY SUBJECT TO THE FINDINGS OF AN UPDATED TITLE REPORT WHICH WAS NOT PROVIDED AT THE TIME OF THIS SURVEY. AN UPDATED SCHEDULE B WAS NOT ADDRESSED BY THIS SURVEY.

APPENDIX B

EXCAVATION WORK PLAN

APPENDIX B

EXCAVATION WORK PLAN

**HEMPSTEAD INTERSECTION STREET FORMER
MANUFACTURED GAS PLANT SITE
VILLAGES OF GARDEN CITY AND HEMPSTEAD, LONG
ISLAND, NEW YORK**

Prepared for:

**National Grid
One Metrotech Center
Brooklyn, New York 11201**

Prepared by:

**URS Corporation
257 West Genesee Street
Suite 400
Buffalo, New York 14203**

November 2016

URS CORPORATION

J:\Projects\11175065.00000\WORD\DRAFT\ISS Construction\Site Management Plan\Final Feb 2017\APPENDIX B-final.docx

**APPENDIX B
EXCAVATION WORK PLAN**

1.0 NOTIFICATION

At least 15 days prior to the start of any excavation into known or potential MGP-related residuals, the site owner or their representative will notify National Grid and the New York State Department of Environmental Conservation (NYSDEC). [Under emergency circumstances (e.g. work required to prevent loss of life or property; restoration of electrical and/or natural gas service) work may be conducted with no prior notification to the NYSDEC; the NYSDEC will be notified as soon as possible thereafter.] As of the time that this document was finalized, the notifications will be made to:

Mr. John Spellman, P.E.
NYSDEC – Division of Environmental Remediation
625 Broadway, 11th Floor
Albany, NY 12233-7013

Mr. Patrick Van Rossem
National Grid
175 East Old Country Road
Hicksville, NY 11801

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for site re-grading, intrusive elements or utilities to be installed onsite, estimated volumes of contaminated soil to be excavated and any work that may impact the engineering controls (i.e., cover system, ISS material).
- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;

URS CORPORATION

**APPENDIX B
EXCAVATION WORK PLAN**

- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;
- A copy of the contractor's health and safety plan, in electronic format, if it differs from the example HASP provided in Appendix C will be followed;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill for excavations into known or potential MGP-related residuals, along with the required chemical testing results to meet 6 NYCRR Part 375 Table 375-6.8(b) restricted-residential use (subsurface below 2 feet of ground surface) or Table 375-6.8(b) residential (within 2 feet of ground surface).

In the event that work is performed near any existing natural gas pipelines, the following will be followed:

- The contractor shall ensure that the identification of all active utilities and gas lines has been performed and marked out in the field, and National Grid has been notified and has reviewed the planned intrusive work near gas lines;
- Any work to be performed near the gas pipeline will be in the presence of a National Grid gas line representative.
- If there is a need to remove a gas pipeline as part of the work, National Grid will need to be consulted so that an appropriate plan can be developed for that.
- The contractor is responsible for protecting the structural integrity of gas pipelines in and around their work areas.
- For any planned construction work that will occur within 25 feet of gas pipelines, the contractor will need to work with National Grid to establish the safe protocol for working near the gas lines.
- National Grid may require that the contractor place survey points on the pipe crown and monitor the pipe behavior during construction and throughout the duration of pipe exposure.

**APPENDIX B
EXCAVATION WORK PLAN**

2.0 SOIL SCREENING METHODS

Visual, olfactory, and instrument-based soil screening will be performed by a qualified environmental professional during all remedial and development excavations into known or potential MGP-related residuals. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the Certificate of Completion.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, material that can be reused in the excavation, and material that can be used as cover soil.

3.0 STOCKPILE METHODS

Soil stockpiles will have a berm and/or silt fence placed around them. Hay bales will be used as needed near catch basins and other discharge points.

When not in use, stockpiles will be kept covered with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and available for inspection by NYSDEC. Stockpiled material not being re-used will be scheduled for transportation to the appropriate disposal facility in a timely manner.

4.0 MATERIALS EXCAVATION AND LOAD OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material known or potential MGP-related residuals.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

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**APPENDIX B
EXCAVATION WORK PLAN**

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and New York State Department of Transportation (NYSDOT) requirements (and all other applicable transportation requirements).

The qualified environmental professional will be responsible for ensuring that all outbound trucks are clean before leaving the site until the activities performed under this section are complete. Locations where vehicles enter or exit the site shall be inspected daily for any indication of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clear of materials derived from the site during intrusive excavation activities. Cleaning of the street will be performed as needed to maintain a clean condition with respect to site-derived materials.

5.0 MATERIALS TRANSPORT OFF-SITE

Transport of contaminated materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be securely covered. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes will be approved prior to use. All trucks loaded with site materials will exit the vicinity of the site using only the approved truck routes which will take into account: (a) limiting transport through residential area and near sensitive sites; (b) use of city mapped truck routes; (c) prohibit off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will minimize stopping and idling outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials.

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**APPENDIX B
EXCAVATION WORK PLAN**

Queuing of trucks will be performed on-site in order to minimize off-site disturbance.

6.0 MATERIALS DISPOSAL OFF-SITE

All excavated ISS monolith material and soil will be treated as contaminated and regulated material unless demonstrated through analysis to be an unregulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of materials from this site is proposed for unregulated off-site disposal (i.e., clean soil removed for development purposes), appropriate planning and testing will be performed based on the scope of the planned work.

Off-site disposal locations for excavated materials will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous fill and contaminated materials taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

7.0 MATERIALS REUSE ON-SITE

Excavated materials may be re-used on-site below a depth of 2 feet if determined to meet DER-10 re-use criteria for restricted residential use.

**APPENDIX B
EXCAVATION WORK PLAN**

8.0 FLUIDS MANAGEMENT

All liquids to be removed from the site, including excavation dewatering, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Contaminated dewatering fluids will not be recharged back to the land surface or subsurface of the site, but will be managed off-site.

9.0 COVER SYSTEM AND ISS MONOLITH RESTORATION

After the completion of soil/gravel removal and any other invasive activities, the cover system will be properly restored. If the type of cover system changes from that which exists (i.e., a soil/gravel cover is replaced by concrete or asphalt), this will be documented in the annual report. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in any updates to the SMP.

Should the monolith be encountered (e.g., through drilling, trenching, excavation), provisions will be made to avoid water accumulation on the encountered monolith surface.

10.0 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import to the site will be in accordance with relevant requirements and the approved remediation work plan.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR Part 375 Table 375-6.8(b) for residential use criteria when used within 2 feet of ground surface or to restricted residential use criteria in the subsurface.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

Trucks entering the site with imported materials will be securely covered. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust emissions.

**APPENDIX B
EXCAVATION WORK PLAN**

11.0 STORMWATER POLLUTION PREVENTION

Smaller-scale soil disturbances for future utility maintenance and landscaping conducted after the completion of Site redevelopment are not anticipated to require coverage under the general State Pollutant Discharge Elimination System (SPDES) Permit or preparation of a Storm Water Pollution Prevention Plan (SWPPP). However, best management practices, such as the placement of silt fencing and hay bales at the perimeter of soil stockpiles and/or the use of polyethylene liners and covers, will be implemented during small-scale soil disturbance that have the potential to encounter MGP-related residuals.

Where barriers and hay bale are installed they will be checked regularly at a minimum of every 7 days and after every storm event. Results of inspections will be recorded in a logbook and available for inspection by NYSDEC. All necessary repairs shall be made immediately.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired quickly with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

**APPENDIX B
EXCAVATION WORK PLAN**

12.0 CONTINGENCY PLAN

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions. The objectives during any emergency shall be to protect human health and safety and then the environment. A qualified environmental professional will determine the best course of action for dealing with the emergency and possible follow-up requirements that may result from implementing those actions (e.g., erosion of cover due to severe weather conditions, injury to site inspection workers, discovery of an unknown source of contamination during future excavation activities that may require remediation).

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (Target Compound List [TCL] volatiles and semi-volatiles, Target Analyte List metals, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes.

Identification of unknown or unexpected contaminated media identified during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. These findings will also be included in the periodic reports prepared pursuant to Section 5 of the SMP.

13.0 COMMUNITY AIR MONITORING PLAN

Community Air Monitoring will be consistent with the guidance provided in the NYSDOH Generic Community Air Monitoring Plan obtained in Appendix 1A of DER-10. An example CAMP is provided in Appendix C. Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

**APPENDIX B
EXCAVATION WORK PLAN**

14.0 ODOR, VAPOR, AND DUST CONTROL PLAN

This odor, vapor and dust control plan is capable of controlling potential emissions of odors, vapor and/or dust that may arise as a result of onsite excavation and handling activities for excavations into known or potential MGP-related residuals. Specific odor, vapor, and dust control methods are to be used as part of the Community Air Monitoring Plan for excavations into known or potential MGP-related residuals.

All necessary means will be employed to prevent onsite and off-site odors, vapors and dust. At a minimum, these measures will include: (a) limiting the excavation size and the surface area of exposed contaminated soil; (b) covering contaminated soil with polyethylene sheeting; and (c) using foams to cover exposed odorous soils. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be suspended and the source of odors will be identified and corrected. Work will resume when nuisance odors have been abated. NYSDEC and New York State Department of Health (NYSDOH) will be notified about any odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner or property owner's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

APPENDIX C

HASP AND CAMP EXAMPLES

(ON CD)

**Hempstead Intersection Street
Former Manufactured Gas Plant Site
Villages of Hempstead and Garden City
Nassau County, New York**

APPENDIX C1

EXAMPLE HEALTH AND SAFETY PLAN

**HEMPSTEAD INTERSECTION STREET FORMER
MANUFACTURED GAS PLANT SITE
VILLAGES OF GARDEN CITY AND HEMPSTEAD, LONG
ISLAND, NEW YORK**

Prepared for:

**National Grid
One Metrotech Center
Brooklyn, New York 11201**

Prepared by:

**URS Corporation
257 West Genesee Street
Suite 400
Buffalo, New York 14203**

January 2015

TABLE OF CONTENTS

	<u>Page</u>
GLOSSARY OF TERMS, ACRONYMS AND ABBREVIATIONS	v
1.0 PLAN-AT-A-GLANCE	1-1
2.0 FACILITY BACKGROUND/WORK PLAN	2-1
2.1 Site History	2-1
2.2 Interim Remedial Measures	2-2
2.3 Proposed Investigation	2-2
2.3.1 Delineation	2-3
2.3.2 Drilling and Well Installation	2-3
2.3.3 Groundwater Sampling	2-3
2.3.4 Surveying	2-3
2.3.5 Sampling and NAPL Collection/Disposal	2-3
3.0 APPLICABILITY	3-1
4.0 RESPONSIBILITIES	4-1
4.1 URS Project Manager	4-1
4.2 URS Site Safety Officer	4-2
4.3 URS Regional Manager of Health, Safety and Environment	4-2
4.4 URS Project Personnel	4-3
4.5 Subcontractor's Safety Representative	4-3
5.0 JOB HAZARD ANALYSIS	5-1
5.1 Chemical Hazards	5-1
5.1.1 Site Constituents	5-1
5.1.2 Hazard Communication Materials	5-2
5.2 Physical Hazards	5-2
5.2.1 Heat Stress Recognition and Control	5-2
5.2.2 Cold Stress Recognition and Control	5-2
5.2.3 Noise Hazards	5-3
5.2.4 Slip/Trip/Fall Hazards	5-3
5.2.5 Lifting Hazards	5-3
5.2.6 Underground and Aboveground Utilities	5-4
5.2.7 Work Area Protection	5-5
5.2.8 Drilling Hazards	5-5
5.3 Biological Hazards	5-6
6.0 EXPOSURE MONITORING PLAN	6-1
6.1 Chemical Exposure Monitoring	6-1

6.2	Background Readings.....	6-1
6.3	Data Logging.....	6-2
6.4	Dust Control.....	6-2
6.5	Explosive Atmospheres.....	6-2
6.6	Oxygen-Deficient Atmospheres.....	6-2
7.0	PERSONAL PROTECTIVE EQUIPMENT.....	7-1
7.1	Limitations of Protective Clothing.....	7-1
7.2	Duration of Work Tasks.....	7-2
8.0	RESPIRATORY PROTECTION.....	8-1
8.1	Respirator Selection.....	8-1
8.2	Medical Screening.....	8-1
8.3	Fit Testing.....	8-1
8.4	Respirator Use Instructions.....	8-2
8.5	Respirator Inspection.....	8-2
8.6	Cleaning of Respirators.....	8-3
8.7	Maintenance of Respirators.....	8-4
8.8	Storage of Respirators.....	8-4
8.9	Additional Information.....	8-4
9.0	SITE CONTROL.....	9-1
9.1	General.....	9-1
9.2	Work Zones.....	9-1
10.0	DECONTAMINATION PROCEDURES.....	10-1
10.1	Sanitation.....	10-1
10.2	Decontamination – Medical Emergencies.....	10-1
10.3	Decontamination of Tools.....	10-2
11.0	SAFE WORK PRACTICES.....	11-1
11.1	General Site Rules.....	11-1
11.2	Sampling Practices.....	11-2
11.3	Sample Shipment/Hazardous Materials Shipment.....	11-2
12.0	EMERGENCY RESPONSE PLAN.....	12-1
12.1	Places of Refuge.....	12-1
12.2	Communication.....	12-1
12.3	Emergency Response Procedures.....	12-2
12.4	Medical Emergency Response Plan.....	12-2
12.5	Incident Report.....	12-3
12.6	Spill or Hazardous Materials Release.....	12-3

13.0	TRAINING, MEDICAL SURVEILLANCE AND SITE INSPECTIONS.....	13-1
13.1	Training and Medical Surveillance	13-1
13.2	Site Inspections	13-2
14.0	RECORDKEEPING.....	14-1
15.0	COMMUNITY AIR MONITORING PLAN	15-1

TABLES

Table 1	Job Safety Analyses
Table 2	Chemical Contaminants of Concern

FIGURES

Figure 1	Location Map
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ATTACHMENTS

Attachment 1	Safety Data Sheets/Safety Cards
Attachment 2	URS Safety Management Standards
Attachment 3	Occupational Health Clinic and Hospital Route Maps
Attachment 4	Real-Time Monitoring Instrumentation Specification Sheets
Attachment 5	HASP Compliance Agreement

GLOSSARY OF TERMS, ACRONYMS AND ABBREVIATIONS

°C	degrees Centigrade
°F	degrees Fahrenheit
ACGIH	American Conference of Governmental Industrial Hygienists
analyzer	field instrument described in Section 6.1
atm	atmosphere
BZ	breathing zone
C	ceiling
Carcinogen	a substance that can cause cancer
cc	cubic centimeter
CGI	combustible gas indicator
CIH	Certified Industrial Hygienist
CNS	central nervous system
CSP	Certified Safety Professional
CRZ	contamination reduction zone
DERA	Designated Emergency Response Authority
DOT	Department of Transportation
ESLI	End-of-Service-Life Indicator
eV	electron volts
EZ	Exclusion Zone
FID	flame ionization detector
HEPA	high-efficiency particulate arresting
HSM	Health and Safety Manager
HASP	Health and Safety Plan
HSE	Health, Safety and Environment
HSR	Health and Safety Representative
kg	kilogram
LEL	lower explosive limit
Lpm	liters per minute
m	meter
mg	milligram
mg/m ³	milligrams per cubic meter
MGP	Manufactured Gas Plant

ml	milliliter
mm	millimeter
MSDS	Material Safety Data Sheet
ND	not detected
NIOSH	National Institute for Occupational Safety and Health
O ₂	oxygen
OEL	occupational exposure limit
OSHA	Occupational Safety and Health Administration
OVA	organic vapor analyzer
OVM	organic vapor monitor
PEL	permissible exposure limit
PID	photoionization detector
PM	project manager
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
REL	recommended exposure limit
RHSM	Regional Health and Safety Manager
RSO	Radiation Safety Officer
SH&E	Safety, Health and Environment
SMS	Safety Management Standard
SSO	Site Safety Officer
SSR	Subcontractor's Safety Representative
STEL	short term exposure limit
TLV [®]	Threshold Limit Value
TWA	time-weighted average
UEL	upper explosive limit
URS	URS Corporation
VOC	volatile organic compound

1.0 PLAN-AT-A-GLANCE

THIS SUMMARY SHEET IS PROVIDED AS A QUICK-REFERENCE/OVERVIEW ONLY. THE REMAINDER OF THIS SITE-SPECIFIC HASP IS INTEGRAL TO THE SAFE CONDUCT OF SITE OPERATIONS AND MUST BE APPLIED IN ITS ENTIRETY.

Project Name: National Grid Hempstead Former MGP Site

Project Number: 11175065

Project Location: Villages of Garden City & Hempstead, New York

Client: National Grid Corporation
Hicksville, New York

URS Operating Unit: Buffalo, New York

URS Project Manager: Mike Akerbergs (Clifton, NJ)

URS Site Safety Officer: Rob Hurley

URS Health and Safety Manager: Phil Jones

Effective Dates: January 14, 2015 to December 31, 2015

Use of the HASP after December 30, 2015 to perform activities described herein or other activities in addition to those described herein, is not permitted. The expiration date may be extended by the HSR by preparation of an addendum to the HASP approved by the URS Project Manager and HSR after a review of the applicability of the HASP and approved addend, if any, to the actual facility

APPROVALS

Mike Akerbergs, Project Manager

Date

Phil Jones, CIH, Area SH&E Manager

Date

Emergency Rescue Services*

To contact FIRE/RESCUE, AMBULANCE, and POLICE **Call 911**

*For cellular phones, be prepared to give the operator your name and location address.

Hospital	First Aid Medical Services Facility
Mercy Medical Center - Rockville	Hempstead Main – Medical Center (Urgent Care ONLY)
1000 North Village Avenue	2 Main Street
Rockville Centre, NY 11571 - 9024	Hempstead, NY 11550
Phone: (516) 705-2525	Phone: (516) 489-6600

Government

US EPA National Response Center (800) 424-8802

Poison Control Center **In Long Island dial 211 or (800) 222-1222**

Sharon McLelland
NY State Dept of Health, (518) 402-7880
Bureau of Environmental Exposure Investigation

Amen Omorogbe, P.E.
NY State Dept of Environmental Conservation (518) 402-9662
Division of Environmental Remediation

Nassau County Dept of Health (516) 227-9697

National Grid

Patrick Van Rossem (516) 545-2578

URS Corporation

Project Manager: Mike Akerbergs (973) 883-8695 (office)
(973) 634-8700 (cell)

Site Safety Officer: Rob Hurley (212) 609-8082 (office)
(646) 423-9594 (cell)

Alternate Site Safety Officer: Megan Dascoli (212) 896-0428 (office)
(908) 623-0145 (cell)

Area Safety, Health and Environment Manager: Phil Jones (610) 832-2794 (office)
(215) 494-6671 (cell)

URS Occupational Nurse Hotline: WorkCare (888) 449-7787

CONSTITUENTS OF CONCERN

1. Polyaromatic Hydrocarbons (PAHs)
2. Volatile Organic Compounds (VOCS) (e.g., benzene, toluene, ethylbenzene and Xylenes [BTEX])
3. Heavy Metals (e.g., As, Pb, Hg, Se)
4. Polychlorinated Biphenyls (PCBs)

Material safety data sheets (MSDS) or Safety Cards are provided for the Constituents of Concern in Attachment 1.

SCOPE OF WORK, HAZARD ANALYSIS & PERSONAL PROTECTIVE EQUIPMENT

Task	Minimum Protective Clothing/Equipment Requirements	Chemical Hazards	Heat/Cold Stress	Noise	Slip/Trip/Fall	Lifting Hazards	Mechanical Hazards	Electrical Hazards	Explosion	Water
Task 1: Mobilization of equipment, site reconnaissance, preparation of work areas, establish work zones and utility clearance; Set Up	Steel-toed boots, safety glasses, hard hat, reflective vests, work gloves. This is to be worn for ALL tasks.	Low	Low	Low	Med	Low	Low	Low	N/A	N/A
Task 2 Monitoring wells: liquid level measurements, purging and sampling	Task 1 PPE, Tyvek (poly-coated when working with saturated materials), nitrile gloves when handling potentially contaminated materials, nitrile gloves for handling all samples.	Med	Med	Low	High	Med	Med	Low	Low	Low
Task 3 Recovery wells: NAPL pumping		High	Med	Low	High	Med	Med	Low	Low	Low
Task 4 Operations and maintenance; management of purged water, NAPL and contaminated equipment		High	Med	Low	High	Med	Med	Low	Low	N/A
Potential task: Oversight of installation of additional monitoring/recovery wells	Task 1 PPE, Tyvek (poly-coated when working with saturated materials), hearing protection, nitrile gloves when handling potentially contaminated materials, nitrile gloves for handling all samples.	high	Med	High	High	Med	Med	Low	Low	Low

High - Exposure likely more than 50 percent (%) of the time

Med - Exposure likely 10 to 50% of the time

Low - Exposure likely less than 10% of the time N/A - Exposure not anticipated

Additional information concerning project hazards and their control is provided in Section 5.0.

The HASP Preparer has conducted a Hazard Assessment for this project based on information provided by the Project Manager in accordance with 29 CFR 1910.132(d).

For more information on Personal Protective Equipment (PPE) and respiratory protection requirements, see the Action Levels table (Page 4) and Section 7.0.

ENGINEERING CONTROLS TO BE USED (as applicable)

- Barricades for delineation of work areas (exclusion zones)
- Water spray for dust suppression
- Natural wind forces to reduce exposure to airborne contaminants (stay upwind of drilling activities)
- Light-colored PPE to reduce solar load for heat stress control

For more information, see Section 5.0.

INSTRUMENTATION TO BE USED

- Combustible Gas/O₂ Indicator
- TSI DustTrak aerosol monitor with PM-10 impactor & internal sampling pump
- MultiRAE PLUS PGM-50 Monitor (10.6 eV lamp) with PID, %LEL
- Drager Kit (benzene) or Drager CMS (or equivalent)

For more information, see Section 6.0

PERSONAL EXPOSURE SAMPLING

Will be conducted

Will be conducted if PID readings require the use of respiratory protection as described in the Action Level Table (page 4) and in Section 6.1.1

- **Is not anticipated**

For more information on monitoring, see Section 6.0.

HAZ-COM MATERIALS INVENTORY

TSP or Alconox (decontamination)
Citrisolve (decontamination) or similar terpene-based product
Isobutylene (calibration gas) CH₄/air
(calibration gas)
Nitric/Hydrochloric Acid (sample preservative)
Fuel (equipment fuel – diesel or gasoline)

EXCLUSION ZONE AIR QUALITY MONITORING PROGRAM

Constituent Monitored	Monitoring Instrument	Instrument Reading ⁽³⁾	Program Response
Total Volatile Organic Compounds ⁽¹⁾	Multi-RAE Plus PGM-50 with PID sensor	< 1 ppm	Continue work in Level D PPG
		≥ 1 ppm <5	Take detector tube for benzene - if reading is ≤ 0.5 ppm, continue work in Level D PPE - if reading is > 0.5 ppm, upgrade to Level C PPE (notify RMHSE)
		≥ 5 ppm <50	Upgrade to Level C PPE (notify RMHSE)
		> 50 ppm	Cease work. If feasible, take immediate actions to suppress emissions. Notify URS Project Manager and URS RMHSE ASAP.
Combustible Gases	Multi-RAE Plus PGM-50 with LEL sensor	< 10% LEL	Continue work
		≥ 10% LEL	Cease work. If feasible, take immediate actions to suppress emissions. Notify URS Project Manager and URS RMHSE ASAP.

NOTES:

- ⁽¹⁾ Measurements indicated are relative to background levels. Thus, a reading “response level” of 5 parts per million (ppm) as listed in this table is actually 7 ppm if the background level is measured as being 2 ppm immediately upwind of the work area.
- ⁽²⁾ All instrument readings contained in this table are “one-minute averages.”
- ⁽³⁾ With the exception of combustible gas measurements, all instrument readings are to be taken in breathing zone of the potentially most exposed worker. Lower Explosive Limit (LEL) instrument readings are to be taken at the nearest possible ignition point located downwind of the source of emissions.
- ⁽⁴⁾ Instrument readings are to be made initially at 10 minute intervals. After 30 minutes, (i.e., after four readings), based on the discretion of the SSO, the intervals between readings may be extended to a maximum of 30 minutes. If work tasks or conditions change, frequency should be adjusted by the Site Safety Officer (SSO) accordingly. For example, if photoionization detector (PID) measurements require upgrade to Level C PPE and the level of emissions cannot be reduced below 5 ppm by engineering controls, workers shall don Level C PPE and instrument readings made at 10-minute intervals.
- ⁽⁵⁾ All monitoring equipment must be calibrated daily; these calibrations must be documented in a field notebook. Monitoring instrument readings and colorimetric tube data shall be recorded in a field log book. If these action levels are exceeded, then all site workers shall secure potential emission sources, suspend work in the immediate area of the source and evacuate the work area in an upwind direction immediately. The Site Safety Officer (SSO) and Site Manager should be notified as soon as possible. Air monitoring should be conducted periodically to determine when work can be continued. Do not resume work until air quality monitoring levels are continuously below the action level for at least 15 minutes. The SSO or Site Manager should notify the URS Project Manager and Project Health and Safety Manager (HSM) as soon as practical. Site workers shall take mitigative measures to suppress emissions as appropriate. If air quality monitoring levels do not recede to below the action level, a measure to eliminate or substantially reduce the emissions should be determined and discussed (prior to implementation) with the URS Project Manager and/or Project RHSEM.

HEALTH AND SAFETY EQUIPMENT LIST

Required	Not Required	
<u>x</u>		URS SMSs (relevant to project - see next page)
	x	Occupational Safety and Health Administration (OSHA) "Safety on the Job" Posters
<u>x</u>		Hardhats
<u>x</u>		Safety glasses
<u>x</u>		Ear plugs or muffs – during drilling
	x	Personal Floatation Device (PFD) – while working on boat or platform in "deep" water areas
<u>x</u>		Reflective safety vest (required when working around heavy equip. i.e. drill rigs)
<u>(x)</u>		Tyvek® coveralls
<u>(x)</u>		Polycoated Tyvek® Q-23 coveralls
<u>x</u>		Steel-toed boots
<u>(x)</u>		Chemical-resistant steel-toed boots or chemical-resistant boot covers
<u>x</u>		Work gloves (as needed)
<u>x</u>		Nitrile outer gloves
<u>x</u>		Nitrile inner gloves
<u>x</u>		Plastic sheeting (as needed to reduce contamination)
	x	55-gallon 17-H drums (for contaminated solids)
	x	55-gallon 17-E drums (for liquids)
	x	Drum liners
<u>(x)</u>		Barricade tape and barricades
<u>x</u>		Wash tubs and scrub brushes
<u>x</u>		Decontamination solution (i.e., TSP)
	x	Folding chairs
<u>(x)</u>		portable eyewash
<u>(x)</u>		Respirator sanitizing equipment
<u>x</u>		First aid kit
<u>x</u>		Infection control kit
<u>x</u>		Drinking water
<u>x</u>		Gatorade or similar drink
<u>x</u>		Type ABC fire extinguishers (contractor supplied)
<u>(x)</u>		Half-face respirators approved by National Institute for Occupational Safety and Health (NIOSH)
<u>(x)</u>		Full-face respirators (NIOSH-approved)
<u>(x)</u>		Respirator cartridges (combination organic/P100)
<u>x</u>		PID w/10.6 eV lamp and calibration kit
<u>x</u>		Combustible gas indicator (CGI) and calibration kit
<u>x</u>		Garden sprayers (for use in decontamination)
	x	Compressed gas horn (small pocket-size)
<u>x</u>		Duct tape
<u>x</u>		Paper towels and hand soap
<u>x</u>		Spill sorbent
<u>x</u>		Plastic garbage bags

(x) use dictated by Site conditions

SAFETY MANAGEMENT STANDARDS REFERENCED BY THIS HASP

SMS	TOPIC	HASP SECTION
2	Worker Right to Know (Hazard Communication)	5.1.2
9	Corrosive and Reactive Materials	1.0
16	Hand Tools	5.2
17	Hazardous Waste Operations	5.0
18	Heat Stress	5.2.1
26	Noise and Hearing Conservation	5.2.3
29	Personal Protective Equipment	5.0
30	Sanitation	10.1
32	Work Zone Traffic Control	5.2
34	Utility Clearances and Isolation	5.2.6
42	Respiratory Protection	8.0
46	Subcontractor H&S Requirements	4.5
47	Biological Hazards	5.3
49	Injury/Illness/Incident Reporting	5.2/12.6
51	Blood-borne Pathogens	5.3
56	Drilling Safety	5.2.8
57	Vehicle Safety	5.0
64	Hand Safety	
69	Manual Material Handling	5.2.5
72	Behavior Based Safety	6.0

These Safety Management Standards (SMSs) are available on the URS Health, Safety, and Environment Web Site. Access the Web Site from the SoURSe or through the Internet (www.urshse.com). User name “urshse”. Password “hardhat.” Copies of these SMSs are also provided in Attachment 2.

Copies of the SMSs referenced by this HASP are to be maintained on Site. Project Managers (PMs) are responsible to see that other SMSs relevant to field activities, but not directly referenced by this HASP, also are available on Site.

2.0 FACILITY BACKGROUND/WORK PLAN

The Site is located in the Villages of Hempstead and Garden City, in the Town of Hempstead, Nassau County, New York and encompasses multiple properties including that owned by National Grid. The majority of the approximately 8-acre Site is located within the Village of Garden City. The remainder is in the Village of Hempstead. Residences and commercial businesses are located around National Grid's former MGP portion of the Site. The former MGP portion of the Site is bordered to the north by Second Street, east by a LIRR inactive railroad ROW, south by Intersection Street, and west by a municipal property owned by the Village of Garden City. Other surrounding areas, some portions of which are included in the Site, include a Professional Office Building to the southwest, the POB parking lot to the south, and an active oil storage terminal (Oswego Oil) to the southeast. An active National Grid natural gas regulator station is located within the northwestern portion of the Site.

2.1 Site History

The Nassau and Suffolk Lighting Company operated the manufactured gas plant starting in the early 1900s. The facility originally produced coal gas but was converted to a carbureted water gas process sometime after 1910. The Long Island Lighting Company (LILCO) acquired an ownership share of the plant site in the early 1930s. Following the arrival of natural gas, the plant site served as a peak/emergency facility to ensure gas supply until all MGP operations ceased in the mid-1950s. The plant was demolished shortly afterward. In 1998, the property was acquired by KeySpan Corporation when LILCO merged with Brooklyn Union Gas. The property was then acquired by National Grid in 2008, during the acquisition of KeySpan.

Since demolition of the plant in the 1950s, the majority of the plant site has been inactive with the exception of the active National Grid natural gas regulator station in the northwestern portion of the plant site. Prior to the remediation work, the plant site was undeveloped and secured by a perimeter fence.

Following initial site investigations in the 1990s, a Remedial Investigation was performed in the 2000s, and a Feasibility Study was completed in 2008. A Voluntary Cleanup Program Decision Document describing the selected remedy was issued by NYSDEC in 2008.

Interim Remedial Measures

Prior to the remedial actions, four IRMs were conducted in accordance with the NYSDEC-approved IRM Work Plans. The IRMs that have been implemented at the Site are summarized below.

1. 1999-2000: Underground piping associated with historic MGP operations was located, cut, drained, and plugged to limit the potential for any off-Site migration of MGP-related constituents.
2. 2008: Shallow MGP-source material was excavated from the plant site and NAPL from groundwater was recovered. The excavation took place in areas where no future remediation would be necessary and to support future Site-wide remediation activities by providing clean areas for support facilities, vehicle parking, and the staging of equipment and materials.
3. 2007-2011: Thirty-one product recovery wells were installed to recover DNAPL present on and downgradient of the plant site.

4. 2010 – 2011: Two groundwater oxygenation treatment systems were installed downgradient of the plant site. These systems deliver oxygen to the groundwater plume to allow naturally occurring bacteria to consume and eliminate dissolved phase hydrocarbons originating from the plant site.

2.2 Planned Field Activities

Field activities at the site will comprise collection of groundwater samples from existing groundwater monitoring wells and recovery of NAPL from one NAPL recovery well. This includes the following activities:

- Interface liquid level measurements in monitoring wells;
- Purging and sampling of groundwater monitoring wells;
- Pumping NAPL from recovery wells using a Water pump or equivalent; and,
- Management of purge water, NAPL and used disposable equipment.

2.3 Potential Future Field Activities

Future Field activities may include:

- New monitoring well installations (HASP includes this task);
- Oversight of landscaping activities; and
- Oversight of general construction activities.

3.0 APPLICABILITY

The purpose of this HASP is to assign responsibilities, establish personal protection standards and mandatory safety procedures, and provide for contingencies that may arise while the proposed investigation activities are being conducted at the Site. This HASP complies with, but does not replace, Federal Health and Safety Regulations as set forth in OSHA Regulation 29 Code of Federal Regulations (CFR) Parts 1910 and 1926, and applicable State and local rules, regulations and guidance. This HASP is to be used by URS personnel and URS' subcontractors as a supplement to these rules, regulations and guidance. This HASP is to be augmented by the URSSH&E Program and Management System; relevant standards from that program and system are required to be available on-site during all activities.

The provisions of this HASP are mandatory for all on-site URS employees and URS' subcontractors involved in hazardous material management activities associated with this project.

Changing and/or unanticipated site conditions may require modification of this HASP to maintain a safe and healthful work environment. Any proposed changes to this HASP must be reviewed by the RMHSE prior to their implementation. Under no circumstances will modifications to this HASP conflict with Federal, State or local health and safety rules, regulations or guidance.

URS will provide a copy of this HASP to each of its subcontractors to fulfill its obligation under OSHA Regulation 29 CFR Part 1910.120(b) to inform subcontractors of site hazards. In turn, each subcontractor will provide documentation to URS that describes their plan for addressing applicable health and safety requirements for activities that are unique to their scope of services (e.g., drilling activities).

4.0 RESPONSIBILITIES

URS will have site safety and health oversight and coordination responsibilities for URS personnel; each subcontractor will be held accountable for the safe and healthful performance of work by its employees, subcontractors or support personnel who may enter the Site.

URS will adhere strictly to the provisions of this HASP, along with applicable regulations issued by governmental entities.

4.1 URS Project Manager, Mike Akerbergs

Responsibilities

- assure that projects are performed in a manner consistent with the URS health and safety program;
- assure that the project HASPs are prepared, approved and properly implemented;
- implement HASPs;
- assure that adequate funds are allocated to fully implement project health and safety;
- coordinate with the HSR on health and safety matters; and
- act as primary point of contact with National Grid for site related activities and coordination with non-project related site operations.

Authority

- assign HSR-approved SSO to project and, if necessary, assign a suitably qualified replacement;
- suspend activities if health and safety of personnel are endangered, pending an evaluation by the HSM;
- suspend an individual from activities for infractions of the HASP, pending an evaluation by the HSR; and
- participate in incident investigations.

OPERATING UNIT HEALTH AND SAFETY REPRESENTATIVE:

Responsibilities

- administer the health and safety program within the Operating Unit;
- maintain a working understanding of key government health and safety regulations and URS health and safety policies;
- interface with Project Managers in matters of health and safety;
- report to RHSM on health and safety matters;
- develop or review, approve or disapprove project HASPs prior to submittal to the RHSM for review;
- conduct staff training and orientation on health and safety related activities;
- appoint or approve SSOs;
- monitor compliance with HASPs and conduct facility audits;
- assist Project Managers in obtaining required health and safety equipment;

- approve personnel to work on hazardous waste management projects with regard to medical examinations, and health and safety training; and,
- answer employee questions and concerns regarding health and safety.

Authority

- suspend work or otherwise limit exposures to personnel if health and safety risks are unacceptable;
- direct personnel to change work practices if existing practices are deemed to be hazardous to health and safety of personnel; and,
- remove personnel from projects, if their actions or conditions endanger their health and safety or the health and safety of co-workers.

4.2 URS Site Safety Officer, Rob Hurley

Responsibilities

- direct health and safety activities on-facility;
- report immediately all safety-related incidents or accidents to the HSR and Project Manager and National Grid;
- verify that URS and Contractor personnel working on-facility have met current training and medical clearance requirements;
- determine that air quality monitoring equipment is used properly by URS personnel in accordance with manufacturer's instructions and that the monitoring results are properly documented and filed;
- coordinate with the URS Project Manager and HSR to identify URS personnel on-facility for whom special personal protective equipment, exposure monitoring or work restrictions may be required;
- conduct safety meetings;
- conduct daily facility safety inspections;
- assist the Project Manager in all aspects of implementing the HASP and addenda, if any;
- maintain health and safety equipment on-facility; and
- verify that field work is scheduled with adequate personnel and equipment to complete job safely.

Authority

- implement emergency procedures as required;
- temporarily suspend activities if health and safety of personnel are endangered, pending further consideration by the HSM; and,
- temporarily suspend an individual from activities for infractions of the HASP pending further consideration by the HSM.

4.3 URS Safety, Health and Environment Area Manager: Phil Jones, CIH

Responsibilities

- direct the implementation of the health and safety program of the Operating Group and provide recommendations for improvement of the program;
- coordinate health and safety activities of the Operating Units in the Operating Group;
- determine need for project HASPs;
- maintain a high level of understanding regarding health and safety regulations affecting URS;
- review and approve HASPs;
- monitor implementation of HASPs;
- investigate reports of incidents or accidents and report to URS Health and Safety Director;
- provide employee health and safety training in the Operating Group;
- determine whether an accidental exposure or injury merits a change in the affected individual's work assignments and whether changes in work practices are required;
- coordinate Operating Units with regard to health and safety equipment needs; and,
- supervise HSMs through a matrix management system, in cooperation with the Operating Unit Managers.

Authority

- approve or disapprove HASPs;
- direct Operating Unit HSR to prepare project HASPs;
- access and review project files;
- direct changes in personnel work practices to improve health and safety of employees;
- remove individuals from projects, if their conduct jeopardizes their health and safety or that of co-workers; and,
- suspend work on any project that jeopardizes the health and safety of personnel involved.

4.4 URS Project Personnel

Responsibilities

- attend and participate in the project safety briefings;
- bring forth any questions regarding content of the HASP to the Project Manager or Site Safety Officer;
- take all reasonable precautions to prevent injury to themselves and to their fellow employees;
- perform only those tasks that they believe they can do safely and immediately reporting any accidents and/or unsafe conditions to the SSO or URS Project Manager;
- implement the procedures set forth in the HASP and reporting any deviations from the procedures described in that HASP to the SSO or URS Project Manager for action;
- notify the URS Project Manager and SSO of any special medical conditions (i.e., allergies) and seeing that all on-facility URS personnel are aware of such conditions; and,
- reviewing the project-specific HASP and addenda, if any, and signing the Safety Plan Compliance Agreement.

Authority

- all personnel following this HASP have “stop work” authority in situations where they believe that injury to themselves, their fellow employees, Contractor or Client personnel or the public, and/or property damage may occur.

4.5 Subcontractor’s Safety Representative

Subcontractors are required to designate an on-site employee who will serve as the Site Safety Representative (SSR) for their company. In this capacity, the SSR is responsible for providing health and safety oversight of their personnel participating on the project team. In addition, the SSR will perform daily work area inspections, conduct safety meetings, provide safety orientations for new employees and investigate incidents involving their employees. The SSR will attend periodic safety meetings with the SSO.

5.0 JOB HAZARD ANALYSIS

A site-specific Job Hazard Analysis is provided in Table 1.

5.1 Chemical Hazards

Two categories of chemical hazards are associated with Site activities:

- site constituents; and,
- chemicals used to conduct the Site work.

Site constituents are those that exist at the Site and are the cause for conducting Site activities. The chemicals that are brought on-site to conduct the work may be hazardous and subject to regulation under OSHA's Hazard Communication Standard (i.e., 29 CFR 1910.1200).

5.1.1 Site Constituents

From an occupational health standpoint, given that any potential exposure to site personnel will be only for a short period of time (i.e., intermittent for several days), the levels of contaminants that have been, or could be, encountered during site activities should not represent a significant concern if the provisions of this HASP are appropriately implemented. However, given that the Site is still under investigation, the potential for exposure to elevated levels of these contaminants may exist. Exposure to elevated levels of these contaminants may pose hazards. Specific constituent hazards are detailed in Table 1. Overviews of these hazards are presented here in terms of the following types of occupational exposure limits:

- PEL Permissible Exposure Limit (OSHA Standard)
- TLV[®] Threshold Limit Value (American Conference of Governmental Industrial Hygienists [ACGIH] Guidance)
- STEL Short Term Exposure Limit
- C Ceiling

OSHA PELs and ACGIH TLV[®]s are time-weighted averages (TWAs), which are defined as concentrations for a normal 8-hour workday and 40-hour work week to which almost all workers can be exposed repeatedly without suffering adverse health effects.

STEL is defined as the concentration to which workers can be exposed for short time periods without irritation, tissue damage or narcosis sufficient to be likely to cause impairment of self-rescue or to precipitate accidental injury. The STEL is a 15-minute TWA that will not be exceeded at any time during the workday. STELs are used by OSHA, and ACGIH, for chemical exposure criteria.

A ceiling value (C) is a concentration that may not be exceeded at any time in any workday. Ceiling limits are used by OSHA and ACGIH for chemical exposure criteria.

Skin contact with potentially contaminated materials will be minimized by the use of personal protective clothing (as described in Sections 1.0 and 7.0). Certain site contaminants (e.g., benzene,

cresol, naphthalene, phenols, PCBs and PAHs) have a “skin” designation which indicates the potential for dermal absorption. Air monitoring and the use of engineering controls will minimize inhalation of vapors or particulates during site activities, and respiratory protection will be used if the action levels described in Section 1.0 are exceeded. Ingestion of contaminated materials will be minimized by the use of appropriate personal hygiene procedures during decontamination (e.g., thoroughly washing face and hands with soap and water after leaving the work area and prior to eating or drinking).

5.1.2 Hazard Communication Materials

Materials that are considered hazardous materials under the OSHA Hazard Communication Standard (i.e., 29 CFR 1910.1200) may be used during this project (possibly including acids for sample preservation and solvents for equipment decontamination). In accordance with the URS Hazard Communication Program, the MSDSs for the hazardous materials listed in Section 1.0 are included in Attachment A. The SSO will make copies of these MSDSs available to URS’ subcontractors (e.g., drillers) on this project.

URS’ written Hazard Communication Program is located in SMS 002, a copy of which is to be maintained on Site.

5.2 Physical Hazards

Physical hazards at this work site include:

- heat stress and/or cold stress, depending on the time of year the work will be performed;
- noise from the operation of site equipment;
- slip-trip-fall hazards;
- back injuries resulting from improper lifting (manual material handling);
- being caught in or struck by moving equipment;
- drilling activities (e.g., pinch points or struck by equipment);
- electrical hazards associated with drilling or excavation activities, such as contact with overhead or underground power lines or pipelines; and,
- vehicular traffic hazards.

5.2.1 Heat Stress Recognition and Control

Heat stress monitoring will commence when personnel are wearing PPE, including Tyvek®-type coveralls, and the ambient temperature exceeds 70°F. If standard work garments (e.g., cotton coveralls) are worn, monitoring will commence at 85°F. Heat stress monitoring and control guidance can be found in SMS 018, a copy of which is to be maintained on-site.

5.2.2 Cold Stress Recognition and Control

Protection against cold stress will be initiated when temperatures drop below 45°F. Cold stress guidance is provided below (and in Attachment 2). Exposure to cold working conditions can result in cold stress (e.g., hypothermia) and/or injury (e.g., frostbite) to hands, feet and head. Hypothermia can

be brought on by exposure to cold air, immersion in cold water, or a combination of both. The wind chill factor, which is the cooling power of moving air, is a critical factor in cold stress.

Hypothermia can result when the core body temperature drops below 36°C (96.8°F). Lower body temperature will be likely to result in dizziness, drowsiness, disorientation, slurred speech or loss of consciousness, with possible fatal consequences. Pain in the extremities may be the first warning of danger from cold stress. Shivering develops when the body temperature falls to 35°C (95°F).

If fine work is to be performed with bare hands for more than 10 to 20 minutes at temperatures below 16°C (60°F), provisions will be made for keeping the workers' hands warm. If equivalent chill temperatures fall below 40°F and fine manual dexterity is not required, gloves will be worn. Metal handles of tools will be covered with insulating material at air temperatures below -1°C (30°F).

If work is to be performed continuously in the cold when the wind chill factor is at or below -7°C (19°F), heated warming shelters (e.g., tents, trailers or vehicle cabs) will be made available nearby.

5.2.3 Noise Hazards

Previous surveys indicate that heavy equipment, such as drilling equipment, may produce continuous and impact noise at or above the action level of 85 dBA. All URS personnel within 25 ft of operating equipment or near an operation that creates noise levels high enough to impair conversation will wear hearing protective devices (either muffs or plugs). URS personnel who are in the Medical Surveillance Program are automatically enrolled in the URS Hearing Conservation Program and have had baseline and, where appropriate, periodic audiograms. Personnel will wash their hands with soap and water prior to inserting earplugs to avoid initiating ear infections. Additional information regarding the URS Hearing Conservation Program is provided in SMS 026.

5.2.4 Slip/Trip/Fall Hazards

Workers should exercise caution when walking around the Site to avoid fall and trip hazards. If there are holes or uneven terrain in the work area that could cause site personnel to fall or trip, they must be covered, flagged or marked to warn workers. If conditions become slippery, workers should take small steps with their feet pointed slightly outward to decrease the probability of slipping. Workers should watch where they are walking and walk only in areas of good stability.

5.2.5 Lifting Hazards

The following guidelines will be followed whenever lifting equipment such as portable generators, coolers filled with samples, and any other objects that are of odd size or shape or that weigh over 50 pounds. Safe lifting procedures are described in SMS 069. The procedures include the following:

- get help when lifting heavy loads. Lift portable generators using a two-person lift;
- when moving heavy objects, such as drums or containers, use a dolly or other means of assistance;

- plan the lift. If lifting a heavy object, plan the route and where to place the object. In addition, plan communication signals to be used (e.g., “1,2,3, lift,” etc.);
- wear sturdy work shoes that are in good condition and supply traction when performing lifts;
- keep your back straight and head aligned during the lift, and use your legs to lift the load – do not twist or bend from the waist. Keep the load in front of you – do not lift or carry objects from the side; and,
- keep the heavy part of the load close to your body to help maintain your balance.

5.2.6 Underground and Aboveground Utilities

The Site Manager or SSO is responsible for locating underground utilities before the commencement of any subsurface (> 0.3 meter [1 ft]) activities. Resources include site plans, utility companies and regional utility locating services. The proper utility company personnel will certify in writing to the Site Manager or SSO that underground utilities have been deactivated; the certification will be retained in the project files.

Procedures for activities conducted proximate to utility locations are located in SMS 034, a copy of which is to be maintained on Site. Utilities in areas designated for intrusive activities will be cleared through the Underground Facilities Protective Organization (UFPO) which can be contacted at 1-800-962-7962.

Drilling or other operations adjacent to overhead lines will not be initiated until operations are coordinated with utility officials. Operations adjacent to overhead lines are prohibited unless one of the following conditions is satisfied.

Power has been shut off and positive means (e.g., lockout/tagout) have been taken to prevent lines from being energized. Wherever possible, the SSO will observe power shut off and place a lock and tag on the switch. In all cases, utility company personnel will certify in writing to the Site Manager or SSO that the overhead utilities have been deactivated and the certification will be retained in the project files. The Site Manager or SSO must also attempt to verify power shut off by checking that power is no longer available to the affected building or equipment.

Equipment, or any part of the equipment, cannot come within the following minimum clearance from energized overhead lines:

<u>Power Lines Nominal System (kilovolts)</u>	<u>Minimum Required Clearance</u>
0-50	10 ft
51- 100	12 ft
101-200	15 ft
201-300	20 ft
301-500	25 ft
501-750	35 ft
751-1000	45 ft

5.2.7 Work Area Protection

Project operations may be undertaken in a roadway or parking lot, e.g., off-site groundwater sampling, causing motor vehicles to pose a hazard. Guidance on properly coning and flagging the work area is provided in Attachment 2. Consideration should be given to parking work vehicles within the coned area between the work area and oncoming traffic. Procedures for work zone traffic control are provided in SMS 032, a copy of which is to be maintained on Site.

5.2.8 Drilling Hazards

The primary responsibility during drilling safety is with the drilling subcontractor(s). URS employees are responsible for their own safety including recognizing and avoiding drill rig hazards. URS employees that observe a drill rig condition believed to be unsafe shall advise the drill rig operator of the unsafe condition.

URS technicians, geologists, engineers or other field staff assigned to observe drilling operations or collect soil samples should observe the following guidelines:

- require a meeting at project start-up regarding the drill rig operator responsibility for rig safety and any site and equipment specific safety requirements;
- set up barricades or other means to delineate work zones;
- set up any sample tables and general work areas for the URS field staff to the side of the drill rig (preferably 10 meters away) and not directly behind the rig; and,
- URS engineers, technicians and geologists shall not assist the drillers with the drilling equipment or supplies and shall not at any time operate the drill rig controls.

Before moving a rig, the operator must do the following:

- to the extent practical, walk the planned route of travel and inspect it for overhead hazards, depressions, gullies, ruts and other obstacles;
- check the brakes of the truck/carrier (especially if the terrain along the route of travel is rough or sloped);
- lower mast;
- discharge all passengers before moving on rough or steep terrain; and,
- engage the front axle (on 4x4, 6x6, etc. vehicles) before traversing rough or steep terrain.

After the rig has been positioned to begin drilling, all brakes and/or locks must be set before drilling begins. If the rig is positioned on a steep grade and leveling of the ground is impossible or impractical, the wheel of the transport vehicle should be blocked and other means of preventing the rig from moving or tipping over employed.

5.3 Biological Hazards

Potential biological hazards include illnesses and/or injuries transmitted by plants, insects, animals and pathogenic agents. There are many plants, animals and insects that are potentially harmful to humans; these include ticks, poison ivy/poison oak, certain spiders, mosquitoes and poisonous snakes. Refer to SMS 047 for specific information on these hazards (Attachment 2). Inspect work areas for the presence of poisonous plants, stinging insect nests, etc. Tyvek® coveralls will be worn for Tasks 2, 3 and 4; however, if poisonous plants are present in the work area while performing Tasks 1 or 5, don Tyvek® coveralls and gloves. Remove coveralls and gloves from the inside out to prevent contact with clothing contaminated with poisonous plant oils. Consider the use of poisonous plant barrier and/or cleanser creams if needed. If working in vegetated areas of the Site, tape coveralls to boots and gloves. Use an insect repellent containing DEET. Check frequently for the presence of ticks, and perform a thorough inspection for possible ticks prior to leaving the Site. If field personnel discover an embedded tick on their skin, report it immediately to the Site Manager or SSO.

Blood-borne pathogens (BPs) include diseases that can be transmitted by contact with blood or other bodily fluids as well as contaminated items that may be encountered on this urban site (e.g., used syringes). Universal precautions should be used when administering first aid. Good hygiene practices and proper decontamination of non-disposable PPE will minimize potential for transmission of BPs. Refer to SMS 051 for additional information (Attachment 2).

6.0 EXPOSURE MONITORING PLAN

Heat stress, noise and chemical exposures may be encountered at the Site. Heat stress monitoring and prevention is addressed in Section 5.2.1. Noise levels will not be monitored; URS personnel will wear hearing protection as described in Section 5.2.3.

6.1 Chemical Exposure Monitoring

The field instrumentation described in this HASP has been specifically selected for the contaminants that may be reasonably anticipated to be encountered during the course of this project. Selection factors include anticipated airborne concentrations, potential interference, ionization potentials, instrument sensitivity and occupational exposure limits. The action levels specified in Section 1.0 were established with the expectation that specific instruments will be used. **DO NOT SUBSTITUTE INSTRUMENTS WITHOUT THE CONSENT OF THE HASP PREPARER OR THE RHSEM.**

The monitoring equipment specified in Section 1.0 will be used on a regular basis to evaluate the potential for exposure to airborne contaminants, typically every five to ten minutes. Specifications for this monitoring equipment are provided in Attachment 4. Monitoring will be conducted in the immediate vicinity of the contaminant source point or work area (e.g., at the borehole and cuttings adjacent to the borehole). If readings exceed the first action level (1-5 ppm > one minute), continuous monitoring will start immediately in the breathing zone (BZ) of the person working nearest the point of operations/contaminant source, and site personnel will don protective clothing.

A reading in the BZ above the second action level will require the use of full-face respirators with appropriate cartridges. If the monitoring instrument reads more than the fourth action level (50 ppm > one minute) work will stop, and workers will move upwind while the airborne contaminants dissipate. If elevated levels remain for more than five minutes, the source of the airborne contamination will be covered with clean soil, plastic sheeting or foam (or be controlled in an appropriate manner), and the HSE Representative or PM will be contacted for further guidance.

Air quality monitoring for must be performed in the breathing zone of the most exposed site worker (i.e., closest to the source) during all intrusive work activities. This monitoring must be performed at least each 30 minutes; results of air monitoring must be documented.

6.2 Background Readings

All direct-reading instrument readings will be evaluated relative to background readings, not “meter zero.” Prior to the start of work at each shift and whenever there is a significant shift in wind direction, instrument readings will be obtained upwind of the site work zone to determine the level of “background” readings from such things as local vehicle traffic or emissions from nearby operations unrelated to the Site. Site readings will be evaluated against these background readings. The SSO will consult with the RMHSE regarding the potential health hazards associated with background readings above 5 ppm.

6.3 Data Logging

All monitoring data, including background readings, will be logged in the field logbook. The results of daily instrument calibrations will be logged either on the field form or in the field logbook. All monitoring instruments will be calibrated in accordance with the manufacturers' instructions prior to the start of each shift. Calibration also will be performed when inconsistent or erratic readings are obtained.

If an instrument cannot be calibrated to specification or becomes otherwise inoperable, all intrusive Site work (e.g., drilling,) will cease until the instrument is appropriately repaired or replaced, and the PM or RMHSE will be contacted for further guidance.

6.4 Dust Control

High winds and site operations can cause airborne dust hazards. If site operations generate sustained visible dust, a water mist will be applied to reduce dust generation. If the mist is not effective in reducing dust generation, personnel will don respirators with combination organic vapor P100 cartridges (such as MSA GMC-H cartridges).

Sand and Portland cement that may be used in groundwater monitoring well construction may contain free silica (quartz). Airborne exposure to silica dust may occur during the handling of these materials. At a minimum, half-face respirators with P100 cartridges will be worn for operations that pose a reasonable possibility of exposure to sustained airborne dust from the pouring and mixing of dry sand or cement.

6.5 Explosive Atmospheres

A CGI/O₂ meter will be used to monitor ambient conditions during the drilling task, and decisions will be based on the levels measured using a CGI/O₂ meter (measurements are in % of the LEL), as determined by the action level table.

6.6 Oxygen-Deficient Atmospheres

No work shall be performed in oxygen-deficient atmospheres (such as confined spaces) without prior approval of the RMHSE. Confined space entry is not expected for this job. Procedures for work in areas that may have oxygen-deficient atmospheres are described in SMS 010. A confined-space entry permit is provided by, and must be approved by, the RMHSE.

Prior to entering any space where an oxygen deficiency may exist, an oxygen meter will be used to test for adequate oxygen levels. Decisions will be based on oxygen concentrations as follows:

- 20.8%: continue operations
- <20.8%: monitor continuously
- <19.5%: do not enter; ventilate and determine whether supplied air equipment is required

7.0 PERSONAL PROTECTIVE EQUIPMENT

The minimum personal protective equipment (PPE) for site personnel includes:

- hardhat (ANSI approved);
- safety glasses with side shields (or properly rated impact-resistant goggles);
- steel-toed boots or chemical-resistant steel-toed boots; (ANSI and ASTM-rated)
- hearing protection in the vicinity of noisy equipment;
- work gloves and/or chemical-resistant gloves; and,
- Tyvek[®] or polycoated-Tyvek[®] as needed.

As the various monitoring action levels are reached, additional PPE is required. Section 1.0 describes the incremental PPE requirements relative to specific action levels and the specific kinds of PPE to be used. Procedures for the use and selection of PPE are provided in SMS 029, a copy of which is to be maintained on Site.

7.1 Limitations of Protective Clothing

The protective equipment ensembles selected for this project are anticipated to provide protection against the types and concentrations of hazardous materials that may be encountered during field operations. However, no protective garment, glove or boot is resistant to all chemicals at any concentration; in fact, chemicals may continue to permeate or degrade a garment even after the source of the contamination is removed.

To obtain optimal usage from PPE, the following procedures are to be followed by all URS personnel:

- when using Tyvek[®] coveralls, don a clean, new garment after each rest break or at the beginning of each shift or when they become damaged or torn;
- inspect all clothing, gloves and boots both prior to and during use for:
 - imperfect seams;
 - non-uniform coatings;
 - tears; and,
 - poorly functioning closures; and,
- inspect reusable garments, boots, and gloves prior to and during use for:
 - visible signs of chemical permeation such as swelling, discoloration, stiffness or brittleness; and,
 - cracks or any signs of puncture or abrasion.

Reusable garments exhibiting any of these characteristics will be discarded.

7.2 Duration of Work Tasks

The SSO will establish the duration of work tasks in which personnel use PPE ensembles that include chemical protective clothing (including uncoated Tyvek®). Variables to be considered include ambient temperature and other weather conditions, the capacity of individual personnel to work in the required level of PPE in heat and cold, and the limitations of specific PPE ensembles. Recommended rest breaks are as follows:

- 15 minutes midway between shift startup and lunch;
- lunch break (30 to 60 minutes); and,
- 15 minutes midway between lunch and shift end.

Rest breaks are to be taken in the support zone or other clean area after personnel have completed the decontamination process, including washing of hands and face with soap and water. Additional rest breaks will be scheduled according to heat stress monitoring protocols as described in SMS 18.

8.0 RESPIRATORY PROTECTION

8.1 Respirator Selection

Engineering controls and safe work practices (e.g., elimination of the source of contamination, ventilation equipment, working upwind, limiting exposure time, etc.) always must be the primary control for air contaminants. Respirators will be used if engineering or work practice controls are not feasible for controlling airborne exposures below acceptable concentrations and as an interim control measure while engineering or work practice controls are implemented.

Once the need for respirators has been established, the respirators will be selected on the basis of the hazards to which the worker is exposed. Only NIOSH-approved respirators will be issued. Selection criteria established in 29 CFR 1910.134 have been used by the Preparer of this HASP in determining respirator requirements for this project.

CAUTION: *Air purifying respirators are not to be used where there is an oxygen deficiency. Only air-supplied respirators with an emergency escape cylinder or self-contained breathing apparatus will be worn when an oxygen deficiency exists.*

CAUTION: *A respirator does not protect against excessive heat or against a hazardous substance that can attack the body through the skin.*

Airborne contaminants have been evaluated based on the suspected contaminants of concern. The concentration of the airborne chemical hazard will be evaluated using direct-reading instruments to determine what type of respirator will be used. Airborne readings will be compared to the action levels in the table in Section 1.0. See action level/respirator requirements in Section 6.1.

8.2 Medical Screening

Project employees are enrolled in the URS Medical Surveillance Program and are medically evaluated in compliance with the requirements of 29 CFR 1910.134(a)(10). Employees not medically cleared to wear respirators will not be assigned to this project.

The medical status of each employee is reviewed annually or more frequently if the physical status of the employee changes (determined by a physician).

8.3 Fit Testing

A person wearing a respirator must be clean-shaven in the area of the face-piece seal. Long hair, sideburns and skullcaps that extend under the seal are not allowed. Glasses with temple pieces extending under the seal are not allowed for full-face respirators. Persons with facial conditions that prevent a proper seal are not allowed to wear a respirator until the condition is corrected. Facial conditions that may cause a seal problem include missing dentures, scars, severe acne, etc. Contact lenses may be worn with respiratory protection.

No individual will enter an area where the use of respiratory protective equipment is required unless the person has been fit tested within the last year. Fit testing will be performed in accordance with accepted fit test procedures defined in SMS 042, a copy of which is to be maintained at the Site.

Records of fit testing will be maintained on Site or by the employee's office and/or corporate medical surveillance program.

Respirator wearers will perform a user seal check each time they put on the respirator. For air-purifying respirators, the positive user seal check is performed by removing the exhalation valve cover, placing the palm over the respirator exhalation valve, and exhaling gently. The respirator mask should puff out without noticeable leakage. The negative user seal check is performed by placing the palms over both of the respirator cartridges, inhaling gently, and holding the breath for 10 seconds. The respirator mask should remain collapsed on the face without noticeable leakage.

8.4 Respirator Use Instructions

Only those employees who have been properly trained and qualified on the specific type of respirator to be worn may use respirators. No individual will enter an area where the use of respiratory protective equipment is required unless the person has been trained.

All employees whose job assignments require the use of respirators are trained in accordance with 29 CFR 1910.134 during initial 40-hour training for hazardous waste operations.

Hands-on training in inspecting and donning a respirator, including user seal checks, also is provided at the time of fit testing. Retraining is performed on an "as-needed" basis on each type of respirator worn by the individual. In addition, site-specific respirator training is provided during site safety briefings conducted by the SSO. Training records are kept in the employee's training file.

A particulate respirator cartridge will be changed out when the wearer has difficulty breathing through the cartridge or at least daily. Chemical gas or vapor respirator cartridges will be ***changed out at least daily***.

The fit of a chemical gas or vapor respirator will be rechecked, and the cartridges will be changed, if the wearer detects chemical odor or feels chemical irritation on the skin, both of which are indicators of leakage or cartridge breakthrough. Where available, an End-of-Service Life Indicator (ESLI) will be used on chemical respirator cartridges. Cartridges will be changed as soon as the ESLI indicates that the cartridge is saturated and no longer effective in absorbing airborne chemicals.

8.5 Respirator Inspection

The user will inspect respirators before and after each day's use. The inspection procedure for air-purifying respirators (i.e., full-face piece and half-face piece cartridge respirators) follows.

Examine the face piece for:

- excessive dirt;
- cracks, tears, holes, or distortion from improper storage;

- inflexibility;
- cracked or badly scratched lenses (full-face only);
- incorrectly mounted eyeglass lenses or broken or missing mounting clips (full-face only); and,
- cracked or broken air-purifying element holder, badly worn threads, or missing gaskets.

Examine the head straps or head harness for:

- breaks or cracks;
- broken or malfunctioning buckles; and,
- excessively worn serration on the headstraps, which may permit slippage.

Examine the two inhalation valves and the exhalation valve for:

- foreign material (e.g., hairs, particles, etc.);
- improper insertion of the valve body in the face piece;
- cracks, tears, or chips in the valve body, particularly in the sealing surface; and,
- missing or defective exhalation valve covers.

Examine the air-purifying cartridge for:

- missing or worn cartridge-holder gasket;
- incorrect cartridge/canister for the hazard;
- incorrect cartridge installation, loose connections, or cross threading in the holder; and,
- cracks or dents in the outside case or threads of the filter or cartridge/canister.

8.6 Cleaning of Respirators

Respirators assigned and worn by one individual must be dismantled and thoroughly cleaned and disinfected after each day's use. Visitors' respirators or respirators assigned to several individuals must be cleaned and disinfected after each use. A disinfectant spray or wipe is approved as a disinfectant between uses during the day but not for cleaning and sanitizing after each day's use. Care must be taken to prevent damage from rough handling during the cleaning procedure. After cleaning, respirators must be reassembled. The procedures for cleaning respirators follow.

- Washing: Disassemble and wash with a mild liquid detergent in warm water (not to exceed 110°F). A stiff bristle (not wire) brush may be used.
- Rinsing: Rinse in clean water (110°F maximum) to remove all traces of detergent. This is important to prevent dermatitis.
- Disinfecting: Thoroughly rinse or immerse in a sanitizer provided by the manufacturer. Alternatively, a weak chlorine bleach solution (1 milliliter of liquid bleach per liter of water) may be used.
- Final Rinsing: Rinse thoroughly in clean water (110°F maximum) to remove all traces of disinfectant. This is important to prevent dermatitis.

- Drying: Drain and dry by hanging by the straps from racks (take care to prevent damage) or by towel drying with clean, soft cloths or paper towels.

8.7 Maintenance of Respirators

Routine respirator maintenance, such as replacing missing valves, gaskets and nose cups, must only be performed by trained respirator users or a respirator manufacturer's representative. Only approved replacement parts must be used. The substitution of parts from a different brand or type of respirator is generally not possible, invalidates the technical approval of the respirator, and is not permitted. Any respirator suspected of being defective must be removed from service and replaced.

8.8 Storage of Respirators

When not in use, respirators must be stored to protect them from dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals and physical damage. Respirators must be stored in sealable (e.g., Ziplock[®] or twist-tie) reusable plastic bags between shifts.

The respirator storage environment must be clean, dry and away from direct sunlight. On-site cabinets or cases are suggested. Storing bagged respirators in vehicles is discouraged because of the potential for damage from other materials or equipment.

8.9 Additional Information

Additional information on the URS Respiratory Protection Program is located in SMS 042, a copy of which is to be available on Site.

9.0 SITE CONTROL

9.1 General

Barricade tape and/or barricades will be used to delineate a work zone for safety purposes around the work area. The barriers will be set in a 25-ft radius (as practical) around the work area to provide sufficient maneuvering space for personnel and equipment. A short piece of barricade tape can be affixed to a secure upright (e.g., a drill rig mast or a vehicle antenna) to serve as a wind direction telltale. A 5-ft opening in the barricades at the support zone (upwind of the work area) will serve as the personnel and equipment entry and exit point.

The personnel decontamination station will be established at this point if formal decontamination procedures are required (see Section 10.0). All entry and exit from the work area will be made at this opening to control potential sources of contamination and leave contaminated soil and debris in the work area.

At the end of the shift, all boring/sampling holes must be covered or otherwise secured. All cuttings and decontamination fluids are to be handled in accordance with relevant regulations and instructions from the PM.

The PM or SSO will determine an upwind evacuation area prior to each shift and all personnel will be notified of its location. A horn or other signaling device will be used to signal an evacuation in the event of an emergency. Three blasts of the horn will be the signal to immediately stop work and proceed to the evacuation area.

9.2 Work Zones

If monitoring instrument readings exceed the first action level (>5 ppm for one minute), requiring the use of chemical protective equipment, work zones must be established as described below.

- Exclusion Zone (EZ) – A 25-ft circle (as practical) around the work area will be defined before work starts. The encircled area will constitute the EZ. This zone is where potentially hazardous contaminants and physical hazards to the workers will be contained. Appropriate personal protection, as described in Section 1.0, will be required in this area. Plastic sheeting and/or tarps may be used as necessary to control contaminated materials spilled to the ground during site operations. The size of the EZ may be altered to accommodate Site conditions and to ensure contaminant containment.
- Contaminant Reduction Zone (CRZ) – A corridor leading from the EZ will be defined; it will lead from the work area to a break area. All decontamination activities will occur in the CRZ. A waste container will be placed at the end of the corridor so that contaminated disposable equipment can be placed inside and covered. Surface/soil contamination in this area will be controlled using plastic sheeting. No one will be permitted into the CRZ or EZ unless he/she is in full compliance with the requirements of this HASP.

- Support Zone – A Support Zone, the outermost part of the Site, must be defined for each field activity. Support equipment is located in this uncontaminated or clean area. Normal work clothes are appropriate within this zone. The location of this zone depends on factors such as accessibility, wind direction (upwind of work area), and resources (e.g., roads, shelter, utilities).

10.0 DECONTAMINATION PROCEDURES

The following steps will be followed whenever personnel leave the EZ/work area:

1. remove all equipment, sample containers, and notes to the CRZ. All waste and spent decontamination solutions will be properly contained.
2. scrub boots with a stiff bristle brush and a solution consisting soap (e.g., Alconox[®]) and water. Washtubs and chairs will be provided.
3. remove outer gloves.
4. remove Tyvek[®] coveralls; discard in provided container.
5. remove hardhat and eye protection.
6. remove inner gloves.
7. wash hands and face.

The decontamination area will be covered with plastic sheeting that will be replaced when torn or heavily soiled and at the end of each shift. Disposable materials shall be placed into proper containers.

Each worker will be responsible for cleaning, sanitizing and storing his/her own respirator in accordance with the manufacturer's guidance (i.e., washing in warm water and detergent or sanitizing solution, air drying, and storing in a plastic storage bag).

All spent decontamination materials (e.g., rinse waters, sludge) will be handled as directed by the PM and in accordance with relevant regulations.

10.1 Sanitation

Potable water will be made available at the Site, either from a pressurized source or as commercially available bottled water. Drinking cups will be supplied; personnel will not drink directly from the source of water or share drinking cups. Sources of non-potable water will be labeled clearly.

Washing facilities will be provided on Site and be located in the decontamination area or in the support area. Soap, clean water, wash basins and/or single-use towels will be available for personnel use. Containers for disposable materials will be available on-site.

10.2 Decontamination – Medical Emergencies

In the event of physical injury or other serious medical concerns, immediate first aid is to be administered in lieu of further decontamination efforts.

10.3 Decontamination of Tools

When all work activities have been completed, contaminated tools used by URS personnel will be appropriately decontaminated or properly disposed of as directed by the PM.

It is expected that all tools will be constructed of non-porous, non-absorbent materials. This will aid the decontamination process. Any tool or part of a tool that is made of a porous/absorbent material will be discarded and disposed of as a hazardous waste if it cannot be properly decontaminated.

11.0 SAFE WORK PRACTICES

11.1 General Site Rules

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited during drilling, well installation, sampling, and NAPL recovery/disposal activities or where the possibility for the transfer of contamination exists.
- All personnel will enter designated work areas only through the CRZ. All personnel leaving an EZ/work zone must exit through the CRZ and pass through the decontamination station, as described in Section 10.0.
- Personnel will wash their hands and faces thoroughly with soap and water prior to eating, drinking or smoking.
- Personnel will avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling, leaning or sitting on contaminated surfaces. Do not place monitoring equipment on potentially contaminated surfaces (e.g., the ground).
- Field survey instruments will be covered with plastic or similar coverings to minimize the potential for contamination.
- Contaminated protective equipment such as respirators, hoses, boots and disposable protective clothing will not be removed from the work area/EZ or decontamination area until it has been cleaned or properly packaged and labeled.
- Field crew members should be familiar with the physical characteristics of the site operations including:
 - wind direction in relation to the contaminated area;
 - accessibility to equipment and vehicles;
 - areas of known or suspected contamination;
 - site access; and,
 - nearest water sources.
- All wastes generated by URS activities at the Site will be disposed of as directed by the PM.
- All personal protective equipment will be used as specified and required.
- The buddy system will be used at all times.
- Personnel are to immediately notify the SSO or Site Manager of any illness, injuries or environmental releases.

11.2 Sampling Practices

For all sampling activities, the following standard safety procedures will be employed:

- all sampling equipment will be cleaned before proceeding to the Site;
- at the sampling site, sampling equipment will be disposed of or cleaned after each use;
- work in “cleaner” areas will be conducted first, where practical; and,
- all unauthorized personnel will remain outside the EZ at all times.

11.3 Sample Shipment/Hazardous Materials Shipment

If samples to be collected during the course of this project fall under criteria that define them as hazardous materials under Department of Transportation (DOT) regulations 49 CFR Parts 171-177 (see URS guidelines for determination) or if hazardous waste is shipped off-site, then they must be shipped in accordance with those regulations by an individual who is certified as having been “function-specific” trained, as required under the DOT regulations.

12.0 EMERGENCY RESPONSE PLAN

Route maps to the nearest hospital (i.e., Mercy Hospital at (516) 705-2525) and the Hempstead Main Clinic (i.e., New York Urgent Care at (516) 489-6640) are provided in Attachment 3.

It is URS' policy to evacuate personnel from areas of hazardous material emergencies and to summon outside assistance from agencies with personnel trained to respond to the specific emergency. This section outlines the procedures to be followed by URS personnel in the event of a site emergency. These procedures are to be reviewed during the on-site safety briefings conducted by the SSO.

In the event of a fire or medical emergency, the emergency numbers identified in Section 1.0 must be called for assistance.

12.1 Places of Refuge

In the event of a site emergency requiring evacuation, all personnel will evacuate to a pre-designated area a safe distance from any health or safety hazard. The primary assembly area will be determined prior to the start of work each day.

During any site evacuation, all employees will be instructed to observe wind direction indicators. During evacuation, employees will be instructed to travel upwind or crosswind of the area of influence.

12.2 Communication

A communication network must be set up to alert site personnel of emergencies and to summon outside emergency assistance. All team members should maintain the list of emergency phone numbers. At least one team member shall have a cell phone which shall be "on" and in good working order.

In the event of an emergency, personnel will use the following hand signals where voice communications are not feasible:

Signal	Definition
Hands clutching throat	Out of air/can't breathe
Hands on top of head	Need assistance
Thumbs up	OK/I'm all right/I understand
Thumbs down	No/negative
Arms waving upright	Send back support
Grip partner's wrist	Exit area immediately

12.3 Emergency Response Procedures

The emergency response team will consist of employees who assume the following roles:

- emergency care provider(s);
- provide first aid/CPR as needed; and,
- communicator.

The role of the communicator is to maintain contact with appropriate emergency services and to provide as much information as possible, such as the number injured, the type and extent of injuries, and the exact location of the accident scene. The communicator will be located as close to the scene as possible to transmit to the emergency care providers any additional instructions that may be given by emergency services personnel in route.

The Site Manager (usually the SSO) will survey and assess existing and potential hazards, evacuate personnel as needed, and contain the hazard. Follow up responsibilities include replacing or repairing damaged equipment, documenting the incident, and notifying appropriate personnel/agencies described under Incident Reporting. Responsibilities also include reviewing and revising site safety and contingency plans as necessary.

The Emergency Response Checklist can be used to help remember the things to do in an emergency.

12.4 Medical Emergency Response Plan

At least one on-site URS employee will hold a current certificate in American Red Cross Standard First Aid. This training provides six and one-half hours of instruction in adult CPR and basic first aid. If a medical emergency exists, personnel should:

- consult the emergency phone number list and request an ambulance immediately;
- perform first aid/CPR as necessary;
- stabilize the injured; decontaminate if necessary, and extricate ONLY if the environment the injured/ill person is in is dangerous or unsafe and ONLY if the rescuers are appropriately protected from potential hazards that might be encountered during the rescue.
- When emergency services personnel arrive, communicate all first aid/CPR activities that have occurred.
- Transfer responsibility for the care of the injured/ill to the emergency services personnel.

The following items and emergency response equipment will be located within easy access at all times:

- first aid kit and infection control kit;
- eyewash – a 15 minute eyewash (required if corrosives are present), or an appropriate amount of portable sterile eyewash bottles, will be available at the Site for flushing foreign particles

or contaminants out of eyes. The SSO will demonstrate the proper operation of the unit(s) prior to the start of work;

- emergency telephone numbers list; and,
- portable radios for emergency communications in remote areas.

12.5 Incident Report

All site injuries and illnesses must be reported to the SSO and PM immediately. The SSO or the PM will notify the RHSEM and National Grid immediately. National Grid will be sent a draft incident report within 24 hours. Any near miss, injury or illness, regardless of severity, is to be reported (see SMS 049).

12.6 Spill or Hazardous Materials Release

Small spills are immediately reported to the SSO and are dealt with according to the chemical manufacturer's recommended procedures, which are found on the MSDSs. Steps will be taken to contain and/or collect small spills for approved storage and disposal.

In the unlikely event of a larger release of hazardous materials as a result of site activities, site personnel will evacuate to the predesignated assembly area. The local Designated Emergency Response Authority (DERA) will be notified by the SSO immediately and appropriate actions will be taken to protect public health and mitigate the contaminant release. The SSO will make the following emergency contacts:

Regional Health, Safety and Environment Manager	Ben Bertolotti:	973- 572-3916
Area SH&E Manager	Phil Jones	610-832-2794
Project Manager	Mike Akerbergs:	973-883-8695
NYSDEC Spill Report Hotline		(800) 457-7362
EPA National Response Center		(800) 424-8802

EMERGENCY RESPONSE CHECKLIST

In an Emergency	Yes?	No?
Confirm the reported incident	_____	_____
Evacuate and secure the area	_____	_____
Render first aid/CPR	_____	_____
Notify promptly:		
Project Manager	_____	_____
Fire Department	_____	_____
Police Department	_____	_____
Nearest Hospital or Medical Care Facility	_____	_____
Start documentation	_____	_____
If spill or leak occurs:		
Don the proper PPE	_____	_____
Stop the source	_____	_____
Contain the spill	_____	_____
Clean up the spill	_____	_____
Upon evacuating, take attendance at the assembly area	_____	_____
Authority given:		
Leave the Site	_____	_____
Restart the operations	_____	_____
Debrief and document the incident	_____	_____
Submit a copy of the document to the Office Safety Representative	_____	_____

13.0 TRAINING MEDICAL SURVEILLANCE AND SITE INSPECTIONS

13.1 Training and Medical Surveillance

All URS site personnel will have met the requirements of 29 CFR 1910.120(e) including:

- 40 hours of initial off-site training or its recognize equivalent;
- 8 hours of annual refresher training (as required);
- 8 hours of supervisor training for personnel serving as Site Managers; and,
- 3 days of work activity under the supervision of a trained and experienced supervisor.
- current First aid/CPR training
- no applicable medical restrictions as determined through medical surveillance

All URS site personnel are required to be active participants in good standing in a medical surveillance program that meet the requirements of 29 CFR 1910.120(f). Current copies of training certificates and statements of medical program participation for all URS personnel are maintained by the local office.

In addition, all URS site personnel will review this HASP and sign a copy of the HASP Compliance Agreement provided in Attachment 5. The Site Manager will maintain these agreements at the Site and place them in the project file at the conclusion of the work.

Prior to the start of operations at the Site, the SSO will conduct a site safety briefing, which will include all personnel involved in site operations. At this meeting, the SSO will discuss:

- contents of this HASP;
- types of hazards at the Site and means for minimizing exposure to them;
- the type of monitoring that will be performed;
- action levels for upgrade and downgrade of PPE;
- PPE that will be used;
- site-specific respiratory protection requirements;
- decontamination protocols;
- site control measures, including safe operating practices and communication;
- location and use of emergency equipment; and,
- evacuation signals and procedures.

All site personnel, including subcontractor personnel, are require to attend the briefings and sign the briefing form.

Subsequent site safety briefings will be conducted at least daily, or whenever there is a change in task or significant change in task location; these briefings (including topics discussed, attendees/affiliations; etc) will be documented. Briefings also will be conducted whenever new personnel report to the Site.

13.2 Site Inspections

The Site Manager or SSO is to conduct a daily site inspection prior to the start of each shift. It is the responsibility of the PM or Site Manager to resolve discrepancies immediately, contacting the RMHSE if necessary for assistance. Inspections are to be documented and maintained on-site until the completion of the project, at which time they are placed in the project files.

14.0 RECORDKEEPING

The PM and SSO are responsible for site recordkeeping. Prior to the start of work, they will review this HASP; if no changes are needed, they will sign the approval form (PM) or acceptance form (SSO) and forward a copy to the HSE Representative.

All URS personnel will review the HASP and sign the HASP Compliance Agreement; copies of these forms will be maintained in the project file as noted in Section 12.

The SSO will conduct a site safety briefing in accordance with Section 13 and have all attendees sign the form; copies of these forms will be maintained in the project file.

Any incident or exposure incident will be investigated and the Incident Report form (SMS 049) will be completed and forwarded to the HSE Representative.

All instrument readings and calibrations, PPE use and changes, health and safety-related issues, and deviations from or problems with this HASP will be recorded in the field log.

15.0 COMMUNITY AIR MONITORING PLAN

Real-time air monitoring for total volatile organic compounds and particulates will be conducted at the perimeter of the exclusion zone during drilling, well installation, direct-push soil sampling, groundwater sampling, and NAPL recovery/disposal activities as part of the Community Air Monitoring Plan (CAMP). The CAMP also provides a contingency plan that addresses potential site control measures that may be implemented in response to elevated levels of target compounds or odor. Additional information about this air monitoring program is contained in the CAMP which is a document separate from this HASP.

ATTACHMENT 1 SAFETY DATA SHEET

MATERIAL SAFETY DATA SHEET



BENZENE (AMOCO/TOTAL)

MSDS No. 11697000 ANSI/ENGLISH

1.0 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: BENZENE (AMOCO/TOTAL)**MANUFACTURER/SUPPLIER:**Amoco Oil Company
200 East Randolph Drive
Chicago, Illinois 60601 U.S.A.**EMERGENCY HEALTH INFORMATION:**

1 (800) 447-8735

EMERGENCY SPILL INFORMATION:

1 (800) 424-9300 CHEMTREC (USA)

OTHER PRODUCT SAFETY**INFORMATION:**

(312) 856-3907

2.0 COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS#	Range % by Wt.
Benzene	71-43-2	99.80
Toluene	108-88-3	0.20

(See Section 8.0, "Exposure Controls/Personal Protection", for exposure guidelines)

3.0 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Danger! Extremely flammable. Causes eye and skin irritation. Inhalation causes headaches, dizziness, drowsiness, and nausea, and may lead to unconsciousness. Harmful or fatal if liquid is aspirated into lungs. Danger! Contains Benzene. Cancer hazard. Can cause blood disorders. Harmful when absorbed through the skin.

POTENTIAL HEALTH EFFECTS:

EYE CONTACT: Causes mild eye irritation.

SKIN CONTACT: Causes mild skin irritation. Causes skin irritation on prolonged or repeated contact. Harmful when absorbed through the skin.

INHALATION: Cancer hazard. Can cause blood disorders. Inhalation causes headaches, dizziness, drowsiness, and nausea, and may lead to unconsciousness. See "Toxicological Information" section (Section 11.0).

INGESTION: Harmful or fatal if liquid is aspirated into lungs. See "Toxicological Information" section (Section 11.0).

HMIS CODE: (Health:2) (Flammability:3) (Reactivity:0)

NFPA CODE: (Health:2) (Flammability:3) (Reactivity:0)

4.0 FIRST AID MEASURES

EYE: Flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation persists.

SKIN: Wash exposed skin with soap and water. Remove contaminated clothing, including shoes, and thoroughly clean and dry before reuse. Get medical attention if irritation develops.

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

INGESTION: If swallowed, drink plenty of water, do NOT induce vomiting. Get immediate medical attention.

5.0 FIRE FIGHTING MEASURES

FLASHPOINT: 12°F(-11°C)

UEL: 8.0%

LEL: 1.5%

AUTOIGNITION TEMPERATURE: 928°F (498°C)

FLAMMABILITY CLASSIFICATION: Extremely Flammable Liquid.

EXTINGUISHING MEDIA: Agents approved for Class B hazards (e.g., dry chemical, carbon dioxide, foam, steam) or water fog.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Extremely flammable liquid. Vapor may explode

if ignited in enclosed area.

FIRE-FIGHTING EQUIPMENT: Firefighters should wear full bunker gear, including a positive pressure self-contained breathing apparatus.

PRECAUTIONS: Keep away from sources of ignition (e.g., heat and open flames). Keep container closed. Use with adequate ventilation.

HAZARDOUS COMBUSTION PRODUCTS: Incomplete burning can produce carbon monoxide and/or carbon dioxide and other harmful products.

6.0 ACCIDENTAL RELEASE MEASURES

Remove or shut off all sources of ignition. Remove mechanically or contain on an absorbent material such as dry sand or earth. Increase ventilation if possible. Wear respirator and spray with water to disperse vapors. Keep out of sewers and waterways.

7.0 HANDLING AND STORAGE

HANDLING: Use with adequate ventilation. Do not breathe vapors. Keep away from ignition sources (e.g., heat, sparks, or open flames). Ground and bond containers when transferring materials. Wash thoroughly after handling. After this container has been emptied, it may contain flammable vapors; observe all warnings and precautions listed for this product.

STORAGE: Store in flammable liquids storage area. Store away from heat, ignition sources, and open flame in accordance with applicable regulations. Keep container closed. Outside storage is recommended.

8.0 EXPOSURE CONTROLS / PERSONAL PROTECTION

EYE: Do not get in eyes. Wear eye protection.

SKIN: Do not get on skin or clothing. Wear protective clothing and gloves.

INHALATION: Do not breathe mist or vapor. If heated and ventilation is inadequate, use supplied-air respirator approved by NIOSH/MSHA.

ENGINEERING CONTROLS: Control airborne concentrations below the exposure guidelines.

EXPOSURE GUIDELINES:

Component	CAS#	Exposure Limits

Benzene	71-43-2	OSHA PEL: 1 ppm OSHA STEL: 5 ppm ACGIH TLV-TWA: 10 ppm
Toluene	108-88-3	OSHA PEL: 100 ppm (1989); 200 ppm (1971) OSHA STEL: 150 ppm (1989); Not established. (1971) OSHA Ceiling: 300 ppm (1971) ACGIH TLV-TWA: 50 ppm (skin)

9.0 CHEMICAL AND PHYSICAL PROPERTIES

APPEARANCE AND ODOR: Liquid. Colorless. Sweet odor.

pH: Not determined.

VAPOR PRESSURE: 74.6 mm Hg at 20 °C

VAPOR DENSITY: Not determined.

BOILING POINT: 176°F(80°C)

MELTING POINT: 42°F(6°C)

SOLUBILITY IN WATER: Slight, 0.1 to 1.0%.

SPECIFIC GRAVITY (WATER=1): 0.88

10.0 STABILITY AND REACTIVITY

STABILITY: Stable.

CONDITIONS TO AVOID: Keep away from ignition sources (e.g. heat, sparks, and open flames).

MATERIALS TO AVOID: Avoid chlorine, fluorine, and other strong oxidizers.

HAZARDOUS DECOMPOSITION: None identified.

HAZARDOUS POLYMERIZATION: Will not occur.

11.0 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY DATA:

EYE IRRITATION: Testing not conducted. See Other Toxicity Data.

SKIN IRRITATION: Testing not conducted. See Other Toxicity Data.

DERMAL LD50: Testing not conducted. See Other Toxicity Data.

ORAL LD50: 3.8 g/kg (rat).

INHALATION LC50: 10000 ppm (rat)

OTHER TOXICITY DATA: Acute toxicity of benzene results primarily from depression of the central nervous system (CNS). Inhalation of concentrations over 50 ppm can produce headache, lassitude, weariness, dizziness, drowsiness, or excitation. Exposure to very high levels can result in unconsciousness and death.

Long-term overexposure to benzene has been associated with certain types of leukemia in humans. In addition, the International Agency for Research on Cancer (IARC) and OSHA consider benzene to be a human carcinogen. Chronic exposures to benzene at levels of 100 ppm and below have been reported to cause adverse blood effects including anemia. Benzene exposure can occur by inhalation and absorption through the skin.

Inhalation and forced feeding studies of benzene in laboratory animals have produced a carcinogenic response in a variety of organs, including possibly leukemia, other adverse effects on the blood, chromosomal changes and some effects on the immune system. Exposure to benzene at levels up to 300 ppm did not produce birth defects in animal studies; however, exposure to the higher dosage levels (greater than 100 ppm) resulted in a reduction of body weight of the rat pups (fetotoxicity). Changes in the testes have been observed in mice exposed to benzene at 300 ppm, but reproductive performance was not altered in rats exposed to benzene at the same level.

Aspiration of this product into the lungs can cause chemical pneumonia and can be fatal. Aspiration into the lungs can occur while vomiting after ingestion of this product. Do not siphon by mouth.

12.0 ECOLOGICAL INFORMATION

Ecological testing has not been conducted on this product.

13.0 DISPOSAL INFORMATION

Disposal must be in accordance with applicable federal, state, or local regulations. Enclosed-controlled incineration is recommended unless directed otherwise by applicable ordinances. Residues and spilled material are hazardous waste due to ignitability.

14.0 TRANSPORTATION INFORMATION

U.S. DEPT OF TRANSPORTATION

Shipping Name Benzene
Hazard Class 3
Identification Number UN1114
Packing Group II
RQ RQ

INTERNATIONAL INFORMATION:

Sea (IMO/IMDG)

Shipping Name Not determined.

Air (ICAO/IATA)

Shipping Name Not determined.

European Road/Rail (ADR/RID)

Shipping Name Not determined.

Canadian Transportation of Dangerous Goods

Shipping Name Not determined.

15.0 REGULATORY INFORMATION

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR Part 302.4): This product is reportable under 40 CFR Part 302.4 because it contains the following substance(s):

Component/CAS Number	Weight %	Component Reportable Quantity (RQ)
Benzene 71-43-2	99.80	10 lbs.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR Part 355): This product is not regulated under Section 302 of SARA and 40 CFR Part 355.

SARA TITLE III SECTIONS 311/312 HAZARDOUS CATEGORIZATION (40 CFR Part 370): This product is defined as hazardous by OSHA under 29 CFR Part 1910.1200(d).

SARA TITLE III SECTION 313 (40 CFR Part 372): This product contains the following substance (s), which is on the Toxic Chemicals List in 40 CFR Part 372:

Component/CAS Number	Weight Percent
Benzene 71-43-2	99.80

U.S. INVENTORY (TSCA): Listed on inventory.

OSHA HAZARD COMMUNICATION STANDARD: Flammable liquid. Carcinogen. Irritant. CNS Effects. Target organ effects.

EC INVENTORY (EINECS/ELINCS): In compliance.

JAPAN INVENTORY (MITI): Not determined.

AUSTRALIA INVENTORY (AICS): Not determined.

KOREA INVENTORY (ECL): Not determined.

CANADA INVENTORY (DSL): Not determined.

PHILIPPINE INVENTORY (PICCS): Not determined.

16.0 OTHER INFORMATION

Prepared by:

Environment, Health and Safety Department

Issued: November 14, 1995

This material Safety Data Sheet conforms to the requirements of ANSI Z400.1.

This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.

International Chemical Safety Cards

ETHYLBENZENE

ICSC: 0268

<p style="text-align: center;">ETHYLBENZENE Ethylbenzol Phenylethane EB $C_8H_{10}/C_6H_5-C_2H_5$ Molecular mass: 106.2</p> <p>CAS # 100-41-4 RTECS # DA0700000 ICSC # 0268 UN # 1175 EC # 601-023-00-4</p>			
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
• INHALATION	Cough. Dizziness. Drowsiness. Headache.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES	Redness. Pain. Blurred vision.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION	(further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Refer for medical attention.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Ventilation. Collect leaking liquid in covered containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer (extra personal protection: A filter respirator for	Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-20 S: (2-)16-24/25-29 UN Hazard Class: 3	

organic vapour).

UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0268

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

ETHYLBENZENE

ICSC: 0268

I M P O R T A N T D A T A	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS LIQUID, WITH AROMATIC ODOUR.</p> <p>PHYSICAL DANGERS: The vapour mixes well with air, explosive mixtures are easily formed.</p> <p>CHEMICAL DANGERS: Reacts with strong oxidants. Attacks plastic and rubber.</p> <p>OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV (as TWA): 100 ppm; 434 mg/m³; as STEL: 125 ppm; 543 mg/m³ (ACGIH 1994-1995). MAK: 100 ppm; 440 mg/m³ (1994).</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.</p> <p>INHALATION RISK: A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The substance irritates the eyes, the skin and the respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure far above OEL could cause lowering of consciousness.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis.</p>
PHYSICAL PROPERTIES	<p>Boiling point: 136°C Melting point: -95°C Relative density (water = 1): 0.9 Solubility in water, g/100 ml at 20°C: 0.015 Vapour pressure, kPa at 20°C: 0.9 Relative vapour density (air = 1): 3.7</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 18°C c.c. Auto-ignition temperature: 432°C Explosive limits, vol% in air: 1.0-6.7 Octanol/water partition coefficient as log Pow: 3.2</p>
ENVIRONMENTAL DATA	The substance is harmful to aquatic organisms.	
NOTES		
The odour warning when the exposure limit value is exceeded is insufficient.		
Transport Emergency Card: TEC (R)-522 NFPA Code: H2; F3; R0		
ADDITIONAL INFORMATION		

ICSC: 0268**ETHYLBENZENE**

© IPCS, CEC, 1993

**IMPORTANT
LEGAL
NOTICE:**

Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

MSDS Number: **T3913** * * * * * *Effective Date: 12/07/07* * * * * * *Supercedes: 10/05/06*

MSDS *Material Safety Data Sheet*

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 900-650-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-956-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TOLUENE

1. Product Identification

Synonyms: Methylbenzene; Toluol; Phenylmethane

CAS No.: 108-88-3

Molecular Weight: 92.14

Chemical Formula: C₆H₅-CH₃

Product Codes:

J.T. Baker: 5375, 5812, 9336, 9351, 9364, 9456, 9457, 9459, 9460, 9462, 9466, 9472, 9476

Mallinckrodt: 4483, 8092, 8604, 8608, 8610, 8611, V560

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Toluene	108-88-3	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)

Flammability Rating: 3 - Severe (Flammable)

Reactivity Rating: 1 - Slight

Contact Rating: 3 - Severe (Life)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD;
PROPER GLOVES; CLASS B EXTINGUISHER

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Inhalation may cause irritation of the upper respiratory tract. Symptoms of overexposure may include fatigue, confusion, headache, dizziness and drowsiness. Peculiar skin sensations (e. g. pins and needles) or numbness may be produced. Very high concentrations may cause unconsciousness and death.

Ingestion:

Swallowing may cause abdominal spasms and other symptoms that parallel over-exposure from inhalation. Aspiration of material into the lungs can cause chemical pneumonitis, which may be fatal.

Skin Contact:

Causes irritation. May be absorbed through skin.

Eye Contact:

Causes severe eye irritation with redness and pain.

Chronic Exposure:

Reports of chronic poisoning describe anemia, decreased blood cell count and bone marrow hypoplasia. Liver and kidney damage may occur. Repeated or prolonged contact has a defatting action, causing drying, redness, dermatitis. Exposure to toluene may affect the developing fetus.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or impaired liver or kidney function may be more susceptible to the effects of this substance. Alcoholic beverage consumption can enhance the toxic effects of this substance.

4. First Aid Measures

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. CALL A PHYSICIAN IMMEDIATELY.

Ingestion:

Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately. If vomiting occurs, keep head below hips to prevent aspiration into lungs.

Skin Contact:

In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician immediately.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: 7C (45F) CC

Autoignition temperature: 422C (792F)

Flammable limits in air % by volume:

l_{el}: 1.1; u_{el}: 7.1

Flammable liquid and vapor!

Dangerous fire hazard when exposed to heat or flame. Vapors can flow along surfaces to distant ignition source and flash back.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above.

Contact with strong oxidizers may cause fire or explosion. Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

Toluene:

- OSHA Permissible Exposure Limit (PEL):

200 ppm (TWA); 300 ppm (acceptable ceiling conc.); 500 ppm (maximum conc.).

- ACGIH Threshold Limit Value (TLV):

20 ppm (TWA), A4 - Not Classifiable as a Human Carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.

Odor:

Aromatic benzene-like.

Solubility:

0.05 gm/100gm water @ 20C (68F).

Specific Gravity:

0.86 @ 20C / 4 C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

111C (232F)

Melting Point:

-95C (-139F)

Vapor Density (Air=1):

3.14

Vapor Pressure (mm Hg):

22 @ 20C (68F)

Evaporation Rate (BuAc=1):

2.24

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Containers may burst when heated.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Heat, flame, strong oxidizers, nitric and sulfuric acids, chlorine, nitrogen tetroxide; will attack some forms of plastics, rubber, coatings.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:

Oral rat LD50: 636 mg/kg; skin rabbit LD50: 14100 uL/kg; inhalation rat LC50: 49 gm/m³/4H; Irritation data: skin rabbit, 500 mg, Moderate; eye rabbit, 2 mg/24H, Severe. Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

Has shown some evidence of reproductive effects in laboratory animals.

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Toluene (108-88-3)	No	No	3

12. Ecological Information

Environmental Fate:

When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. Bioconcentration factor = 13.2 (eels).

Environmental Toxicity:

This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TOLUENE

Hazard Class: 3

UN/NA: UN1294

Packing Group: II

Information reported for product/size: 390LB

International (Water, I.M.O.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294
Packing Group: II
Information reported for product/size: 390LB

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan	Australia
Toluene (108-88-3)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----

Ingredient	Korea	DSL	Phil.	Canada
Toluene (108-88-3)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302- RQ	TPQ	-SARA 313- List	Chemical Catg.
Toluene (108-88-3)	No	No	Yes	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8 (d)
Toluene (108-88-3)	1000	U220	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
 SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
 Reactivity: No (Pure / Liquid)

WARNING:
 THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 3[Y]E
Poison Schedule: S6
WHMIS:
 This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 3 Reactivity: 0

Label Hazard Warning:

POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:

- Keep away from heat, sparks and flame.
- Keep container closed.
- Use only with adequate ventilation.
- Wash thoroughly after handling.
- Avoid breathing vapor.
- Avoid contact with eyes, skin and clothing.

Label First Aid:

Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head below hips to prevent aspiration into lungs. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: X2000 * * * * * Effective Date: 11/21/08 * * * * * Supercedes: 02/16/06

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 909-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 619-899-6666

Outside U.S. and Canada
Chemtree: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

XYLENES

1. Product Identification

Synonyms: Dimethyl benzene, xylol, methyltoluene

CAS No.: 1330-20-7

Molecular Weight: 106.17

Chemical Formula: C₆H₄(CH₃)₂

Product Codes:

J.T. Baker: 5377, 5813, 9483, 9489, 9490, 9493, 9494, 9499, 9516, X516

Mallinckrodt: 8664, 8668, 8671, 8672, 8802, V052

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
m-Xylene	108-38-3	40 - 65%	Yes
o-Xylene	95-47-6	15 - 20%	Yes
p-Xylene	106-42-3	< 20%	Yes
Ethyl Benzene	100-41-4	15 - 25%	Yes

3. Hazards Identification

Emergency Overview

DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. CHRONIC EXPOSURE CAN CAUSE ADVERSE LIVER, KIDNEY, AND BLOOD EFFECTS. FLAMMABLE LIQUID AND VAPOR.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)

Flammability Rating: 2 - Moderate

Reactivity Rating: 1 - Slight

Contact Rating: 3 - Severe

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES;
CLASS B EXTINGUISHER

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Inhalation of vapors may be irritating to the nose and throat. Inhalation of high concentrations may result in nausea, vomiting, headache, ringing in the ears, and severe breathing difficulties which may be delayed in onset. Substernal pain, cough, and hoarseness are also reported. High vapor concentrations are anesthetic and central nervous system depressants.

Ingestion:

Ingestion causes burning sensation in mouth and stomach, nausea, vomiting and salivation. Minute amounts aspirated into the lungs can produce a severe hemorrhagic pneumonitis with severe pulmonary injury or death.

Skin Contact:

Skin contact results in loss of natural oils and often results in a characteristic dermatitis. May be absorbed through the skin.

Eye Contact:

Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.

Chronic Exposure:

Chronic inhalation can cause headache, loss of appetite, nervousness and pale skin. Repeated or prolonged skin contact may cause a skin rash. Repeated exposure of the eyes to high concentrations of vapor may cause reversible eye damage. Repeated exposure can damage bone marrow, causing low blood cell count. May damage the liver and kidneys.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney, blood, or respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.

Ingestion:

Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: 29C (84F) CC

Autoignition temperature: 464C (867F)

Flammable limits in air % by volume:

lcl: 1.0; ucl: 7.0

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above.

Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated.

Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Vapors can flow along surfaces to distant ignition source and flash back.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill

has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):

100 ppm (TWA) xylene

100 ppm (TWA) ethylbenzene

-ACGIH Threshold Limit Value (TLV):

xylene: 100 ppm (TWA) 150 ppm (STEL), A4 - Not classifiable as a human carcinogen.

ethyl benzene: 100 ppm (TWA) 125 ppm (STEL), A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details. Use explosion-proof equipment.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-

supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

The following physical data is for xylene.

Appearance:

Clear, colorless liquid.

Odor:

Characteristic odor.

Solubility:

Insoluble in water.

Specific Gravity:

0.86 @ 20C/4C

pH:

Not applicable.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

137 - 140C (279 - 284F)

Melting Point:

-25C (-13F)

Vapor Density (Air=1):

3.7

Vapor Pressure (mm Hg):

8 @ 20C (68F)

Evaporation Rate (BuAc=1):

0.7

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Involvement in a fire causes formation of carbon monoxide and unidentified organic components.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Strong oxidizing agents and strong acids.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:

Xylene: oral rat LD50: 4300 mg/kg; inhalation rat LC50: 5000 ppm/4H; skin rabbit LD50: > 1700 mg/kg; Irritation eye rabbit: 87 mg mild (Std. Draize); irritation skin rabbit 500 mg/24 moderate (Std. Draize); investigated as a tumorigen, mutagen, reproductive effector. Ethyl benzene: oral rat LD50: 3500 mg/kg; skin rabbit LD50: 17800 uL/kg; investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

May cause teratogenic effects.

-----\Cancer Lists\-----

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
m-Xylene (108-38-3)	No	No	3
o-Xylene (95-47-6)	No	No	3
p-Xylene (106-42-3)	No	No	3
Ethyl Benzene (100-41-4)	No	No	2B

12. Ecological Information

Environmental Fate:

Following data for xylene: When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. (mixed xylenes: octanol / water partition coefficient 3.1 - 3.2; bioconcentration factor = 1.3, eels)

Environmental Toxicity:

For xylene: This material is expected to be slightly toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, XYLENES
Hazard Class: 3
UN/NA: UN1307
Packing Group: III
Information reported for product/size: 398LB

International (Water, I.M.O.)

Proper Shipping Name: XYLENES
Hazard Class: 3
UN/NA: UN1307
Packing Group: III
Information reported for product/size: 398LB

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan	Australia
m-Xylene (108-38-3)	Yes	Yes	Yes	Yes
o-Xylene (95-47-6)	Yes	Yes	Yes	Yes
p-Xylene (106-42-3)	Yes	Yes	Yes	Yes
Ethyl Benzene (100-41-4)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----

Ingredient	--Canada--			
	Korea	DSL	NDSL	Phil.
m-Xylene (108-38-3)	Yes	Yes	No	Yes
o-Xylene (95-47-6)	Yes	Yes	No	Yes
p-Xylene (106-42-3)	Yes	Yes	No	Yes
Ethyl Benzene (100-41-4)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
m-Xylene (108-38-3)	No	No	Yes	No

o-Xylene (95-47-6)	No	No	Yes	No
p-Xylene (106-42-3)	No	No	Yes	No
Ethyl Benzene (100-41-4)	No	No	Yes	No

-----\Federal, State & International Regulations - Part 2\-----			
Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8 (d)

m-Xylene (108-38-3)	1000	No	No
o-Xylene (95-47-6)	1000	No	No
p-Xylene (106-42-3)	100	No	Yes
Ethyl Benzene (100-41-4)	1000	No	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: No
 SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
 Reactivity: No (Mixture / Liquid)

WARNING:
 THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 3[Y]
Poison Schedule: None allocated.

WHMIS:
 This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 3 Reactivity: 0

Label Hazard Warning:
 DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. CHRONIC EXPOSURE CAN CAUSE ADVERSE LIVER, KIDNEY, AND BLOOD EFFECTS. FLAMMABLE LIQUID AND VAPOR.

Label Precautions:
 Keep away from heat, sparks and flame.
 Avoid contact with eyes, skin and clothing.
 Keep container closed.
 Use only with adequate ventilation.
 Avoid breathing vapor.
 Wash thoroughly after handling.

Label First Aid:
 Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

SEMI-VOLATILE ORGANIC COMPOUNDS

ALLIED CHEMICAL CORP. -- COAL TAR PITCH -- 6810-00K000604

===== Product Identification =====

Product ID:COAL TAR PITCH
MSDS Date:01/01/1985
FSC:6810
NIIN:00K000604
MSDS Number: BCBDS
=== Responsible Party ===
Company Name:ALLIED CHEMICAL CORP.
Emergency Phone Num:201-455-5611
CAGE:1L168
=== Contractor Identification ===
Company Name:ALLIED CHEMICAL COMPANY
Box:1087R
CAGE:1L168
Company Name:ALLIED-SIGNAL INC
Address:Box:2332R
City:MORRISTOWN
State:NJ
ZIP:07962-2332
Country:US
Phone:201-455-4414
CAGE:1L164

===== Composition/Information on Ingredients =====

Ingred Name:COAL TAR PITCH VOLATILES (BENZENE SOLUBLE FRACTION),
ANTHRACENE, BAP, PHENANTHACENE, ACRIDINE, CHRYSENE, PYRENE.
CAS:65996-93-2
RTECS #:GF8655000
Fraction by Wt: 100%
OSHA PEL:0.2 MG/M3
ACGIH TLV:0.2 MG/M3, A1; 9192

===== Hazards Identification =====

Effects of Overexposure:INHALD,SKIN,EYE:CAN
IRRITAT.INGESTD:IRRITNT,NAUS,VOMIT.MAY CAUSE CARDIOVAS COLLAPS FROM
HIGH CONCS.

===== First Aid Measures =====

First Aid:INHALED:REMOVE TO FRESH AIR.GIVE CPR/O*2 IF NEED.SKIN:WASH
W/WATERLESS SOAPS,NO SOLVENTS.EYES:FLUSH W/WATER OR MINERAL OIL 15
MIN.CALL PHYSICIAN.INGEST:INDUCE VOMITING,THEN 2 TBLSPN ACTIVATD
CHARCOAL(USP) IN WATER.GETI IMMEDIATE MEDICAL ATTN.

===== Fire Fighting Measures =====

Flash Point:302-392F
Lower Limits:UNK
Upper Limits:UNK
Extinguishing Media:WATER FOG,CO*2,FOAM,DRY CHEM.,SAND OR STEAM
Fire Fighting Procedures:H*2O CAN CONTROL FIRES,WATER CAUSES
FOAMNG/ERUPTION OF TANKS
Unusual Fire/Explosion Hazard:WHEN HEATED EMITS LOW MW CPDS.AIR-BORN
DUST MAY XPLODE.CLOUD IGNITE AT 1310F.XPLOD CONC=1000 MG/03CU

===== Accidental Release Measures =====

Spill Release Procedures:ELIMINATE IGNITION SOURCES.STOP LEAK W/O RISK.DIKE SPILL W EARTH OR SAND.COLLECT IN SUITABLE APPROVED DISPOSAL CONTAINER.

===== Handling and Storage =====

Handling and Storage Precautions:RECOMMENDED STORAGE IS 50 DEGREES ABOVE SOFTENING POINT.WEAR CLOTHING CLOSED AT NECK, LONG SLEEVES, NON-POROUS GLOVES
Other Precautions:CHANGE CLOTHES DAILY IF CONTAMINATED.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:NIOSH APPRVD RESPIR W ORGANIC VAPOR CARTRIDGE
Ventilation:VENTILATE WORK AREA.AND/OR WEAR RESPIRATOR
Protective Gloves:NON-POROUS
Eye Protection:SAFETY GLASSES
Other Protective Equipment:FULL PROTECTV CLOTHES, FACE SHILD, GOGGLES, PROTECTV CREAM(SKIN)
Supplemental Safety and Health
FP=150-200C

===== Physical/Chemical Properties =====

HCC:N1
Boiling Pt:B.P. Text:671F/355C
Vapor Density:>1
Spec Gravity:1.27
Evaporation Rate & Reference:<1: BUTYL ACETATE=1
Solubility in Water:NEGLIGIBLE
Appearance and Odor:BLACK SOLID, LITTLE ODOR @ AMB. SMOKY ODOR ON HEATNG
Percent Volatiles by Volume:UNK

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES
AVOID CONTACT W/WATER WHEN CONFINED
Stability Condition to Avoid:DUSTY CONDITION BREATHING FUMES, WORK IN UNVENT AREA W/O RESP
Hazardous Decomposition Products:EMITS LOW MW CPDS WHEN BURNED
Conditions to Avoid Polymerization:OPEN FLAME/INTENSE HEAT.

===== Disposal Considerations =====

Waste Disposal Methods:BURY OR INCINERATE AT APPROVED SITES IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

Disclaimer (provided with this information by the compiling agencies):
This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever, expressly or implied, warrants this information to be accurate and disclaims all liability for its use. Any person utilizing this document should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation.

MSDS Number: C5456 * * * * * Effective Date: 05/26/09 * * * * * Supercedes: 07/06/06



From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response In Canada
CANUTEC: 613-998-6868

Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

m-CRESOL

1. Product Identification

Synonyms: m-Cresol practical; phenol, 3-methyl-; 3-hydroxytoluene; meta-Cresylic Acid; 3-Cresol; m-Cresylic Acid
CAS No.: 108-39-4
Molecular Weight: 108.14
Chemical Formula: C₇H₈O
Product Codes: F842

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
m-Cresol	108-39-4	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR

ABSORBED THROUGH SKIN. CORROSIVE. CAUSES SEVERE BURNS TO EVERY AREA OF CONTACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, PANCREAS AND CARDIOVASCULAR SYSTEM. VAPOR IS IRRITATING TO EYES AND RESPIRATORY TRACT. COMBUSTIBLE LIQUID AND VAPOR.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)

Flammability Rating: 2 - Moderate

Reactivity Rating: 1 - Slight

Contact Rating: 4 - Extreme (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

Storage Color Code: White (Corrosive)

Potential Health Effects

Cresol is toxic via ingestion and skin absorption. Cresol is similar to phenol in its action on the body, but is less severe in its effects.

Inhalation:

Breathing vapor, dust or mist results in digestive disturbances (vomiting, difficulty in swallowing, diarrhea, loss of appetite). Will irritate, possibly burn respiratory tract. Other symptoms listed under ingestion may also occur.

Ingestion:

Poison. Symptoms may include burning pain in mouth and throat, abdominal pain, headache, dizziness, muscular weakness, irregular breathing, weak pulse, lung damage, liver damage, pancreas damage, kidney damage, coma, and possibly death from circulatory or cardiac failure.

Skin Contact:

Corrosive. Causes severe pain followed by numbness. May be absorbed through the skin with systemic poisoning effects to follow. Discoloration and severe burns may occur.

Eye Contact:

Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.

Chronic Exposure:

Repeated exposure may cause symptoms described for acute poisoning as well as liver damage.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

Onset of systemic effects may be delayed as long as 72 hours.

5. Fire Fighting Measures

Fire:

Flash point: 86C (187F) CC

Autoignition temperature: 1038C (1900F)

Flammable limits in air % by volume:

l_{el}: 1.1; u_{el}: 1.4

Combustible Liquid and Vapor! Contact with strong oxidizers may cause fire.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8.

Solid Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container.

Liquid Spills: Absorb with vermiculite, dry sand, earth or similar material and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush

to sewer.

Any Spill:

US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Protect from light. Outside or detached storage is preferred. Separate from other storage. Do not allow untrained workers to handle cresol. Containers of this material may be hazardous when empty since they retain product residues (dust, solids, vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):
5 ppm (TWA) (skin), cresol, all isomers

-ACGIH Threshold Limit Value (TLV):
5 ppm (TWA) (skin), cresol, all isomers

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH type P100 or R100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. Please note that N series filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain

eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Colorless to yellow liquid.

Odor:

Phenolic odor.

Solubility:

Soluble in water.

Specific Gravity:

1.034 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

No information found.

Boiling Point:

202C (396F)

Melting Point:

11 - 12C (52 - 54F)

Vapor Density (Air=1):

3.72

Vapor Pressure (mm Hg):

0.1528 @ 25C (77F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Darkens on exposure to air or light.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Oxidizing agents and bases.

Conditions to Avoid:

Heat, flame, ignition sources, incompatibles, light, and air.

11. Toxicological Information

Toxicological Data:

Rat oral LD50: 242 mg/kg; Rabbit skin LD50: 2050 mg/kg. Irritant (std Draize) rabbit: skin = 517 mg/24H, severe; eye = 103 mg, severe. Investigated as a tumorigen, mutagen, reproductive effector.

Carcinogenicity:

EPA / IRIS classification: Group C - Possible human carcinogen.

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
m-Cresol (108-39-4)	No	No	None

12. Ecological Information

Environmental Fate:

When released into water, this material is expected to readily biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals.

Environmental Toxicity:

The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CRESOLS

Hazard Class: 6.1, 8

UN/NA: UN2076

Packing Group: II

Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: CRESOLS, LIQUID

Hazard Class: 6.1, 8

UN/NA: UN2076
 Packing Group: II
 Information reported for product/size: 4L

International (Air, I.C.A.O.)

Proper Shipping Name: CRESOLS
Hazard Class: 6.1, 8
 UN/NA: UN2076
 Packing Group: II
 Information reported for product/size: 4L

15. Regulatory Information

```
-----\Chemical Inventory Status - Part 1\-----
Ingredient                                     TSCA  EC   Japan  Australia
-----
m-Cresol (108-39-4)                          Yes  Yes  Yes    Yes
```

```
-----\Chemical Inventory Status - Part 2\-----
Ingredient                                     Korea  --Canada--  NDSL  Phil.
                                     Korea  DSL          NDSL  Phil.
-----
m-Cresol (108-39-4)                          Yes   Yes   No    Yes
```

```
-----\Federal, State & International Regulations - Part 1\-----
Ingredient                                     -SARA 302-  -SARA 313-
                                     RQ   TPQ   List  Chemical Catg.
-----
m-Cresol (108-39-4)                          No   No    Yes   No
```

```
-----\Federal, State & International Regulations - Part 2\-----
Ingredient                                     CERCLA  -RCRA-  -TSCA-
                                     CERCLA  261.33  8(d)
-----
m-Cresol (108-39-4)                          100    No      No
```

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
 SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
 Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2X
Poison Schedule: S6
WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 2 Reactivity: 0

Label Hazard Warning:

POISON! DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CORROSIVE. CAUSES SEVERE BURNS TO EVERY AREA OF CONTACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, PANCREAS AND CARDIOVASCULAR SYSTEM. VAPOR IS IRRITATING TO EYES AND RESPIRATORY TRACT. COMBUSTIBLE LIQUID AND VAPOR.

Label Precautions:

- Do not breathe vapor or mist.
- Do not get in eyes, on skin, or on clothing.
- Keep container closed.
- Use only with adequate ventilation.
- Wash thoroughly after handling.
- Keep away from heat and flame.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 3.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

International Chemical Safety Cards

o-CRESOL

ICSC: 0030

o-CRESOL
2-Hydroxy-1-methylbenzene
2-Methylphenol
Ortho-hydroxytoluene
 $C_7H_8O/CH_3C_6H_4OH$
Molecular mass: 108.2

CAS # 95-48-7
RTECS # GO6300000
ICSC # 0030
UN # 2076
EC # 604-004-00-9

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder, AFFF, foam, carbon dioxide.
EXPLOSION	Above 81°C explosive vapour/air mixtures may be formed.	Above 81°C use a closed system, ventilation.	
EXPOSURE		STRICT HYGIENE!	IN ALL CASES CONSULT A DOCTOR!
• INHALATION	Burning sensation. Cough. Headache. Laboured breathing. Nausea. Vomiting.	Local exhaust or breathing protection.	Fresh air, rest. Half-upright position. Artificial respiration if indicated. Refer for medical attention.
• SKIN	MAY BE ABSORBED! Redness. Pain. Blisters.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
• EYES	Redness. Pain. Severe deep burns.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION	Abdominal cramps. Burning sensation. Collapse.	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place (extra personal protection: complete protective clothing including self-contained breathing apparatus).	Separated from strong oxidants, food and feedstuffs.	Do not transport with food and feedstuffs. T symbol R: 24/25-34 S: (1/2-)36/37/39-45 Note: C UN Hazard Class: 6.1	

UN Subsidiary Risks: 8
UN Packing Group: II
Marine pollutant.

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0030

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

o-CRESOL

ICSC: 0030

<p style="text-align: center;">I M P O R T A N T A T A</p>	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS OR YELLOW LIQUID OR CRYSTALS, WITH CHARACTERISTIC ODOUR. TURNS DARK ON EXPOSURE TO AIR AND LIGHT.</p> <p>PHYSICAL DANGERS:</p> <p>CHEMICAL DANGERS: Reacts violently with strong oxidizing agents, causing fire and explosion hazard.</p> <p>OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV: 5 ppm; 22 mg/m³ (as TWA) (skin) (ACGIH 1993-1994). MAK: 5 ppm; 22 mg/m³; skin (1992).</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p>INHALATION RISK: A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: Corrosive. The substance is corrosive to the eyes, the skin and the respiratory tract. Corrosive on ingestion. Inhalation of vapour or aerosol may cause lung oedema (see Notes). The substance may cause effects on the central nervous system and various organs.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis.</p>
<p style="text-align: center;">PHYSICAL PROPERTIES</p>	<p>Boiling point: 191°C Melting point: 31°C Relative density (water = 1): 1.05 Solubility in water, g/100 ml at 25°C: 2.5 Vapour pressure, Pa at 25°C: 33</p>	<p>Relative vapour density (air = 1): 3.7 Flash point: 81°C c.c. Auto-ignition temperature: 599°C Explosive limits, vol% in air: 1.4-? Octanol/water partition coefficient as log Pow: 1.95</p>
<p style="text-align: center;">ENVIRONMENTAL DATA</p>	<p>This substance may be hazardous to the environment; special attention should be given to water. It is strongly advised not to let the chemical enter into the environment because it persists in the environment.</p>	
NOTES		
<p>The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate spray, by a doctor or a person authorized by him/her, should be considered.</p>		
<p>Transport Emergency Card: TEC (R)-37A, 37C</p>		

NFPA Code: H 3; F 2; R 0;

ADDITIONAL INFORMATION**ICSC: 0030**

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o-CRESOL**IMPORTANT
LEGAL
NOTICE:**

Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

Material Safety Data Sheet

2,4-Dimethylphenol, 99%

ACC# 14357

Section 1 - Chemical Product and Company Identification

MSDS Name: 2,4-Dimethylphenol, 99%**Catalog Numbers:** AC408450000, AC408450050, AC408450250, AC408451000**Synonyms:** 2,4-Xylenol; 4,6-Dimethylphenol Benzene; 1-Hydroxy-2,4-Dimethyl Benzene; M-Xylenol.**Company Identification:**

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01**For emergencies in the US, call CHEMTREC:** 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
105-67-9	2,4-Dimethylphenol	99	203-321-6

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless or almost colorless crystals.

Danger! Causes eye and skin burns. Causes digestive and respiratory tract burns. Harmful if swallowed or absorbed through the skin. May cause kidney damage.**Target Organs:** Kidneys, respiratory system, gastrointestinal system, eyes, skin.**Potential Health Effects****Eye:** Causes eye burns.**Skin:** Harmful if absorbed through the skin. Causes skin burns.**Ingestion:** Harmful if swallowed. Causes gastrointestinal tract burns. A case of fatal xylenol ingestion by a long stay mental hospital patient is described. Clinical course was similar to that observed in other phenolic poisonings with active bowel sounds, nausea, vomiting, severe metabolic acidosis, hypotension, and cardiac and renal failure.**Inhalation:** Causes chemical burns to the respiratory tract.**Chronic:** May cause kidney damage. Chronic exposure may cause effects similar to those of acute exposure.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.

Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

Ingestion: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Dust from this material can form explosive organic dust cloud.

Extinguishing Media: For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray.

Flash Point: 96 deg C (204.80 deg F)

Autoignition Temperature: Not available.

Explosion Limits, Lower: 1.40 vol %

Upper: Not available.

NFPA Rating: (estimated) Health: 3; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up or absorb material, then place into a suitable clean, dry, closed container for disposal. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Do not breathe dust, mist, or vapor. Do not get in eyes, on skin, or on clothing. Keep container tightly closed.

Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store in metal containers.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
2,4-Dimethylphenol	none listed	none listed	none listed

OSHA Vacated PELs: 2,4-Dimethylphenol: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Crystals

Appearance: colorless or almost colorless

Odor: Characteristic phenolic odor.

pH: Not available.

Vapor Pressure: 10 mm Hg @92.3

Vapor Density: Not available.

Evaporation Rate: Not available.

Viscosity: Not available.

Boiling Point: 211 deg C

Freezing/Melting Point: 21-26 deg C

Decomposition Temperature: Not available.

Solubility: 0.5% (25°C)

Specific Gravity/Density: .9700 g/cm³

Molecular Formula: C₈H₁₀O

Molecular Weight: 122.17

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Dust generation, excess heat.

Incompatibilities with Other Materials: Bases - acid chlorides - acid anhydrides - oxidizing agents - corrodes steel - brass - copper - copper alloys.

Hazardous Decomposition Products: Carbon monoxide, carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported

Section 11 - Toxicological Information

RTECS#:

CAS# 105-67-9: ZE5600000

LD50/LC50:

CAS# 105-67-9:

Oral, mouse: LD50 = 809 mg/kg;

Oral, rat: LD50 = 3200 mg/kg;

Skin, rat: LD50 = 1040 mg/kg;

Carcinogenicity:

CAS# 105-67-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.

Teratogenicity: No information found

Reproductive Effects: No information found

Mutagenicity: No information found

Neurotoxicity: No information found

Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.

Environmental: Terrestrial: Would adsorb moderately to soil. It is reported to have been biodegraded in soil in 4 days at 19 deg C. Aquatic: May adsorb moderately to sediment and will be readily biodegradable. Atmospheric: Should degrade by reaction with photochemically produced hydroxyl radicals (half-life 8 hr). Expected to slightly bioconcentrate.

Physical: No information available.

Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series:

CAS# 105-67-9: waste number U101.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	TOXIC SOLIDS, CORROSIVE, ORGANIC, N.O.S.	Toxic Solid, Corrosive, Organic, N.O.S.
Hazard Class:	6.1	6.1
UN Number:	UN2928	UN2928
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 105-67-9 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 105-67-9: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 105-67-9: immediate.

Section 313

This material contains 2,4-Dimethylphenol (CAS# 105-67-9, 99%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

Clean Air Act:

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

CAS# 105-67-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 105-67-9 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 105-67-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T C N

Risk Phrases:

R 34 Causes burns.

R 24/25 Toxic in contact with skin and if swallowed.

R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 105-67-9: No information available.

Canada - DSL/NDSL

CAS# 105-67-9 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of E, D1A.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 105-67-9 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information
--

MSDS Creation Date: 4/16/1999

Revision #5 Date: 11/20/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MSDS Number: **N0090** * * * * * *Effective Date: 08/10/04* * * * * * *Supercedes: 11/02/01*

MSDS**Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 906-859-2151
CHEMTREC: 1-800-424-4300

National Response in Canada
CANUTEC: 619-996-6666

Outside U.S. and Canada
Chemtrec: 763-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

NAPHTHALENE

1. Product Identification

Synonyms: Naphthene; mothballs; tar camphor; naphthaliin; white-tar

CAS No.: 91-20-3

Molecular Weight: 128.16

Chemical Formula: C₁₀H₈

Product Codes:

J.T. Baker: 2718

Mallinckrodt: 6348

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Naphthalene	91-20-3	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY CAUSE ALLERGIC SKIN REACTION. MAY AFFECT LIVER, KIDNEY, BLOOD AND CENTRAL NERVOUS SYSTEM. COMBUSTIBLE.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate

Flammability Rating: 2 - Moderate

Reactivity Rating: 0 - None

Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES; LAB COAT

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Inhalation of dust or vapors can cause headache, nausea, vomiting, extensive sweating, and disorientation. The predominant reaction is delayed intravascular hemolysis with symptoms of anemia, fever, jaundice, and kidney or liver damage.

Ingestion:

Toxic. Can cause headache, profuse perspiration, listlessness, dark urine, nausea, vomiting and disorientation. Intravascular hemolysis may also occur with symptoms similar to those noted for inhalation. Severe cases may produce coma with or without convulsions. Death may result from renal failure.

Skin Contact:

Can irritate the skin and, on prolonged contact, may cause rashes and allergy. "Sensitized" individuals may suffer a severe dermatitis.

Eye Contact:

Vapors and solid causes irritation, redness and pain. Very high exposures can damage the nerves of the eye.

Chronic Exposure:

Has led to cataract formation in eyes. May cause skin allergy.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin, blood or vascular disorders or impaired respiratory function may be more susceptible to the effects of the substance. Particularly susceptible individuals are found in the general population, most commonly in dark skinned races.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: 87C (189F) CC

Autoignition temperature: 526C (979F)

Combustible. May be ignited by heat, sparks or flame. May burn rapidly with flare-burning effect. Fire may produce irritating or poisonous gases.

Explosion:

Explosive limits, volume % in air: lel: 0.9; uel: 5.9. Above flashpoint, vapor-air mixtures are explosive within flammable limits noted above. Closed containers exposed to heat may explode. Contact with strong oxidizers may cause fire or explosion.

Fire Extinguishing Media:

Dry chemical, foam, water or carbon dioxide. Foam or direct water spray on molten naphthalene may cause extensive foaming. Molten naphthalene spatters in contact with water; apply water from as far a distance as possible.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Vapors can flow along surfaces to distant ignition source and flash back.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Keep away from moisture and oxidizers. Containers of this material may be hazardous when empty since they retain

product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

- OSHA Permissible Exposure Limit (PEL):
10 ppm, 50 mg/m³.

- ACGIH Threshold Limit Value (TLV):

TWA= 10 ppm, 52 mg/m³

STEL= 15 ppm, 79 mg/m³.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a half-face respirator with an organic vapor cartridge and particulate filter (NIOSH type P95 or R95 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH P100 or R100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. Please note that N series filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

White crystals.

Odor:

Strong coal tar odor (moth balls).

Solubility:

Insoluble in water.

Specific Gravity:

1.2

pH:
 No information found.
% Volatiles by volume @ 21C (70F):
 No information found.
Boiling Point:
 218C (424F)
Melting Point:
 80C (176F)
Vapor Density (Air=1):
 4.4
Vapor Pressure (mm Hg):
 1 @ 53C (127F)
Evaporation Rate (BuAc=1):
 < 1

10. Stability and Reactivity

Stability:
 Stable at room temperature in sealed containers. Sublimes appreciably at temperatures above melting point.
Hazardous Decomposition Products:
 Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
 Will not occur.
Incompatibilities:
 Strong oxidizers, strong alkalis and strong mineral acids, mixtures of aluminum trichloride and benzoyl chloride. Reacts violently with chromic anhydride. Melted naphthalene will attack some forms of plastics, rubber, and coatings.
Conditions to Avoid:
 Avoid heat, sparks, flames and other ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 490 mg/kg;
 Inhalation rat LC50: 340 mg/m3, 1 hour;
 Skin rabbit LD50: > 20 g/kg;
 Irritation data: skin (open Draize) rabbit 495 mg, mild; eye (standard Draize) rabbit 100 mg, mild;
 Investigated as a tumorigen, mutagen and reproductive effector.

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Naphthalene (91-20-3)	No	No	None

12. Ecological Information

Environmental Fate:

When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material may bioaccumulate to some extent. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NAPHTHALENE, REFINED

Hazard Class: 4.1

UN/NA: UN1334

Packing Group: III

Information reported for product/size: 1KG

International (Water, I.M.O.)

Proper Shipping Name: NAPHTHALENE, REFINED

Hazard Class: 4.1

UN/NA: UN1334

Packing Group: III

Information reported for product/size: 1KG

International (Air, I.C.A.O.)

Proper Shipping Name: NAPHTHALENE, REFINED
Hazard Class: 4.1
UN/NA: UN1334
Packing Group: III
Information reported for product/size: 1KG

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan	Australia
Naphthalene (91-20-3)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----

Ingredient	Korea	DSL	NDSL	Phil.
Naphthalene (91-20-3)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302- RQ	TPQ	-----SARA 313----- List	Chemical Catg.
Naphthalene (91-20-3)	No	No	Yes	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8 (d)
Naphthalene (91-20-3)	100	U165	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
 Reactivity: No (Pure / Solid)

Australian Hazchem Code: 2Z
Poison Schedule: S6
WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 2 Reactivity: 0

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY CAUSE ALLERGIC SKIN

REACTION. MAY AFFECT LIVER, KIDNEY, BLOOD AND CENTRAL NERVOUS SYSTEM. COMBUSTIBLE.

Label Precautions:

- Avoid contact with eyes, skin and clothing.
- Avoid prolonged or repeated contact with skin.
- Avoid breathing dust.
- Avoid breathing vapor.
- Keep container closed.
- Use only with adequate ventilation.
- Wash thoroughly after handling.
- Keep away from heat, sparks and flame.

Label First Aid:

In all cases call a physician. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

ULTRA SCIENTIFIC -- PHENOLS MIXTURE, US-107

 =====
 MSDS Safety Information
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FSC: 6850
 MSDS Date: 05/13/1996
 MSDS Num: CDTDX
 LIIN: 00N041084
 Product ID: PHENOLS MIXTURE, US-107
 MFN: 02
 Responsible Party
 Cage: 0MU35
 Name: ULTRA SCIENTIFIC
 Address: 250 SMITH ST
 City: NORTH KINGSTOWN RI 02852
 Info Phone Number: 401-294-9400
 Emergency Phone Number: 401-294-9400
 Published: Y

 =====
 Contractor Summary
 =====

Cage: 0MU35
 Name: ULTRA SCIENTIFIC
 Address: 250 SMITH STREET
 City: NORTH KINGSTOWN RI 02852-5000
 Phone: 401-294-9400

 =====
 Ingredients
 =====

Name: SUPP DATA:PHENOL, PENTACHLORO-; IARC MONOGRAPHS ON EVAL OF CARCIN RISK OF
 CHEMS TO MAN, VOL 53, PG 371, 1991:

Name: ING 14:GROUP 2B. ANIMAL:LIVER.

Cas: 75-09-2
 RTECS #: PA8050000
 Name: METHANE, DICHLORO-; (METHYLENE CHLORIDE) (SARA 313) (CERCLA).
 LD50:(ORAL,RAT) 2136 MG/KG.
 % Wt: 98.3408
 OSHA PEL: 500 PPM
 ACGIH TLV: 50 PPM
 EPA Rpt Qty: 1000 LBS
 DOT Rpt Qty: 1000 LBS

Cas: 59-50-7
 RTECS #: GO7100000
 Name: M-CRESOL, 4-CHLORO-; (4-CHLORO-3-METHYLPHENOL) (CERCLA). LD50:(ORAL,RAT)
 400 MG/KG.
 % Wt: 0.1508
 OSHA PEL: N/K (FP N)
 ACGIH TLV: N/K (FP N)
 EPA Rpt Qty: 5000 LBS
 DOT Rpt Qty: 5000 LBS

Cas: 95-57-8
 RTECS #: SK2625000
 Name: PHENOL, O-CHLORO-; (2-CHLOROPHENOL) (SARA 313) (CERCLA). LD50:(ORAL,RAT)
 670 MG/KG.
 % Wt: 0.1508
 OSHA PEL: N/K (FP N)

ACGIH TLV: N/K (FP N)
EPA Rpt Qty: 100 LBS
DOT Rpt Qty: 100 LBS

Cas: 120-83-2
RTECS #: SK8575000
Name: PHENOL, 2,4-DICHLORO-; (2,4-DICHLOROPHENOL) (SARA 313) (CERCLA).
LD50: (ORAL,RAT) 580 MG/KG.
% Wt: 0.1508
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
EPA Rpt Qty: 100 LBS
DOT Rpt Qty: 100 LBS

Cas: 105-67-9
RTECS #: ZE5600000
Name: 2,4-XYLENOL; (2,4-DIMETHYLPHENOL) (SARA 313) (CERCLA). LD50: (ORAL,RAT)
3200 MG/KG.
% Wt: 0.1508
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
EPA Rpt Qty: 100 LBS
DOT Rpt Qty: 100 LBS

Cas: 534-52-1
RTECS #: GO9625000
Name: O-CRESOL, 4,6-DINITRO-; (2-METHYL-4,6-DINITROPHENOL) (SARA 302/313)
(CERCLA). LD50: (ORAL,RAT) 10 MG/KG.
% Wt: 0.1508
OSHA PEL: 0.2 MG/M3, S
ACGIH TLV: 0.2 MG/M3, S
EPA Rpt Qty: 10 LBS
DOT Rpt Qty: 10 LBS

Cas: 51-28-5
RTECS #: SL2800000
Name: PHENOL, 2,4-DINITRO-; (2,4-DINITROPHENOL) (SARA 313) (CERCLA).
LD50: (ORAL,RAT) 30 MG/KG.
% Wt: 0.1508
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
EPA Rpt Qty: 10 LBS
DOT Rpt Qty: 10 LBS

Cas: 88-75-5
RTECS #: SM2100000
Name: PHENOL, O-NITRO-; (2-NITROPHENOL) (SARA 313) (CERCLA). LD50: (ORAL,RAT)
334 MG/KG.
% Wt: 0.1508
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
EPA Rpt Qty: 100 LBS
DOT Rpt Qty: 100 LBS

Cas: 100-02-7
RTECS #: SM2275000
Name: PHENOL, P-NITRO-; (P-NITROPHENOL) (SARA 313). LD50: (ORAL,RAT) 250 MG/KG.
% Wt: 0.1508
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

EPA Rpt Qty: 100 LBS
DOT Rpt Qty: 100 LBS

Cas: 87-86-5
RTECS #: SM6300000
Name: PHENOL, PENTACHLORO-; (PENTACHLOROPHENOL) (PCP) (SARA 313) (CERCLA).
LD50:(ORAL,RAT) 50 MG/KG.
% Wt: 0.1508
OSHA PEL: 0.5 MG/M3, S
ACGIH TLV: 0.5 MG/M3, S
EPA Rpt Qty: 10 LBS
DOT Rpt Qty: 10 LBS

Cas: 108-95-2
RTECS #: SJ3327000
Name: PHENOL (SARA 302/313) (CERCLA). LD50:(ORAL,RAT) 414 MG/KG.
% Wt: 0.1508
OSHA PEL: 5 PPM, S
ACGIH TLV: 5 PPM, S
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Cas: 88-06-2
RTECS #: SN1675000
Name: PHENOL, 2,4,6-TRICHLORO-; (2,4,6-TRICHLOROPHENOL) (SARA 313) (CERCLA).
LD50:(ORAL,RAT) 250 MG/KG.
% Wt: 0.1508
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
EPA Rpt Qty: 10 LBS
DOT Rpt Qty: 10 LBS

Name: OTHER PROT EQUIP:SUCH AS A LABORATORY COAT &/OR A RUBBER APRON TO
PREVENT CONTACT W/EYES, SKIN & CLOTHING.

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Health Hazards Data
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LD50 LC50 Mixture: SEE INGREDIENTS.
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: YES
IARC: YES
OSHA: NO

Effects of Exposure: CHLOROCARBON MATLS HAVE PRODUCED SENSITIZATION OF THE
MYOCARDIUM TO EPINEPHRINE IN LAB ANIMALS & COULD HAVE A SIMILAR EFFECT IN
HUMANS. ADRENOMIMETICS (E.G., EPINEPHRINE) MAY BE CONTRAINDICATED EXCEPT FOR
LIFE-SUSTAINING USES IN HUMANS ACUTELY OR CHRONICALLY EXPOSED TO
CHLOROCARBONS (FP N). CONTAINS (EFTS OF OVEREXP)

Explanation Of Carcinogenicity: METHYLENE CHLORIDE:IARC MONOGRAPHS, SUPP, VOL
7, PG 194, 1987:GRP 2B. NTP 7TH ANNUAL RPT ON CARCINS, 1994:ANTIC (SUPDAT)
Signs And Symptions Of Overexposure: HLTH HAZ:CARCINOGEN(S) OR CANCER SUSPECT
AGENT(S). TOXIC; IRRITANT. WARNING:THIS PRODUCT CONTAINS CHEMICALS KNOWN TO
THE STATE OF CALIFORNIA TO CAUSE CANCER. ALL CHEMICALS SHOULD BE CONSIDERED
HAZARDO US - DIRECT PHYSICAL CONATCT SHOULD BE AVOIDED.

Medical Cond Aggravated By Exposure: NONE SPECIFIED BY MANUFACTURER.
First Aid: INGEST:CALL MD IMMEDIATELY (FP N). EYES:FLUSH W/COPIOUS AMOUNTS OF
WATER FOR AT LEAST 15 MINUTES. SKIN:FLUSH W/COPIOUS AMOUNTS OF WATER.
INHAL:REMOVE TO FRESH AIR - GIVE OXYGEN, IF NECESSARY. CONTACT MD.
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Handling and Disposal

Spill Release Procedures: DUE TO THE SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. A LEAKING AMPULE OR BOTTLE MAY BE PLACED IN A PLASTIC BAG AND NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SPLASHES MAY BE ABSORBED ON VERMICULITE OR SAND.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Methods: BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AFTERBURNER & SCRUBBER. OBSERVE ALL FEDERAL, STATE & LOCAL LAWS CONCERNING DISPOSAL.

Handling And Storage Precautions: KEEP TIGHTLY CLOSED & STORE IN A COOL, DRY PLACE. THIS MATL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Other Precautions: NO SMOKING IN AREA OF USE. DO NOT USE IN GENERAL VICINITY OF ARC WELDING, OPEN FLAMES OR HOT SURFACES. HEAT &/OR UV RADIATION MAY CAUSE THE FORMATION OF HCL &/OR PHOSGENE (FP N).

Fire and Explosion Hazard Information

Flash Point Text: NONE

Lower Limits: 15.5%

Upper Limits: 66.4%

Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER OR WATER SPRAY.

Fire Fighting Procedures: WEAR NIOSH APPROVED PRESSURE DEMAND SCBA & FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire/Explosion Hazard: THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE HCL & PHOSGENE (FP N). NON-COMBUSTIBLE.

Control Measures

Respiratory Protection: NIOSH APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).

Ventilation: NONE SPECIFIED BY MANUFACTURER.

Protective Gloves: IMPERVIOUS GLOVES (FP N).

Eye Protection: ANSI APPROVED CHEM WORKERS GOGGLES & (SUPDAT)

Other Protective Equipment: ANSI APPROVED EYE WASH FOUNTAIN & DELUGE SHOWER (FP N). USE APPROP NIOSH APPROVED SAFETY EQUIP. WEAR CHEM RESIST CLOTH

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Supplemental Safety and Health: EYE PROT: FULL LENGTH FACE SHIELD (FP N). EXPLAN OF CARCINOGENICITY: TO BE CARCINOGEN. ANIMAL: LUNG, LIVER, SALIVARY, MAMMARY GLAND (TUMORS). 2,4,6-TRICHLOROPHENOL: IARC MONOGRAPHS, SUPP, VOL 7, PG 154, 1987: ANIMAL SUFFICIENT EVID. NTP 7TH ANNUAL RPT ON CARCINOGENS, 1994: ANTIMUTAGENIC TO BE CARCINOGEN. ANIMAL: SKIN, EYE, CNS, LIVER, KIDNEY LESIONS.

Physical/Chemical Properties

B.P. Text: 104F, 40C

M.P./F.P Text: -142F, -97C

Vapor Pressure: 380 @ 22C

Vapor Density: 2.9

Specific Gravity: 1.326

Solubility in Water: INSOLUBLE

Appearance and Odor: COLORLESS LIQUID.

Reactivity Data

Stability Indicator: YES

Stability Condition To Avoid: NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomposition Products: HCL (FP N). PHOSGENE.

Hazardous Polymerization Indicator: NO

Conditions To Avoid Polymerization: NOT RELEVANT

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 Toxicological Information
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 Ecological Information
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 MSDS Transport Information
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 Regulatory Information
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 Other Information
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=====
 HAZCOM Label
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Product ID: PHENOLS MIXTURE, US-107

Cage: 0MU35

Company Name: ULTRA SCIENTIFIC

Street: 250 SMITH STREET

City: NORTH KINGSTOWN RI

Zipcode: 02852-5000

Health Emergency Phone: 401-294-9400

Label Required IND: Y

Date Of Label Review: 05/20/1997

Status Code: C

Label Date: 05/20/1997

Origination Code: G

Chronic Hazard IND: Y

Eye Protection IND: YES

Skin Protection IND: YES

Signal Word: DANGER

Respiratory Protection IND: YES

Health Hazard: Severe

Contact Hazard: Moderate

Fire Hazard: None

Reactivity Hazard: Slight

Hazard And Precautions: DECOMPOSITION PRODUCTS MAY BE HAZARDOUS.

ACUTE: INHALATION OF VAPORS MAY CONTRIBUTE TO THE OCCURRENCE OF IRREGULAR HEARTBEAT (FP N). TOXIC; IRRITANT. CHRONIC: CANCER HAZARD. CONTAINS METHYLENE CHLORIDE, 2,4,6-TRICHLOROPHENOL AND PENTACHLOROPHENOL, WHICH ARE LISTED AS ANIMAL LUNG AND LIVER CARCINOGENS (FP N).

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 Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

SPEX INDUSTRIES, INC -- CYANIDE -- 6550-00N049220

===== Product Identification =====

Product ID:CYANIDE
 MSDS Date:05/07/1993
 FSC:6550
 NIIN:00N049220
 MSDS Number: BTZDG
 === Responsible Party ===
 Company Name:SPEX INDUSTRIES, INC
 Address:3880 PARK AVE
 City:EDISON
 State:NJ
 ZIP:08820
 Country:US
 Info Phone Num:908-549-7144
 Emergency Phone Num:800-424-9300 (CHEMTREC)
 CAGE:07987

=== Contractor Identification ===

Company Name:SPEX CERTIPREP INC
 Address:203 NORCROSS AVE
 Box:City:METUCHEN
 State:NJ
 ZIP:08840
 Country:US
 Phone:732-549-7144
 CAGE:07977
 Company Name:SPEX INDUSTRIES, INC
 Address:3880 PARK AVE
 City:EDISON
 State:NJ
 ZIP:08820
 Phone:(201) 549-7144
 CAGE:07987

===== Composition/Information on Ingredients =====

Ingred Name:POTASSIUM CYANIDE
 CAS:151-50-8
 RTECS #:TS8750000
 Fraction by Wt: 0.0063%
 OSHA PEL:5 MG/M3 (CN)
 ACGIH TLV:5 MG/M3, C
 EPA Rpt Qty:10 LBS
 DOT Rpt Qty:10 LBS

===== Hazards Identification =====

LD50 LC50 Mixture:LD50:(ORAL,RAT)10 MG/KG
 Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
 Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
 Health Hazards Acute and Chronic:CONC KCN IS A RAPIDLY FATAL POISON
 WHEN TAKEN INTO DIGESTIVE SYS. TOX SYMPS MAY ALSO OCCUR WHEN
 INHALED. PRLNGD SKIN CONT WILL CAUSE IRRIT & POSS POISONING COULD
 OCCUR IF SKIN IS BROKEN. BUT SOLN CNTN S A VERY SM AMT (0.0063%) OF
 POTASSIUM CYANIDE. A STUDY BY AN INDEPENDENT LAB HAS SHOWN THAT
 THIS SOLN (EFTS OF OVEREXP)
 Explanation of Carcinogenicity:NOT RELEVANT

Effects of Overexposure:HLTH HAZ: DID NOT INDUCE ANY MORTALITY IN LAB ANIMALS FOLLOWNG ORAL ADMIN @ 0.5 G/KG & WAS CONSIDERED TO HAVE AN ACUTE ORAL LD50 VALUE OF 0.5 G/KG. ALL ANIMALS APPEARED NORM THROUGHOUT 14-DAY OBSERVAT ION PERIOD & NO ABNORM WERE NOTED @ NECROPSY ON DAY 14 OF STUDY.

Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

===== First Aid Measures =====

First Aid:EYES: FLUSH WITH WATER FOR AT LEAST 15 MINUTES OCCAS LIFTING LIDS. SKIN: REMOVE CONTAMD CLTHG, THEN FLUSH W/WATER FOR @ LST 15 MIN. WASH CLOTHING BEFORE REUSE. INHAL: MOVE TO FRESH AIR. INGEST: GET IM MED MED HELP. IF IRRIT CONTINUES, GET MED ATTN IMMED.

===== Fire Fighting Measures =====

Extinguishing Media:APPROPRIATE TO SURROUNDING FIRE CONDITIONS.

Fire Fighting Procedures:WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT .

Unusual Fire/Explosion Hazard:POTASSIUM CYANIDE IS IN VERY DILUTE CONC IN SOLN. CONC KCN MAY RELEASE HCN GAS.

===== Accidental Release Measures =====

Spill Release Procedures:VENT AREA. WIPE UP AND PLACE IN SEALED CONTAINER FOR PROPER DISPOSAL. WASH SPILL SITE W/WATER AFTER MATERIAL HAS BEEN PICKED UP COMPLETEY. WEAR CHEM RESIST GLASSES, GLOVES & CLTHG. WEAR NIOSH/MSHA APP RVD RESPIRATOR.

Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

===== Handling and Storage =====

Handling and Storage Precautions:KEEP STORED IN TIGHTLY CLOSED CONTR IN A DRY AREA. KEEP @ ROOM TEMP. HARMFUL/FATAL IF SWALLOWED.

Other Precautions:AVOID INHAL, INGEST & CONTACT W/EYES & SKIN.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:NIOSH/MSHA APPROVED RESPIRATOR.

Ventilation:CHEMICAL FUME HOOD.

Protective Gloves:CHEMICAL RESISTANT GLOVES.

Eye Protection:CHEMICAL RESISTANT GLASSES.

Other Protective Equipment:CHEMICAL RESISTANT CLOTHES.

Work Hygienic Practices:WASH CAREFULLY AFTER USE.

Supplemental Safety and Health

NONE SPECIFIED BY MANUFACTURER.

===== Physical/Chemical Properties =====

Spec Gravity:1

pH:8.4

Solubility in Water:SOLUBLE

Appearance and Odor:TRANSPARENT SOLUTION

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

AVOID CONTACT W/ACID AND STRONG OXIDIZING AGENTS.

Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomposition Products:CONC KCN WILL REL TOX HYDROGEN CYANIDE

& NITROGEN OXIDES IN ADDN TO CARBON MONOXIDE & CARBON DIOXIDE.

===== Disposal Considerations =====

Waste Disposal Methods: CONTACT LOCAL HAZARDOUS OR CHEMICAL WASTE
DISPOSAL AGENCY FOR REGULATIONS. DISPOSE OF I/A/W FEDERAL, STATE
AND LOCAL REGULATIONS .

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particular situation.

AIR LIQUIDE AMERICA CORP -- LESS THAN 250PPM HYDROGEN SULFIDE; LESS (SUPDAT)
-- 6830-00N066374

===== Product Identification =====

Product ID:LESS THAN 250PPM HYDROGEN SULFIDE; LESS (SUPDAT)

MSDS Date:08/10/1994

FSC:6830

NIIN:00N066374

MSDS Number: CBDNV

=== Responsible Party ===

Company Name:AIR LIQUIDE AMERICA CORP

Address:2121 N CALIFORNIA BLVD SUITE 350

City:WALNUT CREEK

State:CA

ZIP:94596

Country:US

Info Phone Num:415-977-6500

Emergency Phone Num:800-231-1366;800-424-9300 (CHEMTREC)

CAGE:AIRLI

=== Contractor Identification ===

Company Name:AIR LIQUIDE AMERICA CORPORATION

Box:3047

City:HOUSTON

State:TX

ZIP:77253

Country:US

Phone:713-896-2140

CAGE:AIRLI

Company Name:LIQUID AIR CORP ONE CALIFORNIA PLAZA

Address:2121 N. CALIFORNIA BLVD

Box:City:WALNUT CREEK

State:CA

ZIP:94596

Country:US

Phone:415-977-6500

CAGE:18260

===== Composition/Information on Ingredients =====

Ingred Name:HYDROGEN SULFIDE (SARA 302/313) (CERCLA). BP: -76F,-60C.

VP: 267 PSIA (1840 KPA). % WT: <250 PPM.

CAS:7783-06-4

RTECS #:MX1225000

Fraction by Wt: <0.1%

OSHA PEL:20 PPM, C

ACGIH TLV:10 PPM; 15 STEL

EPA Rpt Qty:100 LBS

DOT Rpt Qty:100 LBS

Ingred Name:CARBON MONOXIDE. BP: -312.75F,-191.53C. VP: ABOVE ITS

CRITICAL TEMPERATURE. % WT: <500 PPM.

CAS:630-08-0

RTECS #:FG3500000

Fraction by Wt: <0.1%

OSHA PEL:50 PPM

ACGIH TLV:25 PPM

Ingred Name:PROPANE. BP: -43.7F,-42.1C. VP: 127 PSIA (675 KPA).

CAS:74-98-6
 RTECS #:TX2275000
 Fraction by Wt: 1.1%
 OSHA PEL:1000 PPM
 ACGIH TLV:ASPHYXIAN

Inged Name:OXYGEN. BP: -297.3F,-182.9C. VP: ABOVE ITS CRITICAL
 TEMPERATURE.

CAS:7782-44-7
 RTECS #:RS2060000
 Fraction by Wt: 18-21%
 OSHA PEL:N/K
 ACGIH TLV:N/K

Inged Name:NITROGEN. BP: -320.5F,-195.5C. VP: ABOVE ITS CRITICAL
 TEMPERATURE.

CAS:7727-37-9
 RTECS #:QW9700000
 OSHA PEL:N/K
 ACGIH TLV:ASPHYXIAN

Inged Name:HNDLG/STOR PRECS: RATE OF PROD FROM CYL. USE CHECK VALVE OR
 TRAP IN DISCHARGE LINE TO PVNT HAZ BACK FLOW INTO (ING 7)
 RTECS #:9999999ZZ

Inged Name:ING 6: CYL. CLOSE VALVE AFTER EACH USE & WHEN EMPTY.
 PROTECT CYLS FROM PHYSICAL DMG. STORE IN COOL, DRY, WELL- (ING 8)
 RTECS #:9999999ZZ

Inged Name:ING 7: VENTILATED AREA AWAY FROM HEAVILY TRAFFICKED AREAS &
 EMER EXITS. DO NOT ALLOW TEMP WHERE CYLS ARE (ING 9)
 RTECS #:9999999ZZ

Inged Name:ING 8: STORED TO EXCEED 125F(52C). FULL & EMPTY CYLS SHOULD
 BE SEGREGATED. USE "FIRST IN - FIRST OUT" INVENTORY (ING 10)
 RTECS #:9999999ZZ

Inged Name:ING 9: SYS TO PVNT FULL CYLS BEING STORED FOR EXCESSIVE
 PERIODS OF TIME. FOR ADDNL HNDLG RECOMS CONSULT L'AIR (ING 11)
 RTECS #:9999999ZZ

Inged Name:ING 10: LIQUIDE'S ENCYCLOPEDE DE GAZ OR COMPRESSED GAS
 ASSOCIATION PAMPHLET P-1.
 RTECS #:9999999ZZ

Inged Name:OTHER PRECS: ENHANCES THE RUSTING OF METALS IN AIR. DOT 39
 CYLS MAY NOT BE REUSED OR REFILLED (49CFR). NEVER (ING 13)
 RTECS #:9999999ZZ

Inged Name:ING 12: TRANSPORT THESE CYLS IN TRUNKS OR VEHICLES, ENCLSD
 VANS, TRUCK CABS OR IN PASSENGER COMPARTMENTS. (ING 14)
 RTECS #:9999999ZZ

Inged Name:ING 13: TRANSPORT THEM "CONTAINED" IN OPEN FLATBED OR OPEN
 PICK-UP TYPE VEHICLES.
 RTECS #:9999999ZZ

=====
 ===== Hazards Identification =====

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.

Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
 Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
 Health Hazards Acute and Chronic:THE ODOR OF HYDROGEN SULFIDE IN THESE MIXTURES SHOULD PRECLUDE THEM FROM BEING BREATHED. IF THEY ARE RELEASED AND MIXED WITH ATMOSPHERIC AIR THEY SHOULD NOT PRESENT ANY MAJOR SYMPTOMS OTHER THAN HEADACHE, POSSIBLE NAUSEA AND DIZZINESS.
 Explanation of Carcinogenicity:NOT RELEVANT
 Effects of Overexposure:SEE HEALTH HAZARDS.
 Medical Cond Aggravated by Exposure:PERSON IN ILL HEALTH WERE SUCH ILLNESS WOULD BE AGGRAVATED BY EXPOSURE TO THESE MIXTURES SHOULD NOT BE ALLOWED TO WORK WITH OR HANDLE THESE PRODUCTS.

===== First Aid Measures =====

First Aid:INGEST: CALL MD IMMED . EYES: IMMED FLUSH W/POTABLE WATER FOR A MINIMUM OF 15 MIN, SEEK ASSISTANCE FROM MD . SKIN: FLUSH W/COPIOUS AMTS OF WATER. CALL MD . INHAL: IF LG QTYS OF MIX H AVE BEEN BREATHED, MOVE PERSON WHO HAS BREATHED THEM TO AREA WHERE THEY CAN INHALE "FRESH" AIR. ADMINISTRATION OF OXYGEN SHOULD ALSO BE HELPFUL. FURTHER TREATMENT SHOULD BE SYMPTOMATIC & SUPPORTIVE.

===== Fire Fighting Measures =====

Flash Point:N/A (GAS)
 Extinguishing Media:MEDIA SUITABLE FOR SURROUNDING FIRE . NONFLAMMABLE GAS MIXTURE.
 Fire Fighting Procedures:USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT . IF CYLINDERS ARE INVOLVED IN A FIRE, SAFELY RELOCATE OR KEEP COOL WITH WATER SPRAY.
 Unusual Fire/Explosion Hazard:THESE MIXTURES AT HIGH PRESSURE WILL ACCELERATE THE BURNING OF MATERIALS TO A GREATER RATE THAN THEY BURN AT ATMOSPHERIC PRESSURE.

===== Accidental Release Measures =====

Spill Release Procedures:EVACUATE ALL PERSONNEL FROM AFFECTED AREA. USE APPROPRIATE PROTECTIVE EQUIPMENT. IF LEAK IS IN CONTAINER OR CONTAINER VALVE, CONTACT THE CLOSEST AIR LIQUIDE AMERICA CORPORATION LOCATION.
 Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

===== Handling and Storage =====

Handling and Storage Precautions:USE PRESS REDUCING REGULATOR WHEN CONNECTING CYL TO LOWER PRESS (<500 PSIG) PIPING OR SYS. DO NOT HEAT CYL BY ANY MEANS TO INCR DISCHARGE (ING 6)
 Other Precautions:MIXS ARE NONCORR & MAY BE USED W/ALL MATLS OF CONSTRUCTION. MOISTURE CAUSES METAL OXIDES WHICH ARE FORMED W/AIR TO BE HYDRATED SO THEY INCR IN VOL & LOSE THEIR PROT ROLE (RUST FORM). CONCS OF SO*2, CL *2, SALT, ETC IN MOISTURE (ING 12)

===== Exposure Controls/Personal Protection =====

Respiratory Protection:NIOSH/MSHA APPROVED POSITIVE PRESSURE AIR LINE WITH MASK OR SELF-CONTAINED BREATHING APPARATUS SHOULD BE AVAILABLE FOR EMERGENCY USE.
 Ventilation:HOOD WITH FORCED VENTILATION. LOCAL EXHAUST TO PREVENT ACCUMULATION ABOVE THE TWA FOR HYDROGEN SULFIDE.
 Protective Gloves:IMPERVIOUS GLOVES .
 Eye Protection:ANSI APPRVD CHEM WORKERS GOGGLES .

Other Protective Equipment:ANSI APPROVED EYE WASH & DELUGE SHOWER .
SAFETY SHOES.

Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.

Supplemental Safety and Health

MFR'S TRADE NAME/PART NO: THAN 500PPM CARBON MONOXIDE; LESS THAN 1.1%
PROPANE & 18-21% OXYGEN IN NITROGEN. SPEC GRAV: 0.99-1.01 @ 70F
(AIR =1). MP: VARIES; -317.8F, -194.35C AIR BUBBLE POINT @ 1 ATM. S
OL IN H*2O: H*2S SOLUBLE; OTHER COMPONENTS NEGLIG. WASTE DISP METH:
CLOSEST MFR LOCATION.

===== Physical/Chemical Properties =====

Boiling Pt:B.P. Text:SEE INGS
Melt/Freeze Pt:M.P/F.P Text:SUPDAT
Vapor Pres:SEE INGS
Spec Gravity:SUPDAT
Solubility in Water:SUPDAT
Appearance and Odor:COLORLESS GAS WITH SLIGHT SULFUR (ROTTEN EGG) ODOR.

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES
NONE.
Stability Condition to Avoid:NONE.
Hazardous Decomposition Products:NONE.

===== Disposal Considerations =====

Waste Disposal Methods:DISPOSAL MUST BE I/A/W FED, STATE & LOCAL REGS .
DO NOT ATTEMPT TO DISPOSE OF WASTE/UNUSED QTYS. RETURN IN SHIPPING
CNTNR PROPERLY LABELED W/ANY VALVE OUTLET PLUGS/CAPS SECURED &
VALVE PROT CAP IN PLACE TO MFR. FOR EMER DISP, CNTCT (SUPDAT)

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International Chemical Safety Cards

LEAD

ICSC: 0052

LEAD Lead metal Plumbum (powder) Pb Atomic mass: 207.2 CAS # 7439-92-1 RTECS # OF7525000 ICSC # 0052

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Finely divided lead powder is flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking (if in powder form).	In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
• INHALATION	Abdominal cramps. Drowsiness. Headache. Nausea. Vomiting. Weakness. Wheezing. Pallor. Hemoglobinuria. Collapse.	Ventilation (not if powder). Avoid inhalation of fine dust and mist. Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN			
• EYES			
• INGESTION	Abdominal cramps (further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect	Separated from strong oxidants, strong bases, strong acids, food and feedstuffs.		

remainder, then remove to safe place.
Do NOT let this chemical enter the
environment (extra personal protection:
P2 filter respirator for harmful
particles).

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0052

Prepared in the context of cooperation between the International Programme on Chemical Safety & the
Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

LEAD

ICSC: 0052

I M P O R T A N T D A T A	<p>PHYSICAL STATE; APPEARANCE: BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</p>
	<p>PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.</p>	<p>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p>
	<p>CHEMICAL DANGERS: Upon heating, toxic fumes are formed. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric and sulfuric acids. Attacked by pure water and by weak organic acids in the presence of oxygen.</p>	<p>EFFECTS OF SHORT-TERM EXPOSURE: The substance may cause effects on the gastrointestinal tract, blood, central nervous system and kidneys, resulting in colics, shock, anemia, kidney damage and encephalopathy. Exposure may result in death. The effects may be delayed. Medical observation is indicated.</p>
	<p>OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV: ppm; 0.15 mg/m³ (as TWA) (ACGIH 1993-1994).</p>	<p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the gastrointestinal tract, nervous system, blood, kidneys and immune system, resulting in severe lead colics, paralysis of muscle groups of the upper extremities (forearm, wrist and fingers), anemia, mood and personality changes, retarded mental development, and irreversible nephropathy. May cause retarded development of the new-born. Danger of cumulative effect.</p>
<p align="center">PHYSICAL PROPERTIES</p>	<p>Boiling point: 1740°C Melting point: 327.5°C</p>	<p>Relative density (water = 1): 11.34 Solubility in water: none</p>
<p align="center">ENVIRONMENTAL DATA</p>	<p>This substance may be hazardous to the environment; special attention should be given to air and water. In the food chain important to humans, bioaccumulation takes place, specifically in plants and water organisms, especially shellfish.</p>	
<p>NOTES</p>		
<p>Explosive limits are unknown in literature. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. Do NOT take working clothes home. Refer also to cards for specific lead compounds, e.g., lead chromate (ICSC # 0003), lead(II) oxide (ICSC # 0288).</p> <p align="right">Transport Emergency Card: TEC (R)-61G12b</p>		
<p>ADDITIONAL INFORMATION</p>		

ICSC: 0052**LEAD**

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**IMPORTANT
LEGAL
NOTICE:**

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MSDS Number: **M1599** * * * * * *Effective Date: 08/20/08* * * * * * *Supercedes: 12/19/05*

MSDS

Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipaburg, NJ 08865



Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 1-800-850-2151
CHEMTREC: 1-800-424-6300

National Response in Canada
CANUTEC: 619-995-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

MERCURY

1. Product Identification

Synonyms: Quicksilver; hydrargyrum; Liquid Silver

CAS No.: 7439-97-6

Molecular Weight: 200.59

Chemical Formula: Hg

Product Codes:

J.T. Baker: 2564, 2567, 2569

Mallinckrodt: 1278, 1280, 1288

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Mercury	7439-97-6	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE KIDNEYS AND CENTRAL NERVOUS SYSTEM. MAY CAUSE ALLERGIC SKIN REACTION.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Life)

Flammability Rating: 0 - None

Reactivity Rating: 1 - Slight

Contact Rating: 3 - Severe (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:

Mercury vapor is highly toxic via this route. Causes severe respiratory tract damage. Symptoms include sore throat, coughing, pain, tightness in chest, breathing difficulties, shortness of breath, headache, muscle weakness, anorexia, gastrointestinal disturbance, ringing in the ear, liver changes, fever, bronchitis and pneumonitis. Can be absorbed through inhalation with symptoms similar to ingestion.

Ingestion:

May cause burning of the mouth and pharynx, abdominal pain, vomiting, corrosive ulceration, bloody diarrhea. May be followed by a rapid and weak pulse, shallow breathing, paleness, exhaustion, tremors and collapse. Delayed death may occur from renal failure. Gastrointestinal uptake of mercury is less than 5% but its ability to penetrate tissues presents some hazard. Initial symptoms may be thirst, possible abdominal discomfort.

Skin Contact:

Causes irritation and burns to skin. Symptoms include redness and pain. May cause skin allergy and sensitization. Can be absorbed through the skin with symptoms to parallel ingestion.

Eye Contact:

Causes irritation and burns to eyes. Symptoms include redness, pain, blurred vision; may cause serious and permanent eye damage.

Chronic Exposure:

Chronic exposure through any route can produce central nervous system damage. May cause muscle tremors, personality and behavior changes, memory loss, metallic taste, loosening of the teeth, digestive disorders, skin rashes, brain damage and kidney damage. Can cause skin allergies and accumulate in the body. Repeated skin contact can cause the skin to turn gray in color. A suspected reproductive hazard; may damage the developing fetus and decrease fertility in males and females.

Aggravation of Pre-existing Conditions:

Persons with nervous disorders, or impaired kidney or respiratory function, or a history of allergies or a known sensitization to mercury may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Undergoes hazardous reactions in the presence of heat and sparks or ignition. Smoke may contain toxic mercury or mercuric oxide. Smoke may contain toxic mercury or mercuric oxide.

6. Accidental Release Measures

Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from vapor.

Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate misting. Sprinkle area with sulfur or calcium polysulfide to suppress mercury. Do not flush to sewer. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker CINNASORB® and RESISORB® are recommended for spills of this product.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Do not use or store on porous work surfaces (wood, unsealed concrete, etc.). Follow strict hygiene practices. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

- OSHA Acceptable Ceiling Concentration:

mercury and mercury compounds: 0.1 mg/m³ (TWA), skin

- ACGIH Threshold Limit Value (TLV):

inorganic and metallic mercury, as Hg: 0.025 mg/m³ (TWA) skin, A4 Not classifiable as a human carcinogen.

- ACGIH Biological Exposure Indices:

total inorganic mercury in urine (preshift): 35 ug/g creatinine;

total inorganic mercury in blood (end of shift): 15 ug/l.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half-face respirator with a mercury vapor or chlorine gas cartridge may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with a mercury vapor or chlorine gas cartridge may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator.

WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Silver-white, heavy, mobile, liquid metal.

Odor:

Odorless.

Solubility:

Insoluble in water.

Density:

13.55

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

356.7C (675F)

Melting Point:

-38.87C (-38F)

Vapor Density (Air=1):

7.0

Vapor Pressure (mm Hg):

0.0018 @ 25C (77F)

Evaporation Rate (BuAc=1):

4

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

At high temperatures, vaporizes to form extremely toxic fumes.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Acetylenes, ammonia, ethylene oxide, chlorine dioxide, azides, metal oxides, methyl silane, lithium, rubidium, oxygen, strong oxidants, metal carbonyls.

Conditions to Avoid:

Heat, flames, ignition sources, metal surfaces and incompatibles.

11. Toxicological Information

Toxicological Data:

Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

All forms of mercury can cross the placenta to the fetus, but most of what is known has

been learned from experimental animals. See Chronic Health Hazards.

Carcinogenicity:

EPA / IRIS classification: Group D1 - Not classifiable as a human carcinogen.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Mercury (7439-97-6)	No	No	3

12. Ecological Information

Environmental Fate:

This material has an experimentally-determined bioconcentration factor (BCF) of greater than 100. This material is expected to significantly bioaccumulate.

Environmental Toxicity:

This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are less than 1 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, MERCURY

Hazard Class: 8

UN/NA: UN2809

Packing Group: III

Information reported for product/size: 1LB

International (Water, I.M.O.)

Proper Shipping Name: MERCURY

Hazard Class: 8

UN/NA: UN2809

Packing Group: III

Information reported for product/size: 1LB

15. Regulatory Information

```

-----\Chemical Inventory Status - Part 1\-----
Ingredient                                     TSCA  EC   Japan  Australia
-----
Mercury (7439-97-6)                          Yes  Yes   No     Yes

```

```

-----\Chemical Inventory Status - Part 2\-----
Ingredient                                     Korea  DSL   NDSL  Phil.
-----
Mercury (7439-97-6)                          Yes   Yes   No    Yes

```

```

-----\Federal, State & International Regulations - Part 1\-----
Ingredient                                     -SARA 302-  -SARA 313-
RQ      TPQ      List  Chemical Catg.
-----
Mercury (7439-97-6)                          No    No    Yes   No

```

```

-----\Federal, State & International Regulations - Part 2\-----
Ingredient                                     CERCLA  -RCRA-  -TSCA-
                                     1       261.33  8(d)
-----
Mercury (7439-97-6)                          1       U151    No

```

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 2Z

Poison Schedule: S7

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 0

Label Hazard Warning:

DANGER! CORROSIVE. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE KIDNEYS AND CENTRAL NERVOUS SYSTEM. MAY CAUSE ALLERGIC SKIN REACTION.

Label Precautions:

Do not get in eyes, on skin, or on clothing.
Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

POLYCHLORINATED BIPHENYLS

MONSANTO CO -- POLYCHLORINATED BIPHENYLS -- 5910-01-019-8871

===== Product Identification =====

Product ID:POLYCHLORINATED BIPHENYLS
 MSDS Date:10/01/1988
 FSC:5910
 NIIN:01-019-8871
 Status Code:A
 MSDS Number: CJDKH
 === Responsible Party ===
 Company Name:MONSANTO CO
 Address:800 N LINDBERGH BLVD
 Box:UNKNOW
 City:ST LOUIS
 State:MO
 ZIP:63167
 Country:US
 Info Phone Num:314-694-1000
 Emergency Phone Num:314-694-1000
 Preparer's Name:PAUL R MICHAEL, SAFETY
 CAGE:3Y784

=== Contractor Identification ===

Company Name:GENERAL ELECTRIC CO CAPACITOR PRODUCTS DEPARTMENT
 Address:JOHN ST
 Box:City:HUDSON FALLS
 State:NY
 ZIP:12839
 Country:US
 Phone:518-746-5750
 CAGE:01002
 Company Name:MONSANTO CO, FIBERS BUSINESS UNIT
 Address:800 N LINDBERGH BLVD
 Box:City:SAINT LOUIS
 State:MO
 ZIP:63167
 Country:US
 Phone:314-694-1000
 CAGE:3Y784

===== Composition/Information on Ingredients =====

Ingred Name:POLYCHLORINATED BIPHENYLS (PCBS) (SARA III)
 CAS:1336-36-3
 RTECS #:TQ1350000
 EPA Rpt Qty:1 LB
 DOT Rpt Qty:1 LB

===== Hazards Identification =====

Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:NO
 Health Hazards Acute and Chronic:EYES: MODERATELY IRRITATING TO EYE
 TISSUES. SKIN: CAN BE ABSORBED THROUGH INTACT SKIN. MAY CAUSE
 DEFATTING. A POTENTIAL FOR CONTACTING CHLORACNE. INHALATION:
 POSSIBLE LIVER INJURY. INGESTION: SLIGHTLY TOXIC.
 Explanation of Carcinogenicity:IARC: PROBABLE CARCINOGENIC. NTP:
 REASONABLY ANTICIPATED TO BE CARCINOGENIC.
 Effects of Overexposure:CAN CAUSE DERMATOLOGICAL SYMPTOMS; HOWEVER,
 THESE ARE REVERSIBLE UPON REMOVAL OF EXPOSURE SOURCE.

=====
First Aid Measures
=====

First Aid: EYES: IRRIGATE IMMEDIATELY WITH COPIOUS QUANTITIES OF RUNNING WATER FOR AT LEAST 15 MIN IF LIQUID OR SOLID PCBS GET INTO THEM.
SKIN: CONTAMINATED CLOTHING SHOULD BE REMOVED AND THE SKIN WASHED THOROUGHLY WITH SOAP AND WATER. HOT PCBS MAY CAUSE THERMAL BURNS.
INHALATION: REMOVE TO FRESH AIR. IF SKIN RASH OR RESPIRATORY IRRITATION PERSISTS, CONSULT A PHYSICIAN. (IF ELECTRICAL EQUIPMENT ARCS OVER, PCBS MAY DECOMPOSE TO PRODUCE HYDROCHLORIC ACID).
INGESTION: CONSULT A PHYSICIAN. DO NOT INDUCE VOMITING OR GIVE ANY OILY LAXATIVES. (IF LARGE AMOUNTS ARE INGESTED, GASTRIC LAVAGE IS SUGGESTED).

=====
Fire Fighting Measures
=====

Flash Point: >141.C, 285.8F
Extinguishing Media: PCBS ARE FIRE-RESISTANT COMPOUNDS.
Fire Fighting Procedures: STANDARD FIRE FIGHTING WEARING APPAREL AND SELF-CONTAINED BREATHING APPARATUS SHOULD BE WORN WHEN FIGHTING FIRES THAT INVOLVE POSSIBLE EXPOSURE TO CHEMICAL COMBUSTION PRODUCTS. FIRE FIGHTING EQUIPMENT SHOULD BE THOROUGHLY CLEANED AND DECONTAMINATED AFTER USE.
Unusual Fire/Explosion Hazard: IF A PCB TRANSFORMER IS INVOLVED IN A FIRE-RELATED INCIDENT, THE OWNER OF THE TRANSFORMER MAY BE REQUIRED TO REPORT THE INCIDENT. CONSULT AND FOLLOW APPROPRIATE FEDERAL, STATE, AND LOCAL REGULATIONS.

=====
Accidental Release Measures
=====

Spill Release Procedures: CLEANUP & DISPOSAL OF LIQUID PCBS ARE STRICTLY REGULATED BY THE FEDERAL GOVERNMENT. VENTILATE AREA. CONTAIN SPILL/LEAK. REMOVE SPILL BY MEANS OF ABSORPTIVE MATERIAL. SPILL CLEANUP PERSONNEL SHOULD USE PROPER PROTECTIVE CLOTHING. ALL WASTES AND RESIDUES CONTAINING PCBS SHOULD BE COLLECTED, CONTAINERIZED, MARKED AND DISPOSED OF IN THE MANNER PRESCRIBED BY EPA, & APPLICABLE STATE AND LOCAL LAWS.

=====
Handling and Storage
=====

Handling and Storage Precautions: CARE SHOULD BE TAKEN TO PREVENT ENTRY INTO THE ENVIRONMENT THROUGH SPILLS, LEAKAGE, USE, VAPORIZATION, OR DISPOSAL OF LIQUID. AVOID PROLONGED BREATHING OF VAPORS OR MISTS. AVOID CONTACT WITH EYES OR PROLONGED CONTACT WITH SKIN. COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS.
Other Precautions: FEDERAL REGULATIONS UNDER THE TOXIC SUBSTANCES CONTROL ACT REQUIRE PCBS, PCB ITEMS, STORAGE AREAS, TRANSFORMER VAULTS, AND TRANSPORT VEHICLES TO BE MARKED. SEE 40 CFR 761 FOR DETAILS.

=====
Exposure Controls/Personal Protection
=====

Respiratory Protection: USE NIOSH/MSHA APPROVED EQUIPMENT WHEN AIRBORNE EXPOSURE LIMITS ARE EXCEEDED. FULL FACEPIECE EQUIPMENT IS RECOMMENDED AND, IF USED, REPLACES NEED FOR FACE SHIELD AND/OR CHEMICAL SPLASH GOGGLES. THE RESPIRATOR USE LIMITATIONS SPECIFIED BY NIOSH/MSHA OR THE MANUFACTURER MUST BE OBSERVED.
Ventilation: PROVIDE NATURAL OR MECHANICAL VENTILATION TO CONTROL EXPOSURE LEVELS BELOW AIRBORNE EXPOSURE LEVELS.
Protective Gloves: WEAR APPROPRIATE CHEMICAL RESISTANT GLOVES TO PREVENT

SKIN CONTACT.

Eye Protection:WEAR CHEMICAL SPLASH GOGGLES AND HAVE EYE BATHS AVAILABLE.

Other Protective Equipment:WEAR APPROPRIATE PROTECTIVE CLOTHING. PROVIDE A SAFETY SHOWER AT ANY LOCATION WHERE SKIN CONTACT CAN OCCUR.

Work Hygienic Practices:WASH THOROUGHLY AFTER HANDLING.

Supplemental Safety and Health
NONE

===== Physical/Chemical Properties =====

HCC:Z3

Vapor Pres:(MM HG @100F).005-.00006

Viscosity:(CENTISTOKES)3.6-540

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

Stability Condition to Avoid:PCBS ARE VERY STABLE, FIRE-RESISTANT COMPOUNDS.

Hazardous Decomposition Products:CARBON MONOXIDE, CARBON DIOXIDE, HYDROGEN CHLORIDE, PHENOLICS, ALDEHYDES AND OTHER TOXIC COMBUSTION PRODUCTS.

===== Disposal Considerations =====

Waste Disposal Methods:CONSULT THE APPLICABLE STATE AND LOCAL REGULATIONS PRIOR TO ANY DISPOSAL OF PCBS OR PCB-CONTAMINATED ITEMS. CONSULT WITH 40 CFR PART 761 FOR FEDERAL REQUIREMENTS.

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MATERIALS BROUGHT TO SITE

MSDS Number: A2052 * * * * * Effective Date: 08/03/07 * * * * * Supercedes: 02/16/06



Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-8666

Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, explosion, or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ALCONOX®

1. Product Identification

Synonyms: Proprietary blend of sodium linear alkylaryl sulfonate, alcohol sulfate, phosphates, and carbonates.

CAS No.: Not applicable.

Molecular Weight: Not applicable to mixtures.

Chemical Formula: Not applicable to mixtures.

Product Codes: A461

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Alconox® proprietary detergent mixture	N/A	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT.

SAF-T-DATA^(TM) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight

Flammability Rating: 0 - None

Reactivity Rating: 0 - None

Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES; LAB COAT; PROPER GLOVES

Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation:

May cause irritation to the respiratory tract. Symptoms may include coughing and shortness of breath.

Ingestion:

May cause irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea.

Skin Contact:

No adverse effects expected.

Eye Contact:

May cause irritation, redness and pain.

Chronic Exposure:

No information found.

Aggravation of Pre-existing Conditions:

No information found.

4. First Aid Measures

Inhalation:

Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion:

If swallowed, **DO NOT INDUCE VOMITING.** Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Wash exposed area with soap and water. Get medical advice if irritation develops.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Not expected to be a fire hazard.

Explosion:

No information found.

Fire Extinguishing Media:

Dry chemical, foam, water or carbon dioxide.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. When mixed with water, material foams profusely. Small amounts of residue may be flushed to sewer with plenty of water.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Moisture may cause material to cake. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

None established.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear protective gloves and clean body-covering clothing.

Eye Protection:

Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

White powder interspersed with cream colored flakes.

Odor:

No information found.

Solubility:

Moderate (1-10%)

Specific Gravity:

No information found.

pH:

No information found.

% Volatiles by volume @ 21C (70F):

0

Boiling Point:

No information found.

Melting Point:

No information found.

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

No information found.

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

No information found.

Conditions to Avoid:

No information found.

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Alconox® proprietary detergent mixture	No	No	None

12. Ecological Information

Environmental Fate:
This product is biodegradable.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
Alconox® proprietary detergent mixture	Yes	No	No	No

-----\Chemical Inventory Status - Part 2\-----				
Ingredient	--Canada--			
	Korea	DSL	NDSL	Phil.

Alconox® proprietary detergent mixture	No	No	Yes	No
---	----	----	-----	----

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302-		-SARA 313-	
	RQ	TPQ	List	Chemical Catg.
Alconox® proprietary detergent mixture	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8 (d)
Alconox® proprietary detergent mixture	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
 Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.

Poison Schedule: None allocated.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 0 Flammability: 0 Reactivity: 0

Label Hazard Warning:

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT.

Label Precautions:

Avoid contact with eyes.

Keep container closed.

Use with adequate ventilation.

Avoid breathing dust.

Wash thoroughly after handling.

Label First Aid:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 3.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

UNOCAL CHEMICALS DIV UNION OIL CO OF CALIFORNIA -- ANTIFREEZE -- 6850-00-664-1403

===== Product Identification =====

Product ID:ANTIFREEZE
 MSDS Date:03/21/1989
 FSC:6850
 NIIN:00-664-1403
 MSDS Number: BJPTD
 --- Responsible Party ---
 Company Name:UNOCAL CHEMICALS DIV UNION OIL CO OF CALIFORNIA
 Address:1345 N MEACHAM RD
 City:SCHAUMBURG
 State:IL
 ZIP:60195
 Country:US
 Info Phone Num:312-490-2539
 Emergency Phone Num:312-490-2539
 CAGE:5W323
 == Contractor Identification ==
 Company Name:UNOCAL CHEMICALS DIV UNION OIL CO OF CALIFORNIA
 Address:1345 N MEACHAM RD
 Box:City:SCHAUMBURG
 State:IL
 ZIP:60195
 Country:US
 Phone:800-967-7601
 CAGE:5W323

===== Composition/Information on Ingredients =====

Ingred Name:ETHYLENE GLYCOL (SARA III) *
 CAS:107-21-1
 RTECS #:KW2975000
 Fraction by Wt: 92-97%
 Other REC Limits:NONE SPECIFIED
 OSHA PEL:C 50 PPM
 ACGIH TLV:C 50 PPM,VAPOR; 9192
 EPA Rpt Qty:1 LB
 DOT Rpt Qty:1 LB

Ingred Name:DIETHYLENE GLYCOL
 CAS:111-46-6
 RTECS #:ID5950000
 Other REC Limits:NONE SPECIFIED

===== Hazards Identification =====

LD50 LC50 Mixture:ACUTE ORAL LD50 (HUMAN) IS 1500 MG/KG
 Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
 Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
 Health Hazards Acute and Chronic:ACUTE: INGESTION:ABDOMINAL DISCOMFORT
 OR PAIN, NAUSEA, CENTRAL NERVOUS SYSTEM DEPRESSION. SEVERE KIDNEY
 AND LIVER DAMAGE FROM LARGE AMOUNTS; MAY BE FATAL.
 INHALATION:IRRITATION OF THE NOSE AND THROAT. EYE:DISCOMFORT WITH
 TRANSIENT CONJUNCTIVITIS. CHRONIC: INHALATION OF MIST MAY PRODUCE
 SIGNS OF CNS DISTURBANCES.
 Explanation of Carcinogenicity:NONE OF THE COMPOUNDS IN THIS PRODUCT IS

LISTED BY IARC, NTP, OR OSHA AS A CARCINOGEN.

Effects of Overexposure: MAY CAUSE DIZZINESS, MALAISE, LUMBAR PAIN, UREMIA, AND CENTRAL NERVOUS SYSTEM DEPRESSION. MAY CAUSE EYE, SKIN & RESPIRATORY TRACT IRRITATION.

Medical Cond Aggravated by Exposure: PERSONS WITH A HISTORY OF KIDNEY OR LIVER DISORDERS MAYBE AT INCREASED RISK FROM EXPOSURE.

===== First Aid Measures =====

First Aid: INHALATION: REMOVE TO FRESH AIR. CALL A PHYSICIAN IF DISCOMFORT PERSISTS. EYE: IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR 15 MINUTES. CALL A PHYSICIAN. SKIN: WASH WITH PLENTY OF SOAP & WATER. REM OVE CONTAMINATED CLOTHING/SHOES. INGESTION: IF CONSCIOUS, GIVE 2 GLASSES OF WATER TO DRINK AND INDUCE VOMITING WITH IPECAC SYRUP-NOTHING BY MOUTH IF UNCONSCIOUS. CALL A PHYSICIAN IMMEDIATELY.

===== Fire Fighting Measures =====

Flash Point Method: COC

Flash Point: 250F, 121C

Lower Limits: 1.6

Upper Limits: 10.8

Extinguishing Media: USE CARBON DIOXIDE, FOAM, OR DRY CHEMICAL. WATER MAY BE INEEFFECTIVE.

Fire Fighting Procedures: FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT WHEN FIGHTING CHEMICAL FIRE. USE WATER SPRAY TO COOL NEARBY CONTAINERS EXPOSED TO FIRE.

Unusual Fire/Explosion Hazard: FIRE OR EXCESSIVE HEAT MAY CAUSE PRODUCTION OF HAZARDOUS DECOMPOSITION PRODUCTS. HEATED VAPORS MAY CAUSE FLASH BACK.

===== Accidental Release Measures =====

Spill Release Procedures: SMALL SPILL: WIPE/SOAK UP WITH PAPER TOWEL OR INERT ABSORBENT. PUT IN DISPOSAL CONTAINER. FLUSH RESIDUE WITH WATER. LARGE SPILL: VENTILATE AREA. IF POSSIBLE, STOP LEAK. DIKE TO RETAIN RUN OFF. VACUUM UP FREE LIQUID. FLUSH RESIDUE WITH WATER.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER. WATER DILUTION RECOMMENDED.

===== Handling and Storage =====

Handling and Storage Precautions: STORE IN A COOL, DRY, WELL VENTILATED AREA. KEEP CONTAINERS TIGHTLY CLOSED WHEN NOT IN USE. PROTECT CONTAINERS FROM PHYSICAL DAMAGE.

Other Precautions: DO NOT TAKE INTERNALLY. DO NOT BREATHE MIST. AVOID PROLONGED OR REPEATED BREATHING OF VAPOR. AVOID CONTACT WITH EYES. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. FOR INDUSTRIAL USE ONLY.

===== Exposure Controls/Personal Protection =====

Respiratory Protection: IF VENTILATION DOES NOT MAINTAIN INHALATION EXPOSURES BELOW PEL (TLV), USE NIOSH/MSHA APPROVED ORGANIC VAPOR CARTRIDGE AND DUST/MIST PRE-FILTER RESPIRATORS AS PER CURRENT 29 CFR 1910.134, INSTRUCTIONS/ WARNINGS AND NIOSH-RESPIRATOR SELECTION.

Ventilation: MECHANICAL (GENERAL) ROOM VENTILATION IS ADEQUATE IF USE IS ENCLOSED. LOCAL EXHAUST IS NEEDED IF VENTED INTO WORK AREA.

Protective Gloves:NEOPRENE, NITRILE, PVC OR NATURAL RUBBER

Eye Protection:SAFETY GOGGLES WITH OPTIONAL FACE SHIELD

Other Protective Equipment:EYE WASH STATION AND SAFETY SHOWER.

INDUSTRIAL-TYPE WORK CLOTHING AND APRON AS REQUIRED.

Work Hygienic Practices:OBSERVE GOOD PERSONAL HYGIENE PRACTICES AND RECOMMENDED PROCEDURES. DO NOT WEAR CONTAMINATED CLOTHING OR FOOTWEAR.

Supplemental Safety and Health

DO NOT TAKE INTERNALLY. DO NOT GET ON SKIN OR IN EYES. AVOID PROLONGED OR REPEATED BREATHING OF VAPOR. DO NOT BREATHE MISTS. WASH THOROUGHLY AFTER HANDLING AND BEFORE EATING OR DRINKING OR SMOKING OR USING REST ROOM.

===== Physical/Chemical Properties =====

HCC:N1

Boiling Pt:B.P. Text:330F,166C

Vapor Pres:0.06 @20C

Vapor Density:2.1 AIR=1

Spec Gravity:1.108

Solubility in Water:COMPLETE

Appearance and Odor:CLEAR GREEN LIQUID - SLIGHT ODOR

Percent Volatiles by Volume:NEG.

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

STRONG OXIDIZING AGENTS

Stability Condition to Avoid:HIGH TEMPERATURES, SPARKS, AND OPEN FLAMES

Hazardous Decomposition Products:CARBON MONOXIDE AND CARBON DIOXIDE

===== Disposal Considerations =====

Waste Disposal Methods:DISPOSAL SHOULD BE MADE BY INCINERATION IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS. AT VERY LOW CONCENTRATIONS IN WATER, DISPOSE OF THIS MATERIAL IN A BIOLOGICAL WASTE WATER TREATMENT PLANT.

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Rev. 1

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION CHEMICAL NAME: CLASS: **NON-FLAMMABLE GAS MIXTURE** Containing One or More of the Following Components in a Nitrogen Balance Gas: Oxygen, 0.0015-23.8%; Methane, 0.0005-2.5%; Carbon Monoxide, 0.0005-0.9%; Hydrogen Sulfide, 0.001-0.025% SYNONYMS: Not Applicable CHEMICAL FAMILY NAME: Not Applicable FORMULA: Not Applicable Note: The Material Safety Data Sheet is for this gas mixture supplied in cylinders with 33 cubic feet (935 liters) or less gas capacity (DOT - 39 cylinders). The MSDS has been developed for various gas mixtures with the composition of components within the ranges listed in Section 2 (Composition and Information on Ingredients). Refer to the product label for information on the actual composition of the product. **PRODUCT USE:** Calibration of Monitoring and Research Equipment
 Document Number: MSDS1013 SUPPLIER/MANUFACTURER'S NAME: Portagal ADDRESS: 6717-B Park Street, Houston, TX 77011 BUSINESS PHONE: General MSDS Inq: (713) 328-5477 EMERGENCY PHONE: INFOTRAC: (800) 635-6263

2. COMPOSITION AND INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA		NIOSH 100% IDLH ppm	OTHER
			TLV ppm	STEL ppm	PEL ppm	STEL ppm		
Oxygen	7782-44-7	0.0015 - 23.8%	There are no specific exposure limits for Oxygen. Oxygen levels should be maintained above 19.5%.					
Methane	74-82-9	0.0005 - 2.5%	There are no specific exposure limits for Methane. Methane is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					
Hydrogen Sulfide	7783-06-4	0.001- 0.025 %	10 (NIC = 5)	15	10 (Vacated 1989 PEL)	20 (ceiling); 50 (ceiling, 10 min. peak once per 8-hour shift 15 (vacated 1989 PEL)	100	NIOSH REL: STEL = 10 (ceiling) 10 minutes DFG MAKs: TWA = 10 PEAK = 2xMAK, 10 min., momentary value
Carbon Monoxide	630-08-0	0.0005 - 1.0%	25	NE	50 30 (Vacated 1989 PEL)	200 (ceiling) (Vacated 1989 PEL)	1200	NIOSH RELS: TWA = 35 STEL = 200 (ceiling) DFG MAKs: TWA = 30 PEAK = 2xMAK, 15 min., average value DFG MAK Pregnancy Risk Classification: B
Nitrogen	7727-37-9	Balance	There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					

NE = Not Established, NIC = Notice of Intended Change See Section 16 for Definitions of Terms Used. NOTE (1): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This gas mixture has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This gas mixture is a colorless gas which has a rotten-egg odor (due to the presence of Hydrogen Sulfide). The odor cannot be relied on as an adequate warning of the presence of this gas mixture, because olfactory fatigue occurs after over-exposure to Hydrogen Sulfide. Hydrogen Sulfide and Carbon Monoxide (another component of this gas mixture) are toxic to humans at relatively low concentrations. Over-exposure to this gas mixture can cause skin or eye irritation, nausea, dizziness, headaches, collapse, unconsciousness, coma, and death. Additionally, releases of this gas mixture may produce oxygen-deficient atmospheres (especially in small confined spaces or other poorly-ventilated environments); individuals in such atmospheres may be asphyxiated.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this gas mixture is by inhalation, **INHALATION:** Due to the small size of an individual cylinder of this gas mixture, no unusual health effects from over-exposure to the product are anticipated under routine circumstances of use. A potential health hazard associated with this gas mixture is the potential of inhalation of Hydrogen Sulfide, a component of this gas mixture. Such over-exposures may occur if this gas mixture is used in a confined space or other poorly-ventilated area. Over-exposures to Hydrogen Sulfide can cause dizziness, headache, and nausea. Over-exposure to this gas could result in respiratory arrest, coma, or unconsciousness, due to the presence of Hydrogen Sulfide. Continuous inhalation of low concentrations of Hydrogen Sulfide may cause olfactory fatigue, so that the odor is no longer an effective warning of the presence of this gas. A summary of exposure concentrations and observed effects are as follows:

HYDROGEN SULFIDE CONCENTRATION

0.3-50 ppm
50 ppm
Slightly higher than 50 ppm
100-150 ppm
200-250 ppm
300-500
500 ppm
> 600 ppm
> 1000 ppm

OBSERVED EFFECT

Order is important.
Eye irritation, dryness and irritation of nose, throat, irritation of the respiratory system.
Temporary loss of smell.
Headache, vomiting, nausea. Prolonged exposure may lead to lung damage. Exposures of 4-6 hours can be fatal.
Swifter onset of symptoms. Death occurs in 1-4 hours.
Headache, excitement, staggering, and stomach ache after brief exposure. Death occurs within 0.5 - 1 hour of exposure.
Rapid onset of unconsciousness, coma, death.
Immediate respiratory arrest.

NOTE: This gas mixture contains a maximum of 250 ppm Hydrogen Sulfide. The higher concentration values here are presented to delineate the complete health effects which have been observed for humans after exposure to Hydrogen Sulfide. Inhalation over-exposures to atmospheres containing more than the Threshold Limit Value of Carbon Monoxide (25 ppm), another component of this gas mixture, use result in serious health consequences. Carbon Monoxide is classified as a chemical asphyxiant, producing a toxic action by combining with the hemoglobin of the blood and replacing the available oxygen. If enough replacement, the body is deprived of the required oxygen, and asphyxiation occurs. Since the affinity of Carbon Monoxide for hemoglobin is about 200-300 times that of oxygen, only a small amount of Carbon Monoxide will cause a toxic reaction to occur. Carbon Monoxide exposures in excess of 50 ppm will produce symptoms of poisoning if breathed for a sufficiently long time. If this gas mixture is released in a small, poorly ventilated area (i.e. an enclosed or confined space), symptoms which may develop include the following:

CARBON MONOXIDE CONCENTRATION

All exposure levels:
200 ppm
400 ppm
1,000 -2000 ppm
200-2800 ppm
>2500 ppm

OBSERVED EFFECT

Over-exposure to Carbon Monoxide can be indicated by the lips and fingernails turning bright red.
Slight symptoms (i.e. headache) after several hours of exposure.
Headache and dizziness experienced within 2-3 hours of exposure.
Within 30 minutes, slight palpitations of the heart occurs. Within 1.5 hours, there is a tendency to stagger.
Within 2 hours, there is mental confusion, headaches, and nausea. Unconsciousness within 30 minutes.
Potential for collapse and death before warning symptoms.

Additionally, if mixtures of this gas mixture contain less than 19.5% Oxygen and are released in a small, poorly ventilated area (i.e. an enclosed or confined space), an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with various levels of oxygen are as follows:

OXYGEN CONCENTRATION

12-16% Oxygen
10-14% Oxygen
8-10% Oxygen
Below 6%:

OBSERVED EFFECT

Breathing and pulse rate increased, muscular coordination slightly disturbed.
Cerebral vessel, abnormal redness, labored respiration.
Nausea, vomiting, collapse or loss of consciousness.
Convulsive movements, possible respiratory collapse, and death.

SKIN AND EYE CONTACT: Hydrogen Sulfide, a component of this gas mixture, may be irritating to the skin. Irritation and irritation of the eyes can occur at very low airborne concentration of Hydrogen Sulfide (less than 10 ppm). Exposure over several hours may result in "gas eyes" or "sore eyes" with symptoms of scratchiness, irritation, tearing and burning. Above 50 ppm of Hydrogen Sulfide, there is an intense tearing, blurring of vision, and pain when looking at light. Over-exposed individuals may see things around bright lights. Most symptoms disappear when exposure ceases. However, in serious cases, the eyes can be permanently damaged. **HEALTH EFFECTS OR RISKS FROM EXPOSURE:** An Explanation in Lay Terms. Over-exposure to this gas mixture may cause the following health effects: **ACUTE:** Due to the small size of the individual cylinder of this gas mixture, no unusual health effects from exposure to the product are anticipated under routine circumstances of use. However the Hydrogen Sulfide and Carbon Monoxide components of this gas mixture are toxic to humans. Over-exposure to this gas mixture can cause nausea, dizziness, headaches, collapse, unconsciousness, coma, and death. Due to the presence of Hydrogen Sulfide, over-exposures to this gas mixture can also irritate the skin and eyes; severe eye contamination can result in blindness. **CHRONIC:** Severe over-exposures to the Hydrogen Sulfide component of this gas mixture, which do not result in death, may cause long-term symptoms such as memory loss, paralysis of facial muscles, or nerve tissue damage. In serious cases of over-exposure, the eyes can be permanently damaged. Skin disorders and respiratory conditions may be aggravated by repeated over-exposures to this gas product. Refer to Section 11 (Toxicology Information) for additional information on the components of this gas mixture. **CHRONIC EXPOSURE TO oxygen-deficient atmospheres (below 18% oxygen in air) may affect the heart and nervous system. TARGET ORGANS:** Respiratory system, blood system, central nervous system effects, cardiovascular system, skin, eyes, **CHRONIC:** Neurological system, reproductive system, eyes.

4. FIRST AID MEASURES RESCUERS SHOULD NOT ATTEMPT TO RESCUE VICTIMS OF EXPOSURE TO THIS GAS MIXTURE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn. Victim(s) who experience any adverse effect after over-exposure to this gas mixture must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s). No unusual health effects are anticipated after exposure to this gas mixture, due to the small cylinder size. If any adverse symptom develops after over-exposure to this gas mixture, remove victim(s) to fresh air as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardiopulmonary resuscitation if necessary. **SKIN EXPOSURE:** If irritation of the skin develops after exposure to this gas mixture, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention. **EYE EXPOSURE:** If irritation of the eye develops after exposure to this gas mixture, open victim's eyes while under gentle running water. Use sufficient time to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Seek medical assistance immediately, preferably an ophthalmologist.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing respiratory conditions may be aggravated by over-exposure to this gas mixture. Carbon Monoxide, a component of this gas mixture, can aggravate some diseases of the cardiovascular system, such as coronary artery disease and angina pectoris. Because of the presence of Hydrogen Sulfide, eye disorders or skin problems may be aggravated by over-exposure to this gas mixture. **RECOMMENDATIONS TO PHYSICIANS:** Treat symptoms and eliminate over-exposure. Hyperbaric oxygen is the most efficient antidote to Carbon Monoxide poisoning. The upstream range being 2-2.5 atm. A special mask, or, preferably, a composition chamber to utilize oxygen at these pressures is required. Avoid administering stimulant drugs. Be observant for initial signs of pulmonary edema in the event of severe inhalation over-exposures.

5. FIRE-FIGHTING MEASURES FLASH POINT: Not applicable. **AUTOIGNITION TEMPERATURE:** Not applicable. **FLAMMABLE LIMITS (in air by volume, %):** Lower (LEL): Not applicable. Upper (UEL): Not applicable. **FIRE EXTINGUISHING MATERIALS:** Non-flammable gas mixture. Use extinguishing media appropriate for surrounding fire. **UNUSUAL FIRE AND EXPLOSION HAZARDS:** This gas mixture contains toxic gases, Hydrogen Sulfide and Carbon Monoxide, and presents a health hazard to firefighters. This gas mixture is not flammable; however, containers, when involved in fire, may rupture or burst in the heat of the fire. **Explosion Sensitivity to Mechanical Impact:** Not Sensitive. **Explosion Sensitivity to Static Discharge:** Not Sensitive. **SPECIAL FIRE-FIGHTING PROCEDURES:** Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment.

6. ACCIDENTAL RELEASE MEASURES LEAK RESPONSE: Due to the small size and content of the cylinder, an accidental release of this gas mixture presents significantly less risk of over-exposure to Hydrogen Sulfide and Carbon Monoxide, the toxic components of this gas mixture, and other safety hazards related to the remaining components of this gas mixture than a similar release from a larger cylinder. However, as with any chemical release, extreme caution must be used during emergency response procedures. In the event of a release in which the atmosphere is unknown, and in which other chemicals are potentially involved, evacuate area/dwelling area. Such releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel. For emergency disposal, secure the cylinder and slowly discharge the gas to the atmosphere in a well-ventilated area as outdoors. Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for Hydrogen Sulfide, Carbon Monoxide, and Oxygen. Hydrogen Sulfide and Carbon Monoxide level must be below exposure level listed in Section 2 (Composition and Information on Ingredients) and Oxygen levels must be above 19.5% before non-emergency personnel are allowed to re-enter area. If leaking incidentally from the cylinder, contact your supplier.

7. HANDLING AND USE WORK PRACTICES AND HYGIENE PRACTICES: Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly ventilated area; exposures to total concentrations of this gas mixture could occur without any significant warning symptoms, due to olfactory fatigue or oxygen deficiency. Do not attempt to repair, adjust, or fix any

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM	
HEALTH HAZARD (H314)	3
FLAMMABILITY HAZARD (H228)	0
PHYSICAL HAZARD (P201/P273)	3
PROTECTIVE EQUIPMENT	
Respirator	Self-Contained Breathing Apparatus
Hand	Gloves
See Section 8	
For Routine Industrial Use and Handling Applications	

NFPA RATING

FLAMMABILITY	
3	0
HEALTH	REACTIVITY
OTHER	

Rev. 1

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Hydrogen Sulfide	YES	YES	YES

U.S. SARA THRESHOLD PLANNING QUANTITY: Hydrogen Sulfide = 500 lb (227 kg) **U.S. TSCA INVENTORY STATUS:** The components of this gas mixture are listed on the TSCA Inventory. **U.S. CERCLA REPORTABLE QUANTITY (RQ):** Hydrogen Sulfide = 100 lb (45 kg) **OTHER U.S. FEDERAL REGULATIONS:** Hydrogen Sulfide and Carbon Monoxide are subject to the reporting requirements of CFR 29.1910.1000. Hydrogen Sulfide and Methane are subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for each of these gases is 10,000 pounds and so this mixture will not be affected by the regulation. Depending on specific operations involving the use of this gas mixture, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Hydrogen Sulfide is listed in Appendix A of this regulation. The Threshold Quantity for Hydrogen Sulfide under this regulation is 1500 lbs (and so one cylinder of this gas mixture will not be affected by this regulation). This gas mixture does not contain any Class I or Class II ozone depleting chemicals (40 CFR part 82). Nitrogen and Oxygen are not listed Regulated Substances, per 40 CFR Part 86, of the Risk Management for Chemical Releases. Hydrogen Sulfide is listed under this regulation in Table I as a Regulated Substance (Toxic Substance), in quantities of 30,000 lbs (4,555 kg) or greater. Carbon Monoxide and Methane are listed under this regulation in Table 3, as Regulated Substances (Flammable), in quantities of 10,000 lbs (4,555 kg) or greater, and so this mixture will not be affected by the regulation. **U.S. STATE REGULATORY INFORMATION:** The components of this gas mixture are covered under the following specific State regulations: Alaska - Designated Toxic and Hazardous Substances; Carbon Monoxide, Hydrogen Sulfide, Methane, California - Permissible Exposure Limits for Chemical Contaminants; Carbon Monoxide, Nitrogen, Hydrogen Sulfide, Methane, Florida - Substance List; Oxygen, Carbon Monoxide, Hydrogen Sulfide, Illinois - Toxic Substance List; Carbon Monoxide, Methane, Hydrogen Sulfide, Kansas - Section 302/313 List; No, Massachusetts - Substance List; Oxygen, Carbon Monoxide, Hydrogen Sulfide, Methane, Michigan - Critical Materials Register; No, Minnesota - List of Hazardous Substances; Carbon Monoxide, Hydrogen Sulfide, Methane, Missouri - Employer Information/Toxic Substance List; Hydrogen Sulfide, Methane, New Jersey - Right to Know Hazardous Substance List; Oxygen, Carbon Monoxide, Nitrogen, Methane, North Dakota - List of Hazardous Chemicals, Reportable Quantities; Hydrogen Sulfide, Pennsylvania - Hazardous Substance List; Oxygen, Carbon Monoxide, Nitrogen, Hydrogen Sulfide, Methane, Rhode Island - Hazardous Substance List; Oxygen, Carbon Monoxide, Nitrogen, Hydrogen Sulfide, Methane, Texas - Hazardous Substance List; Hydrogen Sulfide, West Virginia - Hazardous Substance List; Hydrogen Sulfide, Wisconsin - Toxic and Hazardous Substances; Hydrogen Sulfide **CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):** The Carbon Monoxide component of this gas mixture is on the California Proposition 65 list. **WARNING:** This gas mixture contains a compound known to the State of California to cause birth defects or other reproductive harm. **ADDITIONAL CANADIAN REGULATIONS:** **CANADIAN DSL/NDSL INVENTORY STATUS:** The components of this gas mixture are listed on the DSL Inventory. **CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS:** The components of this gas mixture are not on the CEPA Priorities Substances List. **CANADIAN WHISKY CLASSIFICATION:** This gas mixture is categorized as a Controlled Product, Hazard Classes A and D2A, as per the Controlled Product Regulations. **U.S. OTHER INFORMATION:** INFORMATION ABOUT DOT-39 IFC (Non-Refillable cylinders) PRODUCTS: IFC cylinders ship as hazardous materials when full. Once the cylinders are relieved of pressure (empty) they are not considered hazardous material by waste. Residual gas in this type of cylinders is not an issue because toxic gas mixtures are prohibited. Calibration gas mixtures typically packaged in these cylinders are Nonflammable (i.e., UN 1956). A small percentage of calibration gases packaged in DOT 39 cylinders are flammable or oxidizing gas mixtures. For disposal of used DOT-39 cylinders, it is acceptable to place them in a landfill if local laws permit. Their disposal is no different than that employed with other DOT containers such as spray paint cans, household aerosols, or disposable cylinders of propane (for camping, torch, etc.). When feasible, we recommend recycling for scrap metal content. **MIXTURES:** When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death. **Disclaimer:** To the best of Portagas's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness is not guaranteed and no warranties of any type either express or implied are provided. The information contained herein relates only to this specific product. Data may be changed from time to time. Be sure to consult the latest edition.

PORTAGAS

Material Safety Data Sheet

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION CHEMICAL NAME: CLASS: **ISOBUTANE** SYNONYMS: 2-Methylpropane; CHEMICAL FAMILY: Alkane (hydrocarbon) FORMULA: C₄H₁₀
 Document Number: MSDS1047 PRODUCT USE: For fuel and synthetic chemical use; food additive, agricultural uses, aerosol propellant, refrigerant. SUPPLIER/MANUFACTURER'S NAME: Portagas
 ADDRESS: 6717-B Polk Street, Houston, TX 77011 BUSINESS PHONE: General MSDS Info: (713) 928-6477 EMERGENCY PHONE: INFOTRAC: (800) 535-5053

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			OTHER
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH Ppm	
Isobutane	75-28-5	> 95%	Simple Asphyxiant	NE	800 (Vacated 1969 PEL)	NE	NE	NIOSH REL: 600 ppm
Maximum Impurities		<5%	None of the trace impurities in this product significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalents standards.					

This material is classified as hazardous under OSHA regulations in the United States and the WHMIS in Canada. NE = Not Established C = Ceiling Limit NOTE: all WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-2004 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This product is a colorless, liquefied, flammable gas. Both the liquid and gas pose a serious fire hazard when accidentally released. Rapid evaporation of liquid from cylinder may cause frostbite. Flame or high temperature impinging on a localized area of the cylinder of this product can cause the cylinder to burst or rupture without activating the cylinder's relief devices. Isobutane is an asphyxiant and presents a significant health hazard by displacing the oxygen in the atmosphere. Provide adequate fire protection during emergency response situations.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this product is by inhalation. **INHALATION:** Isobutane also has some degree of aesthetic action and can be mildly irritating to the mucous membranes. Isobutane can also be a narcotic at high concentrations. High concentrations of this gas can cause an oxygen-deficient environment. It should be noted that before suffocation could occur, the lower flammability limit of Isobutane in air would be exceeded; possibly causing an oxygen-deficient and explosive atmosphere. Individuals breathing an oxygen deficient atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with various levels of oxygen are as follows:

CONCENTRATION	SYMPTOM OF EXPOSURE
12-16% Oxygen:	Breathing and pulse rate increased, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea and vomiting, collapse or loss of consciousness.
Below 8%:	Convulsive movements, possible respiratory collapse, and death.

OTHER POTENTIAL HEALTH EFFECTS: Contact with liquid or rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after such contact can quickly subside. **HEALTH EFFECTS OR RISKS FROM EXPOSURE:** An Explanation in Lay Terms: Over-exposure to this gas mixture may cause the following health effects: **ACUTE:** The most significant hazard associated with this product is inhalation of oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, ringing in ears, headache, shortness of breath, wheezing, headache, dizziness, indigestion, nausea, and, at high concentrations, unconsciousness or death may occur. The skin of a victim of over-exposure may have a blue color. **CHRONIC:** There are currently no known adverse health effects associated with chronic exposure to the components of this compressed gas. **TARGET ORGANS:** Respiratory system.

4. FIRST-AID MEASURES RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS PRODUCT WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and Fire-Retardant Personal Protective equipment should be worn. Adequate fire protection must be provided during rescue situations. Remove victim(s) to fresh air, as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation. If necessary, **SKIN EXPOSURE:** Exposure to the liquefied gas can cause frostbite. Remove any clothing that may restrict circulation to any frozen area. Do not rub frozen parts as tissue damage may occur. As soon as practicable, place any affected area in warm water bath which has a temperature that does not exceed 105°F (40°C). NEVER USE HOT WATER. NEVER USE DRY HEAT. If area of frostbite is extensive, and if possible, remove clothing while showering with warm water. If warm water is not available, or is impractical to use, wrap the affected parts gently in blankets. Alternatively, if the fingers or hands are frostbitten, place the affected area of the body in the armpit. Encourage victim to gently exercise the affected part while being warmed. Seek immediate medical attention. Frozen tissue is painless and appears waxy, with a possible yellow color. Frozen tissue will become swollen, painful and prone to infection when thawed. If the frozen part of the body has been thawed by the time medical attention has been obtained, cover the area with a dry sterile dressing and a large bulky protective covering. **EYE EXPOSURE:** If liquid is splashed into eyes, or if irritation of the eye develops after exposure to liquid or gas, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Seek medical assistance immediately, preferably an ophthalmologist. Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s).

5. FIRE-FIGHTING MEASURES FLASH POINT: -159°C (-254°F) **AUTOIGNITION TEMPERATURE:** 462°C (864°F) **FLAMMABLE LIMITS (in air by volume, %):** Lower (L.E.L.): 1.6% Upper (U.E.L.): 8.4% **FIRE EXTINGUISHING MATERIALS:** Extinguish Isobutane fires by shutting-off the source of the gas. Use water spray to cool fire-exposed containers, structures, and equipment. **UNUSUAL FIRE AND EXPLOSION HAZARDS:** When involved in a fire, this material may decompose and produce toxic gases including carbon monoxide and carbon dioxide. **DANGER!** Fires impinging (direct flame) on the outside surface of unprotected cylinders of this product can be very dangerous. Exposure to fire could cause a catastrophic failure of the cylinder releasing the contents into a fireball and explosion of released gas. The resulting fire and explosion can result in severe equipment damage and personnel injury or death over a large area around the cylinder. For massive fires in large areas, use unmanned hose tender or monitor nozzles; if this is not possible, withdraw from area and allow fire to burn. **Explosion Sensitivity to Mechanical Impact:** Not sensitive. **Explosion Sensitivity to Static Discharge:** Static discharge may cause this product to ignite explosively, if released.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment. Because of the potential for a BLEVE, evacuation of non-emergency personnel is essential. If water is not available for cooling or protection of cylinder exposures, evacuate the area. The North American Emergency Response Guidebook (Guide #115) recommends 0.5 miles. Other information for pre-planning can be found in the American Petroleum Institute Publications 2510 and 2510A.

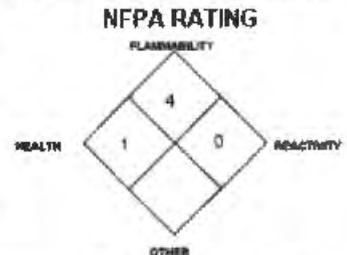
6. ACCIDENTAL RELEASE MEASURES LEAK RESPONSE: Evacuate immediate area. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a gas release, clear the affected area, protect people, and respond with trained personnel. Eliminate any possible sources of ignition, and provide maximum explosion-proof ventilation. If the gas is leaking from cylinder or valve, contact the supplier. Adequate fire protection must be provided. Use only non-sparking tools and equipment during the response. Minimum Personal Protective Equipment should be Level B: fire-retardant protective clothing, gloves and Self-Contained Breathing Apparatus. Use only non-sparking tools and equipment. Locate and seal the source of the leaking gas. Protect personnel attempting the shut-off with water-spray. Allow the gas to dissipate. Combustible gas concentration must be below 10% of the LEL (1.6%) prior to entry. Monitor the surrounding area for combustible gas levels and oxygen level. The atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus. Attempt to close the main source valve prior to entering the area. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in-place or remove it to a safe area and allow the gas to be released there. **THIS IS AN EXTREMELY FLAMMABLE GAS.** Protection of all personnel and the area must be maintained.

7. HANDLING and USE WORK PRACTICES and HYGIENE PRACTICES: Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of this product could occur without any significant warning symptoms. Non-sparking tools should be used. **STORAGE and HANDLING PRACTICES:** Specific requirements are listed in NFPA 58. Cylinders should be stored upright (with valve-protection cap in place) and firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Keep storage area clear of materials which can burn. Do not allow area where cylinders are stored to exceed 52°C (125°F). Store containers away from heavily trafficked areas and emergency exits. Store away from process and production areas, away from elevators, building and room exits or main aisles leading to exits. Protect cylinders against physical damage. Cylinders should be separated from oxygen cylinders, or other oxidizers, by a minimum distance of 20 ft., or by a barrier of non-combustible material at least 5 ft. high, having a fire-resistance rating of at least 0.5 hours. Isolate from other incompatible chemicals (refer to Section 10, Stability and Reactivity). Storage areas must meet national electrical codes for Class I Hazardous Areas. Post "No Smoking or Open Flames" signs in storage or use areas. Consider installation of leak detection and alarm for storage and use areas. Have appropriate extinguishing equipment in the storage area (i.e. sprinkler system, portable fire extinguishers). Keep the smallest amount on-site as is necessary. Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time. Use non-sparking ventilation systems, approved explosion-proof equipment, and appropriate electrical systems. Electrical equipment used

MSDS1047

April 2005

HAZARDOUS MATERIAL INFORMATION SYSTEM		
HEALTH	(BLU)	0
FLAMMABILITY	(RED)	4
REACTIVITY	(YELLOW)	0
PROTECTIVE EQUIPMENT		B
See Section 8		
For routine industrial applications		



PORTAGAS

Material Safety Data Sheet

In gas-handling operations, or located in storage areas, should be non-sparking or explosion-proof. Use a check valve in the discharge line to prevent hazardous backflow. Never tamper with pressure relief devices in valves and cylinders. **SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS:** Compressed gases can present significant safety hazards. The following rules are applicable in work situations in which cylinders are being used. **Before Use:** Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap (where provided) in place until cylinder is ready for use. **During Use:** Use designated CGA fittings and other support equipment. Do not use adapters. Use piping and equipment adequately designed to withstand pressures to be encountered. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Do not use oils or grease on gas-handling fittings or equipment. Do not "crack" valve open before connecting it, since self-ignition may occur. Leak check system with leak detection solution, never with flame. Immediately contact the supplier if there are any difficulties associated with operating cylinder valve. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. Never strike an arc on a compressed gas cylinder or make a cylinder part of an electric circuit. **After Use:** Close main cylinder valve. Valves should be closed tightly. Replace valve protection cap. Mark empty cylinders "EMPTY". **NOTE:** Use only DOT or ASME code containers designed for flammable gas storage. Earth-ground and bond all lines and equipment associated with this product. **STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:** Use the proper connections. **DO NOT USE ADAPTERS: THREADED: 0-500 PSIG - CGA 510 PININDEXED YOKE; Not Applicable. ULTRA HIGH INTEGRITY: Not Applicable. PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:** Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Purge gas handling equipment with inert gas (e.g. nitrogen) before attempting repairs. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Provide natural or explosion-proof ventilation adequate to ensure isobutane does not reach its lower flammability limit of 1.8%. Local exhaust ventilation is preferred, because it prevents gas dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of flammable gas. **RESPIRATORY PROTECTION:** Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if oxygen levels are below 19.5% (air-purifying respirators will not function) or during emergency response to a release of this product. During an emergency situation, before entering the area, check for flammable gas level as well as oxygen-deficient atmospheres. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent State standards. **EYE PROTECTION:** Safety glasses. **HAND PROTECTION:** Wear leather gloves when handling cylinders of this product. Otherwise, wear glove protection appropriate to the specific operation for which this product is used. Use low-temperature protective gloves when working with containers of liquid isobutane. **BODY PROTECTION:** Use body protection appropriate for task. Cotton clothing is recommended for use to prevent static electric build-up. Safety shoes are recommended when handling cylinders. Transfer of large quantities under pressure may require use of fire retardant clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES GAS DENSITY @ 21.1°C (70°F) and 1 atm: 0.114 74 lb/ft³ (2.4787 kg/m³) **BOILING POINT:** -11.72°C (10.9°F) **FREEZING/MELTING POINT @ 10 psig:** -159°C (-255.3°F) **SPECIFIC GRAVITY (Air = 1) @ 21.1°C (70°F):** 2.006 36 **pH:** Not applicable. **SOLUBILITY IN WATER vol/vol @ 37.8°C (100°F):** 0.052 **MOLECULAR WEIGHT:** 58.12 **EVAPORATION RATE (nBuAc = 1):** Not applicable. **EXPANSION RATIO:** Not applicable. **ODOR THRESHOLD:** 1800 mg/m³ **SPECIFIC VOLUME (N₂):** 6.33 **VAPOR PRESSURE @ 21.1°C (70°F) psig:** 30.58 **COEFFICIENT WATER/OIL DISTRIBUTION:** Not applicable. **APPEARANCE AND COLOR:** Colorless, odorless gas which is shipped as a liquefied gas under its own vapor pressure. **HOW TO DETECT THIS SUBSTANCE (warning properties):** There are no distinct warning properties. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

10. STABILITY and REACTIVITY STABILITY: Stable. **DECOMPOSITION PRODUCTS:** When ignited in the presence of oxygen, this gas will burn to produce carbon monoxide, carbon dioxide. **MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:** Strong oxidizers (i.e. chlorine, bromine pentafluoride, oxygen, oxygen difluoride, and nitrogen trifluoride). **HAZARDOUS POLYMERIZATION:** Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials and exposure to heat, sparks and other sources of ignition. Cylinders exposed to high temperatures or direct flame can rupture or burst.

11. TOXICOLOGICAL INFORMATION TOXICITY DATA: The following toxicology data are available for isobutane: **ISOBUTANE: Inhalation-Rat LC₅₀:** 57 ppb/ 15 minute Inhalation-Mouse LCL: 1041 gm/3 2 hour **SUSPECTED CANCER AGENT:** Isobutane is not found on the following lists: **FEDERAL OSHA Z LIST, NTP, IARC, CALIOSHA;** therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies. **IRRITANTY OF PRODUCT:** Isobutane can cause some irritation to mucus membranes. In addition, contact with rapidly expanding gases can cause frostbite to exposed tissue. **SENSITIZATION TO THE PRODUCT:** Isobutane is not known to cause sensitization in humans; however, isobutane is considered a weak heart sensitizing agent, based on animal tests. **REPRODUCTIVE TOXICITY INFORMATION:** Listed below is information concerning the effects of isobutane on the human reproductive system. **Mutagenicity:** No mutagenicity effects have been described for isobutane. **Embryotoxicity:** No embryotoxic effects have been described for isobutane. **Teratogenicity:** No teratogenicity effects have been described for isobutane. **Reproductive Toxicity:** No reproductive toxicity effects have been described for isobutane. *A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process. MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions may be aggravated by over-exposure to isobutane. **BIOLOGICAL EXPOSURE INDICES (BEI):** Currently, Biological Exposure Indices (BEIs) are not applicable for isobutane.*

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary, treat symptoms; reduce or eliminate exposure.

12. ECOLOGICAL INFORMATION ENVIRONMENTAL STABILITY: This gas will be dissipated rapidly in well-ventilated areas. **EFFECT OF MATERIAL ON PLANTS or ANIMALS:** Any adverse effect on animals would be related to oxygen deficient environments. No adverse effect is anticipated to occur to plant-life. **EFFECT OF CHEMICAL ON AQUATIC LIFE:** No evidence is currently available on this product's effects on aquatic life.

13. DISPOSAL CONSIDERATIONS PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with any residual product to Portagas. Do not dispose of locally.

14. TRANSPORTATION INFORMATION THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION. ALTERNATE DESCRIPTION: PROPER SHIPPING NAME: Isobutane Petroleum gases, liquefied **HAZARD CLASS NUMBER and DESCRIPTION:** 2.1 (Flammable Gas) 2.1 (Flammable Gas) **UN IDENTIFICATION NUMBER (1999):** UN 1959 **UN 1075 PACKING GROUP:** Not applicable. **DOT LABEL(S) REQUIRED:** Flammable Gas Flammable Gas **NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996):** 115 **MARINE POLLUTANT:** Isobutane is not classified by the DOT as Marine Pollutants (as defined by 49 CFR 172.101, Appendix B). **SPECIAL SHIPPING INFORMATION:** Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles present serious safety hazards and should be discouraged. **NOTE:** Shipment of compressed gas cylinders which have not been filled with the owners consent is a violation of Federal law (49 CFR, Part 173.301 (b)). **TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS.** Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION SARA REPORTING REQUIREMENTS: Isobutane is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act. This product is subject to the reporting requirements of Sections 311 and 312 of Title III of the Superfund Amendments and Reauthorization Act (40 CFR 370.21). **SARA THRESHOLD PLANNING QUANTITY:** Not applicable. **TSCA INVENTORY STATUS:** Isobutane is listed on the TSCA Inventory. **CERCLA REPORTABLE QUANTITY (RQ):** Not applicable. **OTHER U.S. FEDERAL REGULATIONS:** Generally recognized as safe, (GRAS) as a direct human food ingredient when used as a propellant, aerating agent and gas. Isobutane does not contain any Class I or Class II ozone depleting chemicals (40 CFR part 82). Isobutane is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 pounds. Depending on specific operations involving the use of this product, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Under this regulation Isobutane is not listed in Appendix A, however, any process that involves a flammable gas on-site. In one location, in quantities of 10,000 lbs (4,536 kg) or greater is covered under this regulation unless it is used as a fuel. Isobutane is listed as a Regulated Substance, per 40 CFR, Part 68, of the Risk Management for Chemical Processes as a flammable substance. The threshold quantity for isobutane under this regulation is 10,000 lbs. **OTHER CANADIAN REGULATIONS:** Isobutane is categorized as a Controlled Product, Hazard Classes A, and B1 as per the Controlled Product Regulations. **STATE REGULATORY INFORMATION:** Isobutane is covered under specific State regulations, as denoted below: **Alaska - Designated Toxic and Hazardous Substances; Isobutane. California - Permissible Exposure Limits for Chemical Contaminants: Isobutane. Florida - Substances List: No. Illinois - Toxic Substance List: Isobutane. Kansas - Section 302/313 List: No. Massachusetts - Substance List: Isobutane. Minnesota - List of Hazardous Substances: Isobutane. Missouri - Employer Information/Toxic Substance List: Isobutane. New Jersey - Right to Know Hazardous Substance List: Isobutane. North Dakota - List of Hazardous Chemicals, Reportable Quantities: No. Pennsylvania - Hazardous Substance List: Isobutane. Rhode Island - Hazardous Substance List: Isobutane. Texas - Hazardous Substance List: No. West Virginia - Hazardous Substance List: No. Wisconsin - Toxic and Hazardous Substances: No. **CALIFORNIA PROPOSITION 65:** Isobutane is not on the California Proposition 65 lists.**

16. OTHER INFORMATION INFORMATION ABOUT DOT-39 NRC (Non-Refillable Cylinder) PRODUCTS: DOT 39 cylinders ship as hazardous materials when full. Once the cylinders are relieved of pressure (empty) they are not considered hazardous material or waste. Residual gas in this type of cylinder is not an issue because toxic gas mixtures are prohibited. Calibration gas mixtures typically packaged in these cylinders are Nonflammable n.o.s., UN 1908. A small percentage of calibration gases packaged in DOT 39 cylinders are flammable or oxidizing gas mixtures. For disposal of used DOT-39 cylinders, it is acceptable to place them in a landfill if local laws permit. Their disposal is no different than that employed with other DOT containers such as spray paint cans, household aerosols, or disposable cylinders of propane (for camping, torch etc.). When feasible, we recommend recycling for scrap metal content. **MIXTURES:** When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death. Further information can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 4221 Walney Road 5th floor, Chantilly, VA 20151-2923. Telephone: (703) 788-2700. P-1 "Safe Handling of Compressed Gases in Containers" P-14 "Accident Prevention in Oxygen-Rich and Oxygen Deficient Atmospheres" SB-6 "Use of Cry-fuel Gas Welding and Cutting Apparatus" SB-2 "Oxygen Deficient Atmospheres" "Handbook of Compressed Gases"

Disclaimer: To the best of Portagas's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness is not guaranteed and no warranties of any type either express or implied are provided. The information contained herein relates only to this specific product. Data may be changed from time to time. Be sure to consult the latest edition.

OMEGA LABORATORIES, INC. -- CITRI-SOLVE -- 6850-00F027939

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Product Identification
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Product ID:CITRI-SOLVE
MSDS Date:09/01/1989
FSC:6850
NIIN:00F027939
MSDS Number: BRBGT
=== Responsible Party ===
Company Name:OMEGA LABORATORIES, INC.
Address:8732 CLAY RD SUITE 103
City:HOUSTON
State:TX
ZIP:77080
Country:US
Info Phone Num:713-462-3606
Emergency Phone Num:713-462-3606
CAGE:15205

=== Contractor Identification ===
Company Name:OMEGA LABORATORIES INC
Address:8732 CLAY RD
Box:City:HOUSTON
State:TX
ZIP:77080
Phone:(713) 462-3606
CAGE:15205

=====
Composition/Information on Ingredients
=====

Ingred Name:CARVENE; CYCLOHEXENE, 1-METHYL-4-(1-METHYLETHENYL), CITRUS
TERPENE, D-LIMONENE
CAS:5989-27-5
RTECS #:GW6360000
Fraction by Wt: >20%

Ingred Name:ESTER
Fraction by Wt: >50%

Ingred Name:WEIGHT PER GALLON IN POUNDS: 7.7 LBS
RTECS #:9999999WG

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Hazards Identification
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Routes of Entry: Inhalation:NO Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:SKIN/EYES: IRRITATION.
Explanation of Carcinogenicity:NONE

=====
First Aid Measures
=====

First Aid:INHALATION: REMOVE TO FRESH AIR. INGESTION: DRINK LARGE
AMOUNTS OF WATER OR CARBON BLACK SLURRY. EYES: FLUSH W/CLEAN WATER
FOR AT LEAST 15 MINS. SKIN: WASH W/SOAP & WATER. OBTAIN MEDICAL
ATTENTION IN ALL CASES.

=====
Fire Fighting Measures
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Flash Point Method:CC

Flash Point:140F

Extinguishing Media:FOAM, DRY CHEMICAL & CO2.

Fire Fighting Procedures:CLASS B FIRE PROCEDURES. BECAUSE IT IS A LIGHT OIL, WATER IS NOT VERY EFFECTIVE. MAY PRODUCE SLIPPERY FLOORS.

Unusual Fire/Explosion Hazard:CONTAINERS EXPOSED TO UNUSALLY HIGH TEMPERATURES MAY BURST.

===== Accidental Release Measures =====

Spill Release Procedures:USE ABSORBENT MATERIAL TO PICK UP EXCESS LIQUID; SWEEP OR SCOOP UP & DISPOSE OF PROPERLY, ACCORDING TO LOCAL ORDINANCES. WASH ANY RESIDUE W/DETERGENT & WATER. DON'T DISPOSE OF IN SEWAGE SYSTEM.

===== Handling and Storage =====

Handling and Storage Precautions:KEEP AWAY FROM HEAT, SPARKS OR OPEN FLAMES.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:NONE REQUIRED

Ventilation:NORMAL IS ADEQUATE

Protective Gloves:NONE REQUIRED

Eye Protection:RECOMMENDED

Supplemental Safety and Health

===== Physical/Chemical Properties =====

Spec Gravity:0.857-0.883

Solubility in Water:COMPLETE

Appearance and Odor:LIGHT RED, W/CITRUS/ORANGE ODOR.

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

AVOID MIXING W/ANY OTHER CHEMICALS.

Stability Condition to Avoid:HEAT, SPARKS & OPEN FLAMES

Hazardous Decomposition Products:CO2, CO

===== Disposal Considerations =====

Waste Disposal Methods:SMALL SPILLS CAN BE SAFELY DISPOSED OF BY STANDARD WASTE METHODS. DISPOSE LARGE SPILLS IN ACCORDANCE W/FEDERAL, STATE & LOCAL REGULATIONS REGARDING WASTE DISPOSAL.

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COASTAL CORP -- DIESEL FUEL NO 2 -- 9140-00N017679

===== Product Identification =====

Product ID:DIESEL FUEL NO 2
 MSDS Date:02/07/1990
 FSC:9140
 NIIN:00N017679
 MSDS Number: BLCNC
 === Responsible Party ===
 Company Name:COASTAL CORP
 Address:9 GREENWAY PLAZA
 City:HOUSTON
 State:TX
 ZIP:77046
 Country:US
 Info Phone Num:713-877-1400
 Emergency Phone Num:713-877-1400
 CAGE:46684

=== Contractor Identification ===

Company Name:COASTAL CORP
 Address:9 GREENWAY PLAZA
 Box:City:HOUSTON
 State:TX
 ZIP:77046
 Country:US
 Phone:713-877-6732
 CAGE:46684

===== Composition/Information on Ingredients =====

Ingred Name:PETROLEUM MID-DISTILLATE; (DIESEL FUEL NO. 2). TLV: 5
 MG/M3;10MG/M3 STEL, OIL MIST.
 CAS:68476-34-6
 Fraction by Wt: 100%
 OSHA PEL:5 MG/M3, OIL MIST
 ACGIH TLV:SEE INGRED NAME

Ingred Name:SUPP DATA: CLOSING VALVES, PRESS VACUUM BUNGS & FLAME
 ARRESTORS.
 RTECS #:9999999ZZ

Ingred Name:VENT: 3) TO PREVENT OXYGEN DEFICIENT ATMOSPHERES,
 ESPECIALLY IN CONFINED SPACES.
 RTECS #:9999999ZZ

Ingred Name:EYE PROT: CHEMICAL WORKERS GOGGLES , WHERE CONTACT WITH
 LIQUID OR MIST MAY OCCUR.
 RTECS #:9999999ZZ

===== Hazards Identification =====

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
 Routes of Entry: Inhalation:YES Skin:UNKNOWN Ingestion:YES
 Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
 Health Hazards Acute and Chronic:ACUTE: EYES; SLIGHT-MODERATE IRRIT.
 SKIN: MODERATELY-EXTREMELY IRRITATING; CAUSING REDNESS, DRYING TO
 BURNS OR BLISTERING. INHAL: IRRIT TO MUC MEMB & RESP TRACT. WILL
 PRDCE SYMP OF INTOXICATION SUCH A S HDACH, DIZZ, NAUS, VOMIT & LOSS

OF COORDINATION. INGEST: STOMACH IRRIT, GASTRITIS, MILD EXCITATION,
(EFTS OF OVEREXP)

Explanation of Carcinogenicity:NOT RELEVANT

Effects of Overexposure:HLTH HAZ: LOSS OF CONS, CONVULSIONS, CYANOSIS,
CONGESTION & CAPILLARY HEMORRHAGING OF THE LUNG & INTERNAL ORGANS.
ASPIRATION HAZARD IF VOMITING OCCURS. CHRONIC: PRLNG/RPTD SKIN CONT
MAY CAUSE DERMATIT IS.

Medical Cond Aggravated by Exposure:MAY AGGRAVATE PRE-EXISTING
DERMATITIS. MIDDLE DISTILLATES HAVE CAUSED SKIN CANCER & KIDNEY DMG
IN LAB ANIMALS. THE NIOSH, BASE ON FINDINGS OF CARCINOGENIC &
TUMORIGENIC RESPONSES OF MICE & (SUPP DATA)

===== First Aid Measures =====

First Aid:EYE CONT: FLUSH THORO W/POTABLE WATER FOR AT LEAST 15
MINUTES. GET MED ATTN. SKIN CONT: COOL THE EXPOSED AREA IMMED.
REMOVE CONTAM CLTHG. IMMED WASH AFFECTED AREAS W/SOAP & WATER.
INHAL: REMOVE TO FRE SH AIR. APPLY ARTF RESP IF NOT BRTHG. GET MED
ATTN. INGEST: DO NOT INDUCE VOMITING. IF SPONTANEOUS VOMITING
OCCURS, HOLD THE VICTIM'S HEAD LOWER THAN HIPS TO PREVENT
ASPIRATION.

===== Fire Fighting Measures =====

Flash Point Method:PMCC

Flash Point:125F,52C

Lower Limits:0.6%

Upper Limits:7.5%

Extinguishing Media:DRY CHEMICAL, CARBON DIOXIDE, FOAM, AND WATER
SPRAY.

Fire Fighting Procedures:USE A WATER SPRAY TO COOL FIRE-EXPOSED CONTRS.
USE A SMOTHERING TECHNIQUE FOR EXTING FIRE OF THIS COMBUST LIQUID.
DO NOT USE A FORCED WATER STREAM (SUPP DATA)

Unusual Fire/Explosion Hazard:FLOWING OIL CAN BE IGNITED BY
SELF-GENERATED STATIC ELECTRICITY.

===== Accidental Release Measures =====

Spill Release Procedures:REMOVE SOURCES OF HEAT OR IGNITION INCLUDING
INTERNAL COMBUSTION ENGINES & POWER TOOLS. CLEAN-UP SPILL, BUT DO
NOT FLUSH TO SEWER OR SURFACE WATER. VENTILATE AREA & AVOID
BREATHING VAPORS OR MISTS.

Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

===== Handling and Storage =====

Handling and Storage Precautions:STORE IN TIGHTLY CLOSED CONTRS IN A
DRY COOL PLACE, AWAY FROM SOURCES OF HEAT/IGNIT. GROUND/BOND ALL
TRANSFER/STORAGE EQUIP TO PVNT STATIC (SUPP DATA)

Other Precautions:EMPTY CONTRS MAY CONTAIN RESIDUE (LIQ &/OR VAP) & CAN
BE DANGEROUS. DO NOT PRESSURIZE/CUT/WELD/BRAZE/SOLDER/DRILL/GRIND
OR EXPOSED SUCH CONTRS TO HEAT/FLAME/SPARKS OR OTHER SOURCES OF
IGNIT; THEY MAY EXPLODE & CAUSE INJURY OR DEATH.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:USE NIOSH/MSHA APPROVED RESPIRATORY PROTECTIVE
EQUIPMENT FOR CLEANING LARGE SPILLS OR ENTRY INTO LARGE TANKS,
VESSELS OR OTHER CONFINED SPACES.

Ventilation:PROVIDE ADEQUATE VENT: 1) TO MEET OCCUP EXPOS LIMITS, 2) TO

PREVENT THE FORMATION OF EXPLOSIVE ATMOSPHERES, AND (ING 3)

Protective Gloves:IMPERVIOUS GLOVES .

Eye Protection:REMOVE CONTACT LENSES & WEAR (ING 4)

Other Protective Equipment:EMERGENCY EYEWASH & DELUGE SHOWER

Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.

Supplemental Safety and Health

FIRE FIGHT PROC: DIRECTLY ON OIL FIRES AS THIS WILL SCATTER THE FIRE.

FIREFIGHTERS SHLD WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP .

MED CNDTNS: RATS EXPOSED TO WHOLE DIESEL EXHAUST, RECOMMEN DS THAT WHOLE DIESEL EXHAUST BE REGARDED AS A "POTNTL OCCUP CARCINOGEN".

HNDLG/STOR PREC: SPARKS & EQUIP W/SELF (ING 2)

===== Physical/Chemical Properties =====

HCC:V4

Boiling Pt:B.P. Text:300F,149C

Vapor Pres:1.6

Vapor Density:8

Spec Gravity:0.87

Evaporation Rate & Reference:0.01

Solubility in Water:INSOLUBLE

Appearance and Odor:CLEAR TO LIGHT AMBER LIQUID, MILD PETROLEUM ODOR.

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

STRONG OXIDIZING AGENTS.

Stability Condition to Avoid:HEAT, SPARK, FLAME, & BUILD-UP OF STATIC ELECTRICITY.

Hazardous Decomposition Products:CARBON MONOXIDE, CARBON DIOXIDE, SULFUR DIOXIDE, AND HYDROCARBONS.

===== Disposal Considerations =====

Waste Disposal Methods:DISPOSE THROUGH A LICENSED WASTE DISPOSAL COMPANY. FOLLOW FEDERAL, STATE AND LOCAL REGULATIONS.

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US OIL CO INC -- LEADED REGULAR GASOLINE N/O -- 9130-00-264-6216

===== Product Identification =====

Product ID:LEADED REGULAR GASOLINE N/O
 MSDS Date:03/01/1989
 FSC:9130
 NIIN:00-264-6216
 MSDS Number: BPHZM
 === Responsible Party ===
 Company Name:US OIL CO INC
 Address:425 S WASHINGTON AVE
 City:COMBINED LOCKS
 State:WI
 ZIP:54113-1049
 Country:US
 Info Phone Num:414-739-6100
 Emergency Phone Num:414-739-6100, CHEMTREC 800-424-9300
 CAGE:K0841

=== Contractor Identification ===

Company Name:U S OIL CO INC
 Address:558 CARTER CT
 Box:City:KIMBERLY
 State:WI
 ZIP:54136
 Country:US
 Phone:920-735-8287
 CAGE:9V710
 Company Name:US OIL CO INC
 Address:425 S WASHINGTON AVE
 Box:City:COMBINED LOCKS
 State:WI
 ZIP:54113-1049
 Country:US
 Phone:414-739-6100
 CAGE:K0841

===== Composition/Information on Ingredients =====

Ingred Name:HYDROCARBONS (AROMATIC AND ALIPHATIC)
 Fraction by Wt: >50%
 Other REC Limits:NONE SPECIFIED
 OSHA PEL:1PPM/5STEL;1910.1028
 ACGIH TLV:10 PPM; A2; 9192

Ingred Name:ETHYL BENZENE (SARA III)
 CAS:100-41-4
 RTECS #:DA0700000
 Fraction by Wt: 2.0%
 Other REC Limits:NONE SPECIFIED
 OSHA PEL:100 PPM/125 STEL
 ACGIH TLV:100 PPM/125STEL 9192
 EPA Rpt Qty:1000 LBS
 DOT Rpt Qty:1000 LBS

Ingred Name:BENZENE (SARA III)
 CAS:71-43-2
 RTECS #:CY1400000
 Fraction by Wt: 0.1-4.9%

Other REC Limits:NONE SPECIFIED
 OSHA PEL:1PPM/5STEL;1910.1028
 ACGIH TLV:10 PPM; A2; 9293
 EPA Rpt Qty:10 LBS
 DOT Rpt Qty:10 LBS

Ingred Name:TOLUENE (SARA III)
 CAS:108-88-3
 RTECS #:XS5250000
 Fraction by Wt: 15%
 Other REC Limits:NONE SPECIFIED
 OSHA PEL:200 PPM/150 STEL
 ACGIH TLV:50 PPM; 9293
 EPA Rpt Qty:1000 LBS
 DOT Rpt Qty:1000 LBS

Ingred Name:CYCLOHEXANE (SARA III)
 CAS:110-82-7
 RTECS #:GU6300000
 Fraction by Wt: 1.0%
 Other REC Limits:NONE SPECIFIED
 OSHA PEL:300 PPM
 ACGIH TLV:300 PPM, 9293
 EPA Rpt Qty:1000 LBS
 DOT Rpt Qty:1000 LBS

Ingred Name:CUMENE (SARA III)
 CAS:98-82-8
 RTECS #:GR8575000
 Fraction by Wt: 1%
 Other REC Limits:NONE SPECIFIED
 OSHA PEL:S, 50 PPM
 ACGIH TLV:S, 50 PPM; 9293
 EPA Rpt Qty:5000 LBS
 DOT Rpt Qty:5000 LBS

Ingred Name:1,2,4-TRIMETHYLBENZENE (SARA III) (PSEUDOCUMENE)
 CAS:95-63-6
 RTECS #:DC3325000
 Fraction by Wt: 2.0%
 Other REC Limits:NONE SPECIFIED
 OSHA PEL:25 PPM
 ACGIH TLV:25 PPM; 9293

Ingred Name:XYLENES (O-,M-,P- ISOMERS) (SARA III)
 CAS:1330-20-7
 RTECS #:ZE2100000
 Fraction by Wt: 12%
 Other REC Limits:NONE SPECIFIED
 OSHA PEL:100 PPM/150 STEL
 ACGIH TLV:100 PPM/150STEL;9192
 EPA Rpt Qty:1000 LBS
 DOT Rpt Qty:1000 LBS

=====
 ===== Hazards Identification =====
 =====

Routes of Entry: Inhalation:YES Skin:YES Ingestion:NO
 Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:YES
 Health Hazards Acute and Chronic:ACUTE-INHALATION:CENTRAL NERVOUS
 SYSTEM DEPRESSION, HEADACHE, NAUSEA, DIZZINESS, FATIGUE, NARCOSIS,

UNCONSCIOUSNESS, ASPHYXIATION. EYE:IRRITATION. SKIN:DEFATING, IRRITATION/ DERMATITIS. INGESTION: GI DISTURBANCES, NAUSEA, VOMITING. CHRONIC:DERMATITIS, ANEMIA, PULMONARY EDEMA, LIVER AND KIDNEY DAMAGE.

Explanation of Carcinogenicity: BENZENE IS LISTED AS A CARCINOGEN BY NTP, IARC, OSHA AND EPA.

Effects of Overexposure: OVEREXPOSURE MAY LEAD TO RESPIRATORY IRRITATION, NAUSEA, FATIGUE, BLURRED VISION, DIZZINESS, HEADACHES, UNCONSCIOUSNESS, AND EYE IRRITATION, REDNESS.

Medical Cond Aggravated by Exposure: SKIN AND RESPIRATORY DISORDERS.

===== First Aid Measures =====

First Aid: SKIN: REMOVE CONTAMINATED CLOTHING. WASH WITH SOAP AND WATER. GET MEDICAL ATTENTION IF IRRITATION PERSISTS. INHALATION: REMOVE TO FRESH AIR & RESTORE BREATHING IF NECESSARY. GET MEDICAL ATTENTION. EYE : IMMEDIATELY FLUSH WITH WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION. INGESTION: GET IMMEDIATE MEDICAL ATTENTION. DO NOT INDUCE VOMITING. NOTHING BY MOUTH IF UNCONSCIOUS.

===== Fire Fighting Measures =====

Flash Point Method: TCC

Flash Point: -50F, -46C

Autoignition Temp: Autoignition Temp Text: 495F

Lower Limits: <1.0%

Upper Limits: 8.0%

Extinguishing Media: USE CARBON DIOXIDE, FOAM, OR DRY CHEMICAL. USE WATER FOG TO COOL SRROUNDING CONTAINERS.

Fire Fighting Procedures: WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS. EVACUATE AREA. COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY.

Unusual Fire/Explosion Hazard: VAPORS HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND FLASH BACK.

===== Accidental Release Measures =====

Spill Release Procedures: MINOR: ABSORB MATERIAL WITH CLAY, VERMICULITE, OR SIMILAR ABSORBENT MATERIAL. PLACE IN DISPOSAL CONTAINERS. MAJOR: DIKE & CONTAIN SPILL. ELIMINATE SOURCES OF IGNITION, SHUT OFF LEAKS. REMOVE LIQUID BY VACUUM OR ABSORBENT.

===== Handling and Storage =====

Handling and Storage Precautions: STORE IN A COOL, VENTILATED WORK AREA. KEEP CONTAINERS CLOSED WHEN NOT IN USE. FLAMMABLE LIQUID; EMPTY CONTAINERS CAN BE HAZARDOUS.

Other Precautions: THE SELECTION OF PERSONAL PROTECTIVE EQUIPMENT SHOULD BE MADE BY THE MATERIAL USER BASED ON THE PARTICULAR CONDITIONS WHERE THE MATERIAL IS TO BE USED TOGETHER WITH INFORMATION CONTAINED IN THIS MSDS.

===== Exposure Controls/Personal Protection =====

Respiratory Protection: USE NIOSH APPROVED RESPIRATOR. AIR-SUPPLIED OR FILTERING TYPE WITH ORGANIC VAPOR CARTRIDGES ARE RECOMMENDED.

Ventilation: LOCAL AND MECHANICAL EXHAUST RECOMMENDED. AVOID OPEN ELECTRICAL SOURCES NEAR PRODUCT VAPOR AREAS.

Protective Gloves: NEOPRENE, NITRILE, OR POLYVINYL ALCOHOL

Eye Protection:USE CHEMICAL SAFETY GOGGLES & FACESHIELD
Other Protective Equipment:EYE WASH STATION & SAFETY SHOWER.
Work Hygienic Practices:DO NOT TAKE INTERNALLY. AVOID SKIN CONTACT.
WASH SKIN AFTER USING PRODUCT. DO NOT EAT, DRINK OR SMOKE IN WORK
AREA.

Supplemental Safety and Health
NONE

===== Physical/Chemical Properties =====

HCC:F1
Boiling Pt:=-29.4C, 85.F
Vapor Pres:>275 MMHG
Vapor Density:>1
Spec Gravity:0.70-0.77
Evaporation Rate & Reference:<1 (ETHER=1)
Solubility in Water:NEGLIGIBLE
Appearance and Odor:BRONZE OR RED CLEAR LIQUID WITH GASOLINE ODOR.
Percent Volatiles by Volume:100

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES
STRONG OXIDIZING AGENTS
Stability Condition to Avoid:HIGH HEAT, OPEN FLAMES AND OTHER SOURCES
OF IGNITION
Hazardous Decomposition Products:CARBON MONOXIDE, CARBON DIOXIDE AND
OTHER HYDROCARBON COMPOUNDS DURING COMBUSTION.

===== Disposal Considerations =====

Waste Disposal Methods:WASTE MAY BE BURNED IN AN APPROVED INCINERATOR
OR DISPOSED OF IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND
FEDERAL LAWS AND REGULATIONS.

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document should seek competent professional advice to verify and
assume responsibility for the suitability of this information to their
particular situation.

CONOCO -- UNLEADED GASOLINE -- 9130-00B030050

===== Product Identification =====

Product ID:UNLEADED GASOLINE

MSDS Date:12/01/1988

FSC:9130

NIIN:00B030050

MSDS Number: BHHFM

=== Responsible Party ===

Company Name:CONOCO

Box:2197

City:HOUSTON

State:TX

ZIP:77252

Country:US

Info Phone Num:713-293-5550

Preparer's Name:MSDS ANALYST

CAGE:DO148

=== Contractor Identification ===

Company Name:CONOCO

Address:SOUTH DELMAR

Box:2197

City:HARTFORD

State:IL

ZIP:62048-0177

Phone:800-959-3673

CAGE:DO148

Company Name:CONOCO INC

Address:1000 S PINE

Box:1267

City:PONCA CITY

State:OK

ZIP:74603

Country:US

Phone:800-441-3637,CHEMTREC 800-424-9300

CAGE:58326

===== Composition/Information on Ingredients =====

Ingrid Name:BENZENE (SARA III)

CAS:71-43-2

RTECS #:CY1400000

Fraction by Wt: 0.1-4.9%

OSHA PEL:1PPM/5STEL;1910.1028

ACGIH TLV:10 PPM; A2; 9192

EPA Rpt Qty:10 LBS

DOT Rpt Qty:10 LBS

Ingrid Name:ETHYL BENZENE (SARA III)

CAS:100-41-4

RTECS #:DA0700000

Fraction by Wt: 02%

OSHA PEL:100 PPM/125 STEL

ACGIH TLV:100 PPM/125STEL 9192

EPA Rpt Qty:1000 LBS

DOT Rpt Qty:1000 LBS

Ingrid Name:CUMENE (SARA III)

CAS:98-82-8
 RTECS #:GR8575000
 Fraction by Wt: 01%
 OSHA PEL:S, 50 PPM
 ACGIH TLV:S, 50 PPM; 9192
 EPA Rpt Qty:5000 LBS
 DOT Rpt Qty:5000 LBS

Ingred Name:PSEUDOCUMENE
 CAS:95-63-6
 Fraction by Wt: 02%
 OSHA PEL:NONE ESTABLISHED
 ACGIH TLV:25 PPM 125MG/M3

Ingred Name:METHYL TERT-BUTYL ETHER (SARA III)
 CAS:1634-04-4
 RTECS #:KN5250000
 Fraction by Wt: <15%
 EPA Rpt Qty:1 LB
 DOT Rpt Qty:1 LB

Ingred Name:XYLENES (O-,M-,P- ISOMERS) (SARA III)
 CAS:1330-20-7
 RTECS #:ZE2100000
 Fraction by Wt: 12%
 OSHA PEL:100 PPM/150 STEL
 ACGIH TLV:100 PPM/150STEL;9192
 EPA Rpt Qty:1000 LBS
 DOT Rpt Qty:1000 LBS

Ingred Name:TOLUENE (SARA III)
 CAS:108-88-3
 RTECS #:XS5250000
 Fraction by Wt: 15%
 OSHA PEL:200 PPM/150 STEL
 ACGIH TLV:50 PPM; 9293
 EPA Rpt Qty:1000 LBS
 DOT Rpt Qty:1000 LBS

Ingred Name:HYDROCARBONS (AROMATIC & PARAFFINIC)
 Fraction by Wt: 50%>

=====
 ===== Hazards Identification =====
 =====

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
 Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:YES
 Health Hazards Acute and Chronic:A FEW STUDIES HAVE INDICATED THAT
 WORKERS EXPOSED TO HIGH CONCENTRATIONS OF BENZENE OVER MANY YEARS
 HAVE A SLIGHTLY HIGHER INCIDENCE OF LEUKEMIA. BENZENE CAN ALSO BE
 TOXIC TO THE BLOOD AND BLOOD-FORMING TISSUES. SOME STUDIES HAVE
 SHOWN THAT PETROLEUM DISTILLATES HAVE CAUSED DAMAGE OR TUMORS IN
 KIDNEYS AND LIVER.
 Explanation of Carcinogenicity:BENZENE IS LISTED AS A POTENTIAL
 CARCINOGEN.
 Effects of Overexposure:THIS PRODUCT MAY CAUSE IRRITATION TO EYES,LUNGS
 OR SKIN AFTER PROLONGED OR REPEATED EXPOSURE. OVEREXPOSURE MAY
 CAUSE CENTRAL NERVOUS SYSTEM DEPRESSION. EXTREME EXPOSURE OR
 ASPIRATION INTO THE LUNGS MAY CAUSE PNEUMONIA. OVEREXPOSURE MAY
 CAUSE
 WEAKNESS, HEADACHE, NAUSEA, DIZZINESS, UNCONSCIOUSNESS, CONVULSION, ETC.

Medical Cond Aggravated by Exposure: EXPOSURE TO PETROLEUM DISTILLATES MAY RESULT IN SKIN CANCER (AS SEEN IN SOME LAB ANIMAL STUDIES). WASHING WITH SOAP AND WATER AFTER SKIN EXPOSURE GREATLY REDUCES THIS POSSIBILITY.

===== First Aid Measures =====

First Aid: EYES-FLUSH IMMEDIATELY WITH PLENTY OF WATER FOR 15 MINS AND SEEK MEDICAL ATTENTION. IF SWALLOWED, DO NOT INDUCE VOMITING. IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION. SEEK MEDICAL ATTENTION. SKIN-REMOVE CONTAMINATED CLOTHING AS SOON AS POSSIBLE. WASH EXPOSED SKIN WITH SOAP AND WATER. IF IRRITATION PERSISTS CONSULT A PHYSICIAN. NOTE TO PHYSICIAN-GASTRIC LAVAGE MAY BE CONSIDERED BASES ON QUANTITIES

===== Fire Fighting Measures =====

Flash Point Method: TCC
Flash Point: AS LOW AS -50F
Lower Limits: <1
Upper Limits: 8
Extinguishing Media: DRY CHEMICAL, CO2, FOAM.
Fire Fighting Procedures: USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL. IF LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE VAPORS & PROTECT PERSONNEL ATTEMPTING TO STOP LEAK.
Unusual Fire/Explosion Hazard: PRODUCTS OF COMBUSTION MAY CONTAIN CARBON MONOXIDE, CARBON DIOXIDE AND OTHER TOXIC MATERIAL. DON'T ENTER ENCLOSED SPACE WITHOUT PROTECTIVE EQUIP/RESPIRATORY EQPT.

===== Accidental Release Measures =====

Spill Release Procedures: CONTAIN SPILL IMMEDIATELY IN SMALLEST POSSIBLE AREA. RECOVER AS MUCH OF THE PRODUCT ITSELF AS POSSIBLE BY VACUUMING, THEN RECOVER RESIDUAL FLUIDS BY USING ABSORBENT MATERIAL. REMOVE CONTAMINATED ITEMS AND PLACE IN PROPER DISPOSAL CONTAINERS.

===== Exposure Controls/Personal Protection =====

Respiratory Protection: SELECT APPROPRIATE NIOSH-APPROVED RESPIRATORY PROTECTION WHERE NECESSARY TO MAINTAIN EXPOSURES BELOW THE ACCEPTABLE LIMITS. PROPER RESPIRATOR SHOULD BE DETERMINED BY ADEQUATELY TRAINED PERSONNEL.
Ventilation: USE SUFFICIENT VENTILATION TO MAINTAIN ATMOSPHERIC CONCENTRATIONS BELOW PERMISSIBLE EXPOSURE LIMITS. AVOID SPARKING MIX.
Protective Gloves: NBR OR NEOPRENE FOR PROLONGED SKIN EXPOS
Eye Protection: SPLASH GOGGLES OR FACE SHIELD FOR SPRAY.
Other Protective Equipment: SUFFICIENT PROTECTIVE CLOTHING TO MINIMIZE SKIN EXPOSURE. LAUNDRY CONTAMINATED CLOTHING BEFORE REUSE.
Work Hygienic Practices: AVOID CONTACT WITH EYES, SKIN OR CLOTHING. WASH WITH SOAP AND WATER IF SKIN CONTACT OCCURS.
Supplemental Safety and Health
WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES. HANDLE AND STORE IN ACCORDANCE WITH NFPA PROCEDURES FOR CLASS IA FLAMMABLE LIQUID.

===== Physical/Chemical Properties =====

Boiling Pt: B.P. Text: 85-437F
Vapor Pres: 275-475

Vapor Density:>1 AIR=1.0
Spec Gravity:0.70-0.77 H2O=1
Solubility in Water:SLIGHT
Appearance and Odor:GASOLINE ODOR,WATER WHITE TO STRAW YELLOW LIQUID.
Percent Volatiles by Volume:100

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES
OXIDIZING MATERIALS.
Stability Condition to Avoid:HEAT,FLAME
Hazardous Decomposition Products:CARBON MONOXIDE MAY BE FORMED FROM
INCOMPLETE COMBUSTION.

===== Disposal Considerations =====

Waste Disposal Methods:RECYCLE AS MUCH OF THE RECOVERABLE PRODUCT AS
POSSIBLE. DISPOSE OF NONRECYCLABLE MATERIAL IN ACCORDANCE WITH
STATE,LOCAL AND FEDERAL REGULATIONS. AVOID WASHING,DRAINING OR
DIRECTING MATERIAL TO STORM OR SANITARY SEWERS.

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assume responsibility for the suitability of this information to their
particular situation.

MATERIAL SAFETY DATA SHEET

EQUILON MSDS: 01814ET 01/04/99

HAVOLINE MOTOR OIL 10W-40

TELEPHONE NUMBER:

24 HOUR EMERGENCY ASSISTANCE

EQUIVA SERVICES: 877-276-7283

GENERAL MSDS ASSISTANCE

877-276-7285

CHEMTREC: 800-424-9300

NAME AND ADDRESS:

EQUILON ENTERPRISES LLC

PRODUCT STEWARDSHIP

P.O. BOX 674414

HOUSTON, TX 77267-4414

LEGEND:

N.D. - NOT DETERMINED

N.A. - NOT APPLICABLE

N.T- NOT TESTED

< - LESS THAN

> - GREATER THAN

1. NAME

MATERIAL IDENTITY

Product Code and Name:

01814 HAVOLINE MOTOR OIL 10W-40

Chemical Name and/or Family or Description:

Havoline Motor Oils

2. COMPOSITION/INFORMATION ON INGREDIENTS

THE CRITERIA FOR LISTING COMPONENTS IN THE COMPOSITION SECTION IS AS FOLLOWS: CARCINOGENS ARE LISTED WHEN PRESENT AT 0.1 % OR GREATER; COMPONENTS WHICH ARE OTHERWISE HAZARDOUS ACCORDING TO OSHA ARE LISTED WHEN PRESENT AT 1.0 % OR GREATER; NON-HAZARDOUS COMPONENTS ARE LISTED AT 3.0 % OR GREATER. THIS IS NOT INTENDED TO BE A COMPLETE COMPOSITIONAL DISCLOSURE. REFER TO SECTION 14 FOR APPLICABLE STATES' RIGHT TO KNOW AND OTHER REGULATORY INFORMATION.

Product and/or Component(s) Carcinogenic According to:

OSHA	IARC	NTP	OTHER	NONE
				X

Composition: (Sequence Number and Chemical Name)

Seq.	Chemical Name	CAS Number	Range in %
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01 #	Solvent-dewaxed heavy paraffinic petroleum distillates	64742-65-0	80.00-94.99
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02	Alkenylsuccinimide dispersant	ACC#110544	3.00-9.99
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PRODUCT IS NON-HAZARDOUS ACCORDING TO OSHA (1910.1200).

COMPONENT, BY DEFINITION, IS CONSIDERED HAZARDOUS ACCORDING TO OSHA BECAUSE IT CARRIES THE PERMISSIBLE EXPOSURE LIMIT (PEL) FOR MINERAL OIL MIST.

Exposure Limits referenced by Sequence Number in the Composition Section

Seq.	Limit
------	-------

01	5	mg/m3 TWA-OSHA (MINERAL OIL MIST)
01	5	mg/m3 TWA-ACGIH (MINERAL OIL MIST)
01	10	mg/m3 STEL ACGIH (MINERAL OIL MIST)

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW

Appearance:

Bright and clear liquid

Odor:

Additive odor

WARNING STATEMENT

WARNING ! USED GASOLINE MOTOR OIL IS A POSSIBLE SKIN CANCER HAZARD
BASED ON ANIMAL DATA

	HMIS		NPPA
Health: 1	Reactivity: 0	Health: 1	Reactivity: 0
Flammability: 1	Special : -	Flammability: 1	Special : -

POTENTIAL HEALTH EFFECTS

	EYE	SKIN	INHALATION	INGESTION
Primary Route of Exposure:	X	X	X	

EFFECTS OF OVEREXPOSURE

Acute:

Eyes:

May cause minimal irritation, experienced as temporary discomfort.

Skin:

Brief contact may cause slight irritation. Prolonged contact, as with clothing wetted with material, may cause more severe irritation and discomfort, seen as local redness and swelling.

Other than the potential skin irritation effects noted above, acute (short term) adverse effects are not expected from brief skin contact; see other effects, below, and Section 11 for information regarding potential long term effects.

Inhalation:

Vapors or mist, in excess of permissible concentrations, or in unusually high concentrations generated from spraying, heating the material or as from exposure in poorly ventilated areas or confined spaces, may cause irritation of the nose and throat, headache, nausea, and drowsiness.

Ingestion:

If more than several mouthfuls are swallowed, abdominal discomfort, nausea, and diarrhea may occur.

Sensitization Properties:

Unknown.

Chronic:

No adverse effects have been documented in humans as a result of chronic exposure. Section 11 may contain applicable animal data.

Medical Conditions Aggravated by Exposure:

Because of its irritating properties, repeated skin contact may aggravate an existing dermatitis (skin condition).

Other Remarks:

None

4. FIRST AID MEASURES

Eyes:

Flush eyes with plenty of water for several minutes. Get medical attention if eye irritation persists.

Skin:

Wash skin with plenty of soap and water for several minutes. Get medical attention if skin irritation develops or persists.

Ingestion:

If more than several mouthfuls of this material are swallowed, give two glasses of water (16 oz.). Get medical attention.

Inhalation:

If irritation, headache, nausea, or drowsiness occurs, remove to fresh air. Get medical attention if breathing becomes difficult or respiratory irritation persists.

Other Instructions:

Remove and dry-clean or launder clothing soaked or soiled with this material before reuse. Dry cleaning of contaminated clothing may be

more effective than normal laundering. Inform individuals responsible for cleaning of potential hazards associated with handling contaminated clothing.

5. FIRE-FIGHTING MEASURES

Ignition Temperature - AIT (degrees F):

Not determined.

Flash Point (degrees F):

400 (COC)

Flammable Limits (%):

Lower: Not determined.

Upper: Not determined.

Recommended Fire Extinguishing Agents And Special Procedures:

Use water spray, dry chemical, foam, or carbon dioxide to extinguish flames. Use water spray to cool fire-exposed containers. Water or foam may cause frothing.

Unusual or Explosive Hazards:

None

Special Protective Equipment for Firefighters:

Wear full protective clothing and positive pressure breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES (Transportation Spills: CHEMTREC (800)424-9300)

Procedures in Case of Accidental Release, Breakage or Leakage:

Ventilate area. Avoid breathing vapor. Wear appropriate personal protective equipment, including appropriate respiratory protection. Contain spill if possible. Wipe up or absorb on suitable material and shovel up. Prevent entry into sewers and waterways. Avoid contact with skin, eyes or clothing.

7. HANDLING AND STORAGE

Precautions to be Taken in

Handling:

Minimum feasible handling temperatures should be maintained.

Storage:

Periods of exposure to high temperatures should be minimized. Water contamination should be avoided.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Protective Equipment (Type)

Eye/Face Protection:

Safety glasses, chemical type goggles, or face shield recommended to prevent eye contact.

Skin Protection:

Workers should wash exposed skin several times daily with soap and water. Soiled work clothing should be laundered or dry-cleaned.

Respiratory Protection:

Airborne concentrations should be kept to lowest levels possible. If vapor, mist or dust is generated and the occupational exposure limit of the product, or any component of the product, is exceeded, use appropriate NIOSH or MSHA approved air purifying or air supplied respirator after determining the airborne concentration of the contaminant. Air supplied respirators should always be worn when airborne concentration of the contaminant or oxygen content is unknown.

Ventilation:

Adequate to meet component occupational exposure limits (see Section 2).

Exposure Limit for Total Product:

None established for product; refer to Section 2 for component exposure limits.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Bright and clear liquid

Odor:

Additive odor

Boiling Point (degrees F):

Not determined.

Melting/Freezing point (degrees F):

Not applicable.

Specific Gravity (water=1):

.8805

pH of undiluted product:

Not applicable.

Vapor Pressure:

Not determined.

Viscosity:

13.8 cSt at 100.0 C

VOC Content:

Not determined.

Vapor Density (air=1):

Not determined.

Solubility in Water (%):

Not determined.

Other: None

10. STABILITY AND REACTIVITY

This Material Reacts Violently With:

(If Others is checked below, see comments for details)

Air	Water	Heat	Strong Oxidizers	Others	None of These
			X		

Comments:

None

Products Evolved When Subjected to Heat or Combustion:

Toxic levels of carbon monoxide, carbon dioxide, irritating aldehydes and ketones; combustion products of nitrogen, sulfur, calcium, zinc, or phosphorous may also be released.

Hazardous Polymerizations: DO NOT OCCUR

11. TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION (ANIMAL TOXICITY DATA)**Median Lethal Dose****Oral:**

LD50 Believed to be > 5.00 g/kg (rat) practically non-toxic

Inhalation:

Not determined.

Dermal:

LD50 Believed to be > 2.00 g/kg (rabbit) practically non-toxic

Irritation Index, Estimation of Irritation (Species)**Skin:**

(Draize) Believed to be > .50 - 3.00 /8.0 (rabbit) slightly irritating

Eyes:

(Draize) Believed to be < 15.00 /110 (rabbit) no appreciable effect

Sensitization:

Not determined.

Other:

Used gasoline motor oils have been shown to cause skin cancer when repeatedly applied to mouse skin without any effort to remove the material between applications. There is no evidence of a causal relationship between skin cancer in humans and exposure to used motor oil.

12. DISPOSAL CONSIDERATIONS

Waste Disposal Methods

This product has been evaluated for RCRA characteristics and does not meet the criteria of a hazardous waste if discarded in its purchased form.

Under RCRA, it is the responsibility of the user of the product to determine at the time of disposal, whether the product meets RCRA criteria for hazardous waste. This is because product uses, transformations, mixtures, processes, etc. may render the resulting materials hazardous.

Remarks

None

13. TRANSPORT INFORMATION

Transportation

DOT:

Proper Shipping Name:

Not regulated

IMDG:

Proper Shipping Name:

Not evaluated

ICAO:

Proper Shipping Name:

Not evaluated

TDG:

Proper Shipping Name:

Not evaluated

14. REGULATORY INFORMATION

Federal Regulations:

SARA Title III:

Section 302/304 Extremely Hazardous Substances

Seq. Chemical Name	CAS Number	Range in %
None		

None

Section 302/304 Extremely Hazardous Substances (CONT)

Seq. TPQ	RQ
None	

None

Section 311 Hazardous Categorization:

Acute	Chronic	Fire	Pressure	Reactive	N/A
					X

Section 313 Toxic Chemical

Chemical Name	CAS Number	Concentration
Dialkydithiophosphoric acid, zinc salt	84605-29-8	0.10-0.99
Zinc dithiophosphate	25103-54-2	0.10-0.99

Dialkydithiophosphoric acid, zinc salt

84605-29-8 0.10-0.99

Zinc dithiophosphate

25103-54-2 0.10-0.99

CERCLA 102(a)/DOT Hazardous Substances: (+ indicates DOT Hazardous Substance)

Seq. Chemical Name	CAS Number	Range in %
None		

None

CERCLA/DOT Hazardous Substances (Sequence Numbers and RQ's):
Seq. RQ

None

TSCA Inventory Status:

This product, or its components, are listed on or are exempt from the Toxic Substance Control Act (TSCA) Chemical Substance Inventory.

Other:

None.

State Regulations:

California Proposition 65:

The following detectable components of this product are substances, or belong to classes of substances, known to the State of California to cause cancer and/or reproductive toxicity.

Chemical Name

CAS Number

None

International Regulations:

WHMIS Classification:

Not controlled

Canada Inventory Status:

Not determined.

EINECS Inventory Status:

Not determined.

Australia Inventory Status:

Not determined.

Japan Inventory Status:

Not determined.

15. ENVIRONMENTAL INFORMATION

Aquatic Toxicity:

Not determined.

Mobility:

Not determined.

Persistence and Biodegradability:

Not determined.

Potential to Bioaccumulate:

Not determined.

Remarks:

None

16. OTHER INFORMATION

None

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Date: 1999-01-04 New X Revised, Supersedes: 1998-12-11

Inquiries regarding MSDS should be directed to:

Equiva Services LLC
 Manager Product Stewardship
 P.O. Box 674414
 Houston, TX 77267-4414

17. PRODUCT LABEL

Label Date: 1999-01-04

READ AND UNDERSTAND MATERIAL SAFETY DATA SHEET BEFORE HANDLING OR DISPOSING OF PRODUCT. THIS LABEL COMPLIES WITH THE REQUIREMENTS OF THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) FOR USE IN THE WORKPLACE. THIS LABEL IS NOT INTENDED TO BE USED WITH PACKAGING INTENDED FOR SALE TO CONSUMERS AND MAY NOT CONFORM WITH THE REQUIREMENTS OF THE CONSUMER PRODUCT SAFETY ACT OR OTHER RELATED REGULATORY REQUIREMENTS.

01814 HAVOLINE MOTOR OIL 10W-40

WARNING STATEMENT

WARNING : USED GASOLINE MOTOR OIL IS A POSSIBLE SKIN CANCER HAZARD
 BASED ON ANIMAL DATA

PRECAUTIONARY MEASURES

- Continuous contact with used gasoline motor oils has caused skin cancer in laboratory animals.
- Avoid contact with used motor oil.
- Avoid prolonged breathing of vapor, mist, or gas.
- Clean oil-soaked clothing before reuse.
- Wash thoroughly after handling.

FIRST AID

Eye Contact:

Flush eyes with plenty of water for several minutes. Get medical attention if eye irritation persists.

Skin Contact:

Wash skin with plenty of soap and water for several minutes. Get medical attention if skin irritation develops or persists.

Ingestion:

If more than several mouthfuls of this material are swallowed, give two glasses of water (16 oz.). Get medical attention.

Inhalation:

If irritation, headache, nausea, or drowsiness occurs, remove to fresh air. Get medical attention if breathing becomes difficult or respiratory irritation persists.

Note to Physician:

None

FIRE

In case of fire, use water spray, dry chemical, foam or carbon dioxide.

Water may cause frothing. Use water spray to cool fire-exposed containers.

Chemical Name	CAS Number	Range in %
# Solvent-dewaxed heavy paraffinic petroleum distillates	64742-65-0	80.00-94.99
Alkenylsuccinimide dispersant	ACC#110544	3.00-9.99

PRODUCT IS NON-HAZARDOUS ACCORDING TO OSHA (1910.1200).

COMPONENT, BY DEFINITION, IS CONSIDERED HAZARDOUS ACCORDING TO OSHA

BECAUSE IT CARRIES THE PERMISSIBLE EXPOSURE LIMIT (PEL) FOR MINERAL OIL MIST.

Pennsylvania Special Hazardous Substance(s)	CAS Number	Range in %
---	------------	------------

None

HMIS

NFPA

Health: 1	Reactivity: 0	Health: 1	Reactivity: 0
Flammability: 1	Special : -	Flammability: 1	Special : -

Transportation

DOT:

Proper Shipping Name:

Not regulated

CAUTION: Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting or welding of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flame or heat. Keep container closed and drum bungs in place.

Name and Address:

Equilon Enterprises LLC

P.O. Box 674414

Houston ,TX 77267-4414

TRANSPORTATION EMERGENCY: (877) 276-7283
 CHEMTREC: (800) 424-9300
 HEALTH EMERGENCY: (877) 276-7283

MSDS Number: N3660 * * * * * Effective Date: 11/07/08 * * * * * Supercedes: 02/15/08

MSDS**Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



24-Hour Emergency Telephone: 908-999-2161
CHEMTREC: 1-800-424-6308

National Response in Canada
CANUTEC: 613-896-6666

Outside U.S. and Canada
Chemtrec: 703-627-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

NITRIC ACID, 50-70%

1. Product Identification

Synonyms: Aqua Fortis; Azotic Acid; Nitric Acid 50%; Nitric Acid 65%; nitric acid 69-70%

CAS No.: 7697-37-2

Molecular Weight: 63.01

Chemical Formula: HNO₃

Product Codes:

J.T. Baker: 5371, 5796, 5801, 5826, 5856, 5876, 5896, 9597, 9598, 9600, 9601, 9602, 9603, 9604, 9606, 9607, 9608, 9610, 9616, 9617, 9670, 9761

Mallinckrodt: 1409, 2704, 2705, 2706, 2707, 2716, 6623, H862, H988, H993, H998, V077, V650

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Nitric Acid	7697-37-2	50 - 70%	Yes
Water	7732-18-5	30 - 50%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 3 - Severe (Oxidizer)

Contact Rating: 4 - Extreme (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

Storage Color Code: White (Corrosive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison.

Inhalation:

Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.

Ingestion:

Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.

Skin Contact:

Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.

Eye Contact:

Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.

Chronic Exposure:

Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.

Explosion:

Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.

Fire Extinguishing Media:

Water spray may be used to keep fire exposed containers cool. Do not get water inside container.

Special Information:

Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):

2 ppm (TWA), 4 ppm (STEL)

-ACGIH Threshold Limit Value (TLV):

2 ppm (TWA); 4 ppm (STEL)

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airtight hood, or full-facepiece self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal. Canister-type respirators using sorbents are ineffective.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Colorless to yellowish liquid.

Odor:

Suffocating, acrid.

Solubility:

Infinitely soluble.

Specific Gravity:

1.41

pH:

1.0 (0.1M solution)

% Volatiles by volume @ 21C (70F):

100 (as water and acid)

Boiling Point:

122C (252F)

Melting Point:

-42C (-44F)

Vapor Density (Air=1):

2-3

Vapor Pressure (mm Hg):

48 @ 20C (68F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Containers may burst when heated.

Hazardous Decomposition Products:

When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate.

Will react with water or steam to produce heat and toxic and corrosive fumes.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.

Conditions to Avoid:

Light and heat.

11. Toxicological Information

Nitric acid: Inhalation rat LC50: 244 ppm (NO₂)/30M; Investigated as a mutagen, reproductive effector. Oral (human) LDLo: 430 mg/kg.

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NITRIC ACID

Hazard Class: 8

UN/NA: UN2031

Packing Group: II

Information reported for product/size: 6.5GL

International (Water, I.M.O.)

Proper Shipping Name: NITRIC ACID

Hazard Class: 8

UN/NA: UN2031

Packing Group: II

Information reported for product/size: 6.5GL

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\----- Ingredient	TSCA	EC	Japan	Australia
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes

Water (7732-18-5) Yes Yes Yes Yes

-----\Chemical Inventory Status - Part 2\-----

Ingredient	--Canada--			
	Korea	DSL	NDSL	Phil.
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	CERCLA	-RCRA-		-TSCA-
		261.33	8(d)	
Nitric Acid (7697-37-2)	1000	No	No	
Water (7732-18-5)	No	No	No	

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
 Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2PE

Poison Schedule: S6

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 0 Other: Oxidizer

Label Hazard Warning:

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

Label Precautions:

Do not get in eyes, on skin, or on clothing.

Do not breathe vapor or mist.

Use only with adequate ventilation.

Wash thoroughly after handling.

Keep from contact with clothing and other combustible materials.

Do not store near combustible materials.

Store in a tightly closed container.

Remove and wash contaminated clothing promptly.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 14.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

E K INDUSTRIES INC -- TRISODIUM PHOSPHATE -- 6810-00-141-6078

===== Product Identification =====

Product ID:TRISODIUM PHOSPHATE
 MSDS Date:05/26/1988
 FSC:6810
 NIIN:00-141-6078
 MSDS Number: BLJRR
 === Responsible Party ===
 Company Name:E K INDUSTRIES INC
 Address:411 KAY AVE
 City:ADDISON
 State:IL
 ZIP:60101
 Country:US
 Info Phone Num:815-723-4000
 Emergency Phone Num:815-723-4000
 Chemtrec Ind/Phone:(800)424-9300
 CAGE:0BYE6
 === Contractor Identification ===
 Company Name:E K INDUSTRIES INC
 Address:411 KAY AVE
 Box:City:ADDISON
 State:IL
 ZIP:60101
 Country:US
 Phone:815-723-4000/CHEMTREC 800-424-9300
 CAGE:0BYE6

===== Composition/Information on Ingredients =====

Ingred Name:SODIUM PHOSPHATE, TRIBASIC (SARA III)
 CAS:7601-54-9
 RTECS #:TC9490000
 Other REC Limits:NONE SPECIFIED
 EPA Rpt Qty:5000 LBS
 DOT Rpt Qty:5000 LBS

===== Hazards Identification =====

LD50 LC50 Mixture:LD50 (ORAL RAT) IS 6500 MG/KG
 Routes of Entry: Inhalation:YES Skin:YES Ingestion:NO
 Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
 Health Hazards Acute and Chronic:ACUTE-EYE, SKIN, MUCOUS MEMBRANE AND
 RESPIRATORY TRACT IRRITATION, NAUSEA. CHRONIC-NONE KNOWN OR
 REPORTED.
 Effects of Overexposure:EYE, SKIN, MUCOUS MEMBRANE AND RESPIRATORY
 TRACT IRRITATION, NAUSEA.
 Medical Cond Aggravated by Exposure:NONE KNOWN.

===== First Aid Measures =====

First Aid:INHALATION:REMOVE TO FRESH AIR. CALL A PHYSICIAN. EYES:FLUSH
 WITH WATER FOR 15 MINUTES, INCLUDING UNDER THE EYELIDS. SKIN:WASH
 THOROUGHLY WITH WATER.INGESTION:IF CONSCIOUS, IMMEDIATELY DRINK
 LARGE AMO UNT OF WATER. SEE A DOCTOR.

===== Fire Fighting Measures =====

Flash Point:NON-FLAMMABLE

Extinguishing Media:MEDIA APPROPRIATE FOR SURROUNDING FIRE.

Fire Fighting Procedures:WEAR A NIOSH/MSHA-APPROVED SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE & FULL PROTECTIVE EQUIPMENTS. COOL FIRE EXPOSED CONTAINERS.

===== Accidental Release Measures =====

Spill Release Procedures:WEAR NIOSH/MSHA APPROVED DUST RESPIRATOR. WEAR GOGGLES, IMPERVIOUS COVERALLS, GLOVES AND BOOTS. SHOVEL OR SWEEP UP AND PLACE IN AN APPROVED DOT CONTAINER AND SEAL.

Neutralizing Agent:NOT APPLICABLE.

===== Handling and Storage =====

Handling and Storage Precautions:STORAGE-STORE IN A COOL, DRY, WELL-VENTILATED AREA AWAY FROM EXCESS HEAT AND FLAMES.

Other Precautions:WARNING STATEMENT: EMPLOY NORMAL INDUSTRIAL SAFEGUARD WHEN HANDLING THIS PRODUCT. MATERIAL SHOULD BE INSPECTED PERIODICALLY. IN LIQUID FORM, TRISODIUM PHOSPHATE IS CORROSIVE TO STEEL. THE PH OF A ONE PER CENT AQUEOUS SOLUTION IS 12.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:USE NIOSH/MSHA APPROVED RESPIRATORY PROTECTION WHEN AIRBORNE DUST IS EXPECTED.

Ventilation:LOCAL EXHAUST

Protective Gloves:IMPERVIOUS

Eye Protection:CHEMICAL SAFETY GOGGLES

Other Protective Equipment:EYE WASH STATION AND EMERGENCY SHOWER

Work Hygienic Practices:DO NOT EAT, DRINK OR SMOKE IN WORK AREAS. WASH THOROUGHLY AFTER HANDLING. DO NOT RAISE DUST. DO NOT BREATHE DUST.

Supplemental Safety and Health

===== Physical/Chemical Properties =====

HCC:B3

Melt/Freeze Pt:=-75.C, 167.F

Vapor Pres:NIL

Spec Gravity:1.6

Evaporation Rate & Reference:NIL

Solubility in Water:21% @ 60F

Appearance and Odor:WHITE CRYSTAL OR POWDER - ODORLESS

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES
NONE KNOWN.

Stability Condition to Avoid:MOISTURE, EXCESS HEAT

Hazardous Decomposition Products:PHOSPHOROUS OXIDES

===== Disposal Considerations =====

Waste Disposal Methods:CONSULT APPROPRIATE FEDERAL, STATE AND LOCAL REGULATORY AGENCIES TO ASCERTAIN PROPER DISPOSAL PROCEDURES.

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GEORGIA GULF CORP -- HYDROCHLORIC ACID -- 6810-00F030501

===== Product Identification =====

Product ID:HYDROCHLORIC ACID
 MSDS Date:02/01/1992
 FSC:6810
 NIIN:00F030501
 MSDS Number: BSLCY
 === Responsible Party ===
 Company Name:GEORGIA GULF CORP
 Address:400 PERIMETER CENTER TER SUITE 595
 Box:105197
 City:ATLANTA
 State:GA
 ZIP:30348
 Country:US
 Info Phone Num:504-685-1200/404-395-4500
 Emergency Phone Num:504-685-2638/404-395-4500
 CAGE:49960

=== Contractor Identification ===

Company Name:GEORGIA GULF CORPORATION
 Address:400 PERIMETER CENTER TER SUITE 595
 Box:105197
 City:ATLANTA
 State:GA
 ZIP:30348
 Country:US
 Phone:504-685-2500/770-395-4500 GOOD#
 CAGE:49960

===== Composition/Information on Ingredients =====

Ingred Name:HYDROCHLORIC ACID, HYDROGEN CHLORIDE, MURIATIC ACID
 HYDROCHLORIDE
 CAS:7647-01-0
 RTECS #:MW4025000
 Fraction by Wt: 30.5%
 Other REC Limits:7 PPM
 OSHA PEL:5 PPM
 ACGIH TLV:C 11 MG/CUM
 EPA Rpt Qty:5000 LBS
 DOT Rpt Qty:5000 LBS

===== Hazards Identification =====

LD50 LC50 Mixture:ORAL LDLO (HUMAN): 81 MG/KG
 Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
 Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
 Health Hazards Acute and Chronic:CORROSIVE TO SKIN, EYES, NOSE MUCOUS
 MEMBRANES, RESPIRATORY & GASTROINTESTINAL TRACT. INHALATION:
 RESPIRATORY TRACT IRRITATION/INFECTION. SEVERE & FATAL
 GASTROINTESTINAL BURNS W/NECROSIS. SEVERE BURNS TO EYES &
 BLINDNESS. CHANGES IN PULMONARY FUNCTION, CHRONIC BRONCHITIS,
 DERMATITIS, TOOTH EROSION, & CONJUNCTIVITIS.
 Explanation of Carcinogenicity:NONE
 Effects of Overexposure:INHALATION: BURNING, CHOKING, COUGHING & SEVERE
 BREATHING DIFFICULTIES. INGESTION: PAIN IN MOUTH, THROAT & STOMACH.
 SKIN: INFLAMMATION & SCARRING, RASH. EYES: BURNS.

Medical Cond Aggravated by Exposure:SKIN, RESPIRATORY OR DIGESTIVE DISEASE

===== First Aid Measures =====

First Aid:INHALATION: REMOVE TO FRESH AIR. IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION. PROVIDE EMERGENCY AIRWAY SUPPORT, IF INDICATED, GIVING 100% HUMIDIFIED SUPPLEMENTAL OXYGEN. SKIN: WASH W/SOAP & PLENTY OF WATER PROMPTLY. REMOVE CLOTHING. EYES: IMMEDIATELY FLUSH W/PLENTY OF ROOM TEMPERATURE WATER FOR AT LEAST 15 MINS, OCCASIONALLY LIFTING LOWER/UPPER LIDS. INGESTION: DON'T INDUCE VOMITING. SEE SUPP.

===== Fire Fighting Measures =====

Extinguishing Media:FLOODING AMOUNTS OF WATER, DRY CHEMICAL, ALCOHOL FOAM

Fire Fighting Procedures:KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA & DENY ENTRY. STAY UPWIND. USE ACID PROOF FULL PROTECTIVE CLOTHING & NIOSH APPROVED SELF-CONTAINED RESPIRATOR.

Unusual Fire/Explosion Hazard:HYDROCHLORIC ACID DOES NOT IGNITE READILY. ADDING WATER TO HYDROCHLORIC ACID PRODUCES VIOLENT EXOTHERMIC REACTION.

===== Accidental Release Measures =====

Spill Release Procedures:RESTRICT ACCESS TO AREA. MOVE UNPROTECTED PERSONNEL UPWIND. WEAR APPROPRIATE CLOTHING & RESPIRATORY EQUIPMENT. DON'T TOUCH SPILL. PREVENT SPILLS FROM ENTERING WATER WAYS & SEWERS. NEUTRALIZE & PLACE IN TO CONTAINERS FOR PROPER DISPOSAL.

Neutralizing Agent:BASE SUCH AS LIME, SODIUM HYDROXIDE

===== Handling and Storage =====

Handling and Storage Precautions:STORE IN COOL, DRY, WELL VENTILATED PLACE. STORE AWAY FROM OXIDIZING AGENTS & ALKALINE MATERIALS.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:USE NIOSH APPROVED RESPIRATOR. RESPIRATORS MUST BE SELECTED BASED ON AIRBORNE LEVELS FOUND IN THE WORKPLACE & MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR.

Ventilation:LOCAL TO MAINTAIN EXPOSURE LEVELS BELOW RECOMMENDED EXPOSURE LIMITS

Protective Gloves:NEOPRENE/POLYVINYL CHLORIDE/BUTYL RUBBER

Eye Protection:SPLASH PROOF CHEMICAL SAFETY GOGGLES

Other Protective Equipment:QUICK DRENCH, IMPERVIOUS CLOTHING, EYE WASH FOUNTAIN

Work Hygienic Practices:REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

Supplemental Safety and Health

FIRST AID: DON'T GIVE SODIUM BICARBONATE IN AN ATTEMPT TO NEUTRALIZE THE ACID. THIS CAN RESULT IN AN EXOTHERMIC REACTION & WORSEN THE BURN. IMMEDIATE DILUTION W/WATER OR MILK MAY BE BENEFICIAL. OBTAIN MEDICAL ATTENTION IN ALL CASES.

===== Physical/Chemical Properties =====

Boiling Pt:B.P. Text:81.5C

Melt/Freeze Pt:M.P/F.P Text:-114.8C

Vapor Pres:25

Vapor Density:1.27

Spec Gravity:1.16

pH:<1

Solubility in Water:COMPLETE

Appearance and Odor:WHITE TO YELLOW, CLEAR LIQUID W/STRONG IRRITATING
ODOR

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

ALKALINE MATERIALS & OXIDIZING AGENTS. HIGHLY CORROSIVE TO MOST METALS.

Hazardous Decomposition Products:REACTS W/METALS TO FORM FLAMMABLE
HYDROGEN GAS

===== Disposal Considerations =====

Waste Disposal Methods:DISPOSE OF IN ACCORDANCE W/LOCAL, STATE, &
FEDERAL REGULATIONS. CORROSIVE, UN1789.

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ATTACHMENT 2 SAFETY MANAGEMENT STANDARDS

URS SAFETY MANAGEMENT STANDARD 002
HAZARD COMMUNICATION (WORKER RIGHT-TO-KNOW)

URS SAFETY MANAGEMENT STANDARD

Hazard Communication (Worker Right-to-Know)

1. Applicability

This procedure applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this Hazard Communication standard (also known as worker right-to-know program) is to provide URS personnel with information and training about safety and health hazards associated with the chemicals they may encounter in the workplace. This procedure describes how chemical safety hazards are communicated to URS personnel and how information is to be provided to employees of other companies working at the location. The requirements include steps to acquire this information, maintain the information, and train personnel in the hazard communication program.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 002 NA – North America

SMS 002 EU – UK and Ireland, Europe, and Middle East

SMS 002 AP2 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Hazard Communication (Worker Right-to-Know)

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

This standard is not applicable to chemical laboratory operations that are covered under 29 Code of Federal Regulations (CFR) 1910.1450 (Occupational Exposure to Chemicals in Laboratories).

2. Purpose and Scope

The purpose of this Hazard Communication standard (also known as worker right-to-know program) is to provide URS personnel with information and training about safety and health hazards associated with the chemicals they may encounter in the workplace. This procedure describes how chemical safety hazards are communicated to URS personnel and how information is to be provided to employees of other companies working at the location. The requirements include steps to acquire this information, maintain the information, and train personnel in the hazard communication program.

3. Implementation

Implementation of this standard is the responsibility of the URS manager who directs activities at the facility, site, or project location. For office locations and large projects, this program may be incorporated into the general site orientation and training program or administered by project management.

4. Requirements

A. Hazardous Material Inventory

Maintain a hazardous material inventory that lists all of the hazardous materials used at each workplace (i.e., office, field location). Use chemical names consistent with the applicable material safety data sheet (MSDS).

B. Site-Specific Written Program

A site-specific written program may be prepared as a stand-alone document or included within a site-specific health and safety plan. The program must cover hazardous materials in all physical forms (liquids, solids, gases, vapors, fumes, and mists); regardless of whether they are "contained."

URS SAFETY MANAGEMENT STANDARD
Hazard Communication (Worker Right-to-Know)

C. Material Safety Data Sheets (MSDSs)

1. The safety representative will obtain an MSDS for each chemical before it is used. MSDSs will generally be received by the person ordering the product. MSDSs for products frequently used should be kept on file because additional copies may not be included in repeat shipments.
2. The safety representative will review each MSDS when it is received to evaluate whether the information is complete and to determine whether existing protective measures are adequate.
3. Each office or project location will assign a responsible person or department to maintain a collection of all applicable and relevant MSDSs in an area that is accessible by all employees at all times. An electronic database is an acceptable method of maintaining the MSDSs.
4. The assigned person or department will replace MSDSs when updated sheets are received and will communicate any significant changes to those who work with the chemical.
5. MSDSs are required for all hazardous materials brought on site by project personnel.
6. General household products to be used for their specific purpose, as well as food, drugs, and cosmetics brought into the workplace for employee consumption, are exempt, as are supplies in the first aid kit, such as isopropyl alcohol and antibacterial wipes.
7. Subcontractors bringing hazardous materials on to a site or project must submit MSDSs to the safety representative. The safety representative may restrict the use of certain hazardous materials on a site or project due to occupational health risk, hazardous physical properties of the material, or potential employee sensitivity to odor or irritating properties of the material.

D. Labels

Unless each container has appropriate labeling, label all chemical containers with the following information:

1. Product name and identity of the hazardous chemical(s).
2. Appropriate hazard warnings.

URS SAFETY MANAGEMENT STANDARD
Hazard Communication (Worker Right-to-Know)

3. Name and address of the chemical manufacturer, importer, or other responsible party.

Labels on incoming containers of hazardous materials will not be removed or defaced.

Labels are also required when a hazardous substance is transferred from a primary container to a secondary container. Labels on secondary containers must indicate the product name or the names of the hazardous substances contained therein, as well as related physical and health hazards and their associated target organs.

E. Hazardous Nonroutine Tasks

Periodically, employees are required to perform hazardous nonroutine tasks. Prior to starting work on such projects, each employee must be provided with information about hazards to which they may be exposed, as follows:

1. Specific chemical hazards.
2. Protective/safety measures that must be taken.
3. Measures that have been taken to lessen the hazards, including ventilation, respirators, presence of another employee, and emergency procedures.

F. Informing Contractors/Subcontractors

Provide other contractors/subcontractors working in the same area with the following information on chemicals used by or provided to URS personnel:

1. Names of hazardous chemicals to which they may be exposed while on the jobsite.
2. Precautions the employees may take to lessen the possibility of exposure by usage of appropriate protective measures, such as ventilation or isolation of the work. In some cases, as an administrative control measure, a task may be delayed to a time when a minimal number of employees are present in the area.
3. Location of MSDSs.

URS SAFETY MANAGEMENT STANDARD
Hazard Communication (Worker Right-to-Know)

G. Training

1. Provide training to all employees who have the potential to be exposed to hazardous materials, on the following schedule:
 - a. At the time of the initial task assignment, or
 - b. Whenever new chemicals are introduced into the workplace.
2. This training will include the following:
 - a. Applicable regulatory requirements.
 - b. Location of the program, inventory, and MSDS.
 - c. Chemicals used and their hazards (chemical, physical, and health).
 - d. How to detect the presence or release of chemicals.
 - e. Safe work practices and methods employees can take to protect themselves from chemical hazards.
 - f. How to read an MSDS.
 - g. Site- or project-specific information on hazard warnings and labels in use at the location, if applicable.
3. Document the training.
4. Where non-English-speaking workers are employed, arrange provisions for training in the appropriate language. International Chemical Safety Cards (see Section 6, ILO) may be used in conjunction with MSDS information to provide non-English-language information. MSDSs are required to be on site, but there is no requirement for the MSDSs to be in a language other than English.

5. Documentation Summary

The following documentation will be maintained in the project file:

- A. Chemical Inventory.
- B. MSDSs.

URS SAFETY MANAGEMENT STANDARD

Hazard Communication (Worker Right-to-Know)

- C. Training records.
- D. Contractor/Subcontractor notifications.

6. Resources

- A. U.S. Occupational Safety and Health Administration (OSHA) General Industry Standards – Hazard Communication – 29 Code of Federal Regulations (CFR) 1910.1200
- B. U.S. OSHA General Industry Standards – Occupational Exposure to Hazardous Chemicals in Laboratories – 29 CFR 1910.1450
- C. U.S. OSHA Construction Standards – Hazard Communication – 29 CFR 1926.59
- D. Mine Safety and Health Administration – Hazard Communication – 30 CFR 47
- E. OSHA Administration Technical Links – Hazard Communication
- F. National Paint and Coatings Association (NPCA) – Hazardous Materials Identification System (HMIS) Version III
- G. National Fire Protection Association (NFPA) Standard 704 – Standard System for the Identification of Hazardous Materials for Emergency Response
- H. International Labour Organization (ILO) – International Chemical Safety Cards (information about 1613 chemicals in 18 languages). <http://www.ilo.org/public/english/protection/safework/cis/products/icsc/index.htm>
- I. Agency for Toxic Substances and Disease Registry (ATSDR) – Tox FAQs and Tox FAQs en Espanol, 2003. <http://www.atsdr.cdc.gov/toxfaq.html>

7. Supplemental Information

- A. Hazard Communication Program – Template
- B. Hazard Communication Employee Training Program



HAZARD COMMUNICATION PROGRAM

Table of Contents

- A. Purpose
- B. Identification of Hazardous Substances
- C. Container Labeling
- D. Material Safety Data Sheets (MSDS)
- E. Employee Training and Information
- F. Non-Routine Task Training
- G. Access to Information by Other Employees

Appendices

- I. Hazard Communication Checklist
- II. Potentially Hazardous Substances
- III. List of Jobsite Hazardous Substances
- IV. Sample Letter to Suppliers to Obtain MSDS

	Health, Safety and Environment HAZARD COMMUNICATION PROGRAM - TEMPLATE	SMS 002 NA Supplemental Information A Issue Date: February 2009
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A. PURPOSE

A-1 To protect the health and safety of our employees, URS Corporation has developed this Hazard Communication program.

1. As an organization we intend to provide information about chemical hazards and other hazardous substances, and the control of hazards via our comprehensive Hazard Communication Program, which includes container labeling, Material Safety Data Sheets (MSDS), and training.
2. This written Hazard Communication Program applies to all operations that MAY expose employees to hazardous substances because of normal work conditions or as the result of a reasonably foreseeable emergency.
3. This written Hazard Communication Program is available, upon request, to employees, their designated representatives and to appropriate representatives of state and/or federal safety and health agencies.

A-2 Scope

This program is part of URS Corporation's comprehensive health and safety program and shall be applied in conjunction with that overall program.

A-3 Responsibilities

1. The Project Manager is responsible for implementing and ensuring compliance with this written hazard communication program. The Hazard Communication checklist found in Appendix I is provided to assist the Project Manager in carrying out this responsibility.
2. The designated Project Safety Representative is responsible for coordinating and administering the program, in developing and assisting in the presentation of training materials and in providing technical assistance to project supervision.
3. Each Project Supervisor shall become familiar with the hazard communication procedures and shall supervise the application of these procedures to tasks for which they are responsible.
4. The Safety Manager is the designated safety professional for the project or office location and is responsible for providing technical assistance to the Project Supervisor or Safety Representative to implement the hazard communication program.

B. IDENTIFICATION OF HAZARDOUS SUBSTANCES

- B-1 "Hazardous Substances" are materials or mixtures that are or have physical or health hazards (See Appendix II for examples of potentially hazardous materials).
- B-2 "Exposure" is any situation arising from work conditions where an employee may ingest, inhale, absorb or otherwise come in contact with a hazardous substance.
- B-3 A master list and the MSDSs of all of the hazardous substances to which employees may be exposed on this jobsite shall be maintained in the project office (see Appendix III).

C. CONTAINER LABELING

- C-1 When hazardous substances are received, the project safety representative shall examine the containers to determine if the labels provide the following information (primary containers):
1. The identity of the hazardous substances they contain;
 2. Appropriate warnings of the physical and health hazards associated with those substances;
 3. The name and address of the chemical manufacturer or distributor.
- C-2 When hazardous substances are transferred into portable or secondary containers, the responsible Project Supervisor shall ensure that these containers are labeled with an extra copy, of the manufacturer's label or with a printed label that includes the information in one (1) and two (2) above.
- EXCEPTION: When an employee transfers a hazardous substance into a portable container for his/her own immediate use, within the work shift the portable container need not be labeled.
- C-3 Each Project Supervisor shall ensure that the labels on containers of hazardous substances are not removed or defaced, unless the containers are immediately relabeled with the information in C-1 above. The labels shall be written legibly in English. However, for non-English speaking employees information may be presented in their native language as well.
- C-4 Containers without complete labels or with defaced labels will not be used on the job.
- C-5 The Project Supervisor or Safety Representative shall review the jobsite labeling procedure at least quarterly and update as required.

D. MATERIAL SAFETY DATA SHEETS (MSDS)

- D-1 Material Safety Data Sheets (MSDSs) are documents that supply information about a particular hazardous substance or mixture. Manufacturers are required to provide MSDSs when the hazardous substances are sold to distributors or purchasers. In most cases, MSDSs are sent to the purchaser of the project (e.g. the procurement department or Project Supervisor) not the safety department.
- D-2 The Safety Manager / Project Safety Representative or Project Supervisor in coordination with the purchasing agent or project business manager, will be responsible for obtaining and maintaining the master sets of MSDSs and other information on all hazardous substances used (see sample letter in Appendix IV).
- D-3 The Project Safety Representative will review MSDSs for completeness. If an MSDS is missing or obviously incomplete, a new MSDS will be requested from the manufacturer. In some cases, MSDSs may be obtained on-line through the manufacturer's web site. The Project Safety Representative should review products for highly toxic or dangerous constituents prior to use and consult with the Safety Manager for any items considered hazardous or toxic.
- D-4 MSDSs are available to all employees in their work area for review during each work shift. If MSDSs are not available or new hazardous substance(s) in use do not have MSDSs, contact the Project Safety Representative immediately. Additional information such as chemical safety cards and the NIOSH Pocket Guide to Chemical Hazards may be used for additional information.
- D-5 Project Supervisors shall be alert to other employees (such as subcontractors) whose work on the jobsite may expose employees to additional hazardous substances. When it appears such exposure will occur, MSDSs for the substances must be obtained.
- D-6 When doing renovation or remodeling work, the Project Supervisor shall coordinate MSDSs of hazardous materials used by contractors. Contractors bringing hazardous materials on to a site or project must submit MSDSs to the Project Supervisor. The Project Supervisor should consult with the Safety Manager if there are any questions regarding hazardous constituents of products.

E. EMPLOYEE TRAINING AND INFORMATION

- E-1 Initial Orientation

Before starting work, each new employee must attend a health and safety orientation. Also, URS Corporation's on-line training program on Hazard Communication may be used as a component of the initial training but employees still require site specific information on hazards of chemicals in use, site specific spill and emergency procedures, and site specific labeling systems as described below.

- E-2 Training shall be provided before employees are assigned duties that may cause exposure to hazardous substances. Training shall also be given when new hazardous substances are introduced into the work area or when an MSDS is changed. In general, this training shall include:
1. Information on which hazardous substances are in the work area.
 2. How to read and interpret information on MSDSs and labels.
 3. Any physical or health hazards associated with the use of a hazardous substance or mixture being used in the work area.
 4. Proper precautions for handling, including specific procedures the company has implemented to protect workers from exposure such as personal protective equipment and work practices.
 5. Proper procedures for reporting of releases or threatened releases of hazardous substances.
 6. Emergency procedures for spills, fires, disposal and first aid.
 7. The methods and observations that can be used to detect the presence of a hazardous substance in the work place (odor, visual appearance or monitoring).
 8. The right of employees, their physicians or their collective bargaining agents to receive information on hazardous substances to which they may be exposed.
 9. The right against discharge or discrimination due to an employee's exercise of the rights afforded by law.
 10. The details of this written Hazard Communication Program; the availability and location of this written Hazard Communication Program and of MSDSs or other information.
- E-3 Hazard communication training must be documented.
- E-4 Additional training shall be provided as needed during the weekly safety and health training ("toolbox") meetings in order to emphasize the safe handling, use and storage of onsite hazardous substances.

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F. NON-ROUTINE TASK TRAINING

F-1 When employees are assigned to a non-routine task that may expose them to a hazardous substance for which they have not been trained, they shall be trained in the manner required by Section E.

F-2 Some examples of non-routine tasks are:

- Confined space entry.
- Tank cleaning.
- Reactor vessels.
- Repair of pipes or tanks containing hazardous substances.

Prior to starting work on such projects, each affected employee will be given information about the hazardous chemicals he or she may encounter during such activity. This information will include specific chemical hazards, protective and safety measures the employee can use, and steps the jobsite is using to reduce the hazards, including ventilation, respirators, presence of another employee and emergency procedures including site specific warnings, evacuation routes, and assembly points.

G. ACCESS TO INFORMATION BY OTHER EMPLOYERS

G-1 It is the responsibility of the Project Safety Representative or Project Supervisor to provide contractors and subcontractors with information about hazardous chemicals their employees may be exposed to on a jobsite and suggested precautions for the contractor's employees to follow to avoid exposure to hazardous conditions.

G-2 Contractors and subcontractors on the job site with potential exposure or risk will be contacted before work is started, to gather and distribute information concerning any chemical hazard that they may bring or be exposed to, in areas that are under URS Corporation control.

APPENDIX I**HAZARD COMMUNICATION CHECKLIST**

1. Have we prepared a list of all the hazardous chemicals in our workplace?
2. Are we prepared to update our hazardous chemical list?
3. Have we obtained or developed a material safety data sheet for each hazardous chemical we use?
4. Have we developed a system to ensure that all incoming hazardous chemicals are checked for proper labels and data sheets?
5. Do we have procedures to ensure proper labeling or warning signs for containers that hold hazardous chemicals?
6. Are our employees aware of the specific information and training requirements of the Hazard Communication Standard?
7. Are our employees familiar with the different types of chemicals and the hazards associated with them?
8. Have our employees been informed of the hazards associated with performing non-routine tasks?
9. Do our employees understand how to detect the presence or release of hazardous chemicals in the workplace?
10. Are employees trained about proper work practices and personal protective equipment in relation to the hazardous chemicals in their work area?
11. Does our training program provide information on appropriate first aid, emergency procedures and the likely symptoms of overexposure?
12. Does our training program include an explanation of labels and warnings that are used in each work area?
13. Does the training describe where to obtain data sheets and how employees may use them?
14. Have we worked out a system to ensure that new employees are trained before beginning work?
15. Have we developed a system to identify new hazardous chemicals before they are introduced into a work area?
16. Do we have a system for informing employees when we learn of new hazards associated with a chemical we use?
17. Have the employees been advised of the consequences for failure to follow established procedures?
18. Do we have a system to ensure Subcontractors are sharing information with one another, concerning the hazardous chemicals they have brought to the site?

APPENDIX II**EXAMPLES OF POTENTIALLY HAZARDOUS MATERIALS THAT MAY BE
FOUND ON URS CORPORATION
CONSTRUCTION AND GENERAL INDUSTRY PROJECTS**

Acetone	Kerosene
Acetylene gas	Lead
Adhesives	Lime (calcium oxide)
Aluminum etching agent	Limestone
Ammonia	Lubricating oils
Anti-freeze	Lye (sodium hydroxide, potassium hydroxide)
Arsenic compounds	Magnesium
Asbestos	Metals (aluminum, nickel, copper, zinc, cadmium, iron, etc.)
Asphalt (Petroleum) fumes	Methanol (methyl alcohol)
Battery Fluids	Methyl ethyl ketone (2-butanone)
Benzene (and derivatives)	Motor oil additives
Bleaching agents	Muriatic acid (hydrochloric acid)
Carbon black	Naptha (coal tar)
Carbon monoxide (in cylinders)	Nitroglycerin
Caulking, sealant agents	Oxalic acid
Caustic soda (sodium hydroxide)	Ozone
Chromate salts	Paint remover
Chromium	Paint stripper
Cleaners	Paints/lacquers
Cleaning agents	Particle board
Coal tar pitch	Pentachlorophenol
Coal tar epoxy	Pesticides
Coatings	Photographic developers and fixers
Cobalt	Photogravure ink (copy machine)
Concrete curing compounds	Plastics
Creosol	Polishes for metal floors
Cutting oil (oil mist)	Propanol
De-emulsifier for oil	Putty Resins, epoxy/synthetics
Diesel gas, diesel oil	Sealers
Drywall	Shellac
Dusts (brick, cement block)	Solder, flux (zinc chloride, fluorides, etc.)
Enamel	Solder, soft (lead, tin)
Etching agents	Solvents
Ethyl alcohol	Sulfuric acid
Fiberglass, mineral wool	Thinner, paint/lacquer
Foam insulation	Tin
Freon 20, R20 (and others)	Transite
Gasoline (petrol, ethyl)	Turpentine, gum spirit, oil of turpentine
Glues	Varnishes
Graphite	Waterproofing agents
Greases	Waxes
Helium (in cylinders)	Welding Rods
Hydraulic brake fluid	Wood alcohol (methanol)
Hydrochloric acid	Wood preservative
Hydrogen (in cylinders)	Xylene
Inks	Zinc
Insulations	
Iron	



APPENDIX III

LIST OF PROJECT SPECIFIC HAZARDOUS SUBSTANCES

On the following page(s) is a current list of the specific hazardous substances and the manufacturer's name of the product known to be present at this jobsite.

This list uses the chemical name referenced on the MSDS. Specific information on each substance may be found on the MSDSs located in the project office.

	Health, Safety and Environment HAZARD COMMUNICATION PROGRAM - TEMPLATE	SMS 002 NA Supplemental Information A Issue Date: February 2009
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APPENDIX IV

(PROJECT LETTERHEAD)

Date

Product Manufacturer's Name
Product Manufacturer's Address

Subject: Material Safety Data Sheet Requisition

Dear Manufacturer:

Please provide the following material safety data sheet(s):

Thank you for your support and assistance in this matter.

Sincerely,

Requestor's Name
Requestor's Address



This document presents information that can be used for hazard communication training.

This information has been developed based on groups (types) of hazardous substance(s) used and the common hazards associated with them.

For specific hazard information on each brand of material the MATERIAL SAFETY DATA SHEETS (MSDS) must be reviewed.

OVERVIEW OF THE HAZARD COMMUNICATION REGULATION

The Hazard Communication Regulation is intended to ensure that both employers and employees are aware of the dangers associated with hazardous substances in their workplaces. The following information is a review of the specific requirements of a hazard communication program, including container labeling, MSDS and training.

WRITTEN HAZARD COMMUNICATION PROGRAM

We have a written program that outlines how we will provide information and control your exposure to hazardous substances. This plan is available for your review during our training and at the project office for review during your work shift.

HAZARDOUS SUBSTANCES USED IN OUR WORKPLACE

On this job, we use a variety of products. Many of these products contain one or more hazardous substances. Let's review the HAZARDOUS SUBSTANCE INVENTORY LIST in your work area.

READING LABELS AND MSDS

LABELS: A product label on both the original and secondary containers should be reviewed prior to working with the material. Each label will have three important pieces of information you should be familiar with:

1. The identity of the Hazardous Substance.
2. Hazard Warnings.
3. Target Organs.

The label on the original container will also state the name and address of the manufacturer.

The label should act as a visual reminder of the information we have presented in this training session and of the information found in more detail on the MSDS. It is essential for your safety that you read the Hazard Warning and only use the Hazardous Substance(s) within the guidelines prescribed on the label. Questions concerning the label should be directed to your supervisor/foreman.



MATERIAL SAFETY DATA SHEETS (MSDS): The MSDS is the primary means we will use to convey the necessary information about the hazards of the substances we use. The manufacturers and importers are responsible for providing us with the MSDS. The manufacturer must provide us with adequate information to use the substance safely.

PHYSICAL AND HEALTH HAZARDS OF THE HAZARDOUS SUBSTANCE(S) USED

Employees are to be trained specifically about the hazards of the substances in their work areas. This may be done by specific Hazardous Substance(s) or by categories of hazards, but in any case, the employee is to be aware that information is available on the specific hazards of individual Hazardous Substances through MSDSs.

Employees may be trained using the common type or generic chemical group or by reviewing the specific MSDS as long as the training includes the following information:

1. Measures to protect employee from the hazards (i.e., work practices, engineering controls and the use of personal protective equipment).
2. The physical and health hazards of the Hazardous Substance(s).
3. Detection of release of the substance; emergency and first aid procedures.

EXAMPLE OF GENERAL HAZARDOUS SUBSTANCE GROUP TYPE TRAINING

Product/Chemical Group: Hydrocarbon Solvents.

Health Effects – Effect of Overexposure: High concentrations of solvent vapors are irritating to the eyes, nose, throat and lungs, may cause headaches and dizziness and sleepiness. Even higher levels may cause unconsciousness and may have other brain and central nervous system effects.

Prolonged or repeated liquid contact with the skin may cause defatting of the skin, leading to dryness, possible irritation and dermatitis (reddening and inflamed skin). Some solvents are absorbed right through the skin and the health effects are just as if the solvent vapor was inhaled.

Each organic solvent's possible long term health effects will vary; however, prolonged solvent exposures are related to possible liver, kidney and central nervous system and brain damage (NOTE: THE VARIETY OF SOLVENT TYPES SHOULD BE REVIEWED).

Physical Hazards: Hydrocarbon solvents are flammable and combustible and represent fire and explosion hazards if the materials are not handled correctly. Hydrocarbon solvents are generally stable and will not react violently with water. Review the MSDS section on Fire and Explosion Hazard information. Most solvents will vaporize rapidly and become airborne.



Detection of Release: Odor – Solvent vapor may produce an odor or cause your nose or eyes to be irritated, but do not depend on odor to warn you. Odor thresholds (lowest level that can be detected) for most solvents vary widely from person to person. Also, some solvents produce “olfactory fatigue” - the rapid loss of ability to smell the odor. However, odor can warn you of exposure to some solvents (confirm this with industrial hygiene monitoring).

Appearance – Most solvent vapors are invisible so do not rely on appearance to warn you for exposure.

Instrumentation – A variety of industrial hygiene instruments can be used to measure employee exposure. This equipment should be operated only by qualified personnel.

Emergency Response – For Flammable Solvents: If the material is spilled or leaks, shut-off and eliminate all sources of ignition. Recover the free product by adding absorbents to the spill. Minimize breathing vapors and skin contact. Ventilate the area by opening windows and doors. Follow the established hazardous waste disposal procedures.

Exposure Control: Protective Equipment, Engineering Controls and Proper Work Practices:

- **Protective Equipment –** Use chemical-resistant gloves, aprons or clothing if prolonged or repeated skin contact may occur. Use splash goggles and face shield when eye or face contact may occur. Use approved respiratory protective equipment as established by our Safety Program (NOTE: if needed, a review of the respiratory protective program may be appropriate).
- **Engineering Controls/Work Practices –** Ventilation is to be used when it is necessary to prevent build-up of vapors from both a health or fire and explosion concern. Keep containers closed when not in use. Do not handle or store near heat or sources of ignition or strong oxidants. No smoking, burning or welding is permitted near the flammable vapors. Use the bonding and/or grounding system when transferring materials. Most solvents will vaporize rapidly and become airborne.

APPROPRIATE EMERGENCY AND FIRST AID PROCEDURES

Eye contact – If splashed into the eyes, flush with water for 15 minutes or until irritation subsides. If irritation continues, call a physician.

Skin contact – In case of skin contact, remove any contaminated clothing and wash skin thoroughly with water and soap.

Inhalation – If overcome by vapors, remove from exposure and call a physician immediately. If breathing is irregular or has stopped, start resuscitation.

Ingestion – If ingested, DO NOT induce vomiting, call emergency medical aid immediately.

HAZARDOUS PROPERTIES OF CHEMICALS TRAINING

Chemicals are a part of every aspect of our lives. A minute does not go by that we do not use something that contains chemicals, or chemicals were used in the manufacturing process. The chemicals you use in the work place only present potential health and physical hazards when they are mishandled, improperly used, incompatible mixtures combined, improperly stored or labeled.

Depending upon the chemical and the level of exposure, health hazards can vary from minor skin irritations to serious chemical burns, nerve damage, different forms of cancer and even death. Physical damage may include fires, explosions, property and environmental damage.

Hazard awareness is recognizing and understanding the potential injuries and illnesses or physical damage the chemicals can cause. The communication of this information is essential for your being aware of, understanding and respecting the potential hazards. This knowledge is important for the decisions you make concerning how you use the chemicals and the safe work practices you follow.

Remedial action response personnel may be exposed to a number of substances that are hazardous because of their properties. These properties can be summarized into three broad categories:

- a. physical/chemical
- b. biological
- c. radiological

It should be noted that many hazards may be present at any one time. It is important to understand the fundamentals of each of these properties and their relationships so that effective safety practices may be employed to reduce the risk to the public and remedial response personnel. Some hazards that may be encountered at this work site are toxic substances, flammable materials, explosive materials, corrosive materials, biological agents, excessive noise, heat or cold stress, oxygen deficient work areas, and radioactive materials.

PHYSICAL/CHEMICAL PROPERTIES

Physical hazards. Chemical compounds possess inherent properties, which determine the type and degree of the hazard they represent. Evaluating risks of an incident depends on understanding these properties and their relationship to the environment.

- a. Solubility. The ability of a solid, liquid, gas or vapor to dissolve in a solvent is solubility. An insoluble substance can be physically mixed or blended in a

solvent for a short time but is unchanged when it finally separates. The solubility of a material is important when determining its reactivity, dispersion, mitigation and treatment.

- b. Density. The density of a substance is its mass per unit volume, commonly expressed in g/cc.
- c. Specific gravity. Specific gravity is the ratio of the density of a substance to the density of water. If the specific gravity of a substance is greater than 1 it will sink in water. The substance will float in water if its specific gravity is less than 1.
- d. Vapor density. The vapor density is the density of a gas compared to the density of air. If the density of a gas is greater than that of air then the gas will tend to pocket and settle into the lowest points. If the vapor density is close to air or lower than air then the gas will disperse. If the vapor or gas displaces oxygen in the low spots then it can become an asphyxiant problem. If the gas or vapor is an explosive, when it pockets it will become an explosive hazard.
- e. Flashpoint. If the ambient temperature in relation to the material of concern is right, then it may give off enough vapor at its surface to allow ignition by an open flame or spark. The minimum temperature at which a substance produces sufficient flammable vapors to ignite is its flashpoint. If the vapor does ignite, combustion can continue as long as the temperature remains at or above the flashpoint. The relative flammability of a substance is based on its flashpoint. An accepted relation between the two is:

Highly flammable:	Flashpoint <100°F
Moderately flammable:	Flashpoint >100°F & <200°F
Relatively inflammable:	Flashpoint >200°F
- f. Chemical Hazards. Hazardous conditions that may exist because of the chemical nature of substances may be summarized as fire hazards, explosive hazards, corrosive hazards, and chemical reactivity.

Fire Hazards

- a. Combustibility: Combustibility is the ability of a material to act as a fuel, that is, to burn. Materials that can be readily ignited and sustain a fire are considered to be combustible, while those that cannot are called noncombustible. Three elements are required for combustion to occur: fuel, oxygen, and heat. The concentration of the fuel and the oxygen must be high enough to allow ignition and maintain the burning process. Combustion is a chemical reaction that requires heat to proceed. Heat is supplied by the

ignition source and is maintained by the combustion, or it must be supplied from an external source. The relationship of these three fire components can form a triangle. If one leg of the triangle is removed, then the fire can be extinguished. For example, water applied to a fire removes the heat, thereby extinguishing the fire. When a material generates enough heat by itself to self-ignite and combust, spontaneous combustion occurs, either as a fire or explosion (e.g., diesel greater than 140 degrees Fahrenheit is combustible.)

- b. **Flammability:** Flammability is the ability of a material (liquid or gas) to generate a sufficient concentration of combustible vapors under normal conditions to be ignited and produce a flame. It is necessary to have a proper fuel-to-oxygen (oxygen) ratio (% fuel in air) to allow combustion. A flammable material is considered highly combustible if it can burn at ambient temperatures. But a combustible material is not necessarily flammable because it may not be easily ignited or the ignition maintained. Pyrophoric materials will ignite at room temperature in the presence of a gas or vapor or when a slight friction or shock is applied.

The substances listed below are easily ignited (pyrophorics), require little oxygen to support combustion, have low flammability limits and explosive limits and a wide flammable and explosive range.

Flammable liquids

Aldehydes
Ketones
Amines
Ethers
Aliphatic Hydrocarbons
Aromatic Hydrocarbons
Alcohols
Nitroaliphatics

Flammable solids

Phosphorus
Magnesium Dust
Zirconium Dust
Titanium Dust
Aluminum Dust
Zinc Dust

Water Reactive Flammable Solids

Potassium
Sodium
Lithium

Pyrophoric Liquids

Organometallic compounds
Dimethyl Zinc
Tributyl Aluminum

Some of the hazards related to fires and explosions can cause physical destruction due to shock waves, heat, and flying objects. Secondary fires can be created as well as other flammable conditions. Toxic or corrosive compounds may also be released to the surrounding environment as well.

Explosives

An explosive is a substance, which undergoes a very rapid chemical transformation producing large amounts of gases and heat. The gases produced, for example, nitrogen, oxygen, carbon monoxide, carbon dioxide, and steam, due to the heat produced, rapidly expand to velocities exceeding the speed of sound. This creates both a shockwave (high pressure front) and noise. The main categories of explosives are listed below.

High or detonating – produces a shock wave followed by combustion.

Primary high explosive – detonation occurs in a short time. Examples: lead azide, mercury fulminate, and lead styphnate.

Secondary high explosive – needs a booster to detonate. Examples: Tetryl, cyclonite, dynamite and TNT

Low or deflagrating – Explosive rate very fast. Combustion followed by a shock wave. Examples: smokeless powder, magnesium, and molotov cocktail.

Corrosive Hazards

Corrosion is a process of material degradation. Upon contact, a corrosive material may destroy body tissues, metals, plastics, and other materials. Corrosivity is the ability of material to increase the hydrogen ion concentration of a material or to transfer electron pairs of or from itself or another material. A corrosive material is a reactive compound or element that produces a destructive chemical change in the material it is acting on. Common corrosives are:

Halogens

Bromine
Chlorine
Fluorine
Iodine

Acids

Acetic acid
Hydrochloric acid
Hydrofluoric acid
Nitric acid
Sulfuric acid

Bases (Caustics)

Potassium Hydroxide
Sodium Hydroxide

Skin irritation and burns are typical results when the body contacts an acidic or basic corrosive material.

The measure of an acid or a base is the pH scale. The pH scale ranges from 0 to 14 with a pH <7 being acidic and a pH >7 being basic. The lower the pH of the acid the more acidic is the material, and the higher the pH of the base the more basic the material. A pH of 7 is considered neutral.

	<p>Health, Safety and Environment HAZARD COMMUNICATION EMPLOYEE TRAINING PROGRAM</p>	<p>SMS 002 NA Supplemental Information B Issue Date: February 2009</p>
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Chemical Reactivity

- a. **Reactivity hazards.** A reactive material is one that undergoes a chemical reaction under specified conditions. Generally, the term “reactive hazard” is used to refer to a substance that undergoes a violent or abnormal reaction in the presence of water or under normal ambient atmospheric conditions. Among this type of hazard are the pyrophoric liquids that will ignite in air at or below normal room temperature in the absence of added heat, shock, or friction, and the water-reactive flammable solids that will spontaneously combust upon contact with water.

The most common reactive mixture in construction is found in gas welding or brazing. Acetylene gas mixes with oxygen to provide an extremely powerful reaction in the form of a very intense flame.

- b. **Compatibility.** If two or more hazardous materials remain in contact indefinitely without reaction, they are compatible. Incompatibility, however, does not necessarily indicate a hazard. For example, acids and bases (both corrosive) react to form salts and water, which may not be corrosive.

The compatibility of materials must be determined before the materials are used or stored. Some examples of incompatibilities are sulfuric acid and plastics (toxic gas or vapor is produced), acids and metal (flammable gas or vapor is produced), chlorine and ammonia (chlorine gas is created, toxic gas). There are many other incompatibilities that may be found. Check to make sure that the materials used for a project are compatible.

All of the hazards listed above will be found on the material safety data sheet (MSDS). The MSDS is a short technical report that provides you with the known hazards of a specific material. The MSDS explains how to properly use the material, handle any problems related to the material and how to store the material. Know what the MSDS says for the materials that you work with.

All materials should have a label on them. This is the first and easiest place to look to see if a material is hazardous. Labels should tell you any precautions that must be taken when handling the material. Read the label on the materials that you use and abide with the cautions and warnings. If a material is not properly labeled, notify your supervisor so that the problem is corrected.

BIOLOGICAL HAZARDS

Biological agents are living organisms that can cause sickness or death to exposed individuals. Biological hazards can cause infection or disease to persons who are exposed.

	<p style="text-align: center;">Health, Safety and Environment HAZARD COMMUNICATION EMPLOYEE TRAINING PROGRAM</p>	<p style="text-align: right;">SMS 002 NA Supplemental Information B Issue Date: February 2009</p>
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Biological hazards may involve plants or animals including microorganisms. Biological hazards, such as disease causing agents, may be present at a hazardous waste site or involved in a spill. Like chemical hazards, they can be dispersed throughout the environment via wind and water.

Many biological agents require a carrier to inoculate a person. For instance, rabid rodents at a landfill may be a biological hazard. Deer carry ticks that may have Rocky Mountain Spotted fever; prairie dogs will not.

The same personnel protective requirements for a response to a chemical hazard apply to biological hazards. Body coverings and respiratory protective equipment might have to be utilized. Especially important is the need to maintain personnel cleanliness. Before eating, drinking or smoking residual contamination should be washed off.

BIOHAZARDS

Biohazard training will be provided to employees as per the blood borne pathogen program on biohazardous materials.

HAZARDOUS MATERIAL PROTECTION

The routes of exposure for hazardous materials include the following:

- Inhalation – Breathing contaminated air (e.g. welding fumes.)
- Skin Absorption – Contact with harmful liquids, gases, solids or contaminated clothing, equipment, medications, cosmetics, etc. A good example is solvents. Materials can also enter through an open wound.
- Ingestion – Eating or drinking contaminated foods, water or medications. (Remember food and cigarettes can become contaminated by your unwashed hands, gloves, equipment. Good hygiene practices are very important.)
- Injection – A contaminated material can be injected into some part of the body.

Protection from potentially hazardous materials include the following:

- Use good personal hygiene. This is the simplest control measure to chemical hazards.
- Know what protective equipment is required for the specific job you are doing. Ask your supervisor what risks you might encounter and what hazardous substances you are working with.
- Know what potential explosive and or flammable conditions may exist with the job you are doing.

- Have all confined spaces checked for explosives, hydrogen sulfide, carbon monoxide, and oxygen deficiency. Know what hazards are involved with confined spaces.
- Know where emergency equipment is located and how to use it. For example know where the nearest fire extinguisher is from your work area.
- Know the standard operating procedures for rescue and emergency situations.
- Know the proper method for decontamination when working with hazardous materials.
- Use the buddy system when at all possible. Keep communication lines open when working with hazardous materials.
- Stay out of contaminated areas if you are not properly trained, equipped, or authorized to enter. Do not take chances with life-threatening materials or situations.

PERSONAL PROTECTIVE EQUIPMENT

Different types of protective equipment will be required depending on the substances to be handled, the existing conditions, and the particular situation. Personal protective equipment includes a variety of special suits, hard hats, goggles, face shields, aprons, boots, gloves, and respirators. Each is designed to protect you from certain hazards. It is important for you to know the advantages and disadvantages of all the equipment you may use or need. Use all equipment as instructed and follow all written procedures for the specific equipment.

STANDARD OPERATING PROCEDURES FOR EMERGENCY SITUATIONS

Standard operating procedures exist for any unexpected event such as an accident, fire, explosion, etc.

If you know or suspect that you have been contaminated with a hazardous substance, **TELL YOUR SUPERVISOR**. You should know the general symptoms of over-exposure to toxic substances. These include:

- Irritation of skin, eyes, nose, throat, or respiratory tract
- Changes in complexion or skin discoloration
- Headache
- Difficulty in breathing
- Nausea
- Dizziness or light-headedness
- Excessive salivation (drooling)
- Lack of coordination
- Blurred vision
- Cramps and/or diarrhea

	<p style="text-align: center;">Health, Safety and Environment HAZARD COMMUNICATION EMPLOYEE TRAINING PROGRAM</p>	<p style="text-align: right;">SMS 002 NA Supplemental Information B Issue Date: February 2009</p>
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- Changes in behavior patterns

You should know the location of emergency eyewash and shower facilities.

Before you enter, and periodically while you are working in confined spaces such as tanks, crawl spaces, ditches, etc., the air in the space should be tested by a qualified individual for oxygen content, explosive levels, gases, and contamination of hazardous materials.

Understand the site emergency response procedures and know the locations of response equipment before the need arises. If you must rescue someone, use proper precautions and protective equipment. **DO NOT BECOME A CASUALTY YOURSELF.** Move the affected person from the hazardous exposure if possible. Get help and follow emergency rescue procedures.

For spills and leaks of hazardous materials limit the leak or spill as quickly as possible. Small spills should be cleaned up immediately. If a valve must be closed to prevent a spill from continuing then do so. If the spill is large, or your skin, eyes or clothing are contaminated, leave the work area immediately. Wash eyes, skin, and clothes off with lots of water to remove the material. Get to fresh air. Notify your foreman or supervisor as soon as it is safe for you to do so. Unless you have special training and the proper protective equipment, do not try to clean up large spills yourself.

If a corrosive material is splashed in your eyes or on your skin and clothes, deal with it immediately. Wash the affected area with plenty of water (at least 15 minutes with a continuous stream). Remove any contaminated clothing. Get to fresh air if you feel burning in the nose, throat or lungs. Do not vomit if you have swallowed a corrosive material. Drink large quantities of water to dilute the material, and seek immediate medical attention.

EXAMPLES OF HAZARDOUS MATERIALS POSSIBLY FOUND ON SITE

SOLVENTS

Solvents are among the most common toxic materials in the workplace. Many processes, mixing and cleaning, use or give off solvent vapors. They are also used as thinners in paints and adhesives. Solvents vary in their toxicity from practically non-toxic materials such as the alcohols, ketones, halogenated solvents, to the very toxic such as dimethyl acetamide, methyl acrylate and other materials. Some solvents are also flammable or reactive.

Solvents can cause irritations to the eyes and skin when in high concentrations. Most will dissolve the protective layer of oils on the skin and leave it looking white in the small cracks. They should never be used to clean the skin; if there is a problem



with contamination, some form of glove or barrier cream should be used to protect the skin. The early signs of overexposure often include headaches, dizziness, nausea and other related symptoms.

METALS AND SOLID PARTICULATES

Examples: Babbitt metal, cadmium, galvanized metal, lead, manganese, nickel, zinc

Metals and other particulate solids can be toxic and are usually given off when welding or grinding. Some, like gypsum dust are only nuisance dusts, while others, like zinc fume from welding cause flu-like symptoms. Others, like asbestos have been linked to cancer and other chronic diseases. Dusts can irritate the skin and be ingested with food, drinks or smoking materials if they aren't washed off the hands and removed from clothing. They may also be carried home to family members and cause problems there if they are not washed off before leaving the work area.

When the welding, brazing, grinding or cutting of metal is performed, care should be taken to avoid breathing the fumes or dusts. Local exhaust ventilation should be used to reduce your exposure. If fumes and dust cannot be controlled with exhaust ventilation, appropriate approved respirators should be used. Approved safety goggles and gloves should be worn when working with metals. Gloves may be necessary to prevent skin sensitization and dermatitis.

ACIDS

Examples of acids found on URS Corporation sites are sulfuric acid (used in water treatment plants and found in batteries), hydrochloric acid, and nitric acid. Acids are considered corrosives and cause material degradation. Acids destroy tissues, metals and other materials. Acids can cause skin irritations in the form of rashes or other types of dermatitis, and more severe problems such as skin or eye burns. When working with acids proper eye and face protection should be worn as well as hand protection.

LUBRICANTS, COOLANTS AND MACHINE OILS

Lubricants, coolants and machine oils are common in construction sites. There are three types: petroleum based (straight oils), water based, and synthetic fluids that contain no oils. Many cutting oils contain additives to inhibit corrosion, prevent bacterial growth and permit high temperature operation. The fumes and mist from cutting operations can be irritating to the eyes and lungs. Skin exposure can result in acne-like conditions and can cause other problems. Avoid breathing mist and fumes and use gloves and aprons to minimize contact with materials.



GASES

Examples: Acetylene, ammonia, carbon dioxide, carbon monoxide, freon, oxygen, hydrogen, liquefied petroleum gas, propane

Gases present a range of problems. Some, like nitrogen, are simple asphyxiates. They prevent the body from getting enough oxygen by displacing it from the air stream. Some are chemically hazardous, like carbon monoxide, or nitrous oxide, which cause poisoning of the body systems. Some are very toxic, like arsine and phosphine. Some are very reactive and should be dealt with in very careful manners. Other gases, like hydrogen, oxygen and acetylene are explosives and must be treated with great care. Chains and stands should secure all compressed gas cylinders at all times, and only the proper fittings should be used. Liquefied and petroleum gases are extremely flammable and considered simple asphyxiates.

PLASTICS, EPOXIES AND POLYMERS

Plastics, epoxies and polymers are a growing group of industrial chemicals. Materials such as polystyrene, polypropylene, acrylates, vinyl, and polyurethane are but a few. Although most of these materials are not toxic in their final form, where they are being molded, extruded, laid up, there can be significant hazards. When burned, these materials can be very hazardous.

CLEANERS

Cleaners contain acid, alkalis, aromatics, surfactants, petroleum products, ammonia and hypochlorite. Because of these ingredients these materials are considered to be irritants, and can be harmful to you if swallowed or inhaled. Many may cause eye, nose, throat, and skin and lung irritation. Some cleaners are flammable and burn easily. Others may be caustic or corrosive and cause severe skin burns. Because many cleaners used in the job area are consumer products commonly found in our homes, you may underestimate the hazard they pose. Protect yourself from these hazards by reading the labels and following the recommended precautions. Wear gloves and eye protection. Avoid inhaling the vapors and mists. Wash your hands and face thoroughly before eating, drinking or smoking.

Specific emergency procedures for each chemical will be detailed on that cleaner's material safety data sheet. In general, if a cleaning chemical gets into your eyes, flush the eyes with clean running water for at least 15 minutes, then seek medical attention. If the chemical gets on your skin, wash the area of contact and seek medical attention.

Do not mix two cleaning chemicals together, unless specifically told to do so by your supervisor. For example, the dangerous gas, chlorine, will be created if you mix bleach and ammonia or bleach and drain cleaner together.

Examples: Abrasive cleaners, bleach, drain cleaner, general purpose cleaning spray, germicide, and glass cleaner, metal cleaner, rug and upholstery cleaners, stain remover.

FUELS

Examples: Diesel oil, gasoline, propane, kerosene

The primary hazard posed by fuels is obviously, fire. Fuels are either flammable or combustible. Whether flammable (a material which is easily ignited and burns with extreme rapidity) or combustible (a material capable of fueling a fire), they should be handled with care.

Proper storage and transport of fuels in approved, self-closing, safety containers is extremely important and should be strictly adhered to at all times. When filling portable containers with flammable materials they should be properly grounded and bonded to the container to prevent ignition from static electricity.

Store gasoline in containers marked "gasoline". Store kerosene in containers marked "kerosene". Never use kerosene containers for the transport or storage of gasoline.

Excessive skin contact with fuels can result in dermatitis. Some petroleum products have been shown to cause skin tumors. Inhalation of fuel vapors over a long period of time can cause central nervous system depression, and may aggravate any existing respiratory problems that may exist. Ingestion of fuels can cause poisoning. Do not induce vomiting. If fuels get in your eyes, rinse with clean water for at least 15 minutes and seek medical attention.

LABELING

Proper labeling of all chemical containers is another excellent control measure to chemical hazards. Container labels give the name of the chemical in the container, the name/address of the manufacturer and a hazard warning statement and/or graphic hazard statement that warns you of possible dangers. Read the label on all materials with which you work.

Examples of hazard warning statements:

- Danger, will cause death if swallowed
- Warning, causes eye irritation, harmful if swallowed
- Caution, avoid contact with skin and avoid breathing of vapors

Labels and their warnings should be taken seriously since they provide you with the first clue to the hazards posed to your health and safety. They also give information on personal protective equipment required, emergency response and first-aid steps

	Health, Safety and Environment HAZARD COMMUNICATION EMPLOYEE TRAINING PROGRAM	SMS 002 NA Supplemental Information B Issue Date: February 2009
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in case of an exposure, proper procedures in case of a spill and emergency phone numbers.

	Health, Safety and Environment HAZARD COMMUNICATION EMPLOYEE TRAINING PROGRAM	SMS 002 NA Supplemental Information B Issue Date: February 2009
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MSDS

Material safety data sheets, if read and followed, are a powerful means of controlling chemical exposures. Chemical manufacturers are required to provide MSDSs for the chemicals they produce or import. The purpose of the MSDS is to communicate information on the recommended safe use and handling procedures for that chemical.

MSDS may look different, yet the Occupational Safety and Health Administration (OSHA) requires that all MSDS must provide certain categories of information about the chemical substance or mixture:

- Material identification (physical and chemical)
- Hazardous ingredients
- Emergency and first aid procedures
- Recommended control measures
- Physical and health hazards
- Safe handling procedures
- Date of preparation/revision
- Manufacturer's name, address, and phone number
- Primary routes of entry
- National Toxicological Program (NTP) or Annual Report on Carcinogens from the International Agency for Research on Cancer

**MATERIAL SAFETY DATA SHEETS
THEY ANSWER YOUR QUESTIONS ABOUT THE CHEMICALS YOU WORK WITH**

What product/chemical is this MSDS for?



HFPA HAZARD
HEALTH - 1
FLAMMABILITY - 2
REACTIVITY - 0

Material Safety Data Sheet
May be used to comply with OSHA's Hazard Communication Standard 29 CFR 1910.1200. Standards must be consulted for specific requirements.
U.S. Department of Labor
Occupational Safety and Health Administration
Hazard Communication
Form Approved
OSHA No. 1218-0012 **T-525**

IDENTIFY this label on label and List
WAX & TAR REMOVER LIQUID, T-525
Note: Blank spaces are not provided. If any item is not applicable or not appropriate, the space must be marked to indicate this.

Section I
Manufacturer's Name
TURTLE WAX, INC.
Address
**5656 WEST 73RD STREET
CHICAGO, IL 60638**
Emergency Response Number
NA
Telephone Number for Emergency
(708) 543-5800
Date Prepared
7/1/90
Signature of Preparer (initials)

How much of this material can I be safely exposed to?

What Chemicals are contained in this material?

Section II - Hazardous Ingredients/Identify Information

Hazardous Component (Specify Chemical Name(s), Common Name(s))	OSHA PEL	OSHA TLV	Other Limits (Specify)	% (Approx)
PETROLEUM DISTILLATES (CAS #64475-85-0)	5 MG/M ³	5 MG/M ³	NA	15.0%
PETROLEUM DISTILLATES (CAS #92045-37-9)	5 MG/M ³	5 MG/M ³	NA	10.0%
MONOCYCLIC TERPENES (CAS #8006-64-2)	100 PPM	100 PPM	NA	7.0%

How do I recognize this material? Things to know for storage and

What should I do to prevent this material from catching fire? How do I put it out?

Section III - Physical/Chemical Characteristics

Boiling Point	NA	Flash Point (Closed)	NA	Flash Point (Open)	NA
Specific Gravity (20°C)	0.922	Relating Point	NA	Evaporation Rate (20°C)	NA
Viscosity at 20°C	40c	Additional and Other: WHITE WATERY EMULSION. ODOOR: SOLVENT.			

Section IV - Fire and Explosion Hazard Data

Flash Point (Standard Method)	110°F TCC	Flammable Limit	NA	LEL	NA	UEL	NA
Extinguishing Media	CARBON DIOXIDE, CHEMICAL FOAMS, WATER SPRAY						
Special Fire Fighting Procedures	NA						
Special Fire and Explosion Hazards	NA						

Are there conditions or materials that should not come in contact with the product?

Section V - Reactivity Data

Category	Unstable	Conditions to Avoid
Reactivity with Air	X	NA
Reactivity with Water		NA
Reactivity with Acids		NA
Reactivity with Oxidizers		NA
Reactivity with Inorganic Compounds		NA
Reactivity with Organic Compounds		NA
Reactivity with Metals		NA



HAZARD COMMUNICATION TRAINING QUESTIONS

NAME: _____ LOCATION: _____

1. Container labels must:
 - A. Give directions to the manufacturing plant.
 - B. Give price of the product.
 - C. Notify the user of the physical and health hazards.
 - D. Provide translation in Spanish.

2. What is a MSDS?
 - A. Main Statistical Data Service.
 - B. Material Safety Data Sheet.
 - C. New accident reporting system.
 - D. Both A and C.

3. What are the requirements of the Hazard Communication Standard?
 - A. Chemical inventories.
 - B. Container labeling.
 - C. Negotiations for purchase price of chemicals.
 - D. MSDSs.
 - E. Employee Training.
 - F. All of the above except C.

4. What is one way to determine if a chemical has been spilled or released in your work area?
 - A. When you smell something out of the ordinary.
 - B. By reading the MSDS and being knowledgeable of the chemical appearance and odor.
 - C. Call somebody.
 - D. Both A & B.

5. How can you protect yourself from chemical exposures?
 - A. Personal protective equipment and proper work practices.
 - B. Stay upwind of vapors and gases.
 - C. Use proper ventilation.
 - D. All of the above.

6. What are the main examples of chemicals found on site?
 - A. Solvent, fuel, metals, lubricants, gases.
 - B. Toxic, flammable, corrosive, reactive, pressurized.
 - C. Physical properties and health effects.
 - D. The good, the bad and the ugly.

7. New and transferred employees must be trained on the hazards of their new work area.
 - A. True
 - B. False

8. A MSDS provides what?
 - A. Supervisor guide to acid unloading.
 - B. Engineering data.
 - C. Health, safety and first-aid information.
 - D. Chemical process checklist.

9. Where is your site-specific Hazard Communication program located?
 - A. Accident Prevention Manual.
 - B. Employee Handbook.
 - C. Budget Manual.
 - D. MSDS Book.

10. A new chemical used in your area is always considered a new hazard.
 - A. True
 - B. False

11. If a MSDS is not available for the chemical you are using, you should?
 - A. Notify your supervisor.
 - B. Call the manufacturer.
 - C. Contact the Safety Department.
 - D. Nothing, most chemicals are safe.
 - E. Both A & C.

12. Labeling systems use words, graphics, geometric shapes, and colors to warn you of any possible danger to your health and safety, and to tell you about safe work practices you need to follow when handling chemicals.
 - A. True
 - B. False

13. A flammable chemical is a liquid with a flashpoint:
 - A. Of 2,000 degrees Fahrenheit
 - B. Below 100 degrees Fahrenheit
 - C. At freezing
 - D. All of the above

14. Using the ANSI labeling system, which represents the most serious hazard?
 - A. Caution
 - B. Warning
 - C. Danger
 - D. Beware

15. Chemicals can enter the body through:
 - A. Breathing them in
 - B. Contact with body openings
 - C. Both A and B
 - D. None of the Above



16. If you are not familiar with a chemical, you should check the Material Safety Data Sheets.
 - A. True
 - B. False

17. A primary/original container label for a chemical must include:
 - A. The chemical name
 - B. The chemical manufacturers or importer's name and address
 - C. Warnings of its hazardous content
 - D. All of the above

18. A container label should be checked only if you do not know the contents of the container.
 - A. True
 - B. False

19. If a label is torn or missing, you should report it right away to the proper personnel at your facility.
 - A. True
 - B. False

20. The Hazard Communication Standard is also referred to as the Right to Know Standard.
 - A. True
 - B. False

21. A material safety data sheet is required for all hazardous materials in your facility.
 - A. True
 - B. False

22. Safe work practices require a complete understanding and respect for the potential hazards.
 - A. True
 - B. False

23. The written emergency response plan contains the procedures to take in the event of an emergency.
 - A. True
 - B. False

**HAZARD COMMUNICATION TRAINING QUESTIONS
ANSWER SHEET**

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Health, Safety and Environment
**HAZARD COMMUNICATION
EMPLOYEE TRAINING PROGRAM**

SMS 002 NA
Supplemental Information B
Issue Date: February 2009

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 - B. False
20. The Hazard Communication Standard is also referred to as the Right to Know Standard.
- A. True
 - B. False
21. A material safety data sheet is required for all hazardous materials in your facility.
- A. True
 - B. False
22. Safe work practices require a complete understanding and respect for the potential hazards.
- A. True
 - B. False
23. The written emergency response plan contains the procedures to take in the event of an emergency.
- A. True
 - B. False

**URS SAFETY MANAGEMENT STANDARD 009
CORROSIVE AND REACTIVE MATERIALS**

URS SAFETY MANAGEMENT STANDARD

Corrosive and Reactive Materials

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to protect employees from the hazards of corrosive and reactive materials. Information is provided regarding the proper methods to store, handle and work with corrosive and reactive materials. This procedure considers a corrosive material as one that has a pH less than 2.0 (acid), or greater than 12.5 (base). A reactive material is a chemical that may be sensitive to shock, or may react with air or water depending upon its makeup.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 009 NA – North America

SMS 009 EU – UK and Ireland, Europe, and Middle East

SMS 009 AP7 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Corrosive and Reactive Materials

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies where corrosive and/or reactive materials are used or stored.

2. Purpose and Scope

The purpose of this standard is to protect employees from the hazards of corrosive and reactive materials. This procedure considers a corrosive material as one that has a pH less than 2.0 (acid), or greater than 12.5 (base). A reactive material is a chemical that may be sensitive to shock, or may react with air or water depending upon its makeup.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

4. Requirements

A. Appoint a responsible person who will:

1. Inspect storage areas periodically.
2. Monitor the quantity of corrosive and reactive materials on site, as well as that of incoming materials.
3. Review work practices that involve corrosive and reactive materials.

B. Require that all employees working with corrosive or reactive materials, or who may be exposed to such materials, are trained in accordance with SMS 002 – Hazard Communication.

C. Control the use of corrosive and reactive materials by URS personnel.

1. Order only those materials and quantities that are needed to complete a job.
2. Check incoming corrosive and reactive materials for proper labeling in accordance with SMS 002 – Hazard Communication.
 - a. Label materials, if needed, as they arrive on site.
 - b. Mark reactive materials containers with the date of receipt of the chemical.

URS SAFETY MANAGEMENT STANDARD

Corrosive and Reactive Materials

3. Check incoming corrosive and reactive materials for material safety data sheets (MSDS). If MSDSs are not provided or are already on file, order them from the manufacturer, distributor, or vendor.
 4. Add incoming corrosive and reactive chemicals to the hazardous materials inventory, if not already present, following procedures set forth in SMS 002 – Hazard Communication.
 5. Do not store any quantity of corrosive or reactive materials in an office (with the exception of limited quantities of consumer products). These materials are to be stored off site, or at an on-site laboratory or storage area.
- D. Store corrosive and reactive materials as indicated in the MSDS:
1. In a cool, dry environment, free from extremes of temperature and humidity.
 2. In a manner that separates them from other materials (including flammables and oxidizers) and from each other.
 - a. Separate acids and bases.
 - b. Separate reactive materials from acids and bases, and protect from contact with water.
 3. On materials that are acid-resistant (Teflon-coated, plastic, etc.) for small containers.
 4. Covered, not stacked on one another, on acid-resistant material for carboys (approximately 5 gallons/22 liters).
 5. On individual racks or securely blocked on skids, with closure (plug) facing upward to prevent leakage from drums.
- E. Require that labeling and signage are in place.
1. Label containers with the appropriate warning word to indicate the hazard, such as: DANGER; WARNING; CAUTION; CORROSIVE; OXIDIZER.
- F. Use corrosive and reactive materials appropriately.
1. Prior to use and in accordance with MSDS, safe-handling procedures must be developed for each operation, and type and

URS SAFETY MANAGEMENT STANDARD

Corrosive and Reactive Materials

- concentration of the chemical. In all cases, review the MSDS and product information before use.
2. Follow SMS 029 – Personal Protective Equipment when working with or around corrosive and reactive materials. Review the MSDS for the chemical used to determine the specific type of PPE needed, to include at a minimum:
 - a. Chemical-splash goggles
 - b. Chemical-resistant gloves
 - c. Chemical-resistant apron
 3. Obtain medical care immediately in the event of:
 - a. Skin or eye exposure (e.g., splash) to corrosive liquids
 - b. Inhalation of vapors of corrosive liquids that cause respiratory discomfort.
 4. Require an eyewash station to be located in all areas where acids or bases are used. Safety showers must be near by if significant acid or base quantities are involved.
 - a. Place emergency eyewashes and showers in accessible locations that require no more than 10 seconds to reach, and are in a travel distance no greater than 25 feet (7.5 meters) from the hazard.
 - b. Keep the areas surrounding eyewashes and safety showers free of stored materials or debris at all times.
 - c. Mark emergency eyewashes and showers with a highly visible sign.
 - d. Require the area around emergency eyewashes and showers to be well lighted and visible.
 - e. Where portable eyewash units are used, a process must be in place to change the water and clean the unit, as required by the manufacturer's instructions.
 - f. Require emergency showers and shower/eyewash combinations connected to a self-contained water supply to

URS SAFETY MANAGEMENT STANDARD

Corrosive and Reactive Materials

deliver a minimum 20 gallons (85 liters) per minute for 15 minutes.

- g. Require emergency showers and shower/eyewash combinations permanently connected to a potable water supply to deliver at least 30 gallons (127.5 liters) per minute continuously.
- h. Require emergency eyewashes to be capable of delivering to the eyes not less than 0.4 gallon (1.5 liters) per minute for 15 minutes.

G. Be prepared to clean up spills of corrosive and reactive materials.

- 1. Have a written spill response plan in place before materials are stored on site.
- 2. Have commercial spill kits available for cleanup of small quantities of materials. At a minimum, kits should contain appropriate protective clothing (including full-body suits, gloves, and boots) and spill control equipment (including absorbents, pillows, shovels, containers, etc.).
- 3. Where necessary, ensure that appropriate respiratory protection equipment is provided to spill responders. For additional information, see SMS 042 – Respiratory Protection.
- 4. Clean up or respond to spills promptly.
- 5. Ensure that personnel responding to a spill have been trained in the hazards associated with the spilled material, as well as use of the spill control equipment, including PPE required for the task.
- 6. Do not use combustible organic materials such as sawdust, excelsior, wood chips and shavings, paper, rags, or burlap bags to absorb or clean up spills.

H. Develop a waste management plan and procedures, including procedures for collection, storage, labeling, pick-up and transport, and final disposal.

I. Dispose of corrosive and reactive materials appropriately.

- 1. Segregate organic acids, inorganic acids, and basic wastes.

URS SAFETY MANAGEMENT STANDARD

Corrosive and Reactive Materials

2. Contract hazardous waste disposal services should be obtained, as necessary, to dispose of waste materials. All waste must be appropriately packaged for off-site transportation, if applicable.
 3. Wastes must be marked, labeled, and shipped in accordance with regulatory requirements. For additional information, see SMS 048 – Hazardous Materials/Dangerous Good Shipping.
- J. Inspect corrosive and reactive storage and use areas periodically.
1. Inspect office, laboratory, and project settings quarterly.
 2. Use the inspection sheet provided as Attachment 009-1 NA to inspect sites.

5. Documentation Summary

The following information will be maintained in the project file:

- A. Completed Corrosive and Reactive Material Inspection Sheets.
- B. Worker Right-to-Know training documentation.
- C. Written Spill Response Plan.
- D. Waste Management Plan.
- E. Documentation of training for spill response personnel.
- F. Documentation of hazard communication training for personnel exposed to corrosive and/or reactive materials.

6. Resources

- A. ANSI Z358.1-2004 – American National Standard for Emergency Eyewash and Shower Equipment
- B. U.S. Occupational Safety and Health Administration (OSHA) Technical Links – Personal Protective Equipment
- C. U.S. OSHA Technical Links – Hazard Communication
- D. Australian Standards AS 3780 – 1994. The Storage and Handling of Corrosive Substances
- E. SMS 002 – Hazard Communication

URS SAFETY MANAGEMENT STANDARD
Corrosive and Reactive Materials

- F. SMS 029 – Personal Protective Equipment
- G. SMS 042 – Respiratory Protection
- H. SMS 048 – Hazardous Materials/Dangerous Goods Shipping
- I. Attachment 009-1 NA – Corrosive and Reactive Materials
Inspection Sheet



Health, Safety and Environment
**CORROSIVE AND REACTIVE MATERIALS
INSPECTION SHEET**

Attachment 009-1 NA

Issue Date: June 1999
Revision 3: February 2009

Location: _____

Name of Inspector: _____ Date Inspected: _____

Labeling

1. Original containers are labeled with: Yes No NA
- Name of chemical
 - Signal word (e.g., DANGER; WARNING; CAUTION, etc.)
 - Manufacturer

Pre-Job Activities

2. Corrosives and reactives are stored in a cool, dry environment, free from temperature extremes Yes No NA
3. Corrosives and reactives are stored in their properly labeled original containers, cushioned against shock, and stored to prevent leaks Yes No NA
4. Corrosives are not stored in the vicinity of oxidizers Yes No NA
5. Hydrofluoric acid is stored only in acid-proof polyethylene- or ceresin-lined containers Yes No NA
6. Corrosives are stored on acid-resistant material Yes No NA
7. Chromic acid, nitric acid, perchloric acid, and potassium permanganate (all oxidizers) are stored separately from other corrosives and flammables Yes No NA

Handling

8. The following minimum required PPE is used when working with corrosives: Yes No NA
- Chemical splash goggles
 - Chemical resistant gloves
 - Chemical resistant apron
9. Bottles or carboys are opened slowly to guard from splashes. Yes No NA
10. The outside of the container is washed off with water after use to clean off any droplets of material. Yes No NA
11. An eyewash is located in all areas where corrosives are used. Yes No NA
12. An eyewash is:
- Within 25 feet (7.62 meters) or 10 seconds of travel Yes No NA
 - Marked with a highly visible sign Yes No NA
 - Well lit and visible Yes No NA
 - Working and delivering a minimum of 1.5 liters of water per minute for 15 minutes Yes No NA
13. Where substantial quantities of corrosives and/or reactives are stored, access to an emergency shower is available. Yes No NA
14. Spill control materials compatible with chemicals are available for emergency use. Yes No NA

Waste Disposal

15. Organic acid, inorganic acid, and basic waste are kept segregated. Yes No NA
16. Corrosive waste is disposed in accordance with regulatory and client requirements. Yes No NA
17. A waste management plan or procedure is in place. Yes No NA
18. Arrangements for waste collection, transport, and disposal are in place. Yes No NA

Comments:

**URS SAFETY MANAGEMENT STANDARD 016
HAND TOOLS AND PORTABLE EQUIPMENT**

URS SAFETY MANAGEMENT STANDARD

Hand Tools and Portable Equipment

1. Applicability

This standard applies to all operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to provide procedures for the safe use and handling of hand tools and power equipment. Additional information on hand safety is provided in SMS 064 – Hand Safety.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 016 NA – North America

SMS 016 EU – UK and Ireland, Europe, and Middle East

SMS 016 AP6 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Hand Tools and Portable Equipment

1. Applicability

This standard applies to URS Corporation and its subsidiary companies in which hand tools and/or portable powered equipment, including chain saws; brush cutters, powder-actuated tools, and similar high-hazard implements are used.

2. Purpose and Scope

The purpose of this standard is to provide procedures for the safe use and handling of hand tools and portable powered equipment. SMS 064 – Hand Safety provides additional information on the safe use of hand tools.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site or project location.

4. Requirements

A. General

1. Keep hand and power tools in good repair and use them only for the task for which they were designed. Use tools only in accordance with the manufacturer's recommendations.
2. Remove damaged or defective tools from service. Affix a "Do Not Use" tag (or similar) to the tool until repairs are made or the tool is destroyed.
3. Provide employees using hand tools or portable powered equipment with personal protective equipment (PPE) and train employees in the use of PPE required for the operation being undertaken.
4. Keep surfaces and handles clean and free of excess oil and grease to prevent slipping.
5. Do not carry sharp tools in pockets; this practice may cause puncture wounds.
6. Clean tools and return to a suitable toolbox, room, rack, or other storage area upon completion of a job.
7. Before applying pressure, ensure that wrenches have a good bite.

URS SAFETY MANAGEMENT STANDARD

Hand Tools and Portable Equipment

- a. Brace yourself by placing your body in the proper position so that that you will not fall in case the tool slips.
 - b. Make sure hands and fingers have sufficient clearance in the event the tool slips.
 - c. Always pull on a wrench, never push.
8. When working with tools overhead, place tools in a holding receptacle or secure when not in use to prevent them from falling.
 9. Do not leave tools in or on passageways, access ways, walkways, ramps, platforms, stairways, or scaffolds where they can create a tripping hazard.
 10. Do not throw tools from place to place or from person to person, or drop tools from heights.
 11. Use nonsparking tools in atmospheres with fire or explosive characteristics.
 12. Inspect all tools prior to start-up or use to identify any defects.
 13. Powered hand tools should not be capable of being locked in the ON position, except as noted elsewhere in this standard.
 14. Require that all power-fastening devices be equipped with a safety interlock capable of activation only when in contact with the work surface.
 15. Ensure that all portable powered tools designed to accommodate guards are equipped with such when in use.
 16. Do not allow loose clothing, long hair, loose jewelry, rings, and chains to be worn while working with power tools.
 17. Do not use cheater pipes.
 18. Make provisions to prevent machines from automatically restarting upon restoration of power (see SMS 023 – Lockout and Tagout Safety).
 19. Where URS issues tools to its employees, the supervisor is responsible for the safe condition of tools and equipment.

URS SAFETY MANAGEMENT STANDARD

Hand Tools and Portable Equipment

20. Where workers furnish their own tools, their tools must conform to the requirements demanded for safety and efficiency. The supervisor has the responsibility to regularly inspect these tools for defects.

B. Electrical Power Tools

1. Electric-power-operated tools will be either of the approved double-insulated type or grounded in accordance with the National Electric Code.
2. The use of the electric cord for hoisting or lowering electric tools is an unsafe practice and will not be permitted.
3. All handheld powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than 2 inches (5.1 centimeters) in diameter, disc sanders, belt sanders, reciprocating saws, saber saws, and other similar operating powered tools will be equipped with a momentary contact ON/OFF control and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.
4. All other handheld powered tools such as circular saws, chain saws, and percussion tools without positive accessory holding means will be equipped with a constant pressure switch that will shut off the power when the pressure is released (i.e., "dead man" switch).

C. Grinding Tools

1. Inspect work rests and tongue guards for grinders.
 - a. Work rest gaps should not exceed $\frac{1}{8}$ inch (3 mm).
 - b. Tongue guard gaps should not exceed $\frac{1}{4}$ inch (6 mm).
2. Do not adjust work, guards, or tool rests while the grinding wheel is moving.
3. Inspect the grinding wheel for cracks, chips, defects, or excessive wear. Remove from service if any defects are found.
4. Wear goggles when grinding. A clear full face shield may be worn with the goggles.

URS SAFETY MANAGEMENT STANDARD **Hand Tools and Portable Equipment**

5. Do not use the side of a grinding wheel unless the wheel is designed for side grinding.
6. Always stand to the side of the blade, never directly behind it.
7. Use grinding wheels only at their rated speed.
8. Grinding aluminum is prohibited.
9. For operations in the United Kingdom:
 - a. No grinding wheels exceeding 55 mm are to be used.
 - b. All wheels are to be marked with their safe maximum speed.
 - c. Abrasive wheels will be operated only by personnel who have been specifically trained and specified competent by URS.
 - d. Abrasive wheels will be operated only by persons specified as competent, under the abrasive wheel regulations.
 - e. Abrasive wheels must be operated only if the manufacturer's guard is fitted and they are in good working order.

D. Power Saws

1. Require that circular saws are fitted with blade guards.
2. Inspect each day prior to use. Remove damaged, bent, or cracked saw blades from service immediately.
3. Require that table saws are fitted with blade guards and a splitter to prevent the work from squeezing the blade and kicking back on the operator.
4. Require guards that cover the blade to the depth of the teeth on hand-held circular saws. The guard should freely return to the fully closed position when withdrawn from the work surface.

E. Woodworking Machinery

URS SAFETY MANAGEMENT STANDARD

Hand Tools and Portable Equipment

1. Do not leave woodworking tools running when unattended.
2. Keep the operating table and surrounding area clear of debris.
3. Do not use compressed air to remove dust and chips from woodworking machinery.
4. Locate the ON/OFF switch to prevent accidental start-up. The operator must be able to shut off the machine without leaving the workstation. Safety goggles and kickback aprons should be provided for and worn by operators. Respirators or local exhaust ventilation may also be necessary based on the type of material being cut or sanded.
5. Guard planers and joiners to prevent contact with the blades throughout the full length of the cutting area.
6. Ensure that band saw blades are fully enclosed except at the point of operation.
7. Require that swing cut-off saws have a guard completely covering the upper half of the saw.
8. Require that circular cross-cut and rip saws are provided with a hood guard, splitter, and anti-kickback device. The hood should adjust itself automatically to the thickness of and remain in contact with the material being cut. All circular saws will be provided with a hood guard.
9. Ensure that exposed parts of the saw blade under the table are properly guarded.
10. Equip all swing cutoff and radial saws that are drawn across a table with limit stops to prevent the saw from traveling beyond the edge of the table.
11. Hold the material being cut firmly against a back guide or fence and cut with a single, steady pass.
12. Cut green or wet material slowly and with caution. Check all material being cut for nails, hard knots, etc.
13. Use a push stick when:

URS SAFETY MANAGEMENT STANDARD

Hand Tools and Portable Equipment

- a. The cutting operation requires the hands of the operator to come close to the blade.
 - b. Small pieces are being machined.
14. When cutting long stock, provide extension tables and a helper to assist the operator.
15. Adjust saw blades so they clear only the top of the cut.
16. Automatic feed devices should be used whenever feasible.
17. When drills are used:
- a. Take care to prevent clothing from being wound around the drill. Wear sleeves buttoned at the wrist or short-sleeved shirts.
 - b. Clamp or hold down material being drilled to prevent spinning with the drill.
 - c. If the bit is long enough to pass through the material, provide against damage and injury.
 - d. Secure magnetic drills with a chain or rope to prevent falling. Label cord connections to prevent unplugging.
18. When sanders are used:
- a. Move sanders away from the body.
 - b. Because dust may create an explosion hazard, guard against open flames and sparks.
- F. Pneumatic Tools and Equipment
1. Require that pneumatic tools have:
- a. Tool retainers to prevent the tool from being ejected from the barrel during use.
 - b. Safety clips, chains, tie wires, or other retaining devices to secure connections between tool/hose/compressor to prevent whipping in case of disconnection or failure.

URS SAFETY MANAGEMENT STANDARD

Hand Tools and Portable Equipment

2. Do not lay hose in walkways, on ladders, or in any manner that presents a tripping hazard.
3. Never use compressed air to blow dirt from hands, face, or clothing.
4. Do not use compressed air for cleaning purposes unless the pressure is reduced to 30 pounds per square inch (psi) or less. This rule does not apply for concrete form, mill scale, green cutting, and similar cleaning operations. Proper respiratory, hand, eye, and ear protection must be worn.
5. Never raise or lower a tool by the air hose.
6. Shut off the pressure and exhaust from the line before disconnecting the line from any tool or connection.

G. Powder-Actuated Fastener Tools

1. Use powder-actuated tools that comply with the requirements of the American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Standard A10.3 – 2006 – Powder-Actuated Fastening Systems.
2. Assess local and state regulations governing the use of these tools to ensure compliance.
3. Use only individuals who have been trained by a manufacturer's representative and possess the proper license to operate, repair, service, and handle powder-actuated tools.
4. With each tool, the manufacturer or supplier should furnish a detailed instruction manual covering the application, operation, and maintenance of the tool. The manufacturer's recommendation for size of charge, stud unit, or pin, and for specific application must be followed explicitly by the operator.
5. Keep cartridges or shells in the original containers, in separate metal containers, or in the carrying case provided with the tool, and then stored in locked containers. Keep cartridges of varied charges or forces segregated from each other.

URS SAFETY MANAGEMENT STANDARD **Hand Tools and Portable Equipment**

6. Take precaution, as defined by the manufacturer, in the event of a misfire.
7. Provide information from the manufacturer on the safe use, testing, and maintenance of each type of tool in each tool kit.
8. Never use a powder-actuated tool in a flammable or explosive atmosphere.
9. Require the use of goggles or a full face shield as well as safety glasses during operation of powder-actuated tools.
10. Use only tools that are provided with a shield or muzzle guard. This shield or guard should be of a size, design, and material that will effectively confine flying particles and prevent escape of ricocheting studs and pins.
11. Ensure that powder-actuated tools are not able to be fired unless the tool is pressed against the work surface.
12. Always handle powder-actuated tools like firearms, with hands clear of the muzzle and barrel pointed away from all persons, especially when the tool is being closed or assembled after loading.
13. Ensure that the tool is not able to fire if the tool is dropped when loaded.
14. Ensure that firing the tool requires two separate operations, with the firing movement being separate from the motion of bringing the tool to the firing position.
15. Provide signs and barricades when shooting into walls or floors with personnel working on the other side.
16. Never fire into easily pierced or soft substrates or into materials of unknown resistance to piercing. In these situations, there is potential for the fastener to penetrate and pass through, creating a flying projectile hazard. If penetration of these materials is required, the material should be backed with a box of wood or sand at least four inches (10 cm) thick and of adequate area.
17. Do not use powder-actuated tools in reinforced concrete if there is the possibility of striking the rebar.

URS SAFETY MANAGEMENT STANDARD

Hand Tools and Portable Equipment

18. Do not use powder-actuated tools on cast iron, high carbon, heat treated steel, or armor plate, thin slate, marble, glass, live rock, glazed brick or tile, terra cotta, or other brittle substances, or where the composition is unknown.
19. Do not fire studs closer than three inches (7.5 cm) from the edge or corner when being used on brick or concrete. Do not fire studs closer than ½ inches (1.25 cm) from the edge when being used on steel.
20. Never load and leave a powder-actuated tool unattended. It should be loaded only prior to its intended firing. Use only studs or pins specifically designed for the tool.
21. Test tools each day prior to loading by testing safety devices according to the manufacturer's recommended procedure.
22. Inspect, clean, and store powder-actuated tools in a safe place at the end of each day. No tool will be stored loaded. Store tools with the barrels removed or breech open.
23. At the manufacturer's recommended intervals, the tool will be completely dismantled and carefully inspected for wear on the safety devices by a qualified person familiar with the tool. Worn parts will be replaced before the tool is used again. It is recommended that factory-authorized service representatives be utilized for inspection, repair, and parts replacement, where possible.

H. Chain Saws

1. Approval by the HSE manager is required for all use of chain saws.
2. Inspect the saw prior to each use and periodically during daily use.
3. Never cut above chest height.
4. Require that the idle is correctly adjusted on the chain saw. The chain should not move when the saw is in the idle mode.
5. Start cutting only after a clear escape path has been made.

URS SAFETY MANAGEMENT STANDARD **Hand Tools and Portable Equipment**

6. Shut the saw off when carrying through brush or on slippery surfaces. The saw may be carried no more than 50 feet (15 meters) while idling.
 7. Require applicable protective gear. This will include, but is not limited to:
 - a. Logger's safety hat.
 - b. Safety glasses and face shield.
 - c. Steel-toed boots.
 - d. Protective leggings.
 - e. Hearing protection.
 - f. Work gloves.
 8. Inspect saws to ensure that they are fitted with an inertia break and hand guard.
 9. *Never* operate a chain saw when fatigued.
 10. Do not allow others in the area when chain saws are operated.
 11. Make sure there are no nails, wire, or other imbedded material that can cause flying particles.
 12. Do not operate a chain saw that is damaged or improperly adjusted, or is not completely and securely assembled. Always keep the teeth sharp and the chain tight. Worn chains should be replaced immediately.
 13. Keep all parts of your body away from the saw chain when the engine is running.
 14. For all operations, only personnel specifically trained and certified as competent by URS may operate chain saws.
- I. Hand-Operated Pressure Equipment
1. Direct pressure equipment such as grease guns, and paint and garden sprayers away from the body and other personnel in the area. The person operating any equipment

URS SAFETY MANAGEMENT STANDARD

Hand Tools and Portable Equipment

such as this, which has a potential for eye injury, must wear protective goggles.

2. The noise produced when using certain types of pressure equipment may require the use of hearing protection.
3. Never allow the nozzle of a pressurized tool to come in contact with any body parts while operating. There is potential for injection of a chemical directly into the user's body, resulting in severe injury or death.

J. Gasoline-Powered Tools

1. Never pour gasoline on hot surfaces.
2. Never fuel around an open flame or while smoking.
3. Shut down the engine before fueling.
4. Provide adequate ventilation when using in enclosed spaces.
5. Use only Underwriters Laboratories (UL) - or FM-approved safety cans to transport flammable liquids. The use of unapproved containers for gasoline is strictly prohibited.
6. Label gasoline containers in compliance with Hazard Communication requirements, indicating the chemical and physical hazards of the product.

K. Inspection

Inspect all hand tools on a regular basis. Immediately remove defective tools from service, and tag or destroy them to prevent further use.

5. Documentation Summary

The following documentation will be maintained in the project file:

- A. Site briefings regarding tool use.
- B. Records of tools removed from service.
- C. Copies of powder-actuated tool licenses (as applicable).

URS SAFETY MANAGEMENT STANDARD **Hand Tools and Portable Equipment**

D. Tool inspection documentation.

6. Resources

- A. U.S. Occupational Safety and Health Administration (OSHA) Standard – Hand and Portable Power Tools – 29 Code of Federal Regulations (CFR) 1910, Subpart P
- B. U.S. OSHA Standard – Construction Tools – Hand and Power – 29 CFR 1926, Subpart I
- C. American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Standard A10.3 – 2006 – Powder-Actuated Fastening Systems
- D. National Association of Demolition Contractors
- E. United Kingdom – 'Provision and Use of Work Equipment' Regulations 1998
- F. Australia/New Zealand Standards – Powder-Actuated Handheld Fastening Tools - AS/NZS 1873.1:2003 Australian/New Zealand Standards – Handheld Motor-operated Electric Tools – AS/NZS 60745.1:2003
- G. SMS 023 – Lockout and Tagout Safety
- H. SMS 064 – Hand Safety

**URS SAFETY MANAGEMENT STANDARD 017
HAZARDOUS WASTE OPERATIONS**

URS SAFETY MANAGEMENT STANDARD

Hazardous Waste Operations

1. Applicability

This standard applies to all operations of URS Corporation and its subsidiary companies involving the investigation or remediation of sites impacted with hazardous wastes or hazardous materials including those associated with underground storage tanks.

Normally, investigation projects for real estate transactions conducted to confirm that a site is "clean" are not covered under this standard. If the Project Manager reasonably expects that there is the potential for a "clean" site to actually have some level of contamination, it should initially be treated as contaminated and subject to this standard. Reference related URS Safety Management Standards for such operations.

2. Purpose and Scope

The purpose of this standard is to minimize the risks to URS personnel and subcontractors while conducting hazardous waste field operations.

Investigation techniques included under this standard include, but are not limited to, hand auger, soil gas evaluation, groundwater monitoring, test pits, and all types of power drilling, including direct push. Remediation techniques included under this standard include, but are not limited to, excavation, groundwater treatment, soil gas treatment, containment, and land farming.

The applicability of the HAZWOPER standard to URS activities is primarily in the areas of site investigation and remediation.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 017 NA – North America

SMS 017 EU – UK and Ireland, Europe, and Middle East

SMS 017 AP7 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Hazardous Waste Operations

1. Applicability

This standard applies to all operations of URS Corporation and its subsidiary companies involving the investigation or remediation of sites impacted with hazardous wastes or hazardous materials, including those associated with underground storage tanks.

Normally, investigation projects for real estate transactions conducted to confirm that a site is "clean" are not covered under this standard. If the Project Manager reasonably expects that there is the potential for a "clean" site to actually have some level of contamination, it should initially be treated as contaminated, and be subject to this standard.

2. Purpose and Scope

The purpose of this standard is to minimize the risks to URS personnel and subcontractors while conducting hazardous waste field operations.

Investigation techniques discussed in this standard include, but are not limited to, hand augering, soil gas evaluation, groundwater monitoring, test pits, and all types of power drilling, including direct-push. Remediation techniques discussed under this standard include, but are not limited to, excavation, groundwater treatment, soil gas treatment, containment, and landfarming.

The applicability of the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard to URS activities is primarily in the areas of site investigation and remediation. URS relies on outside vendors or clients to provide emergency response teams (HazMat Teams) at our project sites and locations. On a project-specific basis, if the need arises for URS to provide an emergency response team, then the HAZWOPER requirements specific to that activity will be developed and incorporated into the project health and safety plan (HASP). This includes specific chemical protective clothing, equipment, and post-emergency response operations.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

4. Requirements

The URS Safety Management System and Safety Management Standards were designed to help employees to identify, evaluate, and control safety and health hazards and to provide for emergency response. Site/project hazards and scope

URS SAFETY MANAGEMENT STANDARD

Hazardous Waste Operations

of work dictate the specifics, which are covered in Facility Emergency Action Plans and Project HASPs.

A. Project Evaluation

Assess the technical and field aspects of every hazardous waste site project to evaluate:

1. Risk of exposure to hazardous chemicals, with particular attention to suspected or known human carcinogens.
2. Personal protective equipment requirements.
3. Air monitoring requirements.
4. Emergency services requirements.
5. Hazards addressed by other URS Safety Management Standards (e.g., SMS 010 – Confined Space Entry).
6. Hazardous materials shipping and disposal responsibilities.
7. Other safety and health hazards associated with site operations.

B. Client/Contract Evaluation

1. Review contract documents to determine whether the client has any special internal or regulatory requirements for hazardous waste site operations.
2. Implement client requirements in addition to those of this standard. Those requirements that are the most protective (e.g., most stringent) will be used.

C. Site-Specific Health and Safety Plan

1. Prepare a site-specific HASP for every project under this standard.
2. HASPs must be written or approved by the appropriate Health, Safety, and Environment (HSE) Manager, or a safety professional specifically approved by the HSE Manager, and by the project manager.
3. Evaluate client and agency requirements prior to preparing the HASP, particularly if the client or an agency will approve the HASP prior to implementation.

URS SAFETY MANAGEMENT STANDARD

Hazardous Waste Operations

4. On a site-/project-specific basis, conduct a hazard assessment and identify appropriate engineering controls, work practices, and personal protective equipment (PPE) requirements. This assessment and the mitigations and controls are documented in site-/project-specific HASPs that are provided to clients by the project manager for their review and approval prior to the initiation of field activities.
5. On a site-/project-specific basis, conduct a hazard assessment for potential physical and chemical exposures and identify monitoring equipment, frequency, action levels, and actions. These are incorporated into project-/site-specific HASPs, which are reviewed and approved by clients prior to the initiation of field activities. Guidance on monitoring is provided in SMS 043 – Personal Monitoring/Industrial Hygiene.
6. On a site-/project-specific basis and based on the potential chemical exposures and work activities, develop specific decontamination procedures that include instructions on materials, decontamination steps, and location of decontamination. The purpose of these procedures will be to ensure personnel leaving contaminated areas are appropriately decontaminated, and all equipment is disposed or decontaminated.
7. PPE selection, use, and maintenance are presented in SMS 029 – Personal Protective Equipment. This information is documented on a site/project specific basis in the site/project HASP. Remove any non-impermeable PPE clothing that becomes contaminated with hazardous substances in accordance with the decontamination procedures noted above.
8. Provide regular showers, change rooms, and sanitation facilities for employees, as necessary.

D. Training – Remediation and Investigation Activities

Verify that each assigned URS employee has completed the following required training.

1. 40-hour initial training from an approved training provider, (24 hours of initial training for operations outside of North America).
2. 3 days of on-the-job training (1 day is required for operations outside of the United States).

URS SAFETY MANAGEMENT STANDARD **Hazardous Waste Operations**

3. 8-hour refresher training completed within 12 months of the initial or subsequent refresher training.
4. 8-hour Site Safety Officer (Supervisor) training for directing the activities of any other URS employee or subcontractor.
5. Additional training for the Site Safety Officer as described below.

E. Training – Emergency Response

The HAZWOPER standard is primarily applicable to URS operations involving remediation and investigations at hazardous waste sites or sampling at Treatment, Storage, and/or Disposal Facilities (TSDFs). URS typically contracts emergency response or relies on client or local emergency response teams. On an as-needed basis, if a project requires URS to provide a HAZMAT emergency response team, the following training requirements must be met.

1. Operations Level – a minimum of 8 hours of initial and refresher training for those responsible for acting defensively in the case of a release, attempting to contain the release from a safe distance.
2. HAZMAT Technician – at least 24 hours of initial training and 8 hours of refresher training. They will participate in operations-level training and know how to implement the emergency response plan for the facility/site/project location.
3. HAZMAT Specialist – at least 24 hours of initial training and 8 hours of refresher training. They will be trained in the same content as the HAZMAT Technician, as well as in how to develop a site safety and control plan.
4. Incident Commander – will have at least 40 hours of training covering the Operations Level training and techniques for implementing the emergency response plan and directing the incident. They will be knowledgeable in relevant regulations.

F. Site Safety Officer

1. Appoint a Site Safety Officer (SSO) with appropriate qualifications for the specific hazardous waste project.
2. Assure that the SSO for complex projects, such as those with complicated remediation activities, has no duties other than site safety and health.

URS SAFETY MANAGEMENT STANDARD

Hazardous Waste Operations

3. Verify that the SSO has completed basic supervisor training, and has additional required training and experience as applicable:
 - a. Additional respiratory protection training is required for projects where supplied air respirators may be used.
 - b. Heavy equipment/construction safety.
 - c. Personal air monitoring.
4. The SSO will monitor decontamination and other site activities for effectiveness.

G. Exposure Monitoring

Require that exposure monitoring is conducted in accordance with the HASP on all hazardous waste projects.

H. Project Equipment

1. Provide all health and safety equipment as described by the project HASP.
2. Provide all personal protective equipment as described by the project HASP.

I. Medical Surveillance

Verify that each URS employee assigned to the project meets the minimum requirements of the URS Medical Surveillance Program (refer to SMS 024 – Medical Screening and Surveillance). This typically includes:

1. Baseline examination
2. Annual examination
3. Appropriate clearance for respirator use.

J. Compliance Assurance

SMS 068 – Compliance Assurance is a tool for use in determining the effectiveness and compliance of a waste site operation.

URS SAFETY MANAGEMENT STANDARD

Hazardous Waste Operations

5. Documentation Summary

The following information will be maintained in the project file:

- A. Completed Health and Safety Plan
- B. Completed and signed HASP approval form
- C. Signed HASP acceptance form
- D. Completed Health and Safety (H&S) field forms that are included in each HASP
- E. Training and Medical Surveillance Clearance documentation for project personnel

6. Resources

- A. U.S. Occupational Safety and Health Administration (OSHA) – Hazardous Waste Operations
- B. European Agency for Safety and Health at Work, Dangerous Substances http://europe.osha.eu.int/good_practice/risks/dangerous_substances/
- C. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities – National Institute for Occupational Safety and Health (NIOSH) 85-115
- D. SMS 010 – Confined Space Entry
- E. SMS 024 – Medical Screening & Surveillance
- F. SMS 043 – Personal Monitoring
- G. SMS 029 – Personal Protective Equipment
- H. SMS 068 – Compliance Assurance

URS SAFETY MANAGEMENT STANDARD 018
HEAT STRESS

URS SAFETY MANAGEMENT STANDARD

Heat Stress

1. Applicability

This standard applies to URS field projects where ambient (not adjusted) temperatures exceed 70 °F (21 °C) for personnel wearing chemical protective clothing, including Tyvek™ coveralls, and 90 °F (32 °C) for personnel wearing normal work clothes.

2. Purpose and Scope

The purpose of this standard is to protect project personnel from the effects of heat related illnesses.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 018 NA – North America

SMS 018 EU – UK and Ireland, Europe, and Middle East

SMS 018 AP7 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Heat Stress

1. Applicability

This standard applies to URS Corporation and its subsidiary companies on projects where ambient (not adjusted) temperatures exceed 70 degrees Fahrenheit (°F) (21 degrees Celsius [°C]) for personnel wearing chemical-protective clothing, including semi-permeable or impermeable protective clothing such as Tyvek or Saranex coveralls, and 90°F (32°C) for personnel wearing normal permeable work clothes. Permeable clothing refers to clothes of standard cotton or synthetic materials.

2. Purpose and Scope

The purpose of this standard is to protect project personnel from the effects of heat-related illnesses.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

4. Requirements

- A. The project Health and Safety Plan will address heat stress control when temperatures identified in Section 1 of this standard are anticipated. For employees wearing chemical-protective clothing, physiological monitoring (Section J) is the most effective approach, because evaporative cooling capability is limited.
- B. Heat stress is influenced by air temperature, radiant heat, and humidity. The Wet Bulb Globe Temperature (WBGT) is a useful index of the environmental contribution to heat stress. Because WBGT is only an index of the environment, the contributions of work demands, clothing, and state of acclimatization must also be accounted for, as described in the following steps.
 1. Monitor ambient temperatures and conduct heat stress monitoring in accordance with the project Health and Safety Plan. Revise the heat stress monitoring and controls if there are any reports of discomfort due to heat stress.
 2. Monitor temperatures in each unique environment in which workers perform work (e.g., take WBGT measurements inside truck cabs for truck drivers, and take separate WBGT measurements in the outdoor area where field employees work, etc.).

URS SAFETY MANAGEMENT STANDARD
Heat Stress

3. Determine if individual workers are acclimatized or un-acclimatized. Full heat acclimatization requires up to 3 weeks of continued physical activity under heat-stress conditions similar to those anticipated for the work. Its loss begins when the activity under those heat-stress conditions is discontinued, or when there is a sustained increase in temperatures of 10 °F (5.6 °C) or more, and a noticeable loss occurs after 4 days. A worker can be considered acclimatized for the purpose of this procedure when they have been exposed to the site conditions (including level of activity) for 5 of the last 7 days.

4. Determine the approximate workload of each worker or group of workers. The following examples can be used for comparison:

Table 1
Examples of Activities within Workload Categories

Categories	Example Activities
Resting	Sitting quietly
	Sitting with moderate arm movements
Light	Sitting with moderate arm and leg movements
	Standing with light work at machine or bench while using mostly arms
	Using a table saw
	Standing with light or moderate work at machine or bench and some walking about
Moderate	Scrubbing in a standing position
	Walking about with moderate lifting or pushing
	Walking on level at 6 Km/hr while carrying 3 Kg weight load
Heavy	Carpenter sawing by hand
	Shoveling dry sand
	Heavy assembly work on a non-continuous basis
Very Heavy	Intermittent heavy lifting with pushing or pulling (e.g., pick-and-shovel work)
	Shoveling wet sand

5. Determine the approximate proportion of work within an hour during a typical shift. Typically, the initial work schedule will be 60 minutes of work per hour (100 percent work) with a small break in the morning and afternoon, as appropriate, and a 30-minute lunch break mid-day.

6. Compare the WBGT values measured in 4.B.1 to the screening criteria values in the following table, using the determinations made in 4.B.3 through 4.B.5.

URS SAFETY MANAGEMENT STANDARD
Heat Stress

Table 2
SCREENING CRITERIA FOR HEAT STRESS EXPOSURE
(WBGT Values in °F /°C)

Work Cycle	Acclimatized				Unacclimatized			
	Light Work	Mod. Work	Heavy Work	Very Heavy Work	Light Work	Mod. Work	Heavy Work	Very Heavy Work
100% Work (60 min/ hour)	85.1/ 29.5	81.5/ 27.5	78.8/ 26.0	N/A	81.5/ 27.5	77.0/ 25.0	72.5/ 22.5	N/A

- a. If the measured WBGT is *less than* the table value, there is little risk of excessive exposure to heat stress, and work can continue. Continue to monitor ambient conditions with the WBGT. However, if there are reports of the symptoms of heat-related disorders, then the analysis of little risk should be reconsidered.
- b. If the measured WBGT is *greater than* the table value, institute heat stress controls, including a work-rest cycle, and perform physiological monitoring as described elsewhere in this standard.
- c. Because of the physiological strain associated with very heavy work among less fit workers regardless of WBGT, values are not provided in Table 1 for continuous work. Physiological monitoring should always be implemented under these conditions.
- d. For workers wearing semi-permeable or impermeable clothing, such as Tyvek or Saranex, the WBGT procedures cannot be used. For these situations, workers should begin physiological monitoring as soon as the temperature in the work area exceeds 70°F (21°C).

C. Physiological Monitoring

Physiological monitoring provides a means to assess the effectiveness of the heat stress controls (training, hydration, work-rest cycles, etc.) that are in place. Based on the results of physiological monitoring and self-assessment, work-rest cycles can be adjusted to more effectively control heat stress by shortening the work period, or to allow for longer work periods if workers are recovering adequately during rest breaks.

1. Perform physiological monitoring as soon as the employee stops working and begins their break (rest). Perform *physiological monitoring at least every hour*. Base rest breaks on the results of the monitoring, workers' self-assessment, and professional judgment.

URS SAFETY MANAGEMENT STANDARD

Heat Stress

- a. Example 1: If the WBGT is 85°F (29.4°C) or less for acclimatized, light-duty workers, they can work 60 minutes per hour (100 percent work), and they need only take their regularly scheduled breaks.
 - b. Example 2: If the WBGT is greater than 85°F (29.4°C) for acclimatized, light-duty workers, physiological monitoring must be performed, and workers' work-rest cycles must be adjusted as described below.
2. Have workers assess themselves and their body's reaction to the heat and work conditions (self-assessment), and report any signs or symptoms of heat illness. These can include nausea or dizziness, heat cramps, extreme thirst, or very dark urine.
 3. Based on the results of the physiological monitoring and on the workers' self-assessments, the work period may be adjusted as follows:
 - a. The work period may be *increased* (generally, by 5- to 10-minutes intervals, up to a maximum of 4 hours) if the results of the first 2 hours of the physiological monitoring and the workers' self-assessments indicate that workers *are* recovering adequately (see below), and on the judgment of the Health and Safety Technician.
 - b. The work period *must be decreased* if the results of the physiological monitoring and the workers' self-assessment indicate that workers are NOT recovering adequately (see below).
 4. Perform physiological monitoring
 - a. The worker or the Health and Safety Technician must measure and record body temperature and pulse rate as described below. Use SMS 018-1 NA – Heat Stress Monitoring Record as a tool.
 5. Body Temperature Monitoring
 - a. Monitor body temperature to determine if employees are adequately dissipating heat buildup. Ear probe thermometers which are adjusted to oral temperature (aural temperature) are convenient and the preferred method of measurement. Determine work/rest regimen as follows:
 - i. Measure oral body temperature at the end of the work period. Oral body temperatures are to be obtained prior to the employee drinking water or other fluids.

URS SAFETY MANAGEMENT STANDARD

Heat Stress

- ii. If temperature exceeds 99.6°F (37.5°C), shorten the following work period by 1/3 without changing the rest period.
 - iii. If, at the next rest period, temperature still exceeds 99.6°F (37.5°C), the worker should not be allowed to continue work until repeated temperature measurements are in the acceptable range (i.e., less than 99.6°F). Do not leave the worker alone during the recovery time. Watch for signs of heat illness and be prepared to implement emergency response as necessary.
 - iv. Do not allow a worker to wear impermeable PPE when his/her oral temperature exceeds 100.6°F (38.1°C).
- b. Have employees assess themselves and their body's reaction to the heat and work conditions, and report any signs or symptoms of heat stress, including, but not limited to, feeling nauseous or dizzy, skin rash or skin irritation, muscle cramps, weakness or fatigue, extreme thirst, dizziness, blurred vision, headache, or very dark urine.
6. Pulse Rate Monitoring
- a. Take the radial (wrist) pulse as early as possible in the rest period and determine the worker's heart rate in beats per minute. The heart rate is determined by counting the pulse for ten seconds and multiplying the number by 6 to get the beats per minute. Record this as P1.
 - b. Wait 2 minutes and repeat the pulse measurement. Record this as P2.
 - c. If P1 is greater than or equal to 110 beats per minute (bpm) and if (P1 – P2) is less than or equal to 10 bpm (indicating that workers are not recovering adequately), shorten the next work cycle by 1/3 without changing the rest period.
 - d. At the next rest period, if P1 is still equal to or greater than 110 bpm, and if (P1 – P2) is still less than or equal to 10 bpm, shorten the following work cycle by 1/3 without changing the rest period.
 - e. At the third rest period, if P1 is still equal to or greater than 110 bpm and (P1 – P2) is still less than or equal to 10 bpm, the worker should not be allowed to continue work until repeated pulse measurements are in the acceptable range (i.e., P1 is less than 110 bpm and (P1 – P2) is greater than 10 bpm). Do not leave the worker alone during the recovery time. Watch for signs of heat illness and be prepared to implement emergency response as necessary.

URS SAFETY MANAGEMENT STANDARD
Heat Stress

- D. Record monitoring results and worker's self-assessments on Attachment 018-1 NA – Heat Stress Monitoring Record.
- E. Investigate the use of auxiliary cooling devices in extreme heat conditions.
- F. Conduct briefings for employees regarding health hazards and control measures associated with heat stress whenever conditions require the implementation of heat stress monitoring. Review the information provided in Supplemental Information A.
- G. Provide cool water and electrolyte replacement drinks as described in Supplemental Information A.
- H. Allow employees who are not accustomed to working in hot environments appropriate time for acclimatization, as described in Supplemental Information A.
- I. Provide break areas as described in Supplemental Information A.

5. Documentation Summary

The following information will be maintained in the project file:

- A. Heat Stress Monitoring Records
- B. Employee Safety Briefing Verification Forms

6. Resources

- A. NIOSH – Working in Hot Environments (Publication No. 86-112), 1986
- B. NIOSH – Criteria for a Recommended Standard for Occupational Exposures to Hot Environments (Publication No. 86-113), 1986
- C. ACGIH – Documentation of the Threshold Limit Values and Biological Indices, 2003
- D. AFL-CIO Building Trades Division – Heat Stress in Construction
- E. Attachment 018-1 NA – Heat Stress Monitoring Record

7. Supplemental Information

- A. Heat Stress Informational Supplement

HEAT RASH

Heat rash (prickly heat) may result from continuous exposure to heat or humid air. It appears as red papules (elevated skin lesion), usually in areas where the clothing is restrictive, and gives rise to a prickly sensation, particularly as sweating increases. It occurs in skin that is persistently wetted by un-evaporated sweat. The papules may become infected unless treated.

First Aid for Heat Rash - To prevent heat rash, shower after work, dry off thoroughly, and put on clean, dry underwear and clothes. Try to stay in a cool place after work. If, in spite of this, you develop heat rash, see your physician.

HEAT CRAMPS

Heavy sweating with inadequate electrolyte replacement causes heat cramps. Signs and symptoms include:

- Muscle spasms.
- Pain in the hands, feet and abdomen.

First Aid for Heat Cramps - Leave the work area, and rest in a cool, shaded place.

Mild heat cramps can be treated by drinking beverages that contain salt or eating salty food. Severe heat cramps are treated with fluids and salts given intravenously.

Once the spasms disappear, you may return to work. Taking adequate breaks and drinking electrolyte replacement drink should prevent the cramps from returning.

HEAT EXHAUSTION

Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool, moist skin.
- Heavy sweating.
- Dizziness.
- Nausea.
- Fainting.
- Headache.
- Blurred vision.
- Vomiting.

The key here is that the victim is still sweating, so the cooling system is still working; it's just under severe stress. The body core temperature may be elevated, but not higher than

104°F. It is important to recognize and treat these symptoms as soon as possible, as the transition from heat exhaustion to the very hazardous heat stroke can be quite rapid.

First Aid for Heat Exhaustion – Treatment involves replacing fluids (rehydration) and salts and removing the person from the hot environment. If symptoms are mild, sipping cool, slightly salty beverages every few minutes may be all that is needed. Removing or loosening clothing and applying wet cloths or ice packs to the skin also aid cooling.

HEAT STROKE

Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels, typically at or above 104°F. Immediate action must be taken to cool the body before serious injury and death occurs. Competent medical help must be obtained. Signs and symptoms are:

- Red, hot, usually dry skin.
- Lack of or reduced perspiration (lack of perspiration may be masked for those wearing chemical protective clothing since perspiration from earlier in the day will be present).
- Nausea.
- Vomiting.
- Dizziness and confusion.
- Strong, rapid pulse.
- Coma.

First Aid for Heat Stroke - THIS IS A MEDICAL EMERGENCY! SUMMON MEDICAL ASSISTANCE IMMEDIATELY!

While awaiting transportation to the hospital, a person should be wrapped in cold, wet bedding or clothing; immersed in a lake, stream, or cool bathtub; or cooled with ice. At the hospital, body cooling is usually accomplished by removing the clothes and covering the exposed skin with water or ice. To speed evaporation and body cooling, a fan may be used to blow air on the body. Body temperature is measured frequently, often constantly. To avoid overcooling, cooling is stopped when the body temperature is reduced to about 102°F.

HEAT STRESS PREVENTION

The best approach to avoiding heat-related illness is through preventative heat stress management.

Rest areas - A relatively cool, shaded area must be provided for breaks when ambient temperatures exceed 70°F (21°C) and workers are wearing chemical protective clothing (including uncoated Tyvek), or if temperatures exceed 80°F (26°C) and workers are wearing "Level D" coveralls or work clothes. For hazardous waste sites, the rest area should be located in the support zone adjacent to the contamination reduction zone, situated so that part of it is in the decon area so workers can take breaks without going through full decon. If

shade is not available, shaded areas shall be constructed. This same type of canopy can be set up to shade personnel performing various types of work in hot weather.

Liquids - Encourage employees to drink plenty of cool plain water and electrolyte replacement drinks. Supplementing water with cool electrolyte replacement drinks, such as Gatorade, Squench or Quik-kick (drink), is helpful to employees who tend to sweat a lot. Do not use "community cups"; use paper cups. Have workers drink 16 ounces (0.5 liters) of drink before beginning work, such as in the morning and after lunch. At each break, workers should drink 8 to 16 ounces (0.25 to 0.5 liters). Employees should not wait until they are thirsty to drink.

Discourage the use of alcohol during non-working hours, and discourage the intake of coffee during work hours, as these make heat stress control more difficult.

Acclimatization - This is the process by which your body "gets used to" hot work environments. This is achieved by slowly increasing workloads. Start at 50 percent capacity on day one, and increase by 10 percent per day; on day six, you'll be at 100 percent. You don't lose acclimatization over a weekend, but it'll start to decrease after three to four days. If you don't do hot work for a week, the acclimatization is gone. You don't have to do full shift hot work to achieve or retain acclimatization; a minimum of 100 minutes of continuous hot work exposure per day is adequate.

Auxiliary Cooling - Auxiliary cooling is usually obtained by providing workers with a specially-designed vest, which is worn under the protective clothing, but over any underclothing. These vests typically provide cooling via one of two methods: the use of ice or other frozen media, or the use of a vortex cooler. Each method has its advantages and disadvantages.

The frozen media vest requires a means for freezing the media, and the media (usually water or "blue ice") will melt, requiring replacement.

The vortex cooler tends to cool more uniformly. Instead of frozen media, this vest uses the expansion of compressed air to cool the wearer. The drawback is the compressed air requirement, but this is negated when the wearer is already using an airline respirator supplied by a compressor. A vortex cooler should not be supplied from air cylinders, as this will draw down the cylinders rapidly.

Auxiliary cooling should be considered when the following conditions exist:

- Ambient temperature over 80°F (26°C).
- Workers are wearing impermeable garments (i.e., Tyvek, Saranex, Chemrel, etc.).
- It is desirable to have long work shifts with minimum interruption.

**URS SAFETY MANAGEMENT STANDARD 026
NOISE AND HEARING CONSERVATION**

URS SAFETY MANAGEMENT STANDARD

Noise and Hearing Conservation

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies where personnel may encounter noise exposures that may exceed 85 decibels, measured using an A-weighted scale (dBA), as an 8-hour time-weighted average (TWA).

2. Purpose and Scope

The purpose of this procedure is to protect employees from hazardous noise exposures and to prevent hearing loss.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 026 NA – North America

SMS 026 EU – UK and Ireland, Europe, and Middle East

SMS 026 AP4 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Noise and Hearing Conservation

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies where personnel may encounter noise exposures that may exceed 85 decibels, measured using an A-weighted scale (dBA), as an 8-hour time-weighted average (TWA).

2. Purpose and Scope

The purpose of this procedure is to protect employees from hazardous noise exposures and to prevent hearing loss.

3. Implementation

Implementation of this procedure is the responsibility of the URS manager directing activities of the facility, site, or project location.

4. Requirements

A. General

1. The use of hearing protectors is required in any location where powered or motorized equipment or any other noise source could reasonably be expected to exceed 85 dBA. Whenever information indicates that any employee's exposure may equal or exceed an 8-hour TWA of 85 dBA, the project manager or location manager will be responsible for enforcing the proper use of hearing protectors.
2. Implement a hearing conservation program in accordance with 29 Code of Federal Regulations (CFR) 1910.95(c) when applicable. Work not applicable to 29 CFR 1910.95(c) will assess hazards of noise exposure on a task basis, and implement engineering or administrative controls to reduce employee noise exposure.
3. Hearing protectors will be used in the event that administrative or engineering controls are either not effective or not feasible, and the following criteria will be applicable to selection of hearing protection devices.
 - a. Require that at least two types of hearing protectors are available to employees free of charge, and that the type of hearing protector is suitable to the task.

URS SAFETY MANAGEMENT STANDARD **Noise and Hearing Conservation**

- b. Require that hearing protectors are used in accordance with manufacturer's specifications to effectively protect hearing.

B. Noise Surveys

1. Noise surveys must be conducted in a manner that reasonably reflects the exposure of the affected employees. Surveys must be conducted under the supervision of a URS Health, Safety, and Environment (HSE) Representative.
2. Sound-level meters and audio dosimeters used to determine employee exposure to noise sources must be Type II (accurate to within +/- 2 dBA), operated in "slow" response, on the "A" scale, and be calibrated to factory guidelines (including periodic factory recalibration).

C. Noise Controls

Eliminate noise sources to the extent possible. Examples of controls that must be considered include:

1. Adding or replacing mufflers on motorized equipment.
2. Adding mufflers to air exhausts on pneumatic equipment.
3. Following equipment maintenance procedures to lubricate dry bearings and replace worn or broken components.
4. Isolating loud equipment with barriers.
5. Replacing loud equipment with newer and quieter models.
6. Using caution signs and Hearing Protection Required signs to designate noisy work areas.
7. Installing HPD-dispensing devices at the entrance to noisy work areas.

D. Audiometric Exams

1. Tests
 - a. Details on the medical surveillance program (including audiometric testing) are included in SMS 024 – Medical Screening and Surveillance.

URS SAFETY MANAGEMENT STANDARD

Noise and Hearing Conservation

- b. Audiometric tests will be performed by a person meeting the requirements described in 29 CFR 1910.95(g)(3). Within 6 months of an employee's first exposure at or above the action level, a valid baseline audiogram will be established, against which subsequent audiograms can be compared. Testing to establish a baseline audiogram will be preceded by 14 hours without exposure to noise. Hearing protectors may be used as a substitute for the requirement that a baseline audiogram will be preceded by 14 hours without exposure to workplace noise. The medical surveillance provider will notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination. For multi-year projects, an annual audiogram will be obtained for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.
- c. Each employee's annual audiogram will be compared to that employee's baseline audiogram to determine if the audiogram is valid, and if there is a standard threshold shift (STS). A standard threshold shift is a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 hertz (Hz) in either ear. If the annual audiogram shows that an employee has suffered an STS, the employer will obtain a retest within 30 days, and consider the results in assessing an STS as the annual audiogram. The audiologist, otolaryngologist, or physician will review problem audiograms, and will determine whether there is a need for further evaluation. If an STS has occurred, the medical surveillance provider will notify the employee within 21 days of the determination.

E. Standard Threshold Shifts

If an employee's test results show a confirmed STS, their hearing protection will be evaluated and refitted, and a medical evaluation may be required.

F. Training

Verify that each employee who must work in a noisy environment is current on required Hearing Conservation Training. Training must include the following topics:

1. The effects of noise on hearing.
2. The purpose of hearing protectors.

URS SAFETY MANAGEMENT STANDARD

Noise and Hearing Conservation

3. The advantages and disadvantages of various types of hearing protectors.
4. The attenuation of various types of hearing protection.
5. The selection, fitting, care, and use of hearing protectors.
6. The purpose of audiometric testing.
7. An explanation of the audiometric testing procedure.

5. Documentation Summary

The following documentation will be maintained in the project file:

- A. Noise surveys, when applicable.
- B. Training records.

6. Resources

- A. U.S. Occupational Safety and Health Administration (OSHA) Standard – Occupational Noise Exposure – 29 CFR 1910.95
- B. U.S. OSHA Construction Standard – Occupational Noise Exposure – 29 CFR 1926.52 and 1926.101
- C. U.S. MSHA – Occupational Noise Exposure 30 CFR 62
- D. U.S. FRA – Occupational Noise Exposure 49 CFR 227
- E. U.S. OSHA Technical Links – Noise and Hearing Conservation
- F. American Industrial Hygiene Association: Protect Yourself from Noise-Induced Hearing Loss
- G. National Hearing Conservation Association web site
- H. SMS 024 – Medical Screening and Surveillance

**URS SAFETY MANAGEMENT STANDARD 029
PERSONAL PROTECTIVE EQUIPMENT**

URS Safety Management Standard **Personal Protective Equipment**

1. Applicability

This standard applies to all operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to provide information on recognizing those conditions that require PPE. PPE is designed to protect the employee from health and safety hazards that cannot be practically removed from the work environment.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 029 NA – North America

SMS 029 EU – UK and Ireland, Europe, and Middle East

SMS 029 AP6 – Asia Pacific

URS Safety Management Standard **Personal Protective Equipment**

1. Applicability

This standard applies to all operations of URS Corporation and its subsidiary companies where the use of personal protective equipment (PPE) is anticipated.

2. Purpose and Scope

The purpose of this standard is to provide information on recognizing those conditions that require PPE. PPE is designed to protect the employee from health and safety hazards that cannot be practically removed from the work environment.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

4. Requirements

- A. Perform hazard assessments for those work activities that are likely to require the use of PPE.
 - 1. Use Attachment 029-1 NA to perform the assessment.
 - 2. Reevaluate completed hazard assessments when job conditions or duties change.
- B. Eliminate the hazards identified in Attachment 029-1 NA, if possible, through engineering or administrative controls.
- C. Select PPE that will protect employees if hazards cannot be controlled or eliminated.
 - 1. See Attachment 029-1 NA for recommended PPE.
 - 2. Review Material Safety Data Sheets for chemicals used for PPE recommendations.
 - 3. If needed, consult with the applicable safety representative for assistance in selecting PPE.
- D. Provide required PPE to employees free of charge (excluding, in some instances, components of standard work attire such as steel-toed boots and prescription safety glasses), assuring proper fit and providing a choice

URS Safety Management Standard **Personal Protective Equipment**

if more than one type of PPE is available. Where applicable, the local policy (office or project) regarding reimbursement for PPE will prevail.

- E. Provide the employees with the appropriate PPE whenever a hazard is recognized and PPE is required. However, when PPE is not required and the employee elects to wear his or her own PPE, the manager directing activities must ensure that the employee is properly trained in the fitting, donning, doffing, cleaning, and maintenance of his or her employee-owned equipment.
- F. Make employees aware that they are responsible for PPE maintenance, care, and proper use. Employees must inform their supervisors when a need arises to use PPE for which the employee has not received training, or when a condition exists where adequate PPE is not available.
- G. Conduct and document employee training.
 - 1. Train all employees who are required to wear PPE.
 - 2. Require that training includes:
 - a. When PPE is to be worn.
 - b. The type of PPE necessary for the task to be completed.
 - c. How to properly don, doff, adjust, and wear PPE.
 - d. Limitations of PPE.
 - e. Proper care, maintenance, useful life and disposal of PPE.
 - 3. Conduct training before PPE is assigned.
 - 4. Provide refresher training when:
 - a. The workplace changes, rendering previous PPE and training obsolete.
 - b. New types of PPE are assigned to the worker.
 - c. The worker cannot demonstrate competency in PPE use.
 - 5. Keep written records of the employees trained and type of training provided, including the date of training.

H. PPE Specific Information

URS Safety Management Standard **Personal Protective Equipment**

1. Head Protection

- a. Use hard hats in areas where there is the possible danger of head injury from the impact of falling or flying objects, striking against objects, electrical shock and/or burns, or any combination of these hazards. Hard hats will be worn when required by site safety procedures, client/site requirements, or when posted as an entry requirement.
- b. Adjust the hard hat suspension to fit the wearer and to keep the shell a minimum of 1.25 inches (3.2 cm) above the wearer's head. Do not store materials in the suspension. Cold weather liners and perspiration control bands may be utilized within the hard hat unless specifically excluded by the manufacturer.
- c. Wear hard hats in the forward position unless written verification and instructions from the hard hat manufacturer indicate your hard hat model has been tested and found to be compliant when worn backwards.
- d. Type I helmets are designed to protect the employee from impact and penetration caused by objects hitting the top of the head; Type II helmets extend this protection to the sides of the head as well.
- e. Class G (General) helmets provide protection against impact, penetration, and limited electrical hazards up to 2,200 volts. Class E (Electrical) helmets meet the same criteria, but electrical protection is increased to 20,000 volts. Class C (Conductive) helmets only provide impact and penetration protection.
- f. Do not use bump caps as protection against head injury.
- g. Do not alter hard hats in a way that will downgrade their efficiency. Typical prohibited alterations include painting, drilling holes in shell, application of metal jewelry, etc. Replace hats with these alterations or with excessive scratches.
- h. Wear integral chinstraps when working in high-wind conditions or near helicopters.

URS Safety Management Standard
Personal Protective Equipment

- i. Inspect hard hats before use and remove from service if any of the following are observed: cracking, tearing, fraying, chalking, and flaking.
 - j. Remove hard hats and their components from service and replace as recommended by the manufacturer. Hard hats must be replaced after no more than 5 years.
2. Hearing Protection
- a. Provide hearing protection in any location where powered or motorized equipment or any other noise source could reasonably be expected to exceed 85 dBA. Each task in the work area will be evaluated for potential worker noise exposure as required.
 - b. Review SMS 026 – Noise and Hearing Conservation – for additional information.
3. Eye and Face Protection
- a. Use eye and/or face protection when machines or operations create the risk of eye and/or face injuries due to physical, chemical, and/or radiation sources. Safety glasses will be worn when required by site safety procedures, client/site requirements, or when posted as an entry requirement.
 - b. Provide safety glasses that can be worn over corrective spectacles for employees whose vision requires the use of corrective lenses. Employees will consult with the applicable Division safety representative or project managers for policies on reimbursement for prescription safety glasses.
 - c. Do not use of sunglasses in place of required safety glasses. Heavily tinted safety glasses will only be used in outdoor areas with suitable lighting. Colored or lightly tinted or gradient lenses may be used indoors as appropriate to the work conditions.
 - d. Tasks requiring grinding, cutting, power washing, or handling corrosive chemicals will require face shields over safety glasses. For welding tasks, refer to Supplemental Information B for lens selection criteria.

URS Safety Management Standard **Personal Protective Equipment**

- e. Consult Supplemental Information A for additional information on types of eye and face protection and their various uses.

4. Hand Protection

- a. Wear gloves when the hands are exposed to hazards such as, but not limited to, chemical absorption, cuts or lacerations, abrasions, punctures, chemical burns, thermal burns, vibration, or temperature extremes.
- b. Gloves must always be provided to workers for tasks with potential hand hazards.
- c. Identify hand hazards during job or task hazard analysis. A supply of appropriate gloves in various sizes must be provided to workers assigned to work on that task.
- d. Inspect chemical gloves for degradation or tears prior to use. Do not remove chemical gloves from the work area if it is visibly contaminated. Chemical gloves may be decontaminated or disposed of according to specified procedures. In some cases, inner disposable chemical gloves (e.g., nitrile) will be required for protection of hands during removal of contaminated gloves.
- e. Select chemical-resistant gloves using manufacturer's hazard-based selection programs or other published guides that identify compatibility of glove material with chemical hazards. Selection must also consider physical requirements of the task with regard to puncture resistance and need for flexibility and dexterity in performing the task.
- f. Review SMS 064 – Hand Safety – for additional information.

5. Foot Protection

- a. Wear appropriate specialized protective footwear in the following environments:
 - i. Using harmful corrosive substances or processes.
 - ii. Having a high probability of puncture or crushing injuries.

URS Safety Management Standard
Personal Protective Equipment

- iii. Performing regular assembly or disassembly of heavy system components.
 - iv. Working in wet conditions.
 - v. Working in extreme cold.
 - vi. Working around exposed electrical wires or connections.
 - vii. When using hand-operated compactors, snow blowers, pressure washers, or steam cleaners.
 - viii. Other activities or areas as designated by supervisors or safety personnel.
- b. Employees assigned to field projects who are not required to wear specified protective footwear (e.g., steel-toed boots, metatarsal protection, rubber boots, insulated boots, etc.) will wear substantial leather, high-sided work boots. Shoes (leather, canvas, tennis, deck, or other types of material), sandals, high-heeled shoes, etc., are not allowed on field project sites.
- I. Maintain Protective Equipment
- 1. Check PPE for damage, cracks, and wear prior to each use. Replace or repair equipment not found in good condition.
 - 2. Decontaminate non-disposable PPE with appropriate cleaner, as necessary, to prevent degradation of the equipment. Staff will remove any non-impermeable PPE/clothing that becomes contaminated with hazardous substances. These instructions are reiterated in the emergency decontamination procedures in the Health and Safety Plans.
- J. Periodically inspect worksites where employees are using PPE using Attachment 029-2 NA. Regularity of inspections should be determined by the project manager and/or site safety representative.

URS Safety Management Standard **Personal Protective Equipment**

5. Documentation Summary

The following information will be maintained in the project file:

- A. Completed Hazard Assessment Certification Forms (Attachment 029-1 NA).
- B. Completed Personal Protective Equipment Inspection Sheet (Attachment 029-2 NA).
- C. Documentation of employee training.

6. Resources

- A. U.S. Occupational Safety and Health Administration (OSHA) Standards – Personal Protective Equipment – 29 Code of Federal Regulations (CFR)1910, Subpart I
- B. U.S. OSHA Construction Standard - Personal Protective Equipment – 29 CFR 1926 Subpart E
- C. U.S. OSHA Technical Links – Personal Protective Equipment
- D. American National Standards Institute – ANSI Z89.1-2003, Protective Headwear
- E. American National Standards Institute – ANSI Z87.1 - 1989 – Eye and Face Protection
- F. American National Standards Institute /International Safety Equipment Association, ANSI/ISEA 107 - 2004 – Standard for High-Visibility Safety Apparel
- G. American Society for Testing and Materials, ASTM F13-WK4519, Specification for Personal Protective Footwear
- H. *Quick Selection Guide to Chemical Protective Clothing*, K Forsberg and S.Z. Mansdorf, Wiley Interscience, 2002
- I. Best Manufacturing Co. <http://www.bestglove.com/>. Information on chemical resistant gloves.
- J. SMS 040 – Fall Protection

URS Safety Management Standard
Personal Protective Equipment

- K. SMS 026 – Noise and Hearing Conservation
- L. SMS 064 – Hand Safety
- M. Attachment 029-1 NA – Hazard Assessment Form
- N. Attachment 029-2 NA – Personal Protective Equipment Inspection Form

7. Supplemental Information

- A. Eye and Face Protector Selection Guide
- B. Welding Lens Selector
- C. Traffic Control Class Guidelines and Scenarios



Health, Safety and Environment
**HAZARD ASSESSMENT
CERTIFICATION FORM**

Attachment 029-1 NA

Issue Date: July 2000
Revision 5: February 2009

Location: _____ Job No.: _____

Date: _____ Assessment conducted by: _____

Specific tasks performed at this location: _____

If any of the indicated hazards are present, eliminate the hazard or use the indicated PPE.

Overhead Hazards

- | | | |
|---|--|---|
| 1. Suspended/elevated loads, beams, or objects that could fall or strike head | <input type="checkbox"/> Yes <input type="checkbox"/> No | Hard hat, ANSI Z89, Class G, E or C |
| 2. Flying objects that could strike head | <input type="checkbox"/> Yes <input type="checkbox"/> No | Hard hat, ANSI Z89, Class G, E or C |
| 3. Energized wires or equipment that could strike head | <input type="checkbox"/> Yes <input type="checkbox"/> No | Hard hat, ANZI Z89, Class G or E (dependent on potential voltage) |
| 4. Sharp objects or corners at head level | <input type="checkbox"/> Yes <input type="checkbox"/> No | Hard hat, ANSI Z89, Class G, E or C |

Eye Hazards

- | | | |
|--|--|---|
| 5. Chemical splashes or irritating mists | <input type="checkbox"/> Yes <input type="checkbox"/> No | See Supplemental Information A for additional information |
| 6. Excessive dust | <input type="checkbox"/> Yes <input type="checkbox"/> No | Safety glasses or goggles |
| 7. Smoke and/or fumes | <input type="checkbox"/> Yes <input type="checkbox"/> No | Safety goggles |
| 8. Welding operations | <input type="checkbox"/> Yes <input type="checkbox"/> No | Welding goggles; See Supplemental Information A and B for additional information |
| 9. Lasers/optical radiation | <input type="checkbox"/> Yes <input type="checkbox"/> No | Have URS HSE Representative assist you in proper selection |
| 10. Projectiles | <input type="checkbox"/> Yes <input type="checkbox"/> No | Safety glasses or goggles plus face shield |
| 11. Sawing, cutting, chipping, and/or grinding | <input type="checkbox"/> Yes <input type="checkbox"/> No | Safety glasses or goggles plus face shield; See Supplemental Information A for additional information |

Face Hazards

- | | | |
|---|--|---|
| 12. Chemical splashes or irritating mists | <input type="checkbox"/> Yes <input type="checkbox"/> No | Safety goggles; See Supplemental Information A for more information; add face shield if irritating or corrosive |
| 13. Welding operations | <input type="checkbox"/> Yes <input type="checkbox"/> No | Welding goggles or welding helmet; see Supplemental Information A and B for additional information |
| 14. Projectiles | <input type="checkbox"/> Yes <input type="checkbox"/> No | Safety glasses or goggles plus face shield |

Hand Hazards

- | | | |
|----------------------------------|--|--|
| 15. Chemical exposure | <input type="checkbox"/> Yes <input type="checkbox"/> No | Use chemical-resistant gloves specific to hazard; consult MSDS, chemical hazard guide, or HSE Representative |
| 16. Sharp edges, splinters, etc. | <input type="checkbox"/> Yes <input type="checkbox"/> No | Leather or Kevlar gloves |
| 17. Temperature extremes – heat | <input type="checkbox"/> Yes <input type="checkbox"/> No | Leather gloves, welder's gloves, hot mill gloves |

**HAZARD ASSESSMENT
CERTIFICATION FORM**

If any of the indicated hazards are present, eliminate the hazard or use the indicated PPE.

- | | | |
|--|--|---|
| 18. Temperature extremes – cold | <input type="checkbox"/> Yes <input type="checkbox"/> No | Insulated gloves |
| 19. Blood, fungus, biological agents | <input type="checkbox"/> Yes <input type="checkbox"/> No | Nitrile gloves |
| 20. Exposure to live electrical currents | <input type="checkbox"/> Yes <input type="checkbox"/> No | Electrical gloves; consult HSE representative |
| 21. Sharp tools, machine parts, etc. | <input type="checkbox"/> Yes <input type="checkbox"/> No | Leather or Kevlar gloves |
| 22. Material handling | <input type="checkbox"/> Yes <input type="checkbox"/> No | Leather gloves |

Foot Hazards

- | | | |
|---|--|---|
| 23. Heavy materials (greater than 50 pounds) handled by employees | <input type="checkbox"/> Yes <input type="checkbox"/> No | Safety shoes or boots |
| 24. Potential to crush whole foot | <input type="checkbox"/> Yes <input type="checkbox"/> No | Safety shoes or boots with metatarsal guard |
| 25. Sharp edges or points (puncture risk) | <input type="checkbox"/> Yes <input type="checkbox"/> No | Safety shoes or boots |
| 26. Exposure to electrical wires | <input type="checkbox"/> Yes <input type="checkbox"/> No | Safety shoes or boots with electrically non-conductive soles |
| 27. Slippery conditions | <input type="checkbox"/> Yes <input type="checkbox"/> No | Rubber-soled boots or grips |
| 28. Chemical contamination | <input type="checkbox"/> Yes <input type="checkbox"/> No | Rubber, PVC, or polyurethane boots or boot covers with puncture and protective toe if task required |
| 29. Wet conditions | <input type="checkbox"/> Yes <input type="checkbox"/> No | Rubber boots or boot covers |
| 30. Construction/demolition | <input type="checkbox"/> Yes <input type="checkbox"/> No | Safety boots with metatarsal guard if foot-crushing hazard exists |

Fall Hazards

- | | | |
|---|--|---------------------------------------|
| 31. Elevations above 4 feet (general industry) or 6 feet (construction) without guardrails | <input type="checkbox"/> Yes <input type="checkbox"/> No | ANSI A-10.14 Type 1 full-body harness |
| 32. Suspended scaffolds, boatswain's chairs, float scaffolds, or suspended staging | <input type="checkbox"/> Yes <input type="checkbox"/> No | ANSI A-10.14 Type 1 full-body harness |
| 33. Working in trees | <input type="checkbox"/> Yes <input type="checkbox"/> No | ANSI A-10.14 Type 1 full-body harness |
| 34. Working in vehicle-mounted elevating work platforms (e.g., bucket trucks, aerial lifts) | <input type="checkbox"/> Yes <input type="checkbox"/> No | ANSI A-10.14 Type 1 full-body harness |

Water Hazards

- | | | |
|--|--|--|
| 35. Working on or above water where a risk of drowning exist | <input type="checkbox"/> Yes <input type="checkbox"/> No | U.S. Coast Guard approved personal floatation device; Type I, II, or III |
|--|--|--|

Excessive Heat or Flame

- | | | |
|---|--|--|
| 36. Full body chemical protective clothing in temperatures greater than 80 °F | <input type="checkbox"/> Yes <input type="checkbox"/> No | Cooling vest |
| 37. Work around molten metal or flame | <input type="checkbox"/> Yes <input type="checkbox"/> No | Nomex or heat reflective clothing |
| 38. Welding activities | <input type="checkbox"/> Yes <input type="checkbox"/> No | Welding leathers for those areas that are exposed to flame, spark, or molten metal |

Respiratory Hazards

- | | | |
|---|--|--|
| 39. Airborne particulates, gases, vapors, or mists in excess of established exposure limits | <input type="checkbox"/> Yes <input type="checkbox"/> No | Refer to SMS 042 or URS HSE Representative for respirator selection guidance |
|---|--|--|



Health, Safety and Environment
**HAZARD ASSESSMENT
CERTIFICATION FORM**

Attachment 029-1 NA

Issue Date: July 2000
Revision 5: February 2009

If any of the indicated hazards are present, eliminate the hazard or use the indicated PPE.

Excessive Noise

40. Exposure to noise Yes No Ear plugs, muffs or both

Body and Leg Protection

41. Chemical exposure Yes No Contact URS HSE Representative for assistance in proper selection
42. Using chainsaw, cutting brush Yes No Chainsaw chaps
43. Exposure to snakes Yes No Snake chaps
44. Exposure to vehicle traffic or heavy equipment Yes No See SMS 032 and SMS 029 NA – Supplemental Information C for additional guidance

I certify that the above inspection was performed to the best of my knowledge and ability, based on the hazards present on: _____

Name _____

Signature _____



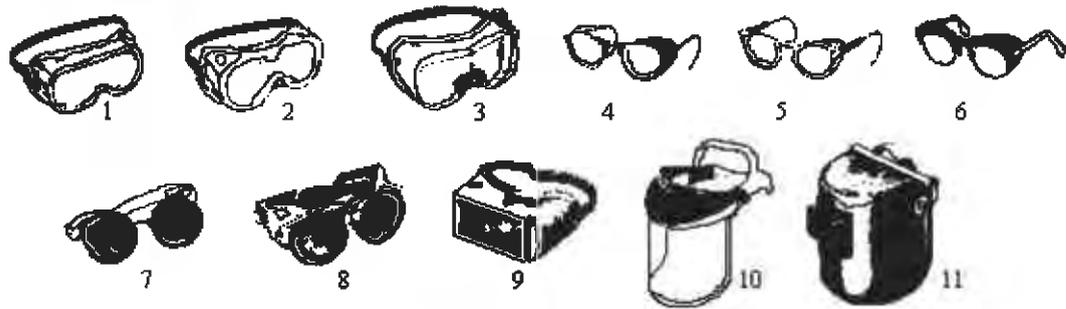
Health, Safety and Environment
**PERSONAL PROTECTIVE EQUIPMENT
INSPECTION SHEET**

Attachment 029-2 NA
Issue Date: July 2000
Revision 5: February 2009

Name of Inspector _____ Date Inspected _____

Hard Hats	
1. The brim or shell does not show signs of exposure and excessive wear, loss of surface gloss, chalking, or flaking.	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Suspension system in hard hat does not show signs of deterioration, including cracking, tearing, or fraying.	<input type="checkbox"/> Yes <input type="checkbox"/> No
3. The brim or shell is not cracked, perforated, or deformed.	<input type="checkbox"/> Yes <input type="checkbox"/> No
4. Employees use hard hats in marked areas.	<input type="checkbox"/> Yes <input type="checkbox"/> No
5. Areas requiring hard hat usage are marked.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Safety Shoes	
6. Safety shoes used by employees do not show signs of excessive wear.	<input type="checkbox"/> Yes <input type="checkbox"/> No
7. Areas requiring safety shoes are marked.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Work Gloves	
8. Gloves are available and worn when needed.	<input type="checkbox"/> Yes <input type="checkbox"/> No
9. Gloves are appropriate for the task.	<input type="checkbox"/> Yes <input type="checkbox"/> No
10. Gloves do not show signs of excessive wear such as cracks, scrapes, or lacerations, thinning or discoloration, or break-through to the skin.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Protective Clothing	
11. Protective clothing (including traffic control apparel) is worn by employees when required.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Hearing Protection	
12. Noise hazard areas are posted.	<input type="checkbox"/> Yes <input type="checkbox"/> No
13. Employees are using earplugs or muffs when using noise producing equipment or working in posted noise hazard areas.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Safety Glasses	
14. Eye hazard areas are marked or posted.	<input type="checkbox"/> Yes <input type="checkbox"/> No
15. Employees use safety glasses when working in eye hazard areas or working with equipment that produces an eye hazard.	<input type="checkbox"/> Yes <input type="checkbox"/> No
16. Face shields are used when required and worn over safety glasses.	<input type="checkbox"/> Yes <input type="checkbox"/> No

REMARKS (All "No" answers indicate a hazard which needs to be fixed.)



- | | |
|--|---|
| <ol style="list-style-type: none"> 1. GOGGLES, Flexible Fitting, Regular Ventilation 2. GOGGLES, Flexible Fitting, Hooded Ventilation 3. GOGGLES, Cushioned Fitting, Rigid Body 4. SPECTACLES, Metal Frame, with Sideshields 5. SPECTACLES, Plastic Frame, with Sideshields 6. SPECTACLES, Metal-Plastic Frame, with Sideshields | <ol style="list-style-type: none"> 7. GOGGLES, Eyecup Type (Tinted Lenses – Welding; Clear Lenses – Chipping) 8. GOGGLES, Coverspec Type (Tinted Lenses – Welding; Clear Lenses – Chipping) 9. WELDING GOGGLES, Coverspec Type, Tinted Plate Lens 10. FACE SHIELD (Plastic or Mesh Window) 11. WELDING HELMETS |
|--|---|

APPLICATIONS		
OPERATION	HAZARDS	RECOMMENDED PROTECTORS Bold Type Numbers = Slightly Preferred Protection
ACETYLENE – BURNING ACETYLENE – CUTTING ACETYLENE – WELDING	SPARKS, HARMFUL RAYS, MOLTEN METAL, FLYING PARTICLES	7,8,9
CHEMICAL HANDLING	SPLASH, ACID BRUNS, FUMES	2,10 (For severe exposure, add 10 over 2)
CHIPPING	FLYING PARTICLES	1,2,4,5,6,7,8
ELECTRIC (ARC) WELDING	SPARKS, INTENSE RAYS, MOLTEN METAL	9,11 (11 in combination with 4,5,6 in tinted lenses, advisable)
FURNACE OPERATIONS	GLARE, HEAT, MOLTEN METAL	7,8,9 (For severe exposure, add 10)
GRINDING – LIGHT	FLYING PARTICLES	1,3,4,5,6,10
GRINDING – HEAVY	FLYING PARTICLES	1,3,7,8 (For severe exposure, add 10)
LABORATORY	CHEMICAL SPLASH, GLASS BREAKAGE	2 (10 when in combination with 4,5,6)
MACHINING	FLYING PARTICLES	1,3,4,5,6,10
MOLTEN METALS	HEAT, GLARE, SPARKS, SPLASH	7,8 (10 in combination with 4,5,6 in tinted lenses)
SPOT WELDING	FLYING PARTICLES, SPARKS	1,3,4,5,6,10

Non-side shield spectacles available for limited hazard use requiring only frontal protection.



Health, Safety and Environment
WELDING LENS SELECTION

SMS 029 NA
Supplemental Information B
Issue Date: February 2009

Operations	Electrode Size (1/32")	Arc Current	Minimum Protective Shade
Shielded metal arc welding (SMAW)	Less than 3	Less than 60	7
SMAW	3 – 5	60 – 160	8
SMAW	5 – 8	160 – 250	10
SMAW	More than 8	250 – 550	11
Gas metal arc welding and flux cored arc welding		Less than 60	7
Gas metal arc welding and flux cored arc welding		60 - 160	10
Gas metal arc welding and flux cored arc welding		160 – 250	10
Gas metal arc welding and flux cored arc welding		250 - 500	10
Gas tungsten arc welding		Less than 50	8
Gas tungsten arc welding		50 – 150	8
Gas tungsten arc welding		150 - 500	10
Air carbon arc cutting	(light)	Less than 500	10
Air carbon arc cutting	(heavy)	500 – 1000	11
Gas tungsten arc welding		Less than 20	8
Gas tungsten arc welding		20 – 100	8
Gas tungsten arc welding		100 – 400	10
Gas tungsten arc welding		400 – 800	11
Plasma arc cutting	(light)	Less than 300	8
Plasma arc cutting	(medium)	300 – 400	9
Plasma arc cutting	(heavy)	400 -800	10
Torch blazing			3
Torch soldering			2
Carbon arc welding			14
Gas welding			5 – 6
Oxygen cutting			3 - 5

A. Class 1 Safety Apparel

1. Class 1 safety apparel provides the minimum amount of required material to differentiate the wearer from the work environment.
2. At a minimum, this shall include 217 square inches (in²), or 0.14 square meters (m²), of fluorescent yellow-green, orange-red, or red background materials combined with 155 in² (0.10 m²) retro-reflective material. As an alternative, the apparel can have 310 in² (0.20 m²) of combined-performance material (i.e., materials that are both retro-reflective and fluorescent).
3. Class 1 safety apparel typically consists of a sleeveless traffic vest with retro-reflective bands no less than 0.98 inches (25 mm) in width.
4. Those occupational activities under which Class 1 safety apparel is typically used:
 - a. Permit full and undivided attention to approaching traffic;
 - b. Provide ample separation of the pedestrian worker from conflicting vehicle traffic; and
 - c. Permit optimum conspicuity in backgrounds that are not complex with vehicle and moving equipment speeds not exceeding 25 miles per hour (mph), or 40 kilometers per hour (kph).
5. Examples of pedestrian workers who could work in these situations may include:
 - a. Workers directing vehicle operators to parking/service locations;
 - b. Workers exposed to the hazards of warehouse equipment traffic;
 - c. Roadside "right-of-way" or sidewalk maintenance workers; and
 - d. Delivery vehicle drivers.

B. Class 2 Safety Apparel

1. Class 2 safety apparel provides superior visibility for the wearers by the additional coverage of the torso and is more conspicuous than Class 1.
2. At a minimum, this shall include 775 in² (0.50 m²) of fluorescent yellow-green, orange-red, or red background materials combined with 201 in² (0.13 m²) retro-reflective material. Combined-performance materials may not be used without background materials in Class 2.
3. Class 2 safety apparel typically consists of a full-torso sleeveless traffic vest with retro-reflective bands no less than 1.38 inches (35 mm) in width.
4. Those occupational activities under which Class 2 safety apparel is typically used:
 - a. Greater visibility is desired during inclement weather conditions;
 - b. Complex backgrounds are present;
 - c. Employees are performing tasks which divert attention from approaching vehicle traffic;

- d. Work activities take place in close proximity to vehicle traffic; and
 - e. Vehicle and moving equipment speeds exceed 25 mph (40 kph).
5. Examples of pedestrian workers who could work in these situations may include:
- a. Roadway construction workers;
 - b. Utility workers;
 - c. Survey crews;
 - d. Railway workers;
 - e. Forestry workers;
 - f. Parking and/or toll gate personnel;
 - g. Airport baggage handlers/ground crew;
 - h. Emergency response personnel;
 - i. Law enforcement personnel; and
 - j. Accident site investigators.

C. Class 3 Safety Apparel

1. Class 3 safety apparel offers greater visibility to the wearer in both complex backgrounds and through a full range of body movements. Visibility is enhanced beyond Class 2 by the enhancement of background and reflective materials to the arms and/or legs.
2. At a minimum, this shall include 1240 in² (0.80 m²) of fluorescent yellow-green, orange-red, or red background materials combined with 310 in² (0.20 m²) retro-reflective material. Combined-performance materials may not be used without background materials in Class 3.
3. Class 3 safety apparel typically consists of a coveralls, jumpsuits, long or short-sleeved jackets, or long-sleeved shirts with retro-reflective bands no less than 1.97 inches (50 mm) in width. A sleeveless garment or vest alone shall not be considered Class 3 apparel.
4. Those occupational activities under which Class 3 safety apparel is typically used:
 - a. Workers are exposed to significantly high vehicle speeds and/or reduced sight distances (note that several sources have interpreted the vehicle speed requirements as 50 mph (80 kph) or more);
 - b. The worker and vehicle operator have high task loads, clearly placing the worker in danger; or
 - c. The wearer must be conspicuous through a full range of body motions at a minimum of 1280 feet (390 m) and must be identifiable as a person.
5. Examples of pedestrian workers who could work in these situations may include:
 - a. Roadway construction personnel;
 - b. Utility workers;

- c. Survey crews;
- d. Emergency response personnel; and
- e. Flagging crews.

D. Class E Safety Apparel

1. Class E apparel includes trousers or shorts which are part of a Class 3 apparel ensemble. Frequently a Class 2 vest is paired with Class E trousers, creating an overall ensemble which meets Class 3 apparel requirements. Class E garments are not intended to be worn without Class 2 or 3 garments.
2. At a minimum, Class E trousers shall have 465 in² (0.30 m²) of fluorescent yellow-green, orange-red, or red background materials combined with 108 in² (0.07 m²) retro-reflective material. Retro-reflective material shall encircle each leg (360° of visibility) and be placed not less than 1.97 inches (50 mm) above the bottom leg of the trouser.
3. At a minimum, Class E shorts shall have 465 in² (0.30 m²) of fluorescent yellow-green, orange-red, or red background materials combined with 108 in² (0.07 m²) retro-reflective material. Retro-reflective material shall encircle each leg.

E. Headwear

1. Headwear is considered an important accessory and compliments the overall visibility of the wearer. High-visibility headwear enhances visibility to the head of a moving worker in daylight and helps define the shape of the human form during nighttime exposures.
2. At a minimum, high-visibility headwear shall have 78 in² (0.05 m²) of fluorescent yellow-green, orange-red, or red background materials combined with 10 in² (0.0065 m²) retro-reflective material. As an alternative, the headwear can have 78 in² (0.05 m²) of combined-performance material.

URS SAFETY MANAGEMENT STANDARD 030
SANITATION

URS SAFETY MANAGEMENT STANDARD

Sanitation

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to provide employees with appropriate personal hygiene facilities, including toilets, wash rooms, and eating facilities, to protect employees from unsanitary conditions.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 030 NA – North America

SMS 030 EU – UK and Ireland, Europe, and Middle East

SMS 030 AP7 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Sanitation

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to provide employees with appropriate personal hygiene facilities, including toilets, wash rooms, and eating facilities, to protect employees from unsanitary conditions.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility or site.

4. Requirements

A. Prior to the start of site activities, ensure the availability of adequate toilet and wash facilities. Note: Mobile crews having transportation readily available (within 5 minute travel time) to nearby toilet facilities need not be provided with facilities.

1. Flush toilets will be used where available.
2. For job sites without flush toilets readily available, one of the following must be provided:
 - a. Chemical toilets.
 - b. Combustion toilets.
 - c. Recirculation toilets.
3. Other than construction sites, toilets will be provided for employees of each sex at sites according to the following ratio:

Number of Employees	Minimum # of toilets ⁽¹⁾
1 to 15	1
16 to 35	2
36 to 55	3
56 to 80	4
81 to 110	5
111 to 150	6
Over 150	⁽²⁾

Notes:

(1) Where toilet facilities will not be used by women, urinals may be provided instead of the minimum specified.

(2) One (1) additional fixture for each additional 40 employees.

URS SAFETY MANAGEMENT STANDARD
Sanitation

- B. A means for washing hands must be provided next to or near toilet areas.
- C. For facilities under URS control:
 - 1. Maintain toilets and toilet area in good repair and in a clean and sanitary condition. Refer to SMS 021 – Housekeeping.
 - 2. Provide paper towels and soap or other suitable sanitizing material for washing hands.
 - 3. Construct toilets so that the interior is lighted, by artificial or natural light, adequate ventilation is provided, and all windows and vents are screened.
- D. Maintain availability and cleanliness of drinking (potable) water.
 - 1. Use backflow prevention devices, testing, and administrative controls for all potable water supply branches. Maintain backflow prevention devices in a sanitary condition.
 - 2. Keep water coolers and water dispensers in a sanitary condition and filled only with potable water. Clearly mark potable drinking water containers as "Drinking Water."
 - 3. Clean and sanitize water containers daily. Tightly close, seal, date, and mark containers as to the contents. Provide containers with a tap, and refill daily.
 - 4. Provide fountain-type dispensers or one-use cups at each water dispenser. Provide a waste receptacle where disposable cups are used.
 - 5. Do not use common drinking cups.
 - 6. Conspicuously post outlets for non-potable water such as water for industrial or firefighting purposes (e.g., Danger – Water Unfit for Drinking, Washing, or Cooking).
 - 7. Laboratory-test drinking water obtained from streams, wells, or other temporary sources in accordance with federal, state, or local regulations, or often enough to ensure it is suitable for consumption. Maintain records of testing reports and results.

URS SAFETY MANAGEMENT STANDARD

Sanitation

E. Eating Facilities

1. Operate and maintain food dispensing facilities established by URS in compliance with applicable health and sanitation regulations.
2. Ensure that buildings housing these facilities are floored completely, painted, well lighted, heated, ventilated, fly proof, and sanitary. Equip doors and windows with screens.
3. Use microwave ovens for food only.
4. Use refrigerators designated for food storage for food only (i.e., no chemical or samples storage).
5. Prohibit workers from eating or storing foods in areas where there is a potential for contamination.
6. Take positive control measures for protection against vermin, insects, and rodents.
7. Provide an ample supply of hot and cold water at all times in mess halls.
8. Clean break rooms /lunchrooms periodically. Refer to SMS 021 – Housekeeping.

F. Washing Facilities

1. Maintained each washing facility in a sanitary condition, and provide adequate water, soap, individual towels of cloth or paper, and covered receptacles for disposal of waste.
2. Provide emergency showers and eyewash facilities as required. Refer to SMS 065 – Injury Management.
3. Provide at least one shower for each 30 employees in construction camps. The use of a common towel is prohibited.

G. Waste Management:

1. Release sanitary sewage into sanitary sewer lines or to other proper disposal channels.
2. Do not dispose of garbage, refuse, or sewage in lakes, reservoirs, rivers, streams, or ditches.

URS SAFETY MANAGEMENT STANDARD **Sanitation**

3. Do not discharge hazardous waste into the sanitary sewer or storm sewer system.
4. Collect garbage and trash daily.
 - a. Provide lids for garbage containers located outside buildings, and keep them closed. Transport garbage offsite at least weekly.
 - b. Remove garbage from the site daily at remote field sites where wild animals are a hazard. Do not let garbage remain on site overnight.

H. Change Rooms

Provide heated and ventilated change rooms for changing, hanging, and/or drying clothing for operations subjecting workers to prolonged wetting or contact with hazardous materials.

I. Sleeping Facilities

1. Keep temporary sleeping quarters heated, ventilated, lighted, and clean. Screen all doors and windows.
2. Keep clean and sanitary, and periodically disinfect bunkhouses, bedding, and furniture.

J. Notify property manager of sanitation issues for sites not under URS control.

K. Personal Hygiene

Wash hands and face before eating, drinking, smoking, and using facilities.

L. Inspect work sites periodically in accordance with Attachment 030-1 NA.

5. Documentation Summary

The following information will be maintained in the project file:

- A. Completed inspection sheets.

URS SAFETY MANAGEMENT STANDARD
Sanitation

6. Resources

- A. U.S. Occupational Safety and Health Administration (OSHA) Construction Standard – Sanitation – 29 Code of Federal Regulations (CFR) 1926.51
- B. U.S. OSHA General Industry Standard – Sanitation – 29 CFR 1910.141
- C. SMS 021 - Housekeeping
- D. SMS 065 – Injury Management
- E. Attachment 030-1 NA - Sanitation Inspection Sheet



Health, Safety and Environment
SANITATION INSPECTION SHEET

Attachment 030-1 NA
Issue Date: June 1999
Revision 3: February 2009

Location: _____ Job No: _____

Date Inspected: _____ Name of Inspector: _____

Toilets

1. Are there an adequate number of toilets on site? Yes No NA
1 to 15 employees = 1 toilet
16 to 35 employees = 2 toilets
36 to 55 employees = 3 toilets
56 to 80 employees = 4 toilets
81 to 110 employees = 5 toilets
2. Toilets are in clean condition. Yes No NA
3. Toilet paper is provided. Yes No NA
4. Toilet areas are clean and sanitary. Yes No NA

Hand Washing Facilities

5. Hand washing facilities are provided near toilets. Yes No NA
6. Paper towels and soap are provided. Yes No NA

Drinking Water

7. Drinking water is provided on site. Yes No NA
8. Disposable cups are provided or fountain-type dispenser is provided. Yes No NA
9. Drinking water containers are kept clean and tightly closed or covered. Yes No NA

Break Rooms

10. Break rooms or eating areas are kept clean. Yes No NA
11. Microwaves are used for food only. Yes No NA
12. Microwave ovens are kept clean. Yes No NA
13. Refrigerators are kept clean. Yes No NA
14. Refrigerators are used to store food only. Yes No NA

Vermin

15. Rats, mice, and other vermin are not living within buildings. Yes No NA
16. Cockroaches and fleas are not thriving within buildings. Yes No NA

Employee Compliance

17. Employees only eat/drink in areas free from contamination. Yes No NA
18. Employees wash hands/face prior to eating, drinking, smoking. Yes No NA

REMARKS:

**URS SAFETY MANAGEMENT STANDARD 032
WORK ZONE TRAFFIC CONTROL**

URS SAFETY MANAGEMENT STANDARD

Work Zone Traffic Control

1. Applicability

This standard applies to the activities of URS Corporation and its subsidiary companies.

2. Purpose and Scope

This purpose of this standard is to protect personnel from the hazards associated with work performed on or next to highways and roads.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 032 NA – North America

SMS 032 EU – UK and Ireland, Europe, and Middle East

SMS 032 AP7 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Work Zone Traffic Control

1. Applicability

This standard applies to those activities of URS Corporation and its subsidiary companies involving work performed on roads, highways, and similar areas where motor vehicles may be a hazard, and where URS is responsible for traffic control.

2. Purpose and Scope

This standard is intended to protect personnel from the hazards associated with work performed on or next to highways and roads.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

4. Requirements

- A. Review the project in the planning phase to determine if any work will be performed on or adjacent to any road that will disrupt normal traffic flow.
- B. Where project operations will be performed on or adjacent to roadways, plan work to interfere as little as possible with traffic, and to provide and maintain ingress and egress for all residences and places of business that may be impacted.
- C. When required by local regulations or when there is a potential to disrupt traffic, a traffic control plan, in detail appropriate to the complexity of the project, must be prepared by a competent person and understood by all responsible parties before activities begin. Any changes in the traffic control plan should be approved by an official trained in safe traffic control practices.
 1. Competent persons are those who are knowledgeable about the fundamental principles of temporary traffic control and the work activities to be performed, and who have the authority to propose and implement corrective measures to eliminate hazardous situations associated with temporary traffic control.
 2. Design traffic control plans to meet requirements set forth in Part 6 of the *Manual on Uniform Traffic Control Devices (MUTCD)*, as well as those rules set by state, county, and cities in which work is

URS SAFETY MANAGEMENT STANDARD **Work Zone Traffic Control**

performed. At a minimum, the plan will include information on the following, as needed:

- a. Pedestrian and worker safety;
 - b. Temporary traffic control elements, including (but not limited to) temporary traffic control zones, advance warning zones, transition areas, activity areas, termination areas, tapers, buffers, detours, etc.;
 - c. Flagger controls, including high-visibility safety apparel, hand-signaling devices, and flagger procedures;
 - d. Temporary traffic control zone devices, including (but not limited to) signs, illuminated/flashing panels, warning devices, channelizing devices, drums, barricades, pavement markings; and
 - e. Temporary traffic control zone activities, including scope of work, duration, location, and portions of the roadway/shoulder affected.
- D. Submit the traffic control plan to the applicable road authority for approval.
- E. A Worksite Traffic Control Supervisor, certified by the American Traffic Safety Services Association (ATSSA) or an equivalent organization will be responsible for initiating, installing, and maintaining all traffic control devices. The Worksite Traffic Control Supervisor will also directly supervise all project flaggers.
1. Certified flaggers must attend an 8-hour work-zone traffic control course as taught by an ATSSA certified instructor (or equivalent).
- F. Execute the traffic control plan developed for the job site.
- G. Require all personnel exposed to the risks of moving roadway traffic or construction equipment to wear hardhats, safety glasses, sleeved shirts, long pants, work boots, and the appropriate class of high-visibility safety apparel. Safety apparel background material must be either fluorescent orange-red or fluorescent yellow-green, with accompanying reflective material of orange, yellow, white, silver, or yellow-green, or fluorescent versions of these colors.

URS SAFETY MANAGEMENT STANDARD **Work Zone Traffic Control**

H. Wear high-visibility clothing as follows:

1. Class 1 safety apparel (as defined by American National Standards Institute/International Safety Equipment Association [ANSI/ISEA]) for activities that permit the worker:
 - a. Full and undivided attention to approaching traffic;
 - b. Ample separation between the worker and vehicle traffic;
and
 - c. Optimum visibility in uncomplicated backgrounds where vehicle and equipment speeds do not exceed 25 miles per hour (mph) (40 kilometers per hours [kph]).
2. Wear Class 2 safety apparel for activities where:
 - a. Greater visibility is required due to bad weather;
 - b. There are complicated backgrounds;
 - c. Employees are performing tasks that draw their attention away from approaching traffic;
 - d. Vehicle speeds exceed 25 mph (40 kph); and
 - e. Work activities take place closer to the vehicle traffic.
3. Wear class 3 safety apparel for activities where:
 - a. Workers are exposed to higher vehicle speeds (generally 50 mph [80 kph] or more) or reduced sight distances;
 - b. The worker and vehicle operators have a high task load; and
 - c. The worker must be visible through the full range of body motions as a person at a minimum of 1,280 feet (390 meters).
4. Refer to SMS 029 – Personal Protective Equipment, for additional information on high-visibility clothing requirements, including suggested apparel for each class.

- F. Perform inspection and maintenance of the Traffic Control devices using Attachment 032-1 NA daily, or at the beginning of each shift.

URS SAFETY MANAGEMENT STANDARD

Work Zone Traffic Control

5. Documentation Summary

The following information will be maintained in the project file:

- A. Copies of traffic control plans used on site.
- B. Training certificates for Traffic Control Supervisors and flaggers.
- C. Inspection records (Attachment 032-1 NA).

6. Resources

- A. Part VI of the Manual on Uniform Traffic Control Devices (MUTCD) – 2003 Edition
- B. American Traffic Safety Services Association
- C. ATTSA Flagger Train-the-Trainer Program
- D. ANSI/ISEA 107-2004 – Standard for High-Visibility Safety Apparel
- E. SMS 029 – Personal Protective Equipment
- I. Attachment 032-1 – Traffic Control Device Inspection Checklist



Health, Safety, and Environment
**TRAFFIC CONTROL DEVICE
INSPECTION CHECKLIST**

Attachment 032-1 NA

Issue Date: June 1999
Revision 2: February 2009

Project Name: _____

Project Number: _____

Location Inspected: _____

1. **Are any devices missing?** Yes No

Do any devices need repair? Yes No

Were all replaced or repaired? Yes No

Notes:

2. **Are any lights (flashers, etc.) not functioning?** Yes No

Were they all replaced or repaired? Yes No

Notes:

3. **Are any devices improperly placed?** Yes No

Were all positions corrected? Yes No

Notes:

4. **Do any devices need cleaning?** Yes No

Were all devices cleaned? Yes No

Notes:

5. **Are flaggers certified and flagging appropriately?** Yes No

Notes:

Additional Comments:

The above check was completed by: _____

Date: _____ Time: _____

URS SAFETY MANAGEMENT STANDARD 034
UTILITY CLEARANCES AND ISOLATION

URS SAFETY MANAGEMENT STANDARD

Utility Clearances and Isolation

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The primary purpose of this standard is to establish operating requirements that will permit employees to work safely in the vicinity of electrical, natural gas, fuel, water, and other utility systems and installations. The secondary purpose is to prevent economic damage to utility systems from operations associated with project-related activities.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 034 NA – North America, UK and Ireland, Europe, and Middle East

SMS 034 AP7 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Utility Clearances and Isolation

1. Applicability

This standard applies to URS Corporation and its subsidiary companies where personnel may encounter subsurface or overhead utilities.

2. Purpose and Scope

Many field activities are conducted near aboveground and underground utilities. The primary purpose of this standard is to establish operating requirements that will permit employees to work safely in the vicinity of electrical, natural gas, fuel, water, and other utility systems and installations. The secondary purpose is to prevent economic damage to utility systems from operations associated with project-related activities.

The term *utility clearance* includes the following:

- A. The positive locating of utility systems in or near the work area.
- B. A signed statement by an appropriate representative attesting to the location of underground utilities and/or the positive de-energizing (including lockout) and testing of electrical utilities.

In some cases, utility representatives may deem it appropriate or necessary to use insulating blankets to isolate a power line. This is an acceptable alternative to positive de-energizing; however, only utility representatives can make the determination.

"Contact" with overhead power lines is considered to occur when equipment is closer to power lines than permitted by the criteria in the table in Section 4.C.2.b. (See note for operations in the United Kingdom).

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

4. Requirements

A. Time for Completion

Complete utility clearances prior to the start of any work in the area of the utility that could feasibly result in contact with or damage to that utility.

URS SAFETY MANAGEMENT STANDARD

Utility Clearances and Isolation

B. Local Regulations

Research local and state codes and regulations regarding utility locating and isolation requirements. Utility companies and locating services are among the appropriate resources.

C. Overhead Power Lines

1. Proximity to Power Lines

No work is to be conducted within 50 feet (15 meters) of overhead power lines without first contacting the utility company to determine the voltage of the system. No aspect of any piece of equipment is to be operated within 50 feet (15 meters) of overhead power lines without first making this determination.

2. Operations adjacent to overhead power lines are *prohibited* unless one of the following conditions is satisfied:

- a. Power has been shut off, positive means (such as lockout) have been taken to prevent the lines from being energized, lines have been tested to confirm the outage, and the utility company has provided a signed certification of the outage.
- b. The minimum clearance from energized overhead lines is presented in the following table, or the equipment will be repositioned and blocked so that no part, including cables, can come within the minimum clearances listed in the table.

Minimum Distances from Power Lines	
Nominal System (kilovolt, kV)	Minimum Required Distance
0–50	10 feet (3 meters)
51–100	12 feet (3.6 meters)
101–200	15 feet (4.6 meters)
201–300	20 feet (6.1 meters)
301–500	25 feet (7.6 meters)
501–750	35 feet (10.7 meters)
751–1000	45 feet (13.7 meters)

Note: For operations in the United Kingdom, the specific safe distance is determined by the utility company.

- c. The power line(s) has been isolated through the use of insulating blankets, which have been properly placed by the utility. If insulating blankets are used, the utility will

URS SAFETY MANAGEMENT STANDARD

Utility Clearances and Isolation

determine the minimum safe operating distance; get this determination in writing with the utility representative's signature.

3. All inquiries regarding electric utilities must be made in writing and a written confirmation of the outage/isolation must be received by the appropriate URS representative prior to the start of the task that may impact the utility.

D. Underground Utilities

1. Do not begin subsurface work (e.g., trenching, excavation, drilling, etc.) until a check for underground utilities and similar obstructions has been conducted. The use of as-built drawings must be confirmed with additional geophysical or other surveys.
2. Contact utility companies or the state/regional utility protection service at least two (2) working days prior to excavation activities to advise them of the proposed work and to ask them to establish the location of the underground utility installations prior to the start of actual excavation. One Call utility location service is available throughout the United States by calling 811. Where these services are unavailable (e.g., private properties), contract with an independent utility locating service to perform an evaluation of subsurface utilities.
3. Obtain utility clearances for subsurface work on both public and private property. Clearances are to be in writing and signed by the party conducting the clearance.
4. Protect and preserve the markings of approximate locations of facilities until the markings are no longer required for safe and proper excavations. If the markings of utility locations are destroyed or removed before excavation commences or is completed, the URS representative must notify the utility company, utility protection service, or the utility locating service to inform them that the markings have been destroyed.
5. Do not conduct mechanical-assisted subsurface work (e.g., work using a powered drill rig, mechanical excavator, etc.) within five (5) feet (1.5 meters) of a confirmed or suspected utility or other subsurface structure. Confirm minimum distances for mechanical-assisted subsurface work with the utility owner, as distances beyond this five-foot minimum may be required.

URS SAFETY MANAGEMENT STANDARD

Utility Clearances and Isolation

6. Nondestructive clearance techniques (e.g., vacuum extraction or other hand clearing means) are required prior to drilling/excavating in higher risk locations, including chemical plants, retail service stations, or other locations with complex underground utility systems.
7. Subsurface work within five feet (1.5 meters) of a confirmed or suspected utility or other subsurface structure must be done by nondestructive clearing techniques to the point where the obstruction is visually located and exposed. Once the obstruction location is confirmed in this manner, mechanical-assisted work may begin.
8. Reference SMS 013 – Excavation Safety for additional information regarding subsurface operations.

E. Training

Conduct a briefing for site employees regarding the hazards associated with working near the utilities and the means by which the operation will maintain a safe working environment. Detail the method used to isolate the utility and the hazards presented by breaching the isolation.

5. Documentation Summary

The following documentation will be maintained in the project file:

- A. Documents requesting utility clearance.
- B. Documents confirming utility clearance.
- C. Training/briefing documentation of each isolation.

6. Resources

- A. Utility Locating Services (typically under "Utility" in the Yellow Pages)
- B. National Institute for Occupational Safety and Health (NIOSH) Alert – Preventing Electrocutions from Contact Between Cranes and Power Lines
- C. One Call Utility Locating List
- D. National Utility Locating Contractor's Association
- E. United Kingdom – Health and Safety Executive GS6
- F. SMS 013 – Excavation Safety

**URS SAFETY MANAGEMENT STANDARD 042
RESPIRATORY PROTECTION**

URS SAFETY MANAGEMENT STANDARD

Respiratory Protection

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to protect employees (1) performing operations for which exposures cannot be controlled by use of conventional engineering or administrative controls and (2) prior to establishing a negative air exposure assessment. This standard is also used to select use, maintain, and store respiratory protection equipment in accordance with acceptable practices.

3. Implementation

The associated implementing regional procedures for this standard are included as attachments:

SMS 042 NA – North America

SMS 042 EU – UK and Ireland, Europe, and Middle East

SMS 042 AP6 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD **Respiratory Protection**

1. Applicability

This standard applies to URS Corporation and its subsidiary companies that may require the use of respiratory protection, including Immediately Dangerous to Life and Health (IDLH) and emergency conditions. This program also addresses the voluntary use of respirators.

2. Purpose and Scope

The purpose of this standard is to protect those employees performing operations for which exposures cannot be controlled by use of conventional engineering or administrative controls, and prior to establishing a negative air exposure assessment, and to require that respiratory protective equipment is selected, used, maintained, and stored in accordance with acceptable practices. This procedure establishes the minimum standard for respirator training, selection, and use during the performance of all work requiring such protection.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

4. Requirements

- A. Before assigning hazardous jobs to employees, determine if respirators are required.
 - 1. If the potential for respiratory hazards exists for any portion of a job, complete Attachment 042-1 NA – Identifying When A Respirator Is Needed.
 - 2. Contact a Division Health, Safety, and Environment (HSE) Manager, Regional or Strategic Business Unit (RBU/SBU) Manager, or URS Certified Industrial Hygienist (CIH) if any of the questions in Attachment 042-1 are checked "yes."
 - 3. Follow instructions in Attachment 042-2 NA – Voluntary Use or Respirators – for employees who wish to voluntarily use dust masks.
 - 4. Follow all the requirements of this standard for employees who wish to voluntarily use tight-fitting (e.g., air purifying) respirators.
 - 5. Required respirators will be paid for by URS and will be provided without cost to the employee.

URS SAFETY MANAGEMENT STANDARD **Respiratory Protection**

6. Control worker's exposure to air contaminants, where practicable, by engineering or administrative controls, or by substitution of process materials with less-toxic substances. Use respirators only when engineering or administrative controls are not feasible or completely effective.
- B. Select the proper respirator for the job.
1. Contact the appropriate HSE Manager or CIH for assistance in respirator selection for those jobs identified in Attachment 042-1 NA.
 2. Contact the appropriate HSE Manager for follow up if there are any problems implementing the recommendations made.
- C. Require employees who will use respirators to be medically qualified by a project medical consultant (PMC) before fit-testing and assigning them a respirator. The PMC should preferably be an occupational physician; however, the Occupational Safety and Health Administration (OSHA) allows any physician or licensed health care professional (PLHCP) to conduct evaluations of respiratory protection medical forms. The PMC, where required, will determine the physiological and psychological status that is relevant to wearing different types of respirators. The PMC will review all questionnaires and test results and verify in writing that workers are physically and psychologically able to perform work while using respiratory protective devices. These determinations will be made using guidelines established by the PMC.
1. For program details, refer to SMS 024 – Medical Screening and Surveillance.
 2. Require that employees have a current and accurate Medical Surveillance form (Attachment 024-2).
 3. Obtain a copy of the employee's Health Status Medical Report from the Office Health and Safety Representative. The consulting occupational physician of the medical service provider following each work-related examination issues the Health Status Medical Report. Employees cannot be assigned respirators unless they are medically cleared for respirator use.
- D. Require respirator users to receive appropriate training.
1. All respirator users must be trained:
 - a. Before they are assigned a respirator.

URS SAFETY MANAGEMENT STANDARD
Respiratory Protection

- b. Annually thereafter.
 - c. Whenever a new hazard or job is introduced.
 - d. Whenever employees fail to demonstrate proper use or knowledge.
 2. Document training in accordance with the requirements of SMS 055 – Training.
 3. Training must address, at a minimum, the following:
 - a. Why the respirator is necessary, and what conditions can make the respirator ineffective.
 - b. What the limitations and capabilities of the respirators are.
 - c. How to inspect, put on and remove, and check the seals of the respirator.
 - d. What the respirator maintenance and storage procedures are.
 - e. How to recognize medical signs and symptoms that may limit or prevent effective use of the respirator.
 - f. The engineering and administrative controls being used and the need for respirators.
 - g. The hazards and consequences of improper respirator use.
 - h. How to recognize and handle emergency situations.
- E. Require respirator users to be fit tested.
 1. Any employee who has been assigned a reusable respirator must be fit tested on an annual basis (no more than 1 year may elapse between fit tests), or when the employee is assigned a respirator of a different make, type, or size from that previously tested.
 2. Qualitative or quantitative fit testing can be performed by contract or in-house personnel.
 3. Obtain a signed, written copy of the fit-test results. The fit-test results should include:
 - a. Employee's name and employee identification number.

URS SAFETY MANAGEMENT STANDARD

Respiratory Protection

- b. Respirator brand, model, and size fitted for.
- c. Date fit tested.
- d. Method of fit testing used.
- e. Name and signature of fit tester.
- f. Manufacturer and serial number of fit-testing apparatus (if used).

A fit test results form is available as Attachment 042-3 NA.

- F. A person assigned the task of issuing respirators to persons who must wear respirators for protection against harmful atmospheres should be given adequate training to ensure that the correct respirator is issued for each application. This training should include, but not necessarily be limited to, the following:
 - 1. Establishment of a working knowledge of the specific types of respirators to be issued, their limitations, and the importance of issuing only the respirators for which each user is specifically approved.
 - 2. Familiarization with the respirator maintenance and repair program in order to be able to identify any respirator that is improperly cleaned or needs repair.
 - 3. Familiarization with the procedures for respirator issue. Only persons trained to ensure that proper respirators are issued will be permitted to issue respirators to persons needing them.
- G. Provide qualified employees with respirator(s) and adequate amounts of parts and cartridges.
 - 1. Assign employees whose duties require respirators their own respirator for which they have been fit tested.
 - 2. Provide special eyeglass inserts designed for the respirator if an employee must wear eyeglasses with a full-facepiece respirator. Contact lenses may be worn when wearing a full-facepiece respirator.
 - 3. Respirators and cartridges must be approved by the National Institute for Occupational Safety and Health (NIOSH). Military-issue respirators are approved under Military Standard AR 11-34.
- H. Require respirators to be used properly.

URS SAFETY MANAGEMENT STANDARD **Respiratory Protection**

1. Prohibit facial hair where the respirator-sealing surface meets the wearer's face.
2. Require employees to perform a positive and negative fit check every time the respirator is put on.
3. Employees will leave the area where respirators are being used:
 - a. Before removing the facepiece for any reason.
 - b. To correct any respirator malfunction.
 - c. To change the respirator and/or respirator cartridges.
 - d. The employee becomes ill (dizziness, nausea, etc.).
 - e. If any of the following is detected:
 1. Vapor or gas breakthrough
 2. Leakage around the facepiece
 3. Increased breathing resistance.
4. Use cartridges with End-of-Service-Life indicators, or determine the respirator cartridge change-out schedule. See Supplemental Information A for guidance.
- I. Require respirators to be cleaned and stored properly.
 1. Clean and disinfect respirators after each use.
 2. Store respirators in a plastic bag or case and in a clean location.
 3. Inspect respirators before use and after each cleaning.
- J. Address issues associated with special-use respirators (self-contained breathing apparatus; air-supply respirators; emergency-use respirators).
 1. Self-Contained Breathing Apparatus

Inspect self-contained breathing apparatus and other emergency-use respirators monthly and after each use in accordance with manufacturer's instructions.
 2. Air-Supplied Respirators

URS SAFETY MANAGEMENT STANDARD

Respiratory Protection

- a. Air used for atmosphere-supplying respirators must meet or exceed the requirements for Type 1 – Grade D breathing air. Never use oxygen.
 - 1. A certificate of analysis must accompany bottled air.
 - 2. Compressors used to supply breathing air must:
 - i. Prevent entry of contaminated air into the air supply.
 - ii. Minimize moisture content.
 - iii. Have suitable in-line sorbent beds and filter to provide appropriate air quality.
 - iv. Have a high-carbon-monoxide alarm that sounds at 10 part per million (ppm).
 - b. Couplings on air-hose lines must be incompatible with other gas systems.
- K. Require follow-up training and medical surveillance to be provided as directed.
- 1. Provide follow-up physical examinations as directed by the SMS 024-3 NA – Medical Screening and Surveillance Exam Protocol table.
 - 2. Provide follow-up physicals as directed by the Occupational Health Manager.
 - 3. Provide annual refresher training.
 - 4. Provide annual fit testing.

5. Documentation Summary

All Respiratory Protection Program documentation must be protected by the Privacy Act of 1974 (PL-93-579), and confidential medical information not required by OSHA may be protected under the Health Insurance Portability Accountability Act of 2003 (HIPAA).

The following information will be maintained in the office/project file:

- 1. Identifying When A Respirator Is Needed – Attachment 042-1 NA.
- 2. Voluntary Use of Respirators – Attachment 042-2 NA.
- 3. Fit Test Record – Attachment 042-3 NA.

URS SAFETY MANAGEMENT STANDARD

Respiratory Protection

4. Employee Health Status Medical Report, including clearance for respirator use.
5. Employee Respirator Training Records.

6. Resources

- A. U.S. OSHA Standard - Respiratory Protection – 29 Code of Federal Regulations (CFR) 1910.134
- B. U.S OSHA Technical Links – Respiratory Protection
- C. ANSI Z88.6-2006 – Respirator Use – Physical Qualifications for Personnel
- D. AIHA, The Occupational Environment – Its Evaluation and Control
- E. NIOSH Respirator Decision Logic
- F. NIOSH Guide to Industrial Respiratory Protection
- G. SMS 024 – Medical Screening and Surveillance Program
- H. SMS 055 – Health and Safety Training
- I. Attachment 042-1 NA – Identifying When a Respirator is Needed
- J. Attachment 042-2 NA – Voluntary Use of Respirators
- K. Attachment 042-3 NA – Fit Test Record
- L. Attachment 042-4 NA – Respirator Standard Operating Procedure

7. Supplemental Information

- A. Respirator Cartridge Change Schedule
- B. Hazard Analysis for Respirator Use
- C. Fit Testing Guidance
- D. Respirator Selection Guidance
- E. Inspection, Cleaning, and Storage Guidance



Health, Safety and Environment
**IDENTIFYING WHEN A RESPIRATOR
IS NEEDED**

Attachment 042-1 NA

Issue Date: July 2000
Revision 3: February 2009

Site Location: _____ Date: _____

Name of Person Performing Evaluation: _____

Project: _____

Answer the questions below for the jobs you are to perform on site. If a 'Yes' response is checked, consult with an HSE Manager or a URS Certified Industrial Hygienist (CIH) to determine if a respirator is truly needed for the job; and if so, the type of respirator needed.

It is important to be aware of the respiratory protection requirements for any chemicals you are exposed to; these can be found on the Material Safety Data Sheets or chemical labels.

Material Used or Process to be Performed	Notes
Abrasive Blasting <ul style="list-style-type: none">• Abrasive blasting (with any type of grit or material) will be performed <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Employee will fill abrasive blasting pots or perform clean-up activities <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Employee will be in a contained area where abrasive blasting is taking place <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
Acids <ul style="list-style-type: none">• Liquid or powder acids will be used in a situation where acid vapors, mists, or dust may be breathed <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
Adhesives <ul style="list-style-type: none">• Aerosols-propelled adhesives are to be used in areas where there is insufficient or no local exhaust ventilation <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Two-part adhesives (mix part one with two, let set, then use) are to be used in areas where there is limited ventilation <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
Alkalis/Bases/Caustics <ul style="list-style-type: none">• Powdered alkalis will be used in a situation where an airborne dust may be breathed <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
Asbestos Abatement <ul style="list-style-type: none">• Asbestos will be removed, repaired, or sampled <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Employees will be inspecting or overseeing areas where asbestos will be removed or disturbed <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
Cleaning Compounds <ul style="list-style-type: none">• Degreasers or carbon removers will be used in areas where local exhaust ventilation is not provided <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Aerosol-propelled cleaning compounds will be used in areas where there is no local exhaust ventilation <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Entry into a vault, tank, silo, sewer, or other confined space that has been used for chemical storage, recently painted, or where inert gases may have been used without ventilation <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Degreasers or carbon removers will be used in voids, tanks, or other confined spaces <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
Corrosion-Preventive Compounds <ul style="list-style-type: none">• Corrosion-prevention compounds, including chemical conversion compounds and corrosion inhibitors, will be used in areas where there is no local exhaust ventilation <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
Detergents/Soaps <ul style="list-style-type: none">• Ammonia-based detergents will be used in large quantities (more than 5 gallons) in areas where local exhaust ventilation cannot be <input type="checkbox"/> Yes <input type="checkbox"/> No _____	



Health, Safety and Environment
**IDENTIFYING WHEN A RESPIRATOR
IS NEEDED**

Attachment 042-1 NA

Issue Date: July 2000
Revision 3: February 2009

Material Used or Process to be Performed	Notes
provided <ul style="list-style-type: none">Large quantities (5- or 55-gallon containers) of high pH powder detergent/soap will be used in a situation where dust may be breathed	<input type="checkbox"/> Yes <input type="checkbox"/> No _____
Fuels (including regular or unleaded gasoline, kerosene, diesel fuel, JP-5) <ul style="list-style-type: none">Employees will be inside unventilated fuel cells or other confined spaces containing fuels	<input type="checkbox"/> Yes <input type="checkbox"/> No _____
Grinding, Cutting, Sanding <ul style="list-style-type: none">Cutting, grinding, or sanding surfaces that have coatings containing beryllium, cadmium, chromium, lead, or zincCutting, grinding, or sanding surfaces that are concrete or glass without use of ventilation or water	<input type="checkbox"/> Yes <input type="checkbox"/> No _____ <input type="checkbox"/> Yes <input type="checkbox"/> No _____
Hazardous Waste Sites <ul style="list-style-type: none">Employees will be performing tasks on a hazardous waste site that requires the use of respirator (as indicated in the site health and safety plan)Employees will be performing site assessments on potential hazardous waste sites	<input type="checkbox"/> Yes <input type="checkbox"/> No _____ <input type="checkbox"/> Yes <input type="checkbox"/> No _____
Hydraulic Fluids (including petroleum-based fluids, synthetic fire-resistant fluids, and water-based fire-resistant fluids) <ul style="list-style-type: none">Hydraulic fluids and the vapors generated will not be exhausted using local exhaust ventilationSynthetic fire-resistant fluids or water-based fire-resistant fluids will be used in an area where the air is contaminated with visible mist or spray from hydraulic fluids	<input type="checkbox"/> Yes <input type="checkbox"/> No _____ <input type="checkbox"/> Yes <input type="checkbox"/> No _____
Inspection Penetrants (including Flouro-finder, water-indicating pastes, and penetrant removers) <ul style="list-style-type: none">An aerosol-propelled inspection penetrant will be used in an area where local exhaust ventilation cannot be provided, or in a situation where the solvent vapors can be breathed	<input type="checkbox"/> Yes <input type="checkbox"/> No _____
Lead Abatement Activities <ul style="list-style-type: none">Lead-containing materials will be disturbed, removed, or sampledEmployees will be inspecting or overseeing areas where lead will be removed or disturbed	<input type="checkbox"/> Yes <input type="checkbox"/> No _____ <input type="checkbox"/> Yes <input type="checkbox"/> No _____
Lubricants/Oils <ul style="list-style-type: none">Aerosol lubricants or oils will be sprayed with no immediate exhaust ventilation	<input type="checkbox"/> Yes <input type="checkbox"/> No _____
Oxidizers (materials that give off oxygen, including chlorine laundry bleach, calcium hypochlorite, calcium oxide, oxygen candles, lithium hydroxide, hydrogen peroxide, and sodium dichromate) <ul style="list-style-type: none">Oxidizers containing organic chlorine will be used in a situation where the dusts or vapors may be breathedPowdered oxidizers will be used in a situation where airborne dust may be breathed	<input type="checkbox"/> Yes <input type="checkbox"/> No _____ <input type="checkbox"/> Yes <input type="checkbox"/> No _____
Paint Materials (including paints, primers, thinners, enamels, lacquers, strippers, coatings, and varnishes) <ul style="list-style-type: none">Paint materials will be spray-applied in areas where there is no local exhaust ventilationTwo-part (mix part a with part b, let set, then apply) polyurethane or epoxy polyamide paints will be brush- or spray-applied	<input type="checkbox"/> Yes <input type="checkbox"/> No _____ <input type="checkbox"/> Yes <input type="checkbox"/> No _____



Health, Safety and Environment
**IDENTIFYING WHEN A RESPIRATOR
IS NEEDED**

Attachment 042-1 NA

Issue Date: July 2000
Revision 3: February 2009

Material Used or Process to be Performed	Notes
<ul style="list-style-type: none">• Paints containing beryllium, cadmium, chromium, lead, or zinc (refer to the MSDS) <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Paint materials will be applied in confined spaces <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
<p>Solvents (including hydrocarbon solvents such as acetone, methyl ethyl ketone, toluene, xylene, and alcohols, as well as mixed solutions like antifreeze, heat-transfer fluid, turpentine, pipe-dope, and naphtha thinner)</p> <ul style="list-style-type: none">• Local exhaust ventilation will not be provided and work will involve breathing solvent vapors <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Solvents will be used within confined spaces <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Solvents will be applied using aerosols <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
<p>Thermal Insulation (including asbestos and non-asbestos materials like pipe lagging, fiberglass insulation, boiler insulation, packing materials, and floor or ceiling tiles)</p> <ul style="list-style-type: none">• Insulation will be disturbed, removed, or sampled <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
<p>Water-Treatment Chemicals (includes corrosive chemicals such as tri-sodium phosphate, hardness buffer, titrating solution, morpholine, caustic soda, citric acid, and nitric acid, as well as toxic chemicals such as mercuric nitrate, hydrazine, EDTA, and sodium nitrate)</p> <ul style="list-style-type: none">• Morpholine, EDTA, or harness buffer/titrating solution is to be used in poorly ventilated spaces <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Powdered water-treatment chemicals will be used in a situation where chemical dusts may be breathed <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
<p>Welding/Brazing/Cutting</p> <ul style="list-style-type: none">• Welding will be performed in confined spaces <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Welding galvanized metal or stainless steel <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Brazing with cadmium or lead <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Torch-cutting on coated/painted materials <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
<p>For Any of the Above-Listed Activities</p> <ul style="list-style-type: none">• An employee will be in the immediate area – within 10 feet of the job or operation; or <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Employee will be inside confined space where activities are taking place; or <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Employee will be inside a "controlled area" such as found in asbestos abatement, lead abatement, radiation control area, or a hazardous waste site <input type="checkbox"/> Yes <input type="checkbox"/> No _____	
<p>Other</p> <ul style="list-style-type: none">• A chemical process procedure (e.g., hydrogen sulfide in refineries, ammonia as a refrigerant, chlorine in water disinfection, inert gas systems) required the use of a respirator or emergency escape respirator <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Mine operations require issuance of an emergency escape respirator <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Emergency response plan requires issuance of respirators to first responders <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Radiological controls require use of a respirator <input type="checkbox"/> Yes <input type="checkbox"/> No _____• Laboratory Chemical Hygiene plan requires issuance of respirators <input type="checkbox"/> Yes <input type="checkbox"/> No _____	



Instructions: Have the employee that is opting to use a respirator for non-overexposure conditions read this page, and then sign on the bottom of the page. Maintain a copy in the employee's training file.

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for employees. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the employee.

Sometimes employees may wear respirators to avoid exposures to hazards, even if the amount of the hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your own voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not pose a hazard.

1. Read and follow all instructions provided by the manufacture on use, maintenance, cleaning, and care, and warnings regarding the respirators limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH (the National Institute for Occupational Safety and Health) certifies respirators in the U.S. A label or statement of certification should appear on the respirator or respirator packaging; it will tell you what the respirator is designed for and how it will protect you.
3. Do not wear your respirator into atmospheres containing contaminants against which your respirator is not designed to protect. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, fumes, smoke, or very small solid particles.
4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.
5. If you have any health conditions (asthma; high blood pressure; emphysema; heart disease) that could be aggravated by using a respirator, you should check with your doctor before using one.

I have read and understand this information: Date:

Employee's Name (Please Print):
Employee's Signature:



FIT TEST RECORD

Employee Name _____ Employee Number _____

Division/Office/Project _____ Last Medical Exam _____

Fit Test Date _____ Corrective Lenses Needed Yes No

Medically qualified to wear respirator? Yes No

Briefed on fundamental principles of respiratory protection, use, selection, inspection, cleaning, maintenance, and storage of equipment? Yes No

Test agent recognition: Yes No N/A

RESPIRATOR 1

RESPIRATOR 2

RESPIRATOR 3

Equipment Type _____

Manufacturer's Name _____

Model _____

Size _____

Facepiece Composition (Rubber/Silicone) _____

TEST PERFORMED

RESPIRATOR 1

RESPIRATOR 2

RESPIRATOR 3

Negative Pressure Test: Pass Fail Pass Fail Pass Fail

Positive Pressure Test: Pass Fail Pass Fail Pass Fail

Isoamyl Acetate Test: Pass Fail Pass Fail Pass Fail

Irritant Smoke Test: Pass Fail Pass Fail Pass Fail

Bitrex: Pass Fail Pass Fail Pass Fail

Saccharin: Pass Fail Pass Fail Pass Fail

Generated Aerosol Quantitative Fit: P F Fit Factor _____ P F Fit Factor _____ P F Fit Factor _____

Ambient Aerosol Quantitative Fit: P F Fit Factor _____ P F Fit Factor _____ P F Fit Factor _____

Controlled Negative Pressure Quantitative Fit: P F Fit Factor _____ P F Fit Factor _____ P F Fit Factor _____

Examiner's Name (Please Print) _____

Examiner's Signature _____

Date _____

Employee's Signature _____

Date _____



Job Task Reviewed: _____

Date Reviewed: _____

Task Review by: _____

ADMINISTRATIVE PROCEDURES

1. All respirator users must be medically qualified to use respirators.
2. Respirator users must be trained annually in respirator use, and must be fit-tested annually.
3. The respirator will be used only by the person to whom it was issued.
4. Persons using glasses who are required to use a full-face respirator may use contact lenses or eyeglass inserts designed for the respirator.

GUIDANCE FOR SELECTION OF RESPIRATOR AND CARTRIDGES/FILTERS

1. Respirators are currently being issued and used for the following job activities:

2. The respirator will be equipped with the following cartridges/filters:

3. Filters are to be changed when the breathing resistance increases.

4. Cartridges are to be changed _____ (frequency), or when the contaminant you are protecting yourself from can be smelled or tasted.

FIT TESTING & FIT CHECKING

1. Fit testing is required annually. To arrange for fit testing, call your local, project, or regional safety representative or qualified industrial hygienist.
2. Respirator users will "fit check" the respirator every time the respirator is put on:
 - **Negative Check** – Cover filters/cartridges with palms of hands and breath in: leakage should not be detected around the face seal of the respirator. Do not use if leakage is detected.
 - **Positive Check** – Cover the exhalation valve cover with palm of hand and blow out slightly: leakage should not be detected around the respirator seal.
 - **For Air Supply Respirators** – Kink or close off air supply hose and breath in: leakage should not be detected around the face seal of the respirator.

CLEANING AND MAINTENANCE OF RESPIRATOR

1. Clean and disinfect respirator after every use.
2. Inspect respirator at the end of work every day in use to ensure parts are not missing. Replace missing parts from stock supply.
3. Store clean respirator in labeled plastic bag out of direct sunlight.
4. Do not alter respirator in any way.



Health, Safety and Environment
**RESPIRATOR CARTRIDGE
CHANGE SCHEDULE**

SMS 042 NA
Supplemental Information A
Issue Date: February 2009

A cartridge change schedule must be developed for cartridges or canisters used with air purifying respirators that do not have an End of Service Life Indicator (ESLI). The purpose of this is to prevent contaminants from breaking through the respirator's sorbent cartridge(s), and thereby over-exposing employees. NIOSH has approved ESLIs for only four cartridges or canisters (mercury vapor, carbon monoxide, ethylene oxide, and hydrogen sulfide). Historically we have relied on the warning properties (odor, irritation) of a contaminant to dictate cartridge change. OSHA no longer allows this as the sole basis for changing respirator cartridges. In developing a change schedule the following factors should be considered:

- Contaminants
- Concentration
- Frequency of use (continuously or intermittently throughout the shift)
- Temperature and humidity
- Work rate
- The presence of potentially interfering chemicals.

The worst-case conditions should be assumed to avoid early breakthrough. This must be documented in the project health and safety plan or, in the cases of office or labs, in the site specific Respiratory Protection Program.

Sources of Help

OSHA provides assistance in developing respirator cartridge change schedules on its website at http://www.osha.gov/SLTC/etools/respiratory/change_schedule.html.

Most cartridge manufacturers maintain on-line interactive cartridge service life programs that can be used to evaluate the service life against many contaminants. Typically, these do not evaluate the service life against mixtures (multiple contaminants).

Because of the complexity in evaluating mixtures, OSHA offers the following guidance:

- When the individual compounds in the mixture have similar breakthrough times (i.e., within one order of magnitude), service life of the cartridge should be established assuming the mixture stream behaves as a pure system of the most rapidly migrating component with the shortest breakthrough time (i.e., sum up the concentration of the components).
- Where the individual compounds in the mixture vary by 2 orders of magnitude or greater, the service life may be based on the contaminant with the shortest breakthrough time.

Rule of Thumb ("The Occupational Environment" - Its Evaluation and Control)

- If the chemical's boiling point is >70 °C and the concentration is less than 200 ppm, you can expect a service life of 8 hours at a normal work rate.
- Service life is inversely proportional to work rate.
- Reducing concentration by a factor of 10 will increase service life by a factor of 5.
- Humidity above 85% will reduce service life by 50%.

OSHA Interpretation

The OSHA inspection procedures for the respiratory protection standard specifies that where contaminant migration is possible, respirator cartridges/canisters should be changed after each work shift where exposure occurs unless there is objective data to the contrary (description studies) showing the performance in the conditions and schedule of use/non-use found in the workplace.

- A. A hazard analysis of the workplace must be performed before selecting respirators. The analysis must consider inhalation hazards under routine and foreseeable emergency conditions. Other factors to consider when choosing respirators include skin and eye exposure, the effects of heat or cold, use of protective clothing, employee conditioning, and workload.
- B. Respiratory hazards that must be identified include:
1. Oxygen Deficiency
 2. Air Contaminants
 3. Particulates
 4. Toxic Gases
- C. Evaluating Exposures
- There are several options on how to evaluate exposures:
1. One option is to rely on personal monitoring data of employees. Representative exposure data provided by industry or laboratory studies is acceptable as long as it applies to similar tasks and conditions at the worksite.
 2. The professional judgment provided by the Division, RBU, SBU, Office, or Project HSE Manager and/or as recommended by a qualified industrial hygienist or safety professional may be employed for the task.
 3. If the exposure cannot be identified or estimated, then the atmosphere is considered immediately dangerous to life or health (IDLH). Atmospheres with levels of oxygen below 19.5% are also defined as IDLH.
 4. Trained and qualified technical personnel shall perform assessment of the degree of respiratory hazard through sampling and testing of the work environment. Problems requiring special respiratory protection should be discussed with the Division or Regional HSE manager or qualified industrial hygienist.
 5. The Project HSE Manager shall establish procedures to control respiratory hazards through engineering or administrative controls, product/material substitution, respiratory protective devices, or a combination of these methods.
 6. He/she shall also perform annual evaluations of the effectiveness of the project's respiratory protection program. These evaluations shall be documented.
 7. The Project HSE Manager shall select and provide adequate respiratory protective devices for use on the project. This selection shall be based upon the specific type of air contaminant(s), the concentration of the contaminants(s) or oxygen deficiency in the work environment.
 8. Establish a change schedule for air-purifying respirators based upon objective information or data that will ensure that cartridges are changed before the end of their useful life. OSHA has mandated that reliance on warning properties is no longer valid



- A. A quantitative fit-test provides the most accurate information; qualitative fit testing depends on the respirator wearer's sense of smell and taste (subjective response). OSHA's standard requires fit-testing for any face mask (full or half) designed to have a tight seal along the face, whether it is used in a positive or negative pressure mode, and whether it is disposable or not. If the required fit factor is greater than 100, then a quantitative fit-test must be performed.
- B. Each person will have a qualitative or quantitative fit test when first required to wear a respirator, every 12 months when respirators will be worn thereafter, or as hazards or respiratory needs change.
- C. Each person will have a qualitative or quantitative fit test for each specific make(s) and model(s) of respirator(s) for which the worker may wear.
- D. Under no circumstances shall a worker be allowed to use any respirator if the results of the qualitative fit test indicate that the worker is unable to obtain a satisfactory seal.
- E. The eight exercises required by OSHA under the respiratory protection standard, 29 CFR 1910.134, Appendix A, are as follows (note that these are not required controlled negative pressure (CNP) quantitative fit testing):
 - 1. normal breathing
 - 2. deep breathing
 - 3. head side to side
 - 4. head up and down
 - 5. talking out loud
 - 6. grimacing (quantitative only)
 - 7. bending
 - 8. normal breathing
- F. Qualitative and quantitative fit testing must be performed in negative pressure mode for all tight fitting respirators, whether the respirator is positive or negative pressure demand.
- G. Qualitative and quantitative fit testing must be conducted according to one of the protocols found in 29 CFR 1910.134, Appendix A.
- H. Employees using respirators when not required under the standard (i.e., dust masks or comfort masks for nuisance type dust without a specified exposure level) must be aware of the potential hazards of using a respirator. See Attachment 042-2 of this standard or Appendix D of 29 CFR 1910.134 for information program requirement.

- A. Physical characteristics, functional capabilities, and performance limitations of various types of respirators shall be considered in the selection process.
- B. Specifics regarding hazard classification, descriptions of respirator types and modes of operation, and the capabilities and limitations of respirators are listed in ANSIZ88.2-1992.
- C. To select the correct respirator, the hazards must first be identified in the workplace and then follow these steps:
1. Determine if the environment is IDLH.
 - a. All oxygen deficient atmospheres shall be considered IDLH.
 - b. If the employee exposure cannot be reasonably estimated, the atmosphere must be considered IDLH.
 2. Identify the contaminant(s) present in the atmosphere and answer the following questions:
 - a. What is the concentration?
 - b. Are they gaseous or particulate?
 - c. Are the contaminants IDLH?
 3. After completing the above steps select the appropriate respirator for the particular hazard(s).
 - a. IDLH – Provide a full facepiece NIOSH certified pressure demand SCBA with a minimum service life of 30 minutes or a full facepiece pressure demand airline respirator with an auxiliary self-contained air supply.
 - b. Non-IDLH – A respirator must be provided that is appropriate for the contaminant(s) identified.
 4. For protection against gases and vapors, either an atmosphere-supplying respirator or an air-purifying respirator equipped with a NIOSH certified end-of-service-life indicator (ESLI) for the contaminant must be used. In lieu of an ESLI, a change schedule for cartridges based on objective information or data may be used to ensure cartridges are changed before the end of their service life occurs (see Supplemental Information A). In most cases, respirator cartridge manufacturers provide a product specific on-line or CD-ROM based "Service Life Calculator" that allows determination of useful service life of a cartridge based on expected concentration and environmental and work conditions. If neither an ESLI or change schedule is available, a supplied air respirator must be used.
 5. For protection against particulates, an atmosphere-supplying respirator or an air-purifying respirator equipped with a NIOSH-certified high-efficiency particulate air (HEPA) filter under 30 CFR 11 or an air-purifying respirator equipped with a NIOSH certified filter for particulates under 42 CFR 84 must be used.

6. There are three classes of filters under NIOSH (N, R, and P series) with three levels of filter efficiency in each class – 95%, 99%, and 99.97% (classified as 100). All filters can be used regardless of aerosol size. The new filters are classified as follows:
- a. N – For solid particulates and non-oil aerosols that do not degrade filter performance.
 - b. R – For solid particulates and degrading oil-based aerosols. R filters have “use limitations.”
 - c. P – For solid particulates and degrading oil-based aerosols. P filters generally have no “use limitations” other than those normally associated with particulate filters. The P100 filter is the replacement for the HEPA filter.
- E. Particulate filters are tested with 200 mg of loading but in many cases, these filters may exceed this capacity. Filtration efficiency may actually increase as the filter cake develops on the filter. Increased resistance to breathing or obvious taste or odor in the respirator would be cause to examine, re-evaluate and replace the filter cartridge

A. Inspection

Routinely used air-purifying and airline respirators should be checked as follows before and after each use:

1. Examine the facepiece for:
 - a. Excessive dirt.
 - b. Cracks, tears, holes or physical distortions of shape from improper storage.
 - c. Inflexibility of rubber facepiece (stretch and knead to restore flexibility).
 - d. Cracked or badly scratched lenses in full facepieces.
 - e. Incorrectly mounted full facepiece lenses, or broken or missing mounting clips.
 - f. Cracked or broken air-purifying element holder(s), badly worn threads or missing gasket(s) if required.
2. Examine the head straps or head harness for:
 - a. Breaks.
 - b. Loss of elasticity.
 - c. Broken or malfunctioning buckles and attachments.
 - d. Excessively worn serrations on head harness, which might permit slippage (full facepieces only).
3. Examine the exhalation valve for the following after removing its cover:
 - a. Foreign material, such as detergent residue, dust particles or human hair under the valve seat.
 - b. Cracks, tears or distortion in the valve material.
 - c. Improper insertion of the valve body in the facepieces.
 - d. Cracks, breaks or chips in the valve body, particularly in the sealing surface.
 - e. Missing or defective valve cover.
 - f. Improper installation of the valve in the valve body.
4. Examine the air-purifying element for:
 - a. Incorrect cartridge, canister, or filter for the hazard.
 - b. Incorrect installation, loose connections, missing or worn gasket or cross threading in the holder.
 - c. Expired shelf-life date on the cartridge or canister.
 - d. Cracks or dents in the outside case of the filter, cartridge or canister, indicated by the absence of sealing material, tape, foil, etc., over the inlet.
5. If the device has a corrugated breathing tube, examine it for:

- a. Broken or missing and connectors.
 - b. Missing or loose hose clamps.
 - c. Deterioration, determined by stretching the tube and looking for cracks.
6. Examine the harness of a front-or back-mounted gas mask for:
- a. Damage or wear to the canister holder, which may prevent its being held in place.
 - b. Broken harness straps for fastening.

B. Self Contained Breathing Apparatus (SCBA)

Follow manufacturer specifications for storage, maintenance and cleaning of SCBA systems.

C. Manual Cleaning

A generalized cleaning procedure is typically found in the manufacturer's manual. Read the respirator manual and follow the manufacturer's recommendations.

1. Remove canisters, filters, valves, straps and speaking diaphragms from the facepiece.
2. Wash facepiece and accessories in warm soapy water or a commercially available cleaner, following the manufacturer's instructions. Gently scrub the respirator.
3. Rinse parts thoroughly in clean water.
4. Air dry in a clean place or wipe dry with a lint less cloth.

D. Machine Cleaning

Machines may be used to expedite the cleaning, sanitizing, rinsing, and drying of large numbers of respirators. Read the machine-cleaning manual and follow manufacturer's recommendations.

1. Extreme care must be taken to ensure against excessive tumbling and agitation, or exposure to temperatures above those recommended by the manufacturer (normally 120°F maximum), as these conditions are likely to result in damage to the respirators.
2. Ultrasonic cleaners, clothes-washing machines, dishwashers, and clothes dryers have been specially adapted and successfully used for cleaning and drying respirators.

E. Disinfection

1. Disinfection is required when more than one person uses the respirator. Recommended NIOSH disinfection procedures include immersion of the respirator body for two minutes in a 50 ppm chlorine solution (about 2 ml bleach to 1 liter of water). Rinse thoroughly in clean water and dry.
 - a. Immersion times have to be limited to minimize damage to respirators. The solutions can age rubber and rust metal parts. Caution must be

taken to thoroughly rinse the respirator after cleaning and disinfection to prevent dermatitis.

- b. An alternate method is to purchase a commercially prepared solution for disinfection/decontamination and follow the directions recommended by the manufacturer.
2. Each person wearing a respirator shall examine the respirator before use in accordance with the training and instruction provided during fit testing.
 3. After cleaning and sanitizing, each respirator shall be examined to determine if it is in proper working condition, if it needs replacement of parts or repairs, or if it should be discarded. Respirator inspection shall include, when applicable, a check for tightness of connections; for the condition of the respiratory inlet covering, head harness, valves, connecting tubes, harness assemblies, filters, cartridges, canisters, end-of-service life indicator, and shelf life date(s), and for the proper function of regulators, alarms, and other warning systems.
 4. Each rubber or other elastomeric part shall be inspected for pliability and signs of deterioration. Each air and oxygen cylinder shall be inspected to ensure that it is fully charged according to the manufacturer's instructions.

F. Repair

Only persons trained in proper respirator assembly and correction of possible respirator malfunctions and defects shall do replacement of parts or repairs. Replacement parts shall be only those designed for the specific respirator being repaired. Reducing or admission valves, regulators, and alarms shall be returned to the manufacturer for repair or adjustment. The valve, regulator, or alarm manufacturer must approve instrumentation for valve, regulator, and alarm adjustments and tests.

G. Storage

Respirators shall be stored in a convenient, clean and sanitary location. The purpose of good respirator storage is to ensure that the respirators will function properly when used. Respirators shall be stored in a manner that will protect them against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators shall be stored to prevent distortion of rubber or other elastomeric parts. This can be done by storing the respirators in hermetically sealed plastic bags, or plastic bags capable of being sealed. Emergency and rescue use respirators that are placed in work areas shall be quickly accessible at all times, and the storage cabinet or container in which they are stored shall be clearly marked.

**URS SAFETY MANAGEMENT STANDARD 046
SUBCONTRACTOR HEALTH AND SAFETY REQUIREMENTS**

URS SAFETY MANAGEMENT STANDARD

Subcontractor Health and Safety Requirements

1. Applicability

This procedure is applicable to subcontractors retained by URS Corporation and its subsidiary companies. This procedure is applicable to the operations of subcontractors and sub-subcontractors of any tier.

This procedure does not apply to third-party contractor operations where there is no subcontract relationship between the contractor and URS Corporation. Health, Safety, and Environment issues regarding third-party contractor operations are governed by project-specific contracts, and are not covered by this standard.

2. Purpose and Scope

This procedure provides requirements on the pre-evaluation of subcontractor safety programs. The attached procedures detail the manner in which this is accomplished by region.

3. Procedures

The associated implementing regional/divisional procedures for this standard are included as attachments:

<i>URS Division</i>

SMS 046 NA – North America

SMS 046 EU – UK and Ireland, Europe, and Middle East

SMS 046 AP8 – Asia Pacific

<i>Washington Division</i>

SMS 046 WD

<i>EG&G Division</i>

SMS 046 EG&G

URS SAFETY MANAGEMENT STANDARD

Subcontractor Health and Safety Requirements

1. Applicability

This standard is applicable to subcontractors retained by URS Divisions of URS Corporation and its subsidiary companies that perform:

- Intrinsically higher-risk construction-related activities (e.g., drilling, excavation, surveying, demolition, electrical contracting, steel erection etc.).
- Significant building or infrastructure alteration, demolition, and/or repair activities using their own workforce or equipment.
- Activities on hazardous waste sites.
- Activities in government services operations (e.g., aviation repair, vehicle repair, warehousing, facility operations, and maintenance) where the annual cost of the subcontract exceeds \$1,000,000.
- An activity where URS Corporation does not supervise the day-to-day activities and work efforts of subcontractor workers, *and* the subcontractor has a designated Supervisor on the work site.

This procedure is applicable to the operations of subcontractors and sub-subcontractors of any tier.

This procedure does not apply to third-party contractor operations where there is no subcontract relationship between the contractor and URS. Health, Safety, and Environment issues regarding third-party contractor operations are governed by project-specific contracts, and are not covered by this standard.

2. Purpose and Scope

This procedure provides requirements on the pre-evaluation of subcontractor safety programs; contractual risk management; subcontractor safety performance on the job site; and the responsibilities of the Project Manager with respect to subcontractor jobsite safety performance.

Each URS subcontractor must be evaluated at least annually using Attachment 046-1 NA, "Subcontractor Safety Evaluation Form," or equivalent client or URS International Operations form, in order to perform work on any new URS projects.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

URS SAFETY MANAGEMENT STANDARD

Subcontractor Health and Safety Requirements

4. Requirements

- A. Pre-qualification of Subcontractor – The Project Manager will complete the following procedures for all subcontractors retained on projects covered by this standard (the PM should also require subcontractors to follow these procedures with respect to pre-qualification of sub-subcontractors of any tier):
1. Request all subcontractor candidates to complete the attached Subcontractor Safety Evaluation Form (Attachment 046-1 NA).
 2. Conduct an assessment of each subcontractor's qualifications with respect to the subcontractor health and safety evaluation criteria contained in Attachment 046-2 NA.
 3. If the subcontractor does not meet the criteria established in Attachment 046-2 NA, and URS must retain the contractor, the Subcontractor Variance Form (Attachment 046-3 NA) must be completed and approved by a Corporate, Regional, or Strategic Business Unit (SBU) Health, Safety, and Environment (HSE) Manager.
 4. Verify that subcontractors meet the insurance requirements as stated in Attachment 046-2 NA, or as approved by URS Legal Counsel or Contracting Manager/Officer.
 5. If the subcontractor has been successfully evaluated within the last 12 months, that evaluation may be substituted.
 6. For long-term operations, update this evaluation within 12 months of the previous evaluation.
- B. Contractual and Risk Management Requirements of Subcontractors
1. Ensure that the subcontractor is contractually bound to comply with applicable client and URS HSE Program requirements.
 2. Ensure that subcontractor is contractually bound to develop additional safety procedures for work that is exclusive to their activities on the site, and for which they may have superior knowledge.
 3. Assess compliance of subcontractor's insurance with the URS Corporation subcontract requirements (including, but not limited to, necessary types and amounts of coverage, URS Corporation additional insured endorsement, etc.).

URS SAFETY MANAGEMENT STANDARD

Subcontractor Health and Safety Requirements

4. Ensure that URS has the right in its subcontract, without liability to URS, to stop the subcontractor's work in the event of any violations of the applicable Health and Safety Plan.

C. Subcontractor Safety Representative

1. Require each subcontractor to appoint a Subcontractor Safety Representative (SSR) who:
 - a. Is knowledgeable of the subcontractor's activities.
 - b. Understands the safety requirements of the subcontractor's activities.
 - c. Has the ability to recognize and the authority to correct safety deficiencies and execute a stop work order should an imminent danger arise.
 - d. Has the responsibility for the administration of the subcontractor Health and Safety Program.
 - e. Will serve as the direct contact with URS Corporation regarding resolution of health and safety issues.

D. Communication

1. Provide the SSR with information regarding Site Safety Program including but not limited to:
 - a. Client Requirements
 - b. URS HSE Program
 - c. Site Hazard Communication Program
 - d. Site Emergency Action Plan
 - e. Any additional safety information from other contractors or subcontractors working on the site.
2. Provide the SSR with the name of the URS project or site contact and alternate for addressing site Health and Safety issues.
3. Require the participation of subcontractors in all Site Safety Briefings.

URS SAFETY MANAGEMENT STANDARD

Subcontractor Health and Safety Requirements

4. Require subcontractor compliance with all safety directives and/or stop work orders issued by the URS site representatives.

E. Subcontractor Safety Performance

1. To the extent reasonable in light of URS' scope of work under the client contract, visit the site and periodically observe subcontractor's operations (i.e., conduct spot checks) to assess whether subcontractor appears to be conducting their operations in accordance with applicable health and safety requirements. Periodically review any required subcontractor health and safety written documentation for compliance with applicable requirements.
2. In the event that unsafe acts or unsafe conditions are observed, immediately stop work, and bring them to the attention of the SSR for resolution.
3. Investigate all injuries/illnesses related to subcontractor operations to identify causes and effect corrective actions.
4. In the event of serious and/or continuing subcontractor breaches of applicable health and safety requirements, contact legal counsel to assess whether formal contractual action is appropriate under the subcontract.

F. Subcontractor Database

1. A database is available to store Attachment 046-1 NA completed by subcontractors. The database is available to all URS Lotus Notes users.
2. A RBU or Regional HSE Manager can upload completed Attachment 046-1 NA. Contact your Office HSE Representative or Regional HSE Manager for information on how to access the database.

5. Documentation Summary

The following documentation will be maintained in the project file:

- A. Subcontractor Health and Safety Evaluation Form (Attachment 046-1 NA)
- B. Applicable and current Insurance Certificates
- C. Names and telephone numbers of SSR for each subcontractor
- D. Verification of Health and Safety documents transmitted to subcontractors and received from subcontractors

URS SAFETY MANAGEMENT STANDARD

Subcontractor Health and Safety Requirements

- E. Identified safety deficiencies as applicable for subcontractors and verification of correction of conditions
- F. All other safety related documentation between URS and subcontractor such as training certifications, etc.
- G. Subcontractor safety plan, incident reports, and resolution reports

5. Resources

- A. "Occupational Injury and Illness Rates by SIC," Bureau of Labor Statistics, U. S. Department of Labor (<http://www.bls.gov/iif/oshsum.htm>)
- B. Managing Subcontractor Safety, Prepared by The Construction Industry Institute, Safety Task Force, Publication 13-1, The University of Texas at Austin, Austin, Texas, 1991 (<http://www.construction-institute.org/>)
- C. American National Standard Construction and Demolition Operations—Safety and Health Program Requirements for Multi-Employer Projects, ANSI A10.33-1992, National Safety Council, Itasca, Illinois 60143-3201 (<http://www.nsc.org>)
- D. "Liability, OSHA, and the Safety of Outside Contractors," Professional Safety, American Society of Safety Engineers, January 1993 (<http://www.asse.org>)
- E. "Proactive Construction Management; Dealing With the Problem of Subcontractor Safety," Professional Safety, American Society of Safety Engineers, January 1990 (<http://www.asse.org>)
- F. Attachment 046-1 NA – Subcontractor Safety Evaluation Form
- G. Attachment 046-2 NA – Subcontractor Evaluation Criteria
- H. Attachment 046-3 NA – Subcontractor Variance Form



Health, Safety and Environment
SUBCONTRACTOR SAFETY
EVALUATION FORM

Attachment 046-1 NA
 Issue Date: July 1999
 Revision 5: February 2009

It is the policy of URS to provide a safe and healthful environment for all of its employees through the prevention of occupational injuries and illnesses. As such, URS considers safety as paramount and requests the following information of all subcontractors.

Company Name:	_____	Date:	_____
Address:	_____	Contact Name:	_____
	_____	Title:	_____
City:	_____	Telephone:	_____
State:	_____	Fax:	_____
Zip:	_____	Email:	_____

Type of services performed: _____

North America Industry Classification System (NAICS) Code: _____

If you are in need of assistance with your company's NAICS Code, please visit <http://www.osha.gov/oshstats/naics-manual.html> or <http://www.osha.gov/pls/imis/sicsearch.html>.

Has your company previously performed work as a subcontractor to URS? Yes No
 If "Yes" explain the nature of the work, project location, and project date, and URS Project Manager and telephone number.

How many years has your organization been in business under your firm's name? _____

If applicable, what was your organization's previous name(s)? _____

1. WORKERS' COMPENSATION EXPERIENCE INFORMATION

Insurance Carrier(s): _____

Contact for Insurance Information: _____

Title: _____ Telephone: _____ Fax: _____



Health, Safety and Environment
SUBCONTRACTOR SAFETY
EVALUATION FORM

Attachment 046-1 NA

Issue Date: July 1999
Revision 5: February 2009

- A. List your firm's Interstate Worker Compensation Experience Modification Rate (EMR) for the three most recent years: (Information is available from your workers compensation insurance carrier.)

<u>Year</u>	<u>EMR Interstate</u>
_____	_____
_____	_____
_____	_____

- B. We require verification of your EMR. Please attach the endorsement page from your policy listing your EMR, or have your insurance carrier or broker provide this information on their letterhead.

- C. If your EMR is 1.0 or exceeds 1.0 for any one or more years above, please explain:

Comments: _____

2. SAFETY PERFORMANCE

- A. Please consolidate your firm's injury and illness data for the last 3 years and complete the table below. The information provided must be for your company as a whole, not an individual office location. **Provide copies of your OSHA 300 and 300A logs for the last 3 years.**

	YEAR	YEAR	YEAR
A. Average Number of Employees			
B. Number of Fatalities (Totals from Column G of OSHA 300 log)			
C. Number of cases that involved days away from work, or cases with job transfer or restriction, or both (Totals from Columns H and I of OSHA 300 log)			
D. Other Recordable Cases – Medical Only (Number of cases without lost or restricted workdays) (Totals from Column J of OSHA 300 log)			
E. Total Recordable Cases (Totals from columns G + H + I + J of OSHA 300 log)			
F. Total hours worked			
G. OSHA Total Recordable Incident Rate $\frac{\text{(E above)} \times 200,000}{\text{Employee Hours Worked (Given Year)}}$			
H. OSHA Lost Workday Case Incident Rate $\frac{\text{(C above)} \times 200,000}{\text{Employee Hours Worked (Given Year)}}$			



Health, Safety and Environment
SUBCONTRACTOR SAFETY
EVALUATION FORM

Attachment 046-1 NA
Issue Date: July 1999
Revision 5: February 2009

B. For each fatality, please attach a description of the accident, including cause, lessons learned, actions taken resulting from that fatality, actions taken to prevent future fatalities, and corporate management summary of their actions and attitudes.

C. Has your company been issued any health and safety related citations from any federal, state, or local regulatory agency during the past 3 years? Yes No

If "Yes", please explain the nature of the citation, classification, and final fine in an attachment to your evaluation form submittal.

3. RISK MANAGEMENT / INSURANCE DATA

A. Does your firm have insurance coverage with the following minimum limits? Yes No

(1)	Workers' Compensation To the extent permitted by law, a waiver of subrogation in favor of URS is required. Coverage must include, if applicable U.S. Harbor Worker's and Longshoremen's, Outer Continental Shelf, and Jones Act coverage	Statutory
(2)	Employer's Liability	\$ 1,000,000 per occurrence
(3)	Commercial General and Contractual Liability Must include: XCU (explosion, collapse, and underground) hazard coverage, premises operations, independent contractors, products and completed operations, broad form contractual, personal injury, and broad form property damage. Where the Work involves diving, Diver's Liability must be included. URS must be named as additional insured, which coverage must be primary and non-contributing.	\$ 1,000,000 per occurrence
(4)	Automobile Liability Must include owned, non-owned, and hired vehicles. If any hazardous substances are transported must include a MCS-90 endorsement and Motor Carriers Act of 1980 coverage applicable in the jurisdiction where the operations of the insured are performed. URS must be named as additional insured, which coverage must be primary and non-contributing.	\$ 1,000,000 per occurrence
(5)	Umbrella Liability In excess of (1), (2), (3), and (4) above.	\$ 2,000,000 aggregate
(6)	Pollution Liability Required if Work involves invasive Work or hazardous substances. If the Work includes asbestos abatement, Asbestos Liability must be included. If the Work includes transportation, treatment, or disposal, such activities must be insured under the policy. URS must be named as additional insured, which coverage must be primary and non-contributing.	\$ 5,000,000 per occurrence
(7)	Professional Liability Required if performing professional services.	\$ 1,000,000 per claim / aggregate
(8)	Aviation Liability Required if using aircraft, including helicopters. Coverage must not exclude War and Terrorism coverage. URS must be named as an additional insured, which coverage must be primary and non-contributing. A waiver of subrogation in favor of URS is required.	\$ 10,000,000 per occurrence
(9)	Marine Liability Required if using watercraft. Must include Charterers' Liability and Hull Protection and Indemnity. URS must be named as an additional insured, which coverage must be primary and non-contributing.	\$ 10,000,000 per occurrence

(Note that certain URS client contracts require insurance in excess of the levels noted above. Inability to supply insurance at levels required by URS' client contract could result in disqualification.)



Health, Safety and Environment
**SUBCONTRACTOR SAFETY
EVALUATION FORM**

Attachment 046-1 NA
Issue Date: July 1999
Revision 5: February 2009

- B. Are you able to provide URS with insurance certificates naming URS, and if requested, URS' client as an additional insured? Yes No
- C. Please provide proof of current Workers' Compensation and Employer's Liability Insurance coverage. (*Attach certificate naming URS as Additional Insured*).

4. HEALTH AND SAFETY PROGRAM

- A. Does your company maintain a written Health and Safety program? Yes No
If "Yes," please include a copy of the Table of Contents.
- B. Is your company capable of preparing safety procedures specific to the work proposed for this project? Yes No
- C. Does your firm have a safety officer? Yes No
If "Yes," please provide name and telephone number.

Name: _____ Telephone: _____

- D. Do you hold jobsite safety meetings?
1. How Often?
- Daily Weekly Bi-Weekly Monthly Less Often, As needed
2. Are the health and safety meetings documented? Yes No
- E. Is a program in place for the reporting and correction of workplace hazards? Yes No
- F. Are workers encouraged to intervene when unsafe conditions are observed? Yes No
- G. Have the safety and health hazards associated with your job activities been identified? Yes No
1. Has a risk assessment been performed on these hazards? Yes No

5. ACCIDENT/INCIDENT REPORTING, INVESTIGATION, AND INJURY MANAGEMENT

- A. Does your company have a process in place for immediate reporting, investigation, and follow-up of incidents, near-misses and occupational injuries? Yes No

If "Yes," who receives copies of the report? (Job Title) _____
(Job Title) _____
(Job Title) _____



Health, Safety and Environment
SUBCONTRACTOR SAFETY
EVALUATION FORM

Attachment 046-1 NA
 Issue Date: July 1999
 Revision 5: February 2009

B. Who is responsible for investigation and completion of your incident report forms? (Job Title) _____

Please provide your company's incident reporting procedures.

Please provide a copy of an investigation report conducted within the last year.

C. Does your company have an injury management procedure? Yes No
If "Yes," provide a copy of the injury management procedure.

D. Does your injury management procedure include the use of occupational clinics (for non-critical injuries) as a preferred method of medical care? Yes No

E. Does your company have a nurse or doctor on staff? Yes No

F. Does your company use a third party to provide medical advice to injured employees? Yes No

If "Yes," which third-party company is used? _____

6. HEALTH AND SAFETY TRAINING

A. Do you have or provide company paid safety/health training to your employees? Yes No

B. Does your company have a formal safety orientation program for new employees? *If "Yes," submit a copy for evaluation.* Yes No

Are records kept? Yes No

If "Yes," who conducts the orientation? (Job Title) _____

If "No," how are new employees informed of safety policies and procedures and expectations?

C. Do you have additional safety and health training for newly hired or promoted foremen/superintendents? Yes No

Topics Covered:



Health, Safety and Environment
SUBCONTRACTOR SAFETY
EVALUATION FORM

Attachment 046-1 NA
Issue Date: July 1999
Revision 5: February 2009

- D. Do you maintain a record of all employees' training? Yes No
- E. Are your employees enrolled in a Defensive Driving Training Program? Yes No

If "Yes," describe the training, including the training provider, who receives the training, and course length.

Please provide a copy of training records from a recent HSE training course.

7. MEDICAL / DRUG TESTING

- A. Does your company have a Drug/Alcohol policy or program? Yes No

If "Yes," does your drug and alcohol program include the following:

- Pre-employment testing Yes No
- Testing for Cause Yes No
- Post-accident testing Yes No
- Random testing Yes No

- B. Does your company have an ongoing medical surveillance program as required by applicable governmental regulations? Yes No

Do you conduct medical examinations for:

- Pre-employment Yes No
- Pre-placement Job Capability Yes No
- Hearing Function (Audiograms) Yes No
- Pulmonary Yes No
- Respiratory Yes No

8. COMPLIANCE ASSURANCE

- A. Does your company conduct job site safety inspections? Yes No

1. How often? _____
2. Who conducts the inspection? (Job Title) _____
3. Who receives the reports? (Job Title) _____

4. Are inspections documented? *If "Yes," provide an example.* Yes No



Health, Safety and Environment
SUBCONTRACTOR SAFETY
EVALUATION FORM

Attachment 046-1 NA
Issue Date: July 1999
Revision 5: February 2009

Comment on any other areas of your company's safety program and policies that you think will be appropriate in our evaluation.

VERIFICATION OF DATA

Please have an officer of the Company sign below certifying that the information provided in this document is current and correct. Misrepresentation of data requested is grounds for immediate termination of contracts and disqualification from future consideration.

Name

Title

Signature

Date

REQUIRED INFORMATION SUBMITTAL

Please provide copies of the following documents with the completed evaluation form. **If the following information is not included, provide a written reason for the failure to do so.**

- EMR documentation from your insurance carrier
- OSHA 300 and 300A Logs (Past 3 Years) – *Employee names must be removed.*
- Description for any fatalities (if applicable)
- Insurance Certificate(s) – *Naming URS as Additional Insured*
- Safety, Health, and Environmental Program (Table of Contents)
- Accident/Incident Reporting Procedure
- Example of an Investigation Report conducted within the past year
- Injury Management Procedure
- Safety, Health & Environmental Orientation for New Hires (Outline)
- Example of Safety, Health and Environmental Training Records
- Example of Job Site Safety Inspection conducted within the past year



Health, Safety and Environment
**SUBCONTRACTOR SAFETY
EVALUATION FORM**

Attachment 046-1 NA
Issue Date: July 1999
Revision 5: February 2009

THIS PAGE IS TO BE COMPLETED BY URS CORPORATION.

**Subcontractor
Name:** _____

Project or Site Manager Evaluation:

- Pass Subcontractor meets the criteria established in Attachment 46-2, and no further action is required.
- Fail Subcontractor does not meet the criteria established in Attachment 46-2 NA. If a unique business need exists, then a subcontractor variance must be initiated using Attachment 46-3 NA. The variance must be submitted to a Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager for evaluation.

Project or Site Manager Name: _____

Signature: _____

Date: _____



**SUBCONTRACTOR
EVALUATION CRITERIA**

Prior to engaging a subcontractor on a project, Project Managers are required to ensure that the contractor has an effective safety program, is capable of conducting its operations in a safe manner, and has appropriate insurance coverage. The following criteria shall be followed in determining whether the subcontractor may be used on a URS Corporation project.

Note: Some questions/answers (Sections 4 through 8) from Attachment 46-1 NA are not discussed in the evaluation criteria below. These questions are asked and the answers are intended to help the Project Manager understand the safety culture and/or safety priority of the subcontractor.

GENERAL INFORMATION

The subcontractor must be able to complete the header section on Page 1 of the questionnaire (Attachment 46-1 NA), including their North American Industry Classification System (NAICS) codes. For assistance determining the NAICS for a business, refer to the U.S. Census Bureau online at <http://www.census.gov/epcd/naics02/>.

If subcontractor has performed work for URS previously, check safety performance history with previous URS Corporation Project Manager.

The numbers in this section directly correspond to the questions in Attachment 46-1 NA.

WORKERS' COMPENSATION EXPERIENCE INFORMATION

- 1.A. For any EMR listed as greater than 1.0, the contractor has failed the sub-evaluation. Further consideration may not occur without referral to a URS Corporate, Regional, or Strategic Business Unit (SBU) Health, Safety, and Environment (HSE) Manager in your Region for further assessment.

If all EMRs listed are 1.0 or below, continue with the evaluation.

SAFETY PERFORMANCE

- 2. For any OSHA Total Recordable Incident Rate (line G in table) listed as greater than 4.0, the subcontractor has failed the evaluation. Further considerations may not occur without referral to a URS Corporate, Regional, or SBU HSE Manager in your Region for further assessment.

If the Total Recordable Incident Rates are at or below 4.0, continue with the assessment.

- 2.B. If the contractor has had a fatality, further consideration may not occur without referral to a URS Corporate, Regional, or SBU HSE Manager in your Region.

- 2.C. Determine the subcontractor's citation history at <http://www.osha.gov/cgi-bin/est/est1>. Click on Establishment Search, enter the subcontractor's name. Query Case Status Open

**SUBCONTRACTOR
EVALUATION CRITERIA**

and Closed. Compare the published data to the subcontractor questionnaire. The subcontractor must explain any discrepancies.

Look for willful, serious, and repeat violations. If they suggest a problem, request information and refer to a URS Corporate, Regional, or SBU HSE Manager in your Region for further assessment.

RISK MANAGEMENT/INSURANCE DATA

- 3.A. The inability to provide insurance coverage at the stated amounts requires referral to the URS Legal Department.
- 3.B. The ability to provide Insurance Certificates naming URS Corporation as an additional insured is required. Refer any questions to the URS Legal Department.
- 3.C. Proof of Workers' Compensation Insurance is required. Refer any questions to the URS Legal Department.

HEALTH AND SAFETY PROGRAM

For Sections 4 through 8, if a subcontractor answers 'No' to any of the questions, the Project Manager needs to consider the type of work the subcontractor will be performing (e.g. HAZWOPER work required medical surveillance exams) to determine if the answer is acceptable.

- 4.A. For small subcontractors, a 'No' answer is not unexpected and may be acceptable with good EMR and OSHA statistics. Generally, some minimal program is expected depending on the breadth and complexity of the work. Contact a URS Corporate, Regional, or SBU HSE Manager in your Region for further assessment if you have any questions or doubts.
- 4.B. It is expected that a subcontractor being hired to perform services on the project site should be the best prepared to address safety issues for their operations, especially when specialty work is being conducted, or for work in which the subcontractor possesses superior knowledge of their operations.

A "No" answer should be referred to a URS Corporate, Regional, or SBU HSE Manager in your Region for further assessment.

Exception:

If the subcontractor does not meet the other requirements outlined above, the decision will be that the subcontractor will not be used. However, if a unique business need exists (e.g., subcontractor is a specialty subcontractor), the Project Manager should initiate a Subcontractor Variance (Attachment 046-3 NA). The Subcontractor Variance must be approved by a Corporate, Regional, or SBU HSE Manager.



Health, Safety and Environment
SUBCONTRACTOR VARIANCE FORM

Attachment 046-3 NA
Issue Date: July 1999
Revision 5: February 2009

Subcontractor Name: _____

Project or Site Location: _____

Description of Work to be Performed:

Explain any of the following conditions that apply to the subcontractor:

- EMR greater than 1.0
- TRIR greater than 4.0
- Fatalities within the past 3 years
- Willful, serious, or repeat OSHA citations

Why should we use this subcontractor?



Health, Safety and Environment
SUBCONTRACTOR VARIANCE FORM

Attachment 046-3 NA
Issue Date: July 1999
Revision 5: February 2009

Have other similar subcontractors been evaluated? If so, please explain.

Mitigations by URS to manage the risks.

Review:
Project or Site Manager Requesting Variance

HSE Manager Approval

Name: _____

Date: _____

Signature: _____

**URS SAFETY MANAGEMENT STANDARD 047
BIOLOGICAL HAZARDS**

URS SAFETY MANAGEMENT STANDARD

Biological Hazards

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to reduce or eliminate illnesses and injuries transmitted by plants, insects, animals, and pathogenic agents.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 047 NA – North America

SMS 047 EU – UK and Ireland, Europe, and Middle East

SMS 047 AP7 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Biological Hazards

1. Applicability

This standard applies to URS Corporation and its subsidiary companies where job activities are performed primarily in outdoor environments.

2. Purpose and Scope

The purpose of this standard is to provide information that will help eliminate or reduce illnesses and injuries transmitted by plants, insects, animals, and pathogenic agents. Although there are many animals and insects that are potentially harmful to humans (e.g., bees, spiders, bears, and rodents), this standard focuses on six common biological hazards: ticks, poison plants, mosquitoes, snakes, Valley Fever, and water-borne pathogenic agents. Refer to SMS 051 – Bloodborne Pathogens for additional information.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

4. Requirements

A. Ticks

1. Precautionary Measures

- a. Background information: Ticks do not jump, crawl, or fall onto a person. They are picked up when clothing or hair brushes a leaf or other object the tick is on. Ticks are generally found within 3 feet of the ground. Once picked up, they will crawl until they find a likely site to feed. Often they will find a spot at the back of the knee, near the hairline, behind the ears, or at pressure points where clothing presses against the skin (underwear elastic, belts, neckline). The best way to prevent tick-borne diseases is not to be bitten by a tick. Ticks can carry a number of diseases, including the following:
 - i. *Lyme Disease* is an infection caused by the corkscrew-shaped bacteria *Borrelia burgdorferi* that is transmitted by the bite of deer tick (ixodes) and western black-legged ticks. The disease occurs in the forested areas of North America, Europe, and Asia. Symptoms that occur within 3 to 30 days following a tick bite include: a spreading ‘bulls-eye’ rash, fever, fatigue, headache, and joint and muscle aches. Prompt treatment with antibiotics is essential in order to prevent more serious complications that may occur if left untreated.

URS SAFETY MANAGEMENT STANDARD **Biological Hazards**

- ii. *Rocky Mountain Spotted Fever* is an infection caused by the bacteria *Rickettsia rickettsii*. The disease occurs in North, Central, and South America. Other *Rickettsia* organisms cause disease worldwide (Mediterranean, Japan, Africa, North Asia). Symptoms which occur 2-6 days following a tick bite include: fever, nausea, vomiting, diarrhea, rash, muscle and joint pain. The disease is treated with antibiotics.
- iii. *Babesiosis* is caused by hemoprotozoan parasites of the genus *Babesia*. It is transmitted by the ixodid tick. The geographic distribution is worldwide. Symptoms include fever, chills, fatigue, muscle aches, and an enlarged spleen and liver. The disease is treated with anti-protozoan drugs.
- iv. *Ehrlichiosis* is caused by several bacteria of the genus *Ehrlichiae*. The geographic distribution is global, primarily in temperate regions. Symptoms which occur 5-10 days following a tick bite include fever, headache, fatigue, muscle aches, nausea, vomiting, diarrhea, confusion, and occasionally a rash. The disease is treated with antibiotics.

b. Avoidance of tick habitats

Whenever possible, persons should avoid entering areas that are likely to be infested with ticks, particularly in spring and summer when nymphal ticks feed. Ticks favor a moist, shaded environment, especially that provided by leaf litter and low-lying vegetation in wooded, brushy, or overgrown grassy habitat. Both deer and rodent hosts must be abundant to maintain the life cycle of the tick.

c. Personal Protective Equipment

- i. Wear light colored clothing or white Tyvek® to allow you to see ticks that are crawling on your clothing.
- ii. Tuck your pant legs into your socks or boots, wear high rubber boots, or use tape to close the opening where they meet so that ticks cannot crawl up the inside of your pant legs.
- iii. Wear a hat, and tie back long hair.
- iv. Apply repellents to discourage tick attachment. Repellents containing permethrin can be sprayed on boots and clothing, and will last for several days. Repellents containing DEET (n,n-diethyl-m-toluamide) can be applied to the skin, but will last only a few

URS SAFETY MANAGEMENT STANDARD

Biological Hazards

hours before reapplication is necessary. Apply according to Environmental Protection Agency guidelines to reduce the possibility of toxicity.

d. Tick Check

- i. Change clothes when you return from an area where ticks may be located.
- ii. Shower to wash off any loose ticks.
- iii. Check your entire body for ticks. Use a hand held or full-length mirror to view all parts of your body.
- iv. Place clothing worn in tick infested areas into the dryer for at least 30 minutes in order to kill any ticks.

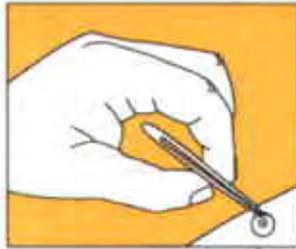
2. Tick Removal

Because it takes several hours of attachment before microorganisms are transmitted from the tick to the host, prompt removal of attached or crawling ticks is an important method of preventing disease. Remember, folklore remedies of tick removal to do not work! Methods such as the use of petroleum jelly or hot matches may actually make matters worse by irritating the tick and stimulating it to release additional saliva or regurgitate gut contents, increasing the chances of transmitting disease.

The best method to remove an attached tick is with a set of fine tipped tweezers.



URS SAFETY MANAGEMENT STANDARD Biological Hazards



- a. Use fine-tipped tweezers. When possible, avoid removing ticks with bare hands.
 - b. Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. If this happens, remove mouthparts with the tweezers.
 - c. Do not squeeze, crush, or puncture the body of the tick because its fluids (saliva and gut contents) may contain infectious organisms.
 - d. After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.
 - e. Disinfect the tweezers.
 - f. Save the tick for identification in case you become ill. This may help the doctor make an accurate diagnosis. Place the tick in a vial or plastic zip lock bag and put it in the freezer. Write the date of the bite on a piece of paper with a pencil and place it in the bag.
3. Medical Follow-Up

In most circumstances, medical treatment of persons who only have a tick bite is not recommended. However, individuals who are bitten by a tick should seek medical attention if any signs and symptoms of tick-borne disease develop over the weeks following the tick bite.

URS SAFETY MANAGEMENT STANDARD

Biological Hazards

B. Poisonous Plants

1. Background Information

Poison ivy and poison oak plants are the most common cause of allergic contact dermatitis in North America. These poisonous plants can be a hazard for many various outdoor activities at work, home, and play. Skin contact with the oleoresins (urushiol) from these plants can cause an itchy, red, oozing, blistered rash in sensitive individuals. Oil content in the plants is highest in the spring and summer; however, the plants are even hazardous in the winter when they have dropped their leaves. There are three types of exposure:

- a. Direct contact: An initial skin exposure is necessary to “sensitize” the individual. Subsequent contact in a sensitized person will result in a rash appearing within 4 to 48 hours. Approximately 50 to 70 percent of the population is sensitized. Poison plant dermatitis is usually characterized by areas of linear or streaked patches where branches of the plant brushed the skin.
- b. Indirect contact: Skin exposure can happen indirectly. Clothing, shoes, tools, personal protective equipment, and other items can be contaminated with the oils and maintain potency for months.
- c. Airborne smoke contact: Never burn poison plants. Droplets of oil can be carried by smoke and enter the respiratory system, causing a severe internal outbreak.

Poison plant rash is not contagious. Skin contact with blister fluid from an affected individual will not cause dermatitis in another sensitized person. Scratching the rash can only spread it to other parts of your body if the oil is still on your skin. After the oil has been washed off or absorbed by the skin, scratching will not spread the rash.

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each and are green in the summer and red in the fall. Both plants also have greenish-white flowers and berries that grow in clusters. All parts of these plants are toxic.

URS SAFETY MANAGEMENT STANDARD

Biological Hazards

Poison Ivy grows as a small plant, vine, and as a shrub. Leaves always consist of three glossy leaflets.



Poison Ivy

Poison Oak grows as a shrub or vine. It has three leaflets that resemble oak leaves.



Eastern Poison Oak

Poison Sumac grows as a woody shrub or small tree from 5 to 25 feet tall. It has 7 to 13 leaves that grow opposite each other with a leaflet at the tip.



Poison Sumac

2. Precautionary Measures

- a. The best approach is to learn to identify the plants and avoid them.
- b. Wear long pants and long sleeves, boots, and gloves.
- c. Barrier skin creams may offer some protection if applied before contact.
- d. Avoid indirect contact with tools, clothing, or other objects that have come into contact with a crushed or broken plant. Don't forget to wash contaminated clothing and clean up contaminated equipment.

URS SAFETY MANAGEMENT STANDARD

Biological Hazards

- e. If you can wash exposed skin areas within 3 to 5 minutes with cold running water, you may keep the urushiol from penetrating your skin. Proper washing may not be practical in remote areas, but a small wash-up kit with pre-packaged alcohol-based cleansing tissues can be effective.

3. Medical Follow-Up

Home treatment: Calamine lotion and an oatmeal (1 cup to a tub full of water) bath can help relieve itching. To prevent secondary skin infection, scratching is not helpful, and the finger nails should be cut to avoid damage to the skin. Over-the-counter hydrocortisone cream can decrease inflammation and itching; however, read the label and use according to directions.

When to see the doctor: Severe cases may require further treatment. A physician should be seen if the rash appears infected, is on the face or other sensitive body areas, or is too extensive to be easily treated at home.

C. Mosquito-Borne Diseases

1. Background Information

- a. Arboviral encephalitis is a viral illness causing inflammation of the brain, and is transmitted to humans by the bite of infected mosquitoes. Globally, there are several strains, including: Eastern equine, Japanese, La Crosse, St. Louis, West Nile, and Western equine encephalitis. Some of the strains have a vaccine. Symptoms of infection are nonspecific and flu-like: fever, headache, and tiredness. Fortunately, only a small proportion of infected people progress to encephalitis. Treatment is supportive, antibiotics are not effective.
- b. Malaria is a serious but preventable disease spread by the bite of an infected anopheline mosquito. It is caused by four species of the parasite *Plasmodium* (*P. falciparum*, *P. vivax*, *P. ovale*, and *P. malariae*). Malaria-risk areas include primarily tropical areas of Central and South America, Africa, India, Southeast Asia, and the Middle East. Symptoms of malaria, which occur 8 days to 1 year after infection, include fever, shaking, chills, headache, muscle ache, tiredness, jaundice, nausea, vomiting, and diarrhea. Malaria can be cured with prescription drugs.
- c. Dengue Fever is a potentially life-threatening viral illness transmitted by the bite of the *Aedes* mosquito, found primarily in urban areas. The

URS SAFETY MANAGEMENT STANDARD

Biological Hazards

disease is found in most of tropical Asia, the Pacific Islands, Central and South America, and Africa. There are four dengue virus serotypes. Symptoms include sudden onset, high fever, severe headache, joint and muscle pain, rash, nausea, and vomiting. There is no specific treatment and no vaccine.

- d. Yellow Fever is a viral disease transmitted between humans by mosquitoes. It occurs only in Africa and South America. There is a vaccine that confers immunity lasting 10 years or more. Symptoms begin 3 to 6 days after the mosquito bite, and include fever, nausea, vomiting, headache, slow pulse, muscle aches, and restlessness. Treatment is symptomatic.
- e. West Nile virus is a viral disease transmitted by mosquitoes. It occurs in North America, Europe, Africa, west and central Asia, and the Middle East. There is no vaccine for West Nile virus. Symptoms include nausea, vomiting, and diarrhea.

2. Precautionary Measures

- a. Insect Repellent: Use insect repellants that contain DEET. The effect should last about 4 hours. Always use according to label directions. Use only when outdoors, and wash skin after coming indoors. Do not breathe in, swallow, or get into the eyes. Do not put on wounds or broken skin.
- b. Protective Clothing: Wear long-sleeved shirts and long pants, especially from dusk to dawn. Avoid going outdoors during these hours.
- c. Mosquito netting: Travelers who will not be staying in well-screened or air conditioned rooms should use a pyrethroid-containing flying insect spray in living and sleeping areas during evening and nighttime hours. Sleep under mosquito netting (bed nets) that has been sprayed with permethrin.
- d. Malaria prophylaxis medications may be prescribed; however, they do not provide complete protection. The type of medication given depends on the area of travel.

URS SAFETY MANAGEMENT STANDARD **Biological Hazards**

D. Poisonous Snakes

1. Background Information

No single characteristic distinguishes a poisonous snake from a harmless one except the presence of poison fangs and glands. Only in dead specimens can you determine the presence of these fangs and glands without danger. Most poisonous snakes have both neurotoxic and hemotoxic venom; however, one type is dominant and the other is weak.

- a. Hemotoxic venom. The folded-fang snakes (fangs can raise to an erect position) have venoms that affect the circulatory system, destroying blood cells, damaging skin tissues, and causing internal hemorrhaging.
- b. Neurotoxic venom. The fixed-fang snakes (permanently erect fangs) have venoms that affect the nervous system, making the victim unable to breathe.
- c. Poisonous snakes in the Americas: copperhead, coral snake, cottonmouth, and rattlesnake.
- d. Poisonous snakes in Europe: adder, viper.
- e. Poisonous snakes in Africa and Asia: viper, cobra, adder, green mamba.
- f. Poisonous snakes in Australia: copperhead, adder, taipan, tiger snake.

2. Precautionary Measures

Bites occur when you don't hear or see the snake, when you step on them, or when you walk too close to them. Follow these simple rules to reduce the chance of accidental snakebite:

- a. Don't put your hands into dark places, such as rock crevices, heavy brush, or hollow logs, without first investigating.
- b. Don't step over a fallen tree. Step on the log and look to see if there is a snake resting on the other side.
- c. Don't walk through heavy brush or tall grass without looking down. Look where you are walking.
- d. Do not pick up any live snake. If you encounter a snake, walk around the snake, giving it plenty of room. A snake can strike half its length.

URS SAFETY MANAGEMENT STANDARD **Biological Hazards**

- e. Don't pick up freshly killed snakes without first severing the head. The nervous system may still be active and a dead snake can deliver a bite.

3. Medical Follow-Up

If you are bitten by a snake, the primary goal is to get to a hospital as soon as possible to receive professional medical evaluation, and possible treatment with anti-venom if warranted. Initial first aid should include: Washing the bite with soap and water; immobilizing the bitten area and keeping it lower than the heart. Try to remain calm. If you are unable to reach a hospital within 30 minutes, a bandage, wrapped 2 to 4 inches above the bite, may help slow the venom. The bandage should not cut off blood flow from a vein or artery; make sure the bandage is loose enough that a finger can slip under it.

Research has shown the following to be potentially harmful: DO NOT apply ice, use a tourniquet, or make incisions into the wound.

E. Valley Fever

1. Background Information

Valley Fever is an illness that results from exposure to a fungal spore (*Coccidioides immitis*). It is endemic to the San Joaquin Valley in California, as well as areas of the Southwestern U.S., Mexico, and Central and South America, although it has been found in many other areas. It is particularly associated with arid soils that are not cultivated. Exposure is generally by inhalation of spores, though it may also enter through broken skin. Approximately 2 weeks after inhalation exposure, severe weakness and flu-like symptoms develop; severe pneumonia may occur. It may also affect the brain, bones, and joints causing disability, spinal meningitis, or death. Dermal forms of the infection can form disfiguring fungal lesions.

2. Precautionary Measures

Because it is associated with arid soils, personnel should avoid locations and activities that create dust. Persons at risk of exposure include geologists, surveyors, excavators, archaeologists, etc. Dust suppression methods should be employed and the use of particulate respirators should be considered for areas known to harbor the fungus. At one phase of the fungus' life cycle, cottony, spider-web-like growths may be seen on the soil surface. If observed, these growths must not be disturbed, and work should be relocated if possible.

URS SAFETY MANAGEMENT STANDARD

Biological Hazards

3. Medical Follow-up

Approximately 60 percent of exposed persons will not have symptoms. Persons that have been in areas associated with Valley Fever should be alert to the development of flu-like symptoms, fatigue, or skin rashes 2 to 4 weeks later. Valley Fever can be treated with anti-fungal medication. Early treatment is critical, as disseminated forms of the disease can result in chronic disease or death.

F. Pathogenic organisms

1. Background Information

Employees who perform certain activities, such as disaster response, may be in areas where water-borne pathogens may be present. A partial list of agents includes: E. coli, Hepatitis A, typhoid, and cholera. Chemical hazards and molds and fungus may also be present. Refer to SMS 051–Bloodborne Pathogens for additional information.

2. Precautionary Measures

All work must be performed within the scope of either a Health and Safety Plan or Safe Work Plan that identifies the task hazards, and specifies appropriate controls. A medical exam and/or inoculations may be required. See SMS 024 – Medical Screening and Surveillance, or contact the Occupational Health Manager for assistance.

Where contact with water or wet materials may occur, personnel must use protection such as impervious coveralls, boots/waders, faceshields, etc, as specified in the project Health and Safety Plan or Safe Work Plan. Personnel must protect any areas of broken skin, eyes, nose, and mouth from contact with potentially infectious materials, and practice good personal hygiene before eating, drinking, etc.

3. Medical Follow-up

Medical evaluation and/or an inoculation schedule may be required prior to beginning work. Because early evaluation and treatment is more successful, personnel should be alert to signs and symptoms of possible pathogenic organisms and seek prompt medical evaluation if illness develops or is suspected.

URS SAFETY MANAGEMENT STANDARD

Biological Hazards

G. Natural disaster relief efforts

1. Natural disaster relief efforts present a variety of hazards, including biological hazards. Biological hazards potentially encountered during relief efforts include mold, sewage-contaminated water, various building materials that may puncture the skin and create various types of infections, and displaced animals and insects. Before work begins, each disaster relief site should be evaluated for the various types of biological hazards that may be encountered. Control measures must be developed to address the biological hazards.

5. Documentation Summary

Complete and distribute a URS Incident Report form 049-1 for all work-related biological exposure incidents.

6. Resources

- A. Centers for Disease Control <http://www.cdc.gov>
- B. U. S. Occupational Safety and Health Administration <http://www.osha.gov>
- C. U.S. Food and Drug Administration - Treating and Preventing Venomous Snake Bites
http://www.fda.gov/fdac/features/995_snakes.html
- D. ENature – Identify plant and animals hazards in a specific area.
<http://enature.com/zipguides/index.asp?choice=poisonous>
- E. [SMS 051](#) – Bloodborne Pathogens
- F. [SMS 024](#) – Medical Screening and Surveillance
- G. [SMS 049](#) – Injury / Illness / Incident Reporting & Notifications
- H. [ORC Pandemic Planning Guide](#)

URS SAFETY MANAGEMENT STANDARD 049
INJURY/ILLNESS/INCIDENT REPORTING & NOTIFICATIONS

URS SAFETY MANAGEMENT STANDARD **Injury / Illness / Incident Reporting & Notifications**

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to provide guidance for the timely reporting of work-related injuries, illness, and incidents. This procedure also defines incident notification procedures for URS employees. For incidents involving motor vehicles, the reporting and notification requirements of URS SMS 057 – Vehicle Safety Program – may also apply.

For significant incidents (e.g., fatality, serious injury, injury to members of the public), SMS 066 – Incident Investigation – is also required.

3. Procedures

The associated regional/divisional procedures for this standard are included as attachments:

URS and EG&G Divisions

SMS 049 NA – North America, UK and Ireland, Europe, and Middle East

SMS 049 AP11 – Asia Pacific

Washington Division

SMS 049 WD

URS SAFETY MANAGEMENT STANDARD

Injury / Illness / Incident Reporting & Notifications

1. Applicability

This standard applies to the operations of URS and EG&G Divisions of URS Corporation (URS) and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to provide guidance for the timely reporting of work-related injuries, illness, and incidents. This procedure also defines incident notification procedures for URS employees. For incidents involving motor vehicles, the reporting and notification requirements of SMS 057 – Vehicle Safety Program – may also apply.

For significant incidents (e.g., fatality, serious injury, injury to members of the public), SMS 066 – Incident Investigation – is also required.

Note that this standard will also be used for investigation of critical injuries as defined by Canadian provincial regulations. See Supplemental Information A for definitions of critical injuries.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

4. Requirements

- A. Reporting: All employees must immediately notify their appropriate level of management (line, project, and/or office) of a reportable incident. A reportable incident includes the following:
1. An injury or illness to any URS employee or subcontractor, even if the injury does not require medical attention.
 2. An injury to a member of the public, or clients, occurring on a URS-controlled work site.
 3. Illness resulting from suspected chemical exposure.
 4. Chronic or re-occurring conditions such as back pain or cumulative trauma disorders (e.g., carpal tunnel syndrome).
 5. Fire, explosion, or flash.

URS SAFETY MANAGEMENT STANDARD

Injury / Illness / Incident Reporting & Notifications

6. Any vehicle accidents occurring on site, while traveling to or from client locations, or with any company-owned, rented, or leased vehicle (including personal vehicles used for company business).
7. Property damage resulting from any URS or subcontractor activity.
8. Structural collapse or potential structural hazards.
9. Unexpected release or imminent release of a hazardous material.
10. Unexpected chemical exposures to workers or the public.
11. A safety-related complaint from the public regarding URS activities.
12. Incidents that could result in adverse public media interest concerning URS or a URS project.
13. Any incident that could or does result in an actual investigation by state, federal, provincial, or local regulatory or law enforcement agencies.
14. Any other significant occurrence that could impact safety, including a near-miss.

Note: A near-miss is defined as an incident having the potential to cause significant injury or property damage as listed above, but did not. Examples of a near-miss include:

- a. A worker steps off a ledge, falls 3 feet (1 meter) to the floor, and is uninjured.
- b. A crane drops a 1,000-pound (454-kilogram) beam during a lift. Nobody is hurt, and no equipment is damaged.
- c. A work crew is conducting a survey along the highway. A vehicle leaves the roadway (driver asleep) and the vehicle enters the survey area at 50 miles per hour (80 kilometers per hour). The vehicle misses an employee by 3 feet (1 meter); the driver recovers control of the vehicle and leaves the area.

B. Actions: The following actions will be taken following a reportable incident:

1. Employees:
 - a. If necessary, suspend operations and secure and/or evacuate the area.

URS SAFETY MANAGEMENT STANDARD

Injury / Illness / Incident Reporting & Notifications

- b. Immediately notify your supervisor and/or project manager.
 - c. Contact appropriate emergency services and obtain appropriate medical attention, as required or directed by your supervisor. For additional information, refer to SMS 065 – Injury and Claims Management.
 - d. Record information pertaining to the incident (e.g., time, date, location, name and company of person(s) involved, witnesses, description of event, and actions taken) and initiate Attachment 049-1 NA – Incident / Near Miss Report. (Note: The international operations of URS Division will complete an on-line Incident Report instead, using the appropriate Health, Safety, and Environment (HSE) and Quality Improvement database).
 - e. Submit this information to your supervisor and/or Project Manager within 24 hours of the incident.
 - f. Assist with incident investigation as directed by management.
 - g. Implement corrective actions as directed by management.
 - h. *Do not* discuss the incident with members of the news media or legal representatives (except URS legal counsel or your personal legal advisor) unless directed to do so by URS management.
 - i. *Do not* make statements pertaining to guilt, fault, or liability.
2. Line/Project Management Responsibilities (U.S. and Mexico Operations)
- a. For instances involving employee or subcontractor death or hospitalization, or equipment damage to Company or customer equipment valued at more than \$100,000 (USD), immediately notify by telephone or other direct means URS/EG&G Operations and the HSE team in the order listed below. If any level of contact is unsuccessful, continue down the list in sequence. After notification has been made, a detailed follow-up, via email, is required.
 - i. Appropriate corporate leadership for the affected program up to the Regional Business Unit (RBU) or

URS SAFETY MANAGEMENT STANDARD

Injury / Illness / Incident Reporting & Notifications

Strategic Business Unit (SBU) Vice President for the affected Operations.

- ii. The URS Occupational Health Manager (OHM).
- iii. Appropriate RBU and SBU HSE Manager for the affected Operation.

Follow-up notification should be made by forwarding Attachment 049-1 NA to the OHM within 24 hours. See Attachment 049-1 NA for methods of distribution. Also, assure copies of the report are distributed as outlined on the form. For the international operations of URS Division, this follow-up notification is not required.

URS/EG&G Division HSE Management will make notification to federal and state authorities as appropriate.

- b. For minor incidents involving only first aid treatment, minor damage to vehicle or equipment, etc., make notifications to a supervisor and OHM immediately and submit Attachment 049-1 NA to the OHM. See Attachment 049-1 NA for methods of distribution. Also, assure copies of the report are distributed as outlined on the form.
 - c. For a near-miss incident, complete Attachment 049-1 NA and submit to the OHM as soon as reasonable. Also, ensure copies of the report are distributed as outlined on the form.
 - d. Review circumstances (i.e., who, what, when, where, and how) of the incident with applicable employee(s) to determine apparent causes and to develop recommended corrective actions.
 - e. Discuss with department or project staff the circumstances surrounding the incident and corrective actions taken.
3. Line/Project Management Responsibilities (Canadian Operations)
- a. If notified of an incident that is a critical injury (see Supplemental Information A for definition), serious accident, or other significant consequence:
 - i. Immediately contact URS Canada Human Resources at (905) 882-4401.

URS SAFETY MANAGEMENT STANDARD

Injury / Illness / Incident Reporting & Notifications

- ii. Review circumstances (i.e., who, what, when, where, and how) of the incident with applicable employee(s) to determine apparent causes and to develop recommended corrective actions.
 - iii. Follow up notification by completing, signing, and delivering/faxing Attachment 049-1 NA to URS Canada Human Resources within 24 hours.
 - iv. URS Canada Human Resources will make notification to provincial authorities as appropriate.
 - b. If notified of an incident that is not a critical injury, nor a serious accident or other significant consequence:
 - i. Review circumstances (i.e., who, what, when, where, and how) of the incident with applicable employee(s) to determine apparent causes and to develop recommended corrective actions.
 - ii. Complete, sign, and deliver/fax Attachment 049-1 NA to URS Canada Human Resources within 24 hours.
 - iii. URS Canada Human Resources will make notification to provincial authorities as appropriate.
 - c. If notified of a near-miss incident:
 - i. Review circumstances (i.e., who, what, when, where, and how) of the incident with applicable employee(s) to determine apparent causes and to develop recommended corrective actions.
 - ii. Complete, sign, and deliver/fax Attachment 049-1 NA to URS Canada Human Resources as soon as practicable.
 - d. Discuss with department or project staff the circumstances surrounding the incident and corrective actions taken.
- 4. Local Office, Project, and/or Certified HSE Representative
 - a. Assist with incident evaluation.

URS SAFETY MANAGEMENT STANDARD
Injury / Illness / Incident Reporting & Notifications

- b. With management, identify cause(s) of incident and identify corrective actions needed to avoid recurrence.
 - c. Review injury/incident report or the near-miss report for completeness and accuracy. Ensure the reports are distributed properly.
 - d. Ensure notifications are made in a timely manner.
 - e. Ensure that the injured employee is properly counseled/advised as directed by SMS 065 – Injury and Claims Management. Communicate with the OHM.
 - f. Note that “Certified” HSE Representatives are those who have received special training in occupational safety and health and have been certified by the Ontario Workplace Safety and Insurance Board. Certified HSE Representatives should be used at larger Canadian project sites where joint worker/employer safety committees are developed.
5. Occupational Health Manager
- a. Report work-related injuries and illness to workers’ compensation carrier.
 - b. Ensure that the employee’s injury is managed in accordance with SMS 065 – Injury and Claims Management. Provide guidance for the affected office, project, and/or Certified HSE Representative.
 - c. Periodically disseminate near-miss reporting summary information to the Regional, RBU/SBU, and Division HSE Managers.
6. URS Human Resources (Canadian Operations Only)
- a. Receive incident notifications from staff.
 - b. For incidents involving critical injuries, serious accidents, or other significant consequences:
 - i. Verbally notify the Office Manager immediately, via cell phone if necessary.

URS SAFETY MANAGEMENT STANDARD

Injury / Illness / Incident Reporting & Notifications

- ii. Notify the Certified HSE Representatives (management and worker) as soon as possible (where necessary).
 - iii. Notify the OHM as soon as possible. Notification to the OHM should in no case occur later than the end of the work shift.
 - iv. Follow up notification by receiving from staff and forwarding Attachment 049-1 NA to the OHM within 24 hours. Also, assure copies of the report are distributed as outlined on the form.
- c. For minor incidents involving only first aid treatment, minor damage to vehicle or equipment, etc.:
- i. Notify the OHM as soon as reasonable during normal business hours.
 - ii. Receive from staff and forward Attachment 049-1 NA to the OHM within 24 hours.

Ensure copies of the report are distributed as outlined on the form.

- d. Report work-related injuries and illness to the Workplace Safety and Insurance Board or appropriate workers' compensation carrier and other provincial or federal authorities as appropriate.
- e. Ensure, in conjunction with the Office HSE Representative, that the employee's injury is managed in accordance with SMS 065 – Injury and Claims Management. Provide guidance for the affected Certified or Project HSE Representative.
- f. Periodically disseminate near-miss reporting summary information to the Regional and Division HSE Managers.

7. Division HSE Management

- a. Notify URS management of any significant occurrence, including lost-time injuries, deaths, or other serious result or circumstance.

URS SAFETY MANAGEMENT STANDARD

Injury / Illness / Incident Reporting & Notifications

- b. The OHM will review all reported incidents to determine OSHA reporting and recording requirements with input from the appropriate Division HSE Manager. For a determination of recordability in those infrequent instances where there is not a clear answer, the Vice President of HSE will make the final determination. All decisions will be based strictly on current U.S. Occupational Safety and Health Administration (OSHA) regulations.
- c. Official records (including required reports and logs for all reported incidents) will be maintained at one central location by the OHM.
- d. Each January, the OHM will prepare and distribute the appropriate government injury/illness reports to each URS and EG&G establishment. These reports will summarize all required government information for incidents that occurred during the preceding calendar year.

5. Documentation Summary

File Attachment 049-1 NA in the appropriate safety files. Note that the international operations of URS Division will use the appropriate HSE and Quality Improvement database.

6. Resources

A. Occupational Health Managers (OHMs)

URS Division	EG&G Division
Jeanette Schrimsher, RN COHN-S (866) 326-7321 (Toll Free-U.S.) (512) 656-0203 (Cell) (512) 419-6413 (Confidential Fax)	BJ (Johnson) Heinrich, RN, BSN, COHN-S (866) 344-1415 (Toll Free-U.S.) (877) 878-9525 (Toll Free-International) (512) 656-8502 (Cell) (512) 419-5252 (Confidential Fax)

- B. SMS 057 – Vehicle Safety Program
- C. SMS 065 – Injury and Claims Management
- D. SMS 066 – Incident Investigation
- E. Attachment 049-1 NA – Injury/Near Miss Report Form



Health, Safety and Environment
INCIDENT / NEAR MISS REPORT FORM

Attachment 049-1 NA
Issue Date: May 2001
Revision 7: February 2009

ADMINISTRATIVE INFORMATION

Database Office ID:

RBU: <input type="checkbox"/> URS Division	SBU: <input type="checkbox"/> EG&G Division
Region:	SBE Director:
Client Sector:	Program:

NOTIFICATION / LOCATION DATA

Site or Office:	Customer/Client Name:	
Date of Event:	Time of Event:	Time Employee Started Work:
Date Supervisor Notified:	Time Supervisor Notified:	Name of Employee Submitting Report:
Client Notification Completed (if required)? <input type="checkbox"/> Yes <input type="checkbox"/> No		Project/Order Number:

TYPE OF EVENT (Check all applicable items)

Illness (Check one) <input type="checkbox"/> Employee <input type="checkbox"/> Subcontractor <input type="checkbox"/> Other	Injury (Check one) <input type="checkbox"/> Employee <input type="checkbox"/> Subcontractor <input type="checkbox"/> Other	Near Miss (Check the potential consequences): <input type="checkbox"/> Injury <input type="checkbox"/> Equipment Damage <input type="checkbox"/> Property Damage <input type="checkbox"/> Environmental release <input type="checkbox"/> Other (describe)
NAME of Injured/III Employee: _____ Property Damage (Check one) <input type="checkbox"/> Company (owned, leased, rented) <input type="checkbox"/> Client/Customer <input type="checkbox"/> Other	Vehicular Accident (Check one) <input type="checkbox"/> Company (owned, leased, rented) <input type="checkbox"/> Client/Customer <input type="checkbox"/> Other	<input type="checkbox"/> Fire <input type="checkbox"/> Explosion <input type="checkbox"/> Flash <input type="checkbox"/> Other (describe): _____

EVENT SUMMARY

Briefly state the facts contributing to the event. Attach additional pages and supporting information, as necessary. Avoid use of employees' names. *If this is an injury or illness, supply additional information as required on Page 2.*

ROOT CAUSE DETERMINATION

Root Cause (State the root or primary cause, then select the most appropriate cause category from Page 4):

CONTRIBUTING FACTORS

Contributing Causes (Describe any contributing causes, then select the applicable cause categories from Page 4):

CORRECTIVE ACTIONS

List methods of preventing/avoiding this type of incident/near miss in the future. There must be one or more corrective actions for each root cause.

NOTE: *If this is a near miss report, no further information is required. Submit only the first page of the form. The preferred method of distribution of near miss reports is by e-mail attachment either in Word, or scanned to PDF. Forward URS near miss reports to incidentreport@urscorp.com. Alternatively, reports may be faxed to 512.419.6413.*

Additional Distribution: Office/Site Manager Regional/SBE/SBU HSE Manager Office/Site HSE Representative



Health, Safety and Environment
INCIDENT / NEAR MISS REPORT FORM

Attachment 049-1 NA
Issue Date: May 2001
Revision 7: February 2009

FOR INJURIES/ILLNESS ONLY

Employee Information

What was the employee's location when the injury/illness occurred (include city and state)?

What was the employee doing when the injury/illness occurred? Describe the activity as well as the tools, equipment, or material you were using.

What happened? Describe how the injury/illness occurred.

What was the injury or illness? Describe the part of the body that was affected and how it was affected. Use the Incident pick lists on Page 4 to aid in your description.

What level of medical treatment was received? First Aid Clinic/Physician Emergency Room Refused/None

List witnesses and/or other employees involved. Attach statements where applicable.

Do you feel URS/EG&G provided you with the proper safety instructions (including PPE usage) for the task you were performing at the time of the incident? Yes No (Explain below)

How do you think this type of incident could be prevented or avoided in the future?

Mark all PPE being used when the incident occurred:

- | | | | |
|---|---|--|--|
| <input type="checkbox"/> Safety Glasses | <input type="checkbox"/> Safety Goggles | <input type="checkbox"/> Face Shield | <input type="checkbox"/> Safety Shoes |
| <input type="checkbox"/> Half-face Respirator | <input type="checkbox"/> Full-face Respirator | <input type="checkbox"/> Protective Gloves | <input type="checkbox"/> Chemical Gloves |
| <input type="checkbox"/> Hard Hat | <input type="checkbox"/> Hearing Protection | <input type="checkbox"/> Other (describe): | |

Injured/III Employee Signature: _____ Date: _____

Name of Injured/III Employee (Please print clearly): _____

Employee Number: _____ Contact Phone Number: _____

Additional Sheets Attached? Yes No (Include photos, maps, and/or diagrams when possible.)



Health, Safety and Environment
INCIDENT / NEAR MISS REPORT FORM

Attachment 049-1 NA
 Issue Date: May 2001
 Revision 7: February 2009

Supervisor Information

Describe any additional/different details other than those provided on the previous page. Avoid use of employees' names, where possible. Attach additional sheets, drawings, or photos, as needed.

Were the required tools available at the time of the injury? Yes No (Explain below)

At the time of the injury, was the employee using the correct tools for the task? Yes No (Explain below)

Was the employee sent for substance screening? Yes No (Explain below)

How do you think this type of incident could be prevented or avoided in the future?

Supervisor Signature: _____ Date: _____

Supervisor Name (Please print clearly): _____

HSE Representative Comments

Signature: _____ Date: _____

Supervisor Name (Please print clearly): _____

Site/Office Manager Comments

Signature: _____ Date: _____

Supervisor Name (Please print clearly): _____

DISTRIBUTION

NOTE: The preferred method of distribution of this report is by e-mail attachment either in Word, or scanned to PDF. Forward URS injury/illness reports to incidentreport@urscorp.com. Alternatively, reports may be faxed to 512.419.6413. Initial reports must be delivered within 24 hours of incident. More detailed follow-up reports may be submitted later.

Additional Distribution: Program/Client Sector Manager Regional/SBE/SBU HSE Manager Office HSE Representative



INCIDENT / NEAR MISS REPORT FORM

Issue Date: May 2001
Revision 7: February 2009

ROOT CAUSE CATEGORIES

Check all cause categories that apply to the incident/near miss, then choose the root cause (or causes) category from the boxes checked. Enter where indicated on Page 1.

PHYSICAL/ENVIRONMENT

- Extreme cold/ice
- Extreme heat
- Working/walking surface unfavorable
- Inadequate lighting
- Excessive noise
- Chemical exposure
- Biological hazards (animal/plant)
- Other weather
- Other

SYSTEMS

- Inadequate training/instruction
- Inadequate management system
- Missing or incorrect procedures or planning
- Inadequate management emphasis on safety
- Corporate/operations procedures not communicated
- Other

PHYSICAL/EQUIPMENT, TOOLS, and PPE

- Failure due to improper maintenance
- Failure due to improper design
- Other

HUMAN

- Failure to adequately recognize hazards
- Failure to follow procedures
- Failure to recognize condition change
- Impaired state (drug, alcohol, other)
- Physical/psychological limitation for task
- Inadequate communications (i.e., supervisor/employee)
- Carelessness by affected person(s)
- Carelessness by other person(s)
- Improper selection of equipment/tool/PPE
- Improper use of equipment/tool/PPE
- Other

INCIDENT PICK LIST

NATURE OF INJURY/ILLNESS

- Amputation
- Burn
- Concussion
- Contusion/Abrasion
- Corneal Abrasion
- Dental
- Dermatitis
- Fatality
- Fracture
- Hearing Loss
- Heat-Related Illness
- Hernia
- Insect Bite
- Laceration/Puncture
- Other
- Respiratory Disorder
- Sprain/Strain

BODY PART

- Ankle/Foot
- Arm/Elbow
- Back
- Eyes
- Head
- Hip/Groin
- Internal Organs/Blood
- Leg/Knee
- Multiple Body Parts
- Neck/Cervical
- Respiratory
- Shoulder
- Trunk
- Wrist/Hand

DIRECT CAUSE

- Animal/Insect Contact
- Biological Agent
- Caught Between
- Ergonomics/Repetitive Trauma
- Exposure To
- Miscellaneous
- Motor Vehicle Wreck
- Overexertion
- Poisonous Plant
- Slips/Trips/Falls
- Struck Against
- Struck By

Per the Ontario Occupational Health and Safety Act, R.R.O. 1990, Regulation 834, a Critical Injury is defined as an injury of a serious nature that:

- a. Places life in jeopardy;
- b. Produces unconsciousness;
- c. Results in substantial loss of blood;
- d. Involves the fracture of a leg or arm but not a finger or toe;
- e. Involves the amputation of a leg, arm, hand or foot, but not a finger or toe;
- f. Consists of burns to a major portion of the body; or
- g. Causes the loss of sight in an eye.

Per the British Columbia Workers Compensation Act, RSBC 1996, Chapter 492, a Critical Injury is defined as injury of a serious nature that includes the following:

- a. Any incident that kills, causes risk of death, or seriously injures a worker;
- b. Any blasting accident that results in injury, or unusual event involving explosives;
- c. A diving incident that causes death, injury, or decompression sickness requiring treatment;
- d. A major leak or release of a dangerous substance;
- e. A major structural failure or collapse of a structure, equipment, construction support system or excavation; and any serious mishap.

URS SAFETY MANAGEMENT STANDARD 051
BLOODBORNE PATHOGENS

URS SAFETY MANAGEMENT STANDARD

Bloodborne Pathogens

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to (1) identify jobs and tasks where occupational exposure to bloodborne pathogens exists and (2) eliminate or significantly reduce the risk of infectious bloodborne diseases.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 051 NA – North America

SMS 051 EU – UK and Ireland, Europe, and Middle East

SMS 051 AP7 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Bloodborne Pathogens

1. Applicability

This standard applies to all operations of URS Corporation and its subsidiary companies, and to all employees who may incur exposure to blood or other potentially infectious body fluids as a result of performing their assigned job duties. Examples include: designated first aid and emergency responders, work assignment at a medical laboratory site, or janitorial work involving removal of red bag waste or sharps from medical facilities or clinics.

Sewage work does not typically involve exposure to bloodborne pathogens as covered under the Occupational Safety and Health Administration (OSHA) standard, even though other biological hazards may be present, and should be addressed in the task/job hazard analysis.

Employees serving on safety committees or who volunteer as first-aid-trained employees do not fall under the OSHA requirements for vaccination, but should have training on bloodborne pathogens as part of the curriculum of their first aid training.

2. Purpose and Scope

The purpose of this standard is to identify jobs and tasks where occupational exposure to bloodborne pathogens (e.g., Human Immunodeficiency Virus, that will eliminate or significantly reduce the risk of infectious bloodborne diseases in accordance with the OSHA Bloodborne Pathogen Standard (29 Code of Federal Regulations [CFR] 1910.1030). This standard also includes provisions for affected employees to receive personal protective equipment; Hepatitis B vaccinations; training; and if necessary, confidential medical evaluations and follow up.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

- A. Program Administration – The Occupational Health Manager (OHM) and Vice President of Health, Safety, and Environment (or equivalent) of the Division is responsible for implementation and annual evaluation of the Exposure Control Plan (ECP) – Attachment 051-1 NA. The OHM will ensure that all medical actions required are performed, and that the appropriate employee health and OSHA records are maintained. The Vice President of Health, Safety, and Environment will oversee provisions of necessary personal protective equipment and supplies, training, documentation of training, and will make the written ECP available to employees and OSHA representatives.

URS SAFETY MANAGEMENT STANDARD Bloodborne Pathogens

4. Requirements

A. Risk Identification

1. The facility or site manager, with assistance from the site safety representative, will perform an exposure determination concerning which employee may or may not have exposure to bloodborne pathogens. Employees will be classified into two categories:
 - a. Employees formally designated as part of their job to perform tasks that may involve direct contact with blood or potentially infectious body fluids.
 - i. Requires initial and annual training
 - ii. Hepatitis B vaccination series will be offered
 - iii. Requires procedures be followed in ECP.
 - b. Employees not assigned to jobs or tasks that involve exposure to blood or potentially infectious body fluids, but who could in extraordinary situations, voluntarily assist injured or ill individuals, and therefore could have exposure to bloodborne pathogens.
 - i. Requires post-exposure procedures outlined in ECP.
2. The ECP will be reviewed and updated at least annually, and whenever necessary to include new or modified tasks and procedures. The ECP will be reviewed by non-managerial employees responsible for direct patient care who are potentially exposed to injuries from contaminated sharps. These employees will be trained in the identification, evaluation, and selection of effective engineering and work practice controls.

B. Exposure Control Methods

1. All employees will use universal precautions—an approach to infection control where all human blood and body fluids are treated as potentially infectious.
2. Use engineering and work practice controls (e.g., sharps disposal containers, perform procedures to prevent splashing) to eliminate or minimize exposure to employees.
3. Provide personal protective equipment (e.g. disposable gloves, face masks with eye protection, liquid impermeable gowns, CPR

URS SAFETY MANAGEMENT STANDARD

Bloodborne Pathogens

pocket masks) and ensure use in order to place a barrier between the employee and the blood or body fluids.

4. Wash hands immediately with soap and water after removing gloves or performing any work with blood or body fluids.
 5. Perform housekeeping and decontamination of work surfaces with U.S. Environmental Protection Agency (U.S. EPA)-registered germicides, or a bleach solution diluted 1:10 with water, as needed, to maintain a safe working environment.
 6. Dispose of regulated biohazardous waste (contaminated sharps or items that are capable of releasing blood or body fluids through employee handling) in special waste receptacles lined with red bags, and incinerate per federal and state regulations. This does not include small amounts of waste from a minor wound, which can be sealed in a plastic bag and disposed of in a solid waste receptacle.
- C. Provide the Hepatitis B Vaccination series to all employees who have been designated to perform tasks that involve direct exposure to bloodborne pathogens. Further, make this vaccination series immediately available to employees who have had an occupational bloodborne exposure incident, whether as a result of their assigned tasks, or occurring as a result of incidental contact.

An employee who declines the vaccination must sign the wavier form located at the end of Attachment 051-1.

- D. In the event that an employee is exposed to blood or body fluids, they should immediately flush the affected area with copious amounts of water. Arrange a confidential medical evaluation and follow-up with an occupational physician for the employee as soon as possible following the report of an exposure incident; preferably within 1 to 2 hours after the exposure incident has occurred.
- E. Hazard Communication
1. Use orange-red biohazard warning labels to identify lab areas or disposal containers with blood or other potentially infectious materials present.
 2. Conduct initial and annual training classes for all employees assigned to tasks where occupational exposure may occur.

URS SAFETY MANAGEMENT STANDARD

Bloodborne Pathogens

F. Exposure Incident Investigation

The OHM and HSE Manager will review the circumstances of each exposure incident to determine if the appropriate work procedures were being followed at the time of the incident, and to assess and implement any necessary corrective actions, including changes required in the ECP.

5. Documentation Summary

- A. Post-exposure medical records from consulting physician and exposure incident reports will be retained in employee's confidential medical record
- B. Initial and annual training records
- C. Regulated infectious medical waste manifest records will be stored by the site safety representative

6. Resources

- A. U.S. OSHA 29 CFR 1910.1030 Occupational Exposure to Bloodborne Pathogens Standard, current revision.
- B. Centers for Disease Control Morbidity and Mortality Weekly Report: "Public Health Service Guidelines for the Management of Health-Care Worker Exposure to HIV and Recommendations for Post-exposure Prophylaxis"
- C. Centers for Disease Control Morbidity and Mortality Weekly Report: "Immunization of Health-Care Workers: Recommendations" December 26, 1997; Vol. 46, No. RR-18.
- D. Centers for Disease Control Morbidity and Mortality Weekly Report: "Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-Related Chronic Disease" October 16, 1998; Vol. 47, No. RR-19.
- E. Bloodborne pathogens standard and the construction industry (OSHA letter of interpretation 01-26-93)
- F. Clarification on first aid requirements for hazardous waste sites (OSHA letter of interpretation 04-20-93)
- G. SMS 024 – Medical Screening and Surveillance
- H. Attachment 051-1 NA – Bloodborne Pathogens Exposure Control Plan

1. Introduction

Employees are at risk for exposure to and possible transmission of infectious diseases each time they are in contact with blood or body fluids. Bloodborne pathogens are microorganisms present in human blood and other body fluids that can cause serious disease in humans and include, but are not limited to Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and Human Immunodeficiency Virus (HIV). Therefore, this exposure control plan (ECP) has been established to ensure that employees are effectively informed concerning potential workplace health hazards, and that protective measures necessary to eliminate or minimize bloodborne exposure incidents are used whenever possible.

2. Exposure Determination

The Medical Surveillance Evaluation form (Attachment 024-2) will be used to evaluate which employees may incur occupational exposure to blood or other potentially infectious materials when performing routine tasks and procedures. These exposure determinations will be made without regard to the use of personal protective equipment, and regardless of exposure frequency.

The employees in the following job classifications may have occupational exposure to bloodborne pathogens, and are covered by this program:

- Occupational health nurse
- Paramedics
- Registered nurses
- Designated first aid providers
- Medical laboratory employees
- Janitorial workers in medical facilities and clinics.

Tasks and procedures that may expose employees to bloodborne pathogens include:

- Treating cuts, abrasions, and burns
- Cleaning contaminated environmental surfaces
- Administering cardiopulmonary resuscitation (CPR).

3. Exposure Control

- A. "Universal precautions" are a required method of control to prevent exposure to blood and body fluids. This term refers to the concept that all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, HCV, and other bloodborne pathogens, regardless of the perceived risk status of another individual. Universal precautions apply to blood, other body fluids containing visible blood,

semen, and vaginal fluids. Universal precautions do not apply to feces, nasal secretions, saliva, sweat, tears, sputum, urine, and vomitus unless they contain visible blood. Although these fluids have an extremely low or nonexistent risk for bloodborne pathogens, they are a potential source for other infectious diseases, and precautions must also be followed when these body fluids are present.

B. Engineering and Work Practice Controls

The following engineering controls will be in place in all areas of occupational exposure:

1. Accessible handwashing facilities. If soap and running water are not available, an antiseptic hand cleaner in conjunction with clean paper towels or antiseptic towelettes are acceptable temporary alternatives to running water. When this alternative method is used, employees must wash their hands with soap and running water as soon as feasible.
2. Containers for disposable contaminated sharps must be puncture-resistant, labeled a biohazard, leakproof, and have a closable top.
3. Containers for storage, transport, or shipment of blood or other potentially infectious materials, regulated waste, and contaminated laundry will be labeled with the biohazard symbol and site address, and have a securely closing lid.

Engineering controls will be reviewed and maintained on a regular basis to ensure effectiveness.

The following work practice controls must be strictly followed to minimize exposure, and isolate or remove bloodborne pathogens from the workplace:

1. Personal protective equipment will be provided at no cost to the employee, and will be chosen based on the anticipated exposure to blood. PPE is considered appropriate if it does not permit blood or other potentially infectious materials to reach or pass through clothes, skin, or mucous membranes of the eyes or mouth under normal conditions of use, and for the duration of time the equipment will be used. PPE must be readily accessible and will be removed prior to leaving the work area.
 - a. Disposable single-use gloves must be used as a protective barrier in all situations in which contact with body fluids is anticipated. Gloves of the correct size will be provided. Disposable gloves will not be washed or disinfected for reuse, and will be replaced between employees, and if they become torn or punctured. Gloves are especially important

if the employee has cuts, abraded skin, chapped hands, or dermatitis.

- b. Liquid-impermeable gowns, boots, and masks, in combination with eye-protective devices such as goggles and shatterproof glasses with solid-side shields or chin-length face shields, must be worn whenever splashing, spraying, or spattering of blood droplets or body fluids can be reasonably anticipated.
- c. Disposable pocket mask ventilation devices must be provided in all first aid kits and used to avoid mouth-to-mouth contact during emergency cardiopulmonary resuscitation.

Examples of Recommended PPE (depending on task, more PPE may be needed).

<u>Task</u>	<u>Gloves</u>	<u>Gown</u>	<u>Mask</u>	<u>Goggles</u>	<u>Boots</u>
Bleeding control w/ minimal bleeding	Yes	No	No	No	No
Bleeding control w /spurting blood	Yes	Yes	Yes	Yes	No
Cardiopulmonary resuscitation	No	No	Yes	No	No
Decontamination/clean-up	Yes	No	No	No	No
Medical laboratory activities	Yes	Yes	Yes	Yes	No

- 2. Eating, drinking, smoking, applying cosmetics, and handling of contact lenses is prohibited in work areas where there is a reasonable likelihood of occupational exposure. Food and drink cannot be kept in refrigerators, freezers, shelves, cabinets, or on counter tops where blood or body fluids are present.
- 3. Contaminated needles and other sharps must not be bent or recapped unless a one-handed technique is used. They must be disposed of in an appropriate sharps container.
- 4. All regulated biohazardous waste will be placed in a waste receptacle that has designated red biohazard bags and a closable top controlled by a foot peddle. When full, the bags shall be removed with gloved hands, tied off, and placed in a biohazard shipping carton, to be held for pick-up. If any biohazard bag appears to be leaking, it must be double-bagged. The waste will be incinerated per federal and state regulations.

B. Housekeeping

- 1. Universal precautions must be used when cleaning or decontaminating any surface or equipment that may be

contaminated. Appropriate PPE must be used for protection during decontamination.

2. All contaminated environmental work surfaces such as countertops or floors will be cleaned with a household bleach solution diluted 1:10 with water directly following contamination with blood or body fluids.
3. Instruments such as tweezers, bandage scissors, and thermometers must be disposable rather than reusable equipment, and must be disposed of in an appropriate manner.
4. Broken, contaminated glassware must not be picked up directly with the hands. It must be cleaned up using a mechanical means such as a brush and dustpan or tongs.

4. Hepatitis B Vaccination

Within 10 working days of placement, all employees assigned to tasks with potential occupational exposure to bloodborne pathogens must be offered the Hepatitis B vaccination at no cost to the employee, unless the employee has had a previous Hepatitis B vaccination series, antibody testing reveals the employee is immune, or the vaccine is contraindicated for medical reasons. Further, this vaccination series must be made immediately available to employees who have an occupational exposure, whether as a result of their assigned tasks, or occurring from an incidental contact.

The local occupational medical facility used for routine medical surveillance will administer the vaccinations.

Employees who decline the Hepatitis B vaccine must sign a copy of the waiver form located at the end of this attachment. The signed waiver will be stored in the employee's medical record with the Occupational Health Manager. Employees may initially decline the vaccination, but may decide to take them at a later date, while still covered under this plan. The vaccinations will be made available to the employee at that time.

Employees choosing to take the vaccination series will sign a consent form at the occupational clinic prior to receiving the injections, and are advised to read the package insert regarding the efficacy, safety, method of administration, and benefits of the vaccine. Employees may also ask questions directly of the Medical Service Provider or local occupational physician. Employees are not required to participate in a prescreening program (to determine immunity) before receiving the vaccinations. If a routine booster of Hepatitis B vaccine is recommended by the U.S. Public Health Service at a future date, such booster dose(s) will be made available to affected employees.

5. Post-Exposure Incident Evaluation And Follow-Up

All occupational bloodborne pathogen exposures must be reported to the HSE representative and Occupational Health Manager immediately after initial decontamination first aid is accomplished. Following the report of an exposure incident, a confidential medical evaluation with an occupational physician will be arranged as soon as possible, ideally no later than 1 to 2 hours after the incident has occurred. In some states, depending on applicable workers' compensation law, employees may choose treatment from their personal physician. A copy of the OSHA Bloodborne Pathogen Standard will be provided if the physician does not have a copy. A written incident report must be completed as soon as possible, fully describing the incident.

A. First aid protocol for treatment immediately after an exposure incident:

1. Lacerations, punctures, and abrasions should be washed under cool running water for at least 5 minutes, allowing free bleeding. Cleanse area well with soap or iodine solution. Apply sterile dressing as needed. Give tetanus booster if indicated (7 to 10 years since last booster).
2. Ocular exposure requires irrigation of the eye with water or sterile normal saline solution for 15 minutes.
3. Mucous membrane exposure requires rinsing mouth with ½ strength 3 percent hydrogen peroxide for 30 seconds, four separate and consecutive times.

B. Confidential Medical Evaluation

1. The treating occupational physician will receive documentation of the routes of exposure, the circumstances surrounding the incident, and identification of the source individual (the individual the employee was exposed to). The blood of the source individual will be tested if possible, and after consent is obtained. When legally permissible, results of the source individual's tests will be made available to the exposed employee, with the exposed employee informed about the applicable laws and regulations concerning the disclosure of the identity and infectivity of the source individual.
2. Testing of the exposed employee's blood, if consented to (the employee may consent to baseline blood collection, but may request that the sample not be tested for HIV for up to 90 days, if at all), is recommended.
3. Post-exposure medical treatment will be offered in accordance with the current recommendations of the U.S. Public Health Services. This may include, but is not limited to:
 - a. A series of HIV post-exposure blood tests

- b. Hepatitis B vaccination and/or Hepatitis B immune globulin
- c. HIV post-exposure prophylactic medications
- d. Evaluation of acute febrile illnesses following exposure
- e. Employee counseling concerning precautions to take during the period after the exposure incident, and information on signs and symptoms of potential illnesses.

C. Healthcare Professional's Written Opinion

The Occupational Health Manager must obtain and provide the employee with a copy of the evaluating physician's written opinion within 15 days of the completion of the medical evaluation. A copy will be maintained in the employee's confidential medical record. The written opinion must be in accordance with the requirements of the OSHA Bloodborne Pathogens Standard indicating that the employee has been informed of any medical conditions resulting from exposure that require further evaluation or treatment. All other findings or diagnoses must remain confidential and will not be included in the report.

6. Hazard Communication

- A. Fluorescent red or orange-red warning labels bearing the universal biohazard symbol and the legend BIOHAZARD must be firmly affixed to all containers (e.g., waste cans, sharps containers, and refrigerators) used for the storage or shipment of blood or other potentially infectious materials.
- B. All employees designated to perform tasks involving occupational exposure must receive bloodborne pathogens training at the time of initial assignment to the job. This training will be given during working hours and at no cost to employees. Refresher courses will be provided annually (within 1 year of previous training), and if new tasks or procedures are implemented. Material appropriate in content and vocabulary to education level, literacy, and language of the employees must be used for all required training.

Training will include: making accessible a copy of the regulatory text of the standard and explanation of its contents, general discussion on bloodborne diseases and their transmission, exposure control plan, engineering and work practice controls, personal protective equipment, Hepatitis B vaccine, response to emergencies involving blood, how to handle exposure incidents, the post-exposure evaluation and follow-up program, signs/labels/color-coding, and question and answer time with the trainer.

7. Exposure Incident Investigation

The site Health and Safety Representative will review the circumstances of any exposure incident to determine corrective actions. The incident report will include:

- A. Engineering controls in use at the time
- B. Work practices followed
- C. A description of any equipment being used
- D. A description of the work being performed
- E. PPE that was used at the time of the incident
- F. Date, time, and location of the incident
- G. Employee's training.

Within 24 hours, a copy of this incident report will be forwarded to the Occupational Health Manager, who will evaluate what follow-up actions should be addressed, including if revisions need to be made to the Exposure Control Plan.

8. Recordkeeping

- A. The Occupational Health Manager will be responsible for establishing and maintaining accurate, confidential workers' compensation medical records for each employee with occupational exposure for the duration of employment plus 30 years, in accordance with OSHA 29 CFR 1910.1020 – Access to Employee Exposure and Medical Records.
- B. The HSE representative will be responsible for maintaining the bloodborne pathogens training class records for at least 3 years from the date of training. The records will include the date of the training class, a summary of the class contents, the names of the qualified instructors, and the names and job titles of personnel attending the training.
- C. Employee medical records must be made available to employees (or their designated representative) with written consent by the employee within 15 working days of request.
- D. An exposure incident will be evaluated by the Occupational Health Manager and Vice President of Health, Safety, and Environment to determine if the case meets OSHA's Recordkeeping Requirements (29 CFR 1904).



HEPATITIS B VACCINATION DECLINATION FORM

I understand that due to my occupational exposure to blood or other potentially infectious materials, I may be at risk of acquiring Hepatitis B virus (HBV) infection.

I have been given the opportunity to be vaccinated with Hepatitis B vaccine, at no charge to myself; however, I decline Hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease.

If, in the future, I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with the Hepatitis B vaccine, I can receive the vaccine series at no cost to me.

Name

Date

Witness

Date

**URS SAFETY MANAGEMENT STANDARD 056
DRILLING SAFETY GUIDELINES**

URS SAFETY MANAGEMENT STANDARD

Drilling Safety Guidelines

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to provide an overview for working safely around drilling operations with truck-mounted and other engine-powered drill rigs. The procedure addresses off-road movement of drill rigs, overhead and buried utilities, use of augers, rotary and core drilling, and other drilling operations and activities.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 056 NA – North America, UK and Ireland, Europe, and Middle East

SMS 056 AP7 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD **Drilling Safety Guidelines**

1. Applicability

This standard applies to URS Corporation and its subsidiary companies on projects using truck-mounted or other engine-powered drill rigs. The primary responsibility for drilling safety is with the drilling contractor.

2. Purpose and Scope

The purpose of this standard is to provide an overview for working safely around drilling operations with truck-mounted and other engine-powered drill rigs. The procedure addresses off-road movement of drill rigs, overhead and buried utilities, the use of augers, rotary and core drilling, and other drilling operations and activities. More detailed drilling safety guidelines are provided in the document *Environmental Remediation Drilling Safety Guidelines*.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

Drill rig safety and maintenance is the responsibility of the drill rig operator. Drilling subcontractors must be qualified in accordance with SMS 046 – Subcontractor Health and Safety Requirements.

4. Requirements

A. General Safety Guidelines

URS technicians, geologists, engineers, or other field staff assigned to oversee drilling operations or collect soil samples will observe the following guidelines:

1. Require a meeting at project startup regarding the drill rig operator's responsibility for rig safety, and any site- and equipment-specific safety requirements.
2. Set up any sample tables and general work areas for the URS field staff at a distance of at least the height of the fully extended mast plus 5 feet (1.52 meters), and no less than 30 feet (10 meters) from the rig.
3. URS engineers, technicians, and geologists will limit their assistance to the drillers with the drilling equipment or supplies, and will not at any time operate the drill rig controls except to activate the emergency shutoff, if needed.

URS SAFETY MANAGEMENT STANDARD **Drilling Safety Guidelines**

4. Require that all rotary drilling equipment have an emergency shut off/kill switch. The location of the switch should be reviewed with all field staff.

B. Movement of Drill Rigs

1. Before moving a rig, the operator must do the following:
 - a. To the extent practical, walk the planned route of travel and inspect it for depressions, gullies, ruts, and other obstacles.
 - b. Check the brakes of the truck/carrier, especially if the terrain along the route of travel is rough or sloped.
 - c. Discharge all passengers before moving on rough or steep terrain.
 - d. Engage the front axle (on 4x4, 6x6, etc., vehicles) before traversing rough or steep terrain.
2. Driving drill rigs along the sides of hills or embankments should be avoided; however, if side-hill travel becomes necessary, the operator must conservatively evaluate the ability of the rig to remain upright while on the hill or embankment. The possibility must be considered that the presence of drilling tools on the rig may reduce the ability of the rig to remain upright (raises the center of mass of the rig).
3. Logs, ditches, road curbs, and other long and horizontal obstacles should be approached and driven over squarely, not at an angle.
4. When close lateral or overhead clearance is encountered, the driver of the rig should be guided by another person on the ground.
5. Loads on the drill rig and truck must be properly stored while the truck is moving, and the mast must be in the fully lowered position.
6. After the rig has been positioned to begin drilling, all brakes and/or locks must be set before drilling begins. If the rig is positioned on a steep grade and leveling of the ground is impossible or impractical, the wheel of the transport vehicle must be blocked and other means employed of preventing the rig from moving or toppling over.

URS SAFETY MANAGEMENT STANDARD

Drilling Safety Guidelines

C. Buried and Overhead Utilities

1. The location of overhead and buried utility lines must be determined before drilling begins, and the locations should be noted on boring plans and/or assignment sheets.
2. When overhead power lines are close by, the drill rig mast should not be raised unless the distance between the rig and the nearest power line is at the minimum distance stated in SMS 034 – Utility Clearances and Isolation. The drill rig operator or assistant should walk completely around the rig to make sure that adequate clearance exists.
3. The rig operator should be aware that when the drill rig is positioned near an overhead line, hoist lines and power lines can be moved towards each other by wind. When necessary and approved by the project manager, the utility and/or power lines may be shielded, shut down, or moved by the appropriate personnel.
4. Before performing work, for additional information, please refer to SMS 034 – Utility Clearances and Isolation.

D. Clearing the Work Area

1. Before a drill rig is positioned to drill, the area on which the rig is to be positioned must be cleared of removable obstacles and the rig must be leveled if it is sloped. The cleared/leveled area should be large enough to accommodate the rig and supplies.

E. Safe Use of Augers

1. Never place hands or fingers under the bottom of an auger flight or drill rods when hoisting the augers or rods over the top of another auger or rod in the ground or other hard surfaces, such as the drill rig platform.
2. Never allow feet to get under the auger or drill rod while they are being hoisted.
3. When the drill is rotating, stay clear of the drill string and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.
4. Move auger cuttings away from the auger with a long-handled shovel or spade; never use hands or feet.

URS SAFETY MANAGEMENT STANDARD **Drilling Safety Guidelines**

5. Never clean an auger attached to the drill rig unless the transmission is in neutral or the engine is off, and the auger has stopped rotating.
6. Do not wear loose clothing or jewelry while working near the drill rig. Long hair must be pulled back to avoid entanglement with moving parts.
7. Hearing protection is required when working near an operating drill rig.

F. Rod Separation

1. Do not use manual tools (e.g., pipe wrenches) in combination with rotation of the drill stem. Manual tools are not designed for the load, and may break. The use of such tools creates a significant impact hazard for those in the work area, because they rotate with the drill stem. URS does not permit drillers to use manual tools in combination with a rotating drill stem to break rods. Manual tools may be used if the drill stem is isolated/positively disengaged.
2. Mechanical means of rod separation that are permitted include:
 - a. Opposing hydraulic controls.
 - b. Rod locking devices.
 - c. Hydraulic breakout tools.
 - d. Hydraulic foot clamps.

G. Safe Use of Hand Tools

Review SMS 064 – Hand Safety for information regarding hand tools in addition to the guidelines provided below:

1. Use each tool to perform only tasks for which it was originally designed.
2. Repair damaged tools before use, or discard them.
3. Wear safety goggles or glasses when using a hammer or chisel. Nearby co-workers and bystanders are required to wear safety goggles or glasses also, or move away.
4. Clean tools and store them in an orderly manner when they are not in use.

URS SAFETY MANAGEMENT STANDARD

Drilling Safety Guidelines

H. Safe Use of Wire Line Hoists, Wire Rope, and Hoisting Hardware

1. Whenever wire line hoists, wire rope, or hoisting hardware are used, the safety rules described in Title 29 Code of Federal Regulations (CFR) 1926.552, and guidelines contained in the Wire Rope User's Manual published by the American Iron and Steel Institute, will be followed. The driller will provide written reports (upon request) documenting inspections of equipment.

I. Traffic Safety

1. Drilling in streets, parking lots, or other areas of vehicular traffic requires definition of the work zones with cones, warning tape, etc., and compliance with local police requirements. Refer to SMS 032 – Work Zone Traffic Control.

J. Fire Safety

1. Fire extinguishers (type ABC) will be kept on or near drill rigs for fighting small fires.
2. If methane or other flammable gases or vapors are suspected in the area, a combustible gas indicator (CGI) will be used to monitor the air near the borehole, with all work to stop at 20 percent of the Lower Explosive Limit (LEL).
3. Work must stop during lightning storms.

K. Drilling at Potential MEC/UXO Sites

If the project site is suspected of containing munitions and explosives of concern (MEC) or unexploded ordnance (UXO), the UXO team will conduct a reconnaissance and MEC/UXO avoidance to provide clear access routes to each site before drilling crews enter the area. The following procedures will be implemented:

1. Drilling operations on an MEC/UXO site will not be conducted until a complete plan for the site is prepared and approved by the URS UXO Safety Officer. MEC/UXO avoidance must be conducted during drilling operations on known or suspect MEC/UXO sites. Refer to SMS 039 – Munitions Response/Munitions and Explosives of Concern.
2. The UXO team will identify and distinctly mark the boundaries of a clear approach path for the drilling crews, vehicles, and equipment to enter the site. This path will be, at a minimum, twice the width of the

URS SAFETY MANAGEMENT STANDARD **Drilling Safety Guidelines**

- widest vehicle. No personnel will be allowed outside any marked boundary.
3. If MEC/UXO is encountered on the ground surface, the UXO team will clearly mark the area where it is found, report it to the proper authorities, and divert the approach path around it.
 4. The UXO team will conduct an access survey using the appropriate geophysical instrument over the approach path for avoidance of MEC/UXO that may be in the subsurface. If a magnetic anomaly is encountered, it will be assumed to be MEC/UXO, and the approach path will be diverted around the anomaly. UXO personnel only will operate the appropriate geophysical instrument and identify MEC/UXO.
 5. An incremental geophysical survey of the drill-hole location(s) will be initially accomplished by the UXO team using a hand auger to install a pilot hole. If MEC/UXO is encountered or an anomaly cannot be positively identified as inert material, Hazardous, Toxic, and Radioactive Waste (HTRW) sampling personnel will select a new drill-hole location.
 6. Once the surface of a drilling site has been cleared and a pilot hole established as described above, the drilling contractor will be notified that the site is available for subsurface drilling.
 7. Additional guidance for MEC/UXO support during drilling activities is provided in SMS 039 – Munitions Response/Munitions and Explosives of Concern.

L. Protective Gear

1. Minimum Protective Gear

At a minimum, items listed below must be worn by all staff working within 30 feet (10 meters) of drilling activities.

- a. Hearing protection.
- b. Hard hat.
- c. Eye protection (safety glasses, goggles, or face-shield).
- d. Safety shoes (steel-toed shoes or boots).

URS SAFETY MANAGEMENT STANDARD **Drilling Safety Guidelines**

2. Other Gear

Items listed below must be worn when conditions warrant their use. Some of the conditions are listed after each item.

- a. **Safety Harnesses and Lifelines:** Safety harnesses and lifelines must be worn by all persons working on top of an elevated derrick beam or mast. Lifelines should be secured at a position that will allow a person to fall no more than 6 feet (2 meters). OSHA Fall Protection (1926 Subpart M) requirements apply. Refer to SMS 040 – Fall Protection for additional information.
- b. **Life Vests:** Life vests must be used for work over water. Refer to SMS 027 – Work Over Water for additional information.

5. Resources

- A. International Association of Drilling Contractors Safety Alerts
<http://iadc.org/alerts.htm>
- B. U.S. Occupational Safety and Health Administration (OSHA) Standard Fall Protection – 29 CFR 1926 Subpart M
- C. U.S. OSHA - 29 CFR 1926.552, Material Hoists, Personnel Hoists and Elevators
- D. Environmental Remedial Safety Drilling Guidelines
- E. SMS 026 – Noise and Hearing Conservation
- F. SMS 027 – Work Over Water
- G. SMS 032 – Work Zone Traffic Control
- H. SMS 034 – Utility Clearances and Isolation
- I. SMS 039 – Munitions Response/Munitions and Explosives of Concern
- J. SMS 040 – Fall Protection
- K. SMS 046 – Subcontractor Health and Safety Requirements
- L. SMS 064 – Hand Safety

URS SAFETY MANAGEMENT STANDARD 057
VEHICLE SAFETY

URS SAFETY MANAGEMENT STANDARD

Vehicle Safety Program

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

This standard applies to employees operating motor vehicles that are owned, rented or leased by the Company, and the use of personal or government supplied vehicles while on Company business.

This SMS does not apply to heavy equipment operations.

2. Purpose and Scope

This standard defines the policies that help URS minimize losses, injuries, and legal liabilities associated with improper vehicle use.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

URS Division

SMS 057 NA – North America, UK and Ireland, Europe, and Middle East

SMS 057 AP7 – Asia Pacific

Washington Division

SMS 057 WD

EG&G Division

SMS 057 EG&G

URS SAFETY MANAGEMENT STANDARD

Vehicle Safety Program

1. Applicability

This standard applies to the operations of URS Division of URS Corporation and its subsidiary companies.

This standard applies to employees who operate motor vehicles that are owned, rented, or leased by URS and to employees who use personal or government-supplied vehicles while conducting URS business. This safety management standard (SMS) does not apply to heavy equipment operations (see SMS 019 – Heavy Equipment Operations).

2. Purpose and Scope

This standard defines the policies that help URS minimize losses, injuries, and legal liabilities associated with improper vehicle use. This policy also provides information for required training and makes all applicable employees aware of their respective duties and obligations when driving on URS business.

The standard applies to operations worldwide. For countries outside the United States, some terminology may need to be read in the context of local or national regulations.

3. Implementation

The overall responsibility for this standard implementation is with the URS Office Manager. Additional responsibilities are as follows:

- | | |
|--------------------------|--|
| Fleet Management | Participation in the Vehicle Safety Program, vehicle acquisition, insurance claims reporting, controlling access to vehicles, maintenance of vehicles, and participation in accident review processes. |
| Human Resources | Documentation of driver's license upon hire, and participation in accident review processes when necessary and any related performance management issues. |
| Health and Safety | Employee safety training, maintenance of the Vehicle Safety Program, and participation in accident review processes. |
| Employee | Familiarization with URS Vehicle Safety Program and compliance with its requirements. |

URS SAFETY MANAGEMENT STANDARD Vehicle Safety Program

4. Requirements

A. Authorized Drivers

1. Authorized Drivers are those individuals permitted to drive URS-owned, -rented, or -leased vehicles, and employees driving a personal vehicle for work purposes.
2. The Authorized Driver must be at least 18 years of age (noncommercial license) or 21 years of age (commercial license) and have a current driver's license for the appropriate class of vehicle (unless more stringent requirements are established by the leasing/renting agency). Employees with conditional licenses are prohibited from operating vehicles on URS business.
3. Human Resources/Administration will conduct an authorized background check, which includes a driving record, and will obtain a copy of the state-issued driver's license for all Authorized Drivers during the new hire process. The employee will not be permitted to be an Authorized Driver if the background check indicates legal action involving alcohol or drug use (e.g. driving under the influence [DUI]), a driving without a license violation, or a hit-and-run/leaving the scene of an accident within the past two years.

URS employees that are Authorized Drivers will produce their driver's license upon request at any time. Authorized drivers who lose their driver's license through legal action or are otherwise unauthorized to drive *must* notify their Human Resources Representative immediately. The Human Resources Representative will notify the Fleet Manager, Office Manager, and Health, Safety and Environment (HSE) Representative of this employee's loss of authorization to drive for URS.

4. All Authorized Drivers will be asked annually to attest to their ability and authorization to drive. At that time, Authorized Drivers must attest that they understand the duties and responsibilities of an Authorized Driver and that the employee remains in good standing with his or her local Department of Motor Vehicles. If there is a change in an employee's status, it is the responsibility of the employee to immediately contact his or her Human Resources Representative.

URS SAFETY MANAGEMENT STANDARD
Vehicle Safety Program

5. Authorized drivers must
 - a. Review SMS 057 – Vehicle Safety Program.
 - b. Report any conviction for driving under the influence of drugs or alcohol to the Human Resources Representative responsible for the employee's office or operation.
 - c. Complete vehicle safety training, including the URS online training module and other sanctioned driving courses described in Section 4.B, Training.
 - d. Report all accidents. If the Authorized Driver has an accident in a vehicle owned, rented, or leased by URS, the accident must be reported to the Office Manager within 24 hours. Attachment 049-1 and Attachment 057-1 forms must be completed and submitted to the Fleet Manager and the Regional Health, Safety, and Environment (HSE) Manager (see Attachment 049-1 and Attachment 057-1 for reporting instructions).
 - e. Cooperate with any URS investigation concerning the accident.
 - f. Complete remedial driver safety training described in Section 4.B.3 as appropriate following an accident.
6. Non-URS employees (e.g., subcontractors, alliance partners) may operate URS-owned, -leased, or -rented vehicles only when this activity is specifically agreed to in the applicable contract and only within the parameters of the contract and project plans.
7. For URS operations or offices that plan vehicle use that requires compliance with Federal Motor Carrier Regulations, the affected manager directing operations at the facility or site must obtain approvals from the URS Vice President of Health, Safety, and Environment and the Fleet Manager. This requirement typically applies to vehicles with a gross vehicle weight over 10,000 pounds, vehicles carrying more than 15 passengers, or vehicles used for hazardous materials transport. The driver must have an appropriate commercial driver's license and may be subject to medical surveillance (see SMS 024 – Medical Screening and Surveillance).

URS SAFETY MANAGEMENT STANDARD Vehicle Safety Program

8. Only Authorized Drivers can be reimbursed mileage for the use of their personal vehicle on URS business. Requests for reimbursements for mileage by nondesignated drivers may be denied.

B. Training

1. Within 1 month of their hire date, Authorized Drivers will complete basic driver safety training, including a review of the URS Vehicle Safety Program (SMS 057) and the 30-minute online Learning Management System (LMS) Vehicle Safety training module.
2. Authorized Drivers will complete the 4-hour web-based defensive driving training program provided through the National Safety Council (NSC). Other defensive driving training programs that are equivalent or exceed the NSC training (i.e., the Smith Driving System) may be substituted by approval of the Regional HSE Manager. The internet web site for the NSC training is located at <http://www.safetyserve.com/urscorp>. Use **URSDDC** as the access code. *All URS Authorized Drivers will complete this web-based defensive driver training or equivalent training by 2010.*
3. Additional training is required for employees who have been involved in a work-related, at-fault vehicle accident where \$2,000 in damages was sustained or when the accident included a police citation. This additional training will be in the form of a behind-the-wheel training equivalent to the Smith Driving System.

C. General Operating Policy and Procedure (Applies to Authorized Drivers and Passengers Operating Motor Vehicles on Official URS Business)

1. Only properly licensed employees who are specifically authorized to drive URS vehicles may operate motor vehicles owned, rented, or leased by URS.
2. Authorized drivers required to operate vehicles with special hazards (i.e., trucks carrying fuel cells, vehicles used to tow trailers, vehicles with limited visibility, etc.) will be thoroughly briefed on the hazards and control measures necessary for safe operation of the vehicle. The local URS operation will maintain documentation of the briefing.
3. Drivers/operators will know and obey all federal, state, and local motor vehicle laws applicable to the operation of their vehicle.

URS SAFETY MANAGEMENT STANDARD
Vehicle Safety Program

4. A driver will not permit unauthorized persons to operate a vehicle owned, rented, or leased by URS.
5. URS policy regarding reimbursement and insurance coverage requirements for use of personal automobiles may be found in the Policies and Procedures Manual (Section 074.020). Only Authorized Drivers may be reimbursed mileage for the use of a personal vehicle.
6. Personal vehicles driven by Authorized Drivers for business use must satisfy the state's registration and inspection requirements and may not be modified beyond manufacturer's specifications.
7. All cargo extending 4 feet or more beyond the end of a truck, trailer, or similar vehicle will be clearly marked with a red warning flag or cloth measuring no less than 16 inches square. Red lights must be used at night.
8. URS-owned, -rented, or -leased vehicles are for official business use only and are not to be used for personal activities. Exceptions to this requirement can be made only with the specific approval of a Division Manager, Senior Vice President, or the URS Fleet Manager.
9. Seat belts and shoulder harnesses (occupant restraint systems) will be worn or used whenever the vehicle is in operation. The vehicle may not move until all passengers have fastened their restraints. Vehicles are not to be operated or used by URS employees if seatbelts are not included as part of the vehicle's safety equipment.
10. When parking or leaving a vehicle, the following procedures must be followed: Shut off the engine, engage the transmission in park (automatic transmission) or first gear (standard transmission), set the parking brake, remove the ignition keys, and lock the vehicle.
11. The vehicle's engine is to be turned off during refueling. Smoking or cellular phone use is not allowed while refueling.
12. Drivers/operators will not drive or operate vehicles while under the influence of alcohol or illegal drugs. Additional details on the URS Substance Abuse Policy are available in the Policies and Procedures Manual (Section 034.030).
13. Drivers/operators will not drive or operate vehicles while under the influence of medications when told by a physician, another

URS SAFETY MANAGEMENT STANDARD Vehicle Safety Program

healthcare provider, or the manufacturer (i.e., instructions on the label) that the activity is unsafe.

14. Vehicle operators are responsible for any fines levied by law enforcement agencies for the operation of their vehicles.
15. Driver/operators may not deactivate or muffle any backup warning device.
16. Distractions while driving are a major cause of accidents. Distractions include the use of cellular phones (including texting), eating, drinking, smoking, and engaging in intense conversations. URS Authorized Drivers must exercise proper control of the vehicle at all times, including the management of possibly distracting actions and behaviors. If you have to eat, pull over and park. If you become engaged in an intense conversation to the point of distraction, pull over and park or end the conversation.
17. *The use of cellular phones/devices, including cellular phones with hands-free devices, while driving is prohibited.* If you need to make a call on a cellular phone, pull over and park in a safe area. This prohibition includes text messaging and other wireless devices (e.g., Blackberries).
18. The use of motorcycles on URS business is prohibited.

D. Field/Site Vehicle Safety

1. Define specific vehicle travel routes and parking areas at field sites. Use fencing, cones, or other markings to define roads and parking. SMS 032 – Work Zone Traffic Control provides additional information.
2. If parking on the shoulder of an active road, park as far off the road as possible.
3. If work (e.g., surveying) is required alongside an active road, park the vehicle behind the area of work to provide a barrier against out-of-control vehicles.
4. URS will not transport DOT-placard quantities of hazardous materials. However, small quantities of hazardous materials (e.g., sample coolers) may be transported if properly packaged. Take precautions to prevent chemical contamination of the vehicle.

URS SAFETY MANAGEMENT STANDARD

Vehicle Safety Program

Further details on DOT shipping may be found in SMS 048 – Hazardous Materials/Dangerous Goods Shipping.

5. Nuclear density meters (e.g., Troxler units) may be transported only by employees who have been trained in the use of nuclear density meters (see SMS 044 – Radiation Safety for Portable Gauges). Nuclear density meters must be secured from movement and locked during transport. Nuclear Regulatory Commission (NRC) and state-specific regulations regarding transport documentation also apply.
6. When performing fieldwork that requires the blocking of traffic lanes (e.g., bridge inspection), follow SMS 032, the Manual on Uniform Traffic Control Devices for Streets and Highways (American National Standards Institute D6.1), and local police requirements for barriers, cones, and flaggers.
7. No employee may ride in the bed of a pickup truck unless seating and restraints are provided for this specific use.
8. Articles, tools, equipment, etc. placed in vehicles will be stored so as not to interfere with vision or the proper operation of the vehicle in any way. All items in the vehicle must be secured to prevent them from flying about or out of the vehicle during sudden stops, turning, etc.
9. Trucks or vehicles with obstructed rearview mirrors must observe the following procedures when backing up: Position an employee to act as a spotter at the rear of the vehicles, in the driver's line of sight, to ensure that the area behind the truck is clear. If no other employee is present, then the driver must step out of the vehicle and check the area behind the vehicle before backing up. As an added precaution, avoid backing up whenever possible.
10. All uncontrolled intersections (no traffic lights or traffic signs) will be treated as a four-way stop. The driver will exercise extreme caution at uncontrolled intersections.
11. URS drivers carrying more than 15 passengers will perform route planning using Journey Management Plan – Attachment 057-2 NA. Route planning will address hazards associated along the intended route, including lack of traffic controls, speed, and hazards associated with road conditions, weather, visibility, and other threats. Route planning will be verified by the Office or Site Manager.

URS SAFETY MANAGEMENT STANDARD
Vehicle Safety Program

12. On buses and vehicles capable of carrying more than 15 passengers, no passengers may ride in a seat in the driver's row, which would otherwise impede the driver's lateral visibility.

E. Accident Response and Reporting

1. In case of injury, call or have someone else call 9-1-1 immediately for emergency assistance. If you are involved in an accident and are not injured, the following requirements apply:
 - a. Protect the accident scene.
 - b. Do not admit liability or place any blame for the accident.
 - c. Provide only your name, address, driver's license number, and vehicle insurance information.
 - d. Complete the Auto Claim Report – Attachment 057-1 NA and obtain the following information:
 - i. Name(s), addresses, and telephone number(s) of the owner(s).
 - ii. Name(s) of the driver and any occupants of other vehicle(s).
 - iii. The owner's insurance company.
 - iv. Driver's license number.
 - v. Year, make, model, and license number of the vehicle(s).
 - vi. Name(s) and addresses of any witnesses.
 - e. DO NOT
 - Make any admissions of guilt or culpability.
 - Call the insurance company; the Fleet Manager's office will do this (unless the incident involves your personal vehicle).
 - Give a statement to the press.
 - Give a signed statement to the claims adjuster representing the other driver's insurance company.

Note: The Auto Claim Report for vehicles owned or leased by URS is located in the vehicle glove compartment. The driver must complete this form at the scene of the accident.

URS SAFETY MANAGEMENT STANDARD

Vehicle Safety Program

2. Notification

All accidents with a URS-owned, -rented, or -leased vehicle or with a personally owned vehicle used for business must be reported to your Office Manager within 24 hours of the time of the accident. The Auto Claim Report must be completed and distributed as instructed on the form. Additionally, for motor vehicle accidents involving injured parties, the Incident/Near Miss Report Form – Attachment 049-1 NA must be completed.

F. Accident Review

1. A violation of this vehicle safety standard is subject to disciplinary action, including termination. The Fleet Manager will review all accidents involving URS-owned, -rented, or -leased vehicles.
2. URS may suspend the privilege to operate vehicles on URS business because of noncompliance with the URS Vehicle Safety Program, involvement in a motor vehicle accident, or resulting citations or other legal actions associated with motor vehicle violations. Personnel authorized to suspend an employee's status as an Authorized Driver include the following:
 - a. A Project Manager with responsibility for dedicated vehicles on a site. The suspension is applicable to those site vehicles only.
 - b. A URS Operations Manager responsible for the employee.
 - c. The URS Fleet Manager.
 - d. The Vice President of Health, Safety, and Environment.
3. The employee's driving privileges *will be* suspended for any of the following:
 - a. Accidents or legal action involving alcohol or drug use (e.g., driving under the influence [DUI]).
 - b. Driving without a license.
 - c. Hit-and-run driving or leaving the scene of an accident.
 - d. Unauthorized use of URS vehicles (i.e., using a URS vehicle for moving personal items, carrying passengers who are not associated with work activities, etc.).

URS SAFETY MANAGEMENT STANDARD
Vehicle Safety Program

4. The employee's driving privileges *may be* suspended for any of the following:
 - a. Two or more at-fault accidents involving the same Authorized Driver within a 12-month period.
 - b. Multiple complaints from other employees or members of the public about driving performance.
 - c. Any accident caused by a URS Authorized Driver where damages exceed \$2,000.
 - d. Failure to comply with the cellular phone use policy.
 - e. Gross misconduct or violation of policy.
5. An Authorized Driver's driving privileges may be reinstated as follows:
 - a. For any suspension resulting from law enforcement agency legal action involving drugs and alcohol on the part of the former Authorized Driver, driving privileges may be reinstated only by concurrent agreement from the URS Operating Unit Manager, the URS Fleet Manager, the Vice President of Health, Safety, and Environment, and the appropriate Human Resources Regional Manager.
 - b. For those Authorized Driver's privilege suspensions that are not related to driving under the influence of drugs or alcohol, privileges may be reinstated with concurrent agreement by the URS Operating Unit Manager, the Vice President of Health, Safety, and Environment, and appropriate Human Resources Regional Manager upon completion of required remedial training (see Section 4.B.3).
6. Disciplinary action may include the following:
 - a. Loss of URS driving privileges.
 - b. Additional driver safety training (required for at-fault accidents resulting in more that \$2,000 in damages, but optional for all other accidents). Refer to Section 4.B, Training.
 - c. Disciplinary warning.

URS SAFETY MANAGEMENT STANDARD

Vehicle Safety Program

d. Termination.

G. Inspection

1. The driver is responsible for inspecting the vehicle prior to use and not driving a vehicle with obvious safety defects.
2. Basic safety checks must include the following:
 - a. Tire condition/pressure.
 - b. Lights/turn signals.
 - c. A clean windshield and adequate window washer fluid.
 - d. Gauges/warning lights indicating a normal condition.
 - e. Mirrors properly adjusted.
 - f. Brakes with adequate pedal pressure for proper braking.

Any defects must be reported to the local office Fleet Representative or Office Administrator.

H. Vehicle Maintenance

1. The Office Administrator (or designee) is to ensure that all vehicles owned or leased by URS are properly maintained.
2. Routine maintenance must be performed in accordance with the schedule provided in the owner's manual stored in the vehicle.
3. Reported defects/problems with vehicles must be repaired promptly.

5. Documentation Summary

The following documentation will be maintained in the office/project file:

- A. Auto Claim Reports
- B. Journey Management Plans

URS SAFETY MANAGEMENT STANDARD

Vehicle Safety Program

6. Resources

- A. National Safety Council, Information on Defensive Driving Courses
<http://www.nsc.org/psg/ddc.htm>
- B. AAA Foundation for Traffic Safety
<http://www.aaaftr.org/>
- C. Smith Driving System
<http://smith-system.com/>
- D. 4-Hour Defensive Driver Training
<http://www.safetyserve.com/urscorp> password: URSDDC
- E. American National Standards Institute (ANSI) D6.1 – Manual on Uniform Traffic Control Devices for Streets and Highways
- F. SMS 019 – Heavy Equipment Operations
- G. SMS 024 – Medical Screening and Surveillance
- H. SMS 032 – Work Zone Traffic Control
- I. SMS 044 – Radiation Safety for Portable Gauges
- J. SMS 048 – Hazardous Materials/Dangerous Goods Shipping
- K. SMS 049 – Injury/Illness/Incident Reporting and Notifications
- L. Attachment 057-1 NA – Auto Claim Report
- M. Attachment 057-2 NA – Journey Management Plan



AUTO CLAIM REPORT

To be used for **all** vehicle accidents involving URS-leased/rented/owned vehicles and for personal vehicles used on company business.

Name of Employee Involved in Accident _____

Was the employee injured? Yes No

Job Title: _____

Was anyone else injured? Yes No

Details: _____

Office Location _____

Date of Accident _____

Employee Phone/Cell # _____

Office Phone # _____

Describe Injury (including medical treatment, if any):

Company Vehicle

On Company business at the time of accident? Yes

No

Personal Vehicle

Vehicle Identification Number (company or personal):

Rental Vehicle

Government or Customer Vehicle

Year _____

Make _____

Model _____

Other Driver's Information

Name _____

Phone Number _____

Address _____

Insurance Co. _____

Policy # _____

License Plate # _____

Make _____

Model _____

Description of Accident

Time of Accident _____

Police Report # _____

Location of Accident _____

Police Department _____

Description (provide a clear, inclusive description of the accident):

Accidents should be reported immediately to the Office Manager, Regional HSE Manager and:

All accidents occurring in the US will be reported to:

PHH

All accidents occurring outside the US will be reported to the Regional HSE Manager.

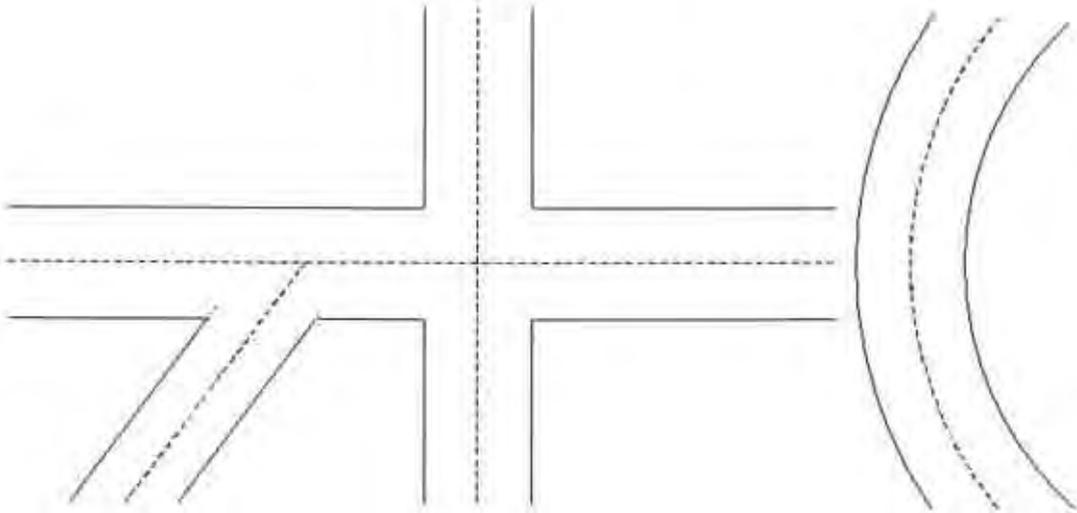
Phone 800 446 7052 Fax 410 771 6181

e-mail: reporting@phh.com

AUTO CLAIM REPORT

To be used for all vehicle accidents involving URS-leased/rented/owned vehicles and for personal vehicles used on company business.

Draw a diagram showing the position of vehicles before and after the accident. Correct the diagram to fit your situation. Attach police report if available.



Check all applicable conditions on each subject

WEATHER

- Clear
- Cloudy
- Fog
- Rain
- Snow
- Sleet
- Other

LIGHTING

- Daylight
- Dusk
- Dark - no street lights on
- Dark - street lights on
- Headlights
- Headlights on dim
- Headlights on bright
- No lights on
- Dark
- Dawn

ROAD SURFACE

- Dry
- Wet
- Muddy
- Snowy
- Snow-covered
- Ice in places
- Ice -covered
- Other

ROAD DESCRIPTION

- Straight
- Level
- Hill
- Paved
- One-way
- Two-way
- Divided road
- Intersection
- Curve
- Up
- Down
- Black top

ACTION OF DRIVER

You Other

ACTION OF DRIVER	You	Other
Exceeding safe speed		
On wrong side of street		
Did not have right-of-way		
Disobeyed traffic signal		
Passed illegally		
Improper turning		
Improper backing		
Following too closely		
Failure to signal		
Improper lane change		
Misjudged clearance		
Other		



AUTO CLAIM REPORT

Issue Date: February 2001
Revision 6: February 2009

To be used for **all** vehicle accidents involving URS-leased/rented/owned vehicles and for personal vehicles used on company business.

What was speed limit?

MPH

Witnesses?

Yes No

Traffic control

Signal lights

Caution lights

Stop sign

Police officer

None Other

Witness Name

Address

Name

Address



Health, Safety and Environment
JOURNEY MANAGEMENT PLAN

Attachment 057-2 NA

Issue Date: February 2001
Revision 8: February 2009

Commencement Point	Destination Point

Issue #: 1 Date:

<u>ROUTE DIRECTIONS</u>	<u>PERSONAL PROTECTIVE EQUIPMENT</u>
<u>TIME AND DISTANCE, ROUND TRIP</u>	<u>SPECIAL INSTRUCTIONS</u> 1. Do not use cell phone or two-way communication devices while driving. 2. Use three points of contact when entering/exiting the cab. 3. Everyone has the authority and responsibility to stop work if conditions are unsafe. 4. Do not drive while under the influence of medication, drugs or alcohol. 5. Do not drive when you are fatigued.
<u>SITE HAZARDS</u>	
<u>ROUTE HAZARDS</u>	<u>EMERGENCY INFORMATION</u>
<u>DESTINATION ENTRY INSTRUCTIONS</u>	<u>EMERGENCY CONTACT NUMBERS</u> Fire/Ambulance/Police:
<u>DESTINATION HAZARDS</u>	<u>SITE CONTACT NUMBERS</u> Site Manager:
	Safety Manager:
<u>DESTINATION EXIT INSTRUCTIONS</u>	<u>CURRENT TRIP INFORMATION UPDATE</u>
<u>RETURN JOURNEY</u>	



Health, Safety and Environment
JOURNEY MANAGEMENT PLAN

Attachment 057-2 NA
Issue Date: February 2001
Revision 6: February 2009

ROUTE MAP

URS SAFETY MANAGEMENT STANDARD 064
HAND SAFETY

URS SAFETY MANAGEMENT STANDARD

Hand Safety

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

This standard is intended to protect employees from activities that may expose them to injury when working with materials or equipment that presents the potential for hand injury.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 064 NA – North America, UK and Ireland, Europe, and Middle East

SMS 064 AP7 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Hand Safety

1. Applicability

This standard applies to URS Corporation and its subsidiary companies where the potential for hand injuries is present.

Appropriate gloves must be worn when persons work with materials or equipment that presents the potential for hand injury due to sharp edges, corrosives, flammable and irritating materials, extreme temperatures, splinters, etc.

2. Purpose and Scope

This standard is intended to protect employees from activities that may expose them to injury. This standard provides information on recognizing those conditions that require personal protective equipment (PPE) or specific work practices to reduce the risk of hand injury.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

4. Requirements

A. Hazard Assessment

1. Perform hazard assessments for those work activities likely to require PPE.
 - a. Use the PPE Hazard Assessment Certification Form – Attachment 029-1 NA to perform the assessment. The Hazard Assessment Certification Form will accompany URS personnel at jobsites for use in the event of a job or task change.
 - b. Reevaluate completed hazard assessments when the job or task changes.
2. If possible, eliminate the hazards identified through engineering or administrative controls. Examples of controls are chemical substitution, machine guarding, and use of different tools.
3. Select PPE that will protect employees if hazards cannot be eliminated.
 - a. Review Material Safety Data Sheets for project or task-specific chemicals to determine appropriate PPE. If needed, consult with a URS safety representative for assistance.

URS SAFETY MANAGEMENT STANDARD **Hand Safety**

- b. Review glove manufacturer recommendations for both physical and chemical protection.
 - c. Obtain gloves of the correct size for project field staff.
 - d. When both chemical and physical protection is of concern, wear the chemical protection gloves (e.g., nitrile) inside the physical protection gloves (e.g., leather, Kevlar®).
 - e. Latex gloves are not recommended for chemical protection.
 - f. Do not wear metal or metal-reinforced gloves when working with electrical equipment or on electrical services. Proper leather and/or rubber gloves designed and tested for this purpose should be used.
4. Follow glove requirements in the project-specific safety plan.
- B. Guidelines for Working With and Around Equipment (Hand Tools, Portable Powered Equipment)
- 1. General
 - a. Employees should be trained in the use of all tools.
 - b. Keep hand and power tools in good repair and use them only for the task for which they were designed.
 - c. Inspect tools before use and remove damaged or defective tools from service.
 - d. Operate tools in accordance with manufacturer's instructions.
 - e. Do not remove or bypass a guarding device for any reason.
 - f. Keep surfaces and handles clean and free of excess oil to prevent slipping.
 - g. Wear proper PPE, including gloves, as necessary.
 - h. Do not carry sharp tools in pockets.
 - i. Clean tools and return to the toolbox or storage area upon completion of a job.
 - j. Before applying pressure, ensure that wrenches have a good bite.

URS SAFETY MANAGEMENT STANDARD **Hand Safety**

- i. Brace yourself by placing your body in the proper position so you will not fall if the tool slips.
 - ii. Make sure hands and fingers have sufficient clearance in the event the tool slips.
 - iii. Always pull on a wrench, never push.
 - k. When working with tools overhead, place tools in a holding receptacle when not in use.
 - l. Do not throw tools from place to place or from person to person, or drop tools from heights.
 - m. Inspect all tools prior to start-up or use to identify any defects.
 - n. Powered hand tools should not be capable of being locked in the ON position.
 - o. Require that all power-fastening devices be equipped with a safety interlock capable of activation only when in contact with the work surface.
 - p. Do not allow loose clothing, long hair, loose jewelry, rings, and chains to be worn while working with power tools.
 - q. Do not use cheater pipes.
 - r. Make provisions to prevent machines from restarting through proper lockout/tagout (refer to SMS 023 – Lockout and Tagout Safety).
2. Cutting Tools
- a. Always use the specific tool for the task. Tubing cutters, snips, self-retracting knives, concealed blade cutters, and related tools are task specific and minimize the risk of hand injury. For more information about cutting tools, see Supplemental Information A.
 - b. Fixed open-blade knives (FOBK) are prohibited from use. Examples of fixed open-blade knives include pocket knives, multitools, hunting knives, and standard utility knives.
 - c. When utilizing cutting tools, personnel will observe the following precautions to the fullest extent possible:
 - i. Use the correct tool and correct size tool for the job.

URS SAFETY MANAGEMENT STANDARD Hand Safety

- ii. Cut in a direction away from yourself and not toward other workers in the area.
- iii. Maintain the noncutting hand and arm toward the body and out of the direction of the cutting tool if it were to slip out of the material being cut.
- iv. Ensure that the tool is sharp and clean; dirty and dull tools typically cause poor cuts and more hazard than a sharp, clean cutting tool.
- v. Store these tools correctly with covers in place or blades retracted, as provided by the manufacturer.
- vi. On tasks where cutting may be very frequent or last all day (e.g., liner samples), consider Kevlar® gloves in the PPE evaluation for the project.
- vii. Do not remove guards on paper cutters.

3. Moving/Rotating Equipment

- a. General Requirements for Rotating Equipment (feed augers, chippers, conveyors, etc.)
 - i. Never place hands, fingers, or extremities near hoppers and operational areas of machinery.
 - ii. When the equipment is rotating, stay clear of the rotating components and only operate equipment with proper machine guarding in place.
 - iii. Never clean a jammed piece of equipment unless the transmission is in neutral and the power source or the engine is off, and the moving parts of the equipment have stopped rotating. Refer to SMS 023 – Lockout and Tagout Safety.

4. Other Physical Hazards

- a. Activities such as drum handling, fencing, work near razor wire, manhole cover removal, and demolition also pose hazards to hands.
- b. Plan work to avoid pinch points for hands when moving drums, moving manhole covers into position, and handling other heavy objects.
- c. Work handling scrap metal or other sharp edges requires proper hand PPE (Kevlar® or leather gloves).

URS SAFETY MANAGEMENT STANDARD **Hand Safety**

C. Ergonomics – Hand and Wrist Care

1. Keep your wrist in neutral. Avoid using your wrist in a bent (flexed), extended, or twisted position for long periods of time. Instead try to maintain a neutral (straight) wrist position. Ergonomic tools may be needed for long-term work.
2. Watch your grip. Gripping, grasping, or lifting with the thumb and index finger can put stress on your wrist. When practical, use the whole hand and all the fingers to grasp an object.
3. Minimize repetition. Even simple, light tasks may eventually cause injury. If possible, avoid repetitive movements or holding an object in the same way for extended periods of time.
4. Reduce speed and force. Reducing the speed with which you do a forceful, repetitive movement gives your wrist time to recover from the effort. Using power tools helps reduce the force.
5. Rest your hands. Periodically give your hands a break by letting them rest briefly. Or you may be able to alternate easy and hard tasks, switch hands, or rotate work activities.

D. Biological Impacts

1. Poisonous Plants

- a. Personnel in regions where there is the potential for contact with poisonous plants should be aware of the hazard.
 - i. Avoid contact with poisonous plants.
 - ii. Wear appropriate PPE.
 - iii. Clean hands thoroughly after contact before performing additional work tasks.

2. Further information can be obtained from SMS 047 – Biological Hazards.

E. Cleaning Hands

1. Avoid contamination of hands by proper use of gloves when contact with physical, chemical, or biological hazards is possible.

URS SAFETY MANAGEMENT STANDARD

Hand Safety

2. Use soap and water for normal hand cleaning. Do not use solvents for cleaning as they remove essential oils in the skin and may cause dermatitis. Do not use pressure washers for hand cleaning.
3. If the hands contact a corrosive (e.g., nitric acid), wash the area with water for fifteen minutes and then seek medical attention.
4. Use antibiotic ointment and skin protection on minor breaks/scratches of the skin.

5. Documentation Summary

The following documentation will be maintained in the project file:

- A. Hand tool training records, as applicable.

6. Resources

- A. U.S. OSHA Regulation - 29 Code of Federal Regulations (CFR) 1910.138 – Hand Protection
- B. Chemical resistant glove selection: <http://www.bestglove.com/>
- C. SMS 016 – Hand Tools and Portable Equipment
- D. SMS 023 – Lockout and Tagout Safety
- E. SMS 029 – Personal Protective Equipment
- F. SMS 047 – Biological Hazards
- G. SMS 054 – Office Ergonomics
- H. SMS 056 – Drilling Safety Guidelines

7. Supplemental Information

- A. Safer Alternative Tools

Types of safety knives or alternative cutting tools:

Self-retracting utility knives (brands – OLFA, Martor, Allway Tools)



Guarded utility knives (brands – The Safety Knife Co., Martor)



Shears, snips, scissors (brands – Ridgid, Craftsman, Wolfcraft)



Concealed blade cutters (brands – The Safety Knife Co., Martor)



Pipe cutters (brands – Ridgid, Empire)



Specialty cutter (brand – Geoprobe)



URS SAFETY MANAGEMENT STANDARD 069
MANUAL MATERIAL HANDLING

URS SAFETY MANAGEMENT STANDARD

Manual Material Handling

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to prevent common injuries caused by the practice of manual materials handling (MMH). For this procedure, MMH is defined as the movement of items by lifting, lowering, pushing, pulling, carrying, holding, or restraining.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 069 NA – North America

SMS 069 EU – UK and Ireland, Europe, and Middle East

SMS 069 AP7 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Manual Material Handling

1. Applicability

This standard applies to URS Corporation and its subsidiary companies where personnel perform manual handling of materials. For this procedure, manual material handling (MMH) is defined as the movement of items by lifting, lowering, pushing, pulling, carrying, holding, or restraining.

2. Purpose and Scope

The purpose of this standard is to prevent common injuries caused by the practice of MMH. Immediate or short-term effects include lacerations, bruises, and muscle fatigue. Long-term effects include chronic pain, frequently in the lower back but also in limb joints and ligaments.

3. Implementation

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project.

4. Requirements

A. General

1. Prior to lifting, lowering, pushing, pulling, carrying, holding, or restraining an object of any significant size or weight, employees must evaluate the object and the required task to determine whether they can handle the object safely.
2. If the employee has any doubt about whether he or she can safely move the object alone, the employee should obtain additional manual or mechanical help.
3. Healthy employees with no physician-imposed restrictions should be able to lift and carry a maximum of 50 pounds (23 kilograms) using proper lifting and carrying techniques. Physical and workplace factors may reduce this recommended weight limit (RWL) significantly and should be considered prior to attempting lifts of this magnitude. Examples of physical and workplace factors may include the following:
 - a. Physical size of an object.
 - b. Slippery container surface or poor grip ability.
 - c. Sharp edges.
 - d. Slippery floors or obstacles on the floor.
 - e. Cold or hot objects surfaces.
 - f. Distance and route of travel.

URS SAFETY MANAGEMENT STANDARD Manual Material Handling

4. An employee's personal "safe" MMH capability is defined as the employee's personal capability to manually lift, carry, push, or pull an object alone. This "safe" limit must consider the employee's past experience and training with MMH, health status, and any other personal or environmental characteristics affecting the employee's ability to perform these tasks. An employee's "safe" MMH capability is typically at or below the calculated RWL. In some cases, a trained and physically conditioned employee may exceed the MMH capability limit, but only after a complete hazard review of the task has determined an acceptable risk for minimizing injury.
5. An MMH task that exceeds an employee's personal "safe" MMH capability or RWL should be brought to the attention of the applicable manager or safety supervisor for the project.
6. If, due to a medical or health condition, the employee's physician or the employee has set a personal "safe" MMH capability, then appropriate medical documentation must be provided to the applicable manager to define these limits. The manager and appropriate safety supervisor should evaluate the tasks to which that employee is assigned and recommend a specific course of action to limit the potential for injury. This should include periodic monitoring of the employee and his/her work environment.
7. A recommended RWL can be calculated using the factors described in Supplemental Information A. The weight limit derived from these calculations is considered to be a load that over 99% of men and over 75% of women can safely handle without application of engineering or administrative controls. **Implementation of the calculations in Supplemental Information A should be attempted only with the assistance of a safety professional knowledgeable in the application of these factors. The calculations are intended to determine RWLs for repetitive lifting scenarios rather than occasional lifts.**
8. Prior to any manual lift, it is suggested that the employee warm up his or her muscles and joints using a combination of stretching and flexing.

B. Preplanning

1. Where MMH will be a necessary function of the task, the manager and/or safety supervisor should perform a thorough evaluation of the activities to determine ergonomic solutions to reduce or eliminate conditions that can cause or contribute to MMH injuries.

URS SAFETY MANAGEMENT STANDARD

Manual Material Handling

2. If a heavy object is to be moved to another location, the safest transport route should be determined prior to the activity.
3. The area around the object and the route over which it will be transported should be checked for slip, trip, and fall hazards. Hazards should be removed prior to initiation of the task.
4. The object to be moved should be inspected for grasping or handling hazards, such as slivers, sharp edges, grease, water, etc. Eliminate or abate any identified hazards where possible. Safe grasping or handling points on the object should be determined. Whenever possible, containers with carrying handles should be used for objects because they increase the manual grip strength for holding the object, thus providing better control and reduced muscle fatigue.
5. The distance to be traveled and the length of time that a grip on the object must be maintained should be considered before moving objects. If the travel distance is greater than 10 feet (3 meters) at maximum RWL, the employee should consider using an alternative method, rather than manually carrying the object.

C. Lifting/Lowering Guidelines

1. Reduce or eliminate manual lifting and lowering tasks where possible. Determine whether there are ways to abate the safety and ergonomic hazards associated with manual lifting.
2. The recommended technique for two-handed manual lifting/lowering involves five maneuvers:
 - a. Get a firm footing. Keep your feet apart for a stable base. Put one foot slightly in front of the other.
 - b. Bend your knees. Do not bend at the waist. When grasping the object, a firm grip should be obtained before lifting/lowering.
 - c. Lift/lower with your legs. Lift/lower the load slowly and in a straight line, avoiding sudden movements.
 - d. Keep the load close to the body. Generally, the closer the load is to the body, the less force it exerts on your back.
 - e. Keep your back straight, your head and shoulders up, and your stomach muscles tights. Do not add the weight of your body to the load. Avoid twisting.

URS SAFETY MANAGEMENT STANDARD **Manual Material Handling**

3. When a turn or change of direction is necessary, the object should be lifted or lowered into a carrying position, then the whole body should be turned with the feet, avoiding any trunk twisting motion.
4. Objects to be lifted to shoulder height should first be lifted to waist height, then rested on a level surface so the grasping position can be changed prior to lifting to a higher level.
5. Employees should never lift a load above their head.

D. Carrying/Holding Guidelines

1. Manual carrying is an inefficient way of transporting materials in the work place. Where possible, reduce or eliminate manual carrying tasks.
2. Never carry a load above the head.
3. Carry an object close to the body using both hands. One-handed carries are awkward and tend to unbalance the employee.
4. Do not carry objects that are so large they will obstruct visibility.
5. Do not change grips on an object while carrying or holding an object. Rest the object on a secure surface prior to changing grip.
6. If an object is of a size, shape, or mass that it requires two people to carry, use two people of similar size and physique. Two-person lifts should be planned and coordinated before performing the lift. Lift the item in unison.
7. Avoid carrying objects on stairs, particularly where the line of sight may be obstructed or the object can interfere with leg movement. All travel on stairs requires use of a handrail at all times, so only carry objects that can be safely handled with one hand. Always maintain handrail contact when carrying an object up or down stairs.

E. Pushing/Pulling Guidelines

1. Check the condition of the floor, ground, or other surface prior to pushing or pulling an object across it.
2. Be aware of the "break out" force of the object; this is the force at which a push or pull overcomes the frictional force between the surface and object. Adjust posture to avoid losing balance when this point is reached.
3. Get assistance when moving or guiding a large load.
4. Where possible, always push rather than pull a load.

URS SAFETY MANAGEMENT STANDARD

Manual Material Handling

5. Never load the cart or load-carrying device in such a manner that visibility is obstructed in the path of travel.
6. When pushing or pulling an object on an inclined surface, be certain that you can control the load and direction of travel before proceeding. Obtain additional support to control the load if necessary.
7. Never leave carts or loads in an area that will present a hazard to other workers. Make sure carts or transport devices are secured in position before leaving them unattended.

F. Workplace Design

1. Store heavy or bulky materials at heights between the knee and shoulder to avoid the need to stretch or bend. Use step stools to access objects above shoulder height.
2. Pack or arrange items to be lifted to avoid shifting of weight in the package. If a box has hand cutouts (e.g., file archive boxes) do not load the box so full that the handles cannot be used for carrying the box.
3. Design work areas to avoid the need to lift, carry, push, or pull heavy or bulky materials for extended distances.
4. Design workplaces with the following in mind:
 - a. Lifts from the floor should be avoided.
 - b. The torso should never twist while handling loads.
 - c. Asymmetrical or unbalanced one-handed lifts should be avoided.
 - d. Loads should not be lifted with sudden movements.
 - e. Loads should not be lifted over obstacles.
 - f. Loads should not be lifted at extended forward or sideway reaches.
 - g. Uncomfortable or static postures should not be necessary throughout the work cycle.
 - h. Environmental factors (e.g., task lighting, dry work surfaces, heat or cold stress) should be considered.

G. Training

1. Personnel who may have MMH as part of their duties are required to receive training that includes the following topics:

URS SAFETY MANAGEMENT STANDARD
Manual Material Handling

- a. Showing personnel how to avoid unnecessary physical stress and strain during MMH operations.
 - b. Teaching personnel to become aware of what they can comfortably handle without undue strain.
 - c. Instructing personnel on the proper use of equipment.
 - d. Teaching personnel to recognize potential hazards and how to prevent or correct them.
2. This training must be completed prior to an employee being assigned to a task that involves MMH activities.
 3. Assistance with training or training materials is available through the HSE staff.

5. Documentation Summary

The following documentation will be maintained in the project file:

- A. Training rosters.
- B. Other proof of completion of MMH training.

6. Resources

- A. National Institute for Occupational Safety and Health (NIOSH) – Work Practices Guide for Manual Lifting <http://www.cdc.gov/niosh>
- B. Canadian Centre for Occupational Health and Safety <http://www.ccohs.ca/oshanswers/ergonomics/>
- C. Oregon OSHA – Ergonomics of Manual Materials Handling <http://www.cbs.state.or.us/external/osh/pdf/workshops/206w.pdf>
- D. North Carolina Department of Labor – A Guide to Manual Materials Handling and Back Safety <http://www.nclabor.com/osh/etta/indguide/ig26.pdf>

7. Supplemental Information

- A. Recommended Weight Limit (RWL) Calculations



This lifting equation, developed by the National Institute for Occupational Safety and Health (NIOSH), takes into account the weight of an object plus several other variables in lifting tasks that contribute to the risk of injury. For example, if the situation requires frequent lifts or lifting loads far away from the body, there is an increased risk of injury. Under these conditions, the weight limit would be reduced from a baseline weight or "load constant" (LC) to a recommended weight limit (RWL). A "load constant" (LC) of 23 kg (about 51 pounds) has been established by NIOSH as a load that, under ideal conditions, is safe for 75% of females and 90% of males.

To calculate the RWL, you must first measure or assess several variables related to the lifting task. The six variables that are considered in determining the RWL are:

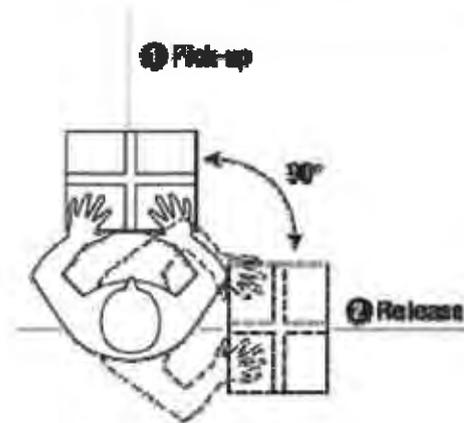
- The horizontal distance (H) the load is lifted (distance of hands from midpoint between ankles),
- The starting height of the hands from the ground (V),
- The vertical distance of lifting (D),
- The time between lifts or frequency of lifting (F),
- The angle of the load in relation to the body (e.g., straight in front of you or off to the side, A), and
- The quality of the grasp or handhold based on the type of handles available (hand-to-load coupling, C).

Each of these variables is then assigned a numerical value (multiplier factor) from look-up charts. The equation includes six multiplier factors to calculate the RWL:

$$\text{RWL} = \text{LC} \times \text{HM} \times \text{VM} \times \text{DM} \times \text{FM} \times \text{AM} \times \text{CM}$$

Where LC is the load constant (23 kg) and other factors in the equation are:

- HM, the "Horizontal Multiplier" factor,
- VM, the "Vertical Multiplier" factor,
- DM, the "Distance Multiplier" factor,
- FM, the "Frequency Multiplier" factor,
- AM, the "Asymmetric Multiplier" factor, and
- CM, the "Coupling Multiplier" factor.



Horizontal Multiplier is the distance the object is from the body. Measure (in centimeters) the distance from in between the person's ankles to their hands when holding the object. Write down this number. Next, look up the number on the accompanying chart and find the matching "multiplier factor". Use this factor in the lifting equation.

Vertical Multiplier is measured as the starting point of the lift and is the distance in centimeters of the hands up from the ground. Measure this distance and use the number to determine which value to use on the chart.

Distance Multiplier is the number of centimeters the load travels up (or down) from the starting position. Measure this distance and use the number to determine which value to use on the chart.

Frequency Multiplier is how often the lift is repeated within a certain time period. You need to determine if the lift is done while standing or stooping, for more or less than one hour (in total time for the shift), and how much time there is for rest between lifts.

Asymmetric Multiplier measures if the body must twist or turn during the lift. This measurement is done in degrees (with 360° being one complete circle).

Coupling Multiplier determines the "coupling" or type of grasp the person has on the container. It rates the type of handles as good (handles), fair (make-shift cut outs in cardboard boxes) or poor. You also need to know if the lift is done in a standing or stooping position.

When these multipliers are placed into the equation, determine the RWL. If the weight of the object to be lifted exceeds the RWL, the task is considered to be dangerous. Assess the relevant factors which contribute most to the risk (the lower the factor, the more it contributes to the risk) and redesign the handling task.

The lifting equation only applies in certain situations. It does not apply in situations where a person is lifting (or lowering):

- With one hand,
- For over 8 hours,
- While seated or kneeling,
- In a restricted work space,
- Objects that are unstable (such as buckets or containers of liquids),
- While pushing or pulling,
- With wheelbarrows or shovels,
- With high speed motion (faster than about 30 inches/second),
- Extremely hot or cold objects or in extreme temperatures, or
- With poor foot/floor coupling (high risk of a slip or fall).

This equation applies to most workers for:

- Two-handed lifting,
- Comfortable lifting postures, and
- Comfortable environments and non-slip floorings.

FACTORS USED IN RWL CALCULATIONS

Horizontal Multiplier (HM): Horizontal distance (H, in cm) from the midpoint between the ankles to the hands while holding the object.

H = Horizontal Distance (cm)	HM Factor
25 or less	1.00
30	0.83
40	0.63
50	0.50
60	0.42



Health, Safety and Environment
**RECOMMENDED WEIGHT LIMIT (RWL)
CALCULATIONS**

SMS 069 NA
Supplemental Information A
Issue Date: February 2009

Vertical Multiplier (VM): The vertical distance (V, in cm) of the hands from the ground at the start of the lift.

V = Starting Height (cm)	VM Factor
0	0.78
30	0.87
50	0.93
70	0.99
100	0.93
150	0.78
175	0.70
>175	0.00

Distance Multiplier (DM): The vertical distance (D, in cm) that the load travels.

D = Lifting Distance (cm)	DM Factor
25 or less	1.00
40	0.97
55	0.90
100	0.87
145	0.85
175	0.85
>175	0.00

Asymmetric Multiplier (AM): The twisting angle (A) of the body while lifting, measured in degrees.

A = Angle (degrees)	AM Factor
90°	0.71
60°	0.81
45°	0.86
30°	0.90
0°	1.00



Health, Safety and Environment
**RECOMMENDED WEIGHT LIMIT (RWL)
CALCULATIONS**

SMS 069 NA
Supplemental Information A
Issue Date: February 2009

Frequency Multiplier (FM): The frequency (F) of lifts and the duration of lifting (in minutes or seconds) over a work shift.

F = Time Between Lifts	FM Factor			
	Lifting While Standing		Lifting While Stooping	
	One Hour or Less	Over One Hour	One Hour or Less	Over One Hour
5 min	1.00	0.85	1.00	0.85
1 min	0.94	0.75	0.94	0.75
30 sec	0.91	0.65	0.91	0.65
15 sec	0.84	0.45	0.84	0.45
10 sec	0.75	0.27	0.75	0.27
6 sec	0.45	0.13	0.45	-
5 sec	0.37	-	0.37	-

Coupling Multiplier (CM): The quality of grasp (or coupling, C) classified as good, fair or poor and depends on the body position (either standing or stooping).

C = Grasp	CM Factor	
	Standing	Stooping
Good (handles)	1.00	1.00
Fair	1.00	0.95
Poor	0.90	0.90

URS SAFETY MANAGEMENT STANDARD 072
BEHAVIOR BASED SAFETY

URS SAFETY MANAGEMENT STANDARD

Behavior Based Safety

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to describe the URS approach to implementing our behavior based safety program.

Behavior based safety is a process that provides a higher level of safety excellence by promoting proactive responses, building ownership, and developing opportunities which relate to employee safety. A primary concept is that most accidents are due to unsafe behavior, and behavior changes may be made that significantly reduce accident risk.

3. Procedures

The associated implementing regional procedures for this standard are included as attachments:

SMS 072 NA – North America, UK and Ireland, Europe, and Middle East

SMS 072 AP4 – Asia Pacific

URS SAFETY MANAGEMENT STANDARD

Behavior-Based Safety

1. Applicability

This standard applies to all operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this standard is to describe the URS approach to implementing our behavior-based safety program.

Behavior-based safety is a process that provides a higher level of safety excellence by promoting proactive involvement, building ownership, and fostering communication that relates to employee safety. A primary concept is that most accidents are due to at-risk behavior, and behavioral changes may be made that significantly reduce accident potential.

3. Implementation

Implementation of this procedure is the responsibility of the URS manager directing activities of the facility, site, or project location.

4. Requirements

A. Definitions

1. **At-Risk Behavior:** Individual actions that increase the chance of injury, despite knowledge of the hazard. An example is excessive speed while driving.
2. **Activators:** Items that are intended to produce desired behaviors. URS activators for safety include, but are not limited to, policy statements, safety management standards (SMS), training, safety slogans, posters and signs, health and safety plans, safe work plans, safety meetings, and rules and regulations.
3. **Behaviors:** Visible actions on the part of individuals and can be characterized as safe (following health and safety plans, using work practices that minimize risk, coaching others on safe behavior, having safety as a priority over speed and convenience, etc.), or at-risk.
4. **Consequences:** Result of safe and at-risk behaviors, and can therefore be positive or negative. Examples of consequences include self-approval, reprimand, peer approval, penalty, feedback, inconvenience, and comfort. The most effective consequences are positive, immediate, and certain.

URS SAFETY MANAGEMENT STANDARD

Behavior-Based Safety

B. Values of Behavior-Based Safety

1. Employees hold safety as a core value.
2. Each employee feels responsible for the safety of their coworkers as well as themselves, and takes action accordingly.
3. Each employee is willing and able to “go beyond the call of duty” on behalf of the safety of others.

C. Roles for Safe Behavior

1. Supervisor's Role:
 - a. Provide clearly defined safety expectations and encourage/reinforce the implementation of safety observations using the SMS 072-1 NA checklist or equivalent.
 - b. Provide consequences for observed behaviors throughout the course of the work shift.
2. Co-Worker Role
 - a. Intervene when observing at-risk behavior.
 - b. Provide positive feedback for safe behavior.
 - c. Volunteer to be observed.

C. Identification of At-Risk Behaviors

Observations and review of incident and near miss data will be used by URS Safety Officers to help identify at-risk behavior.

1. Employee observations.
 - a. Observation checklists, either project-specific or Attachment 072-1 NA, will be used as a tool to help identify safe and at-risk behaviors and why the behavior(s) occurred.
 - b. Employees will be instructed on using the checklists.
 - c. Checklists will be included in the site-specific health and safety plan or the safe work plan.
 - d. The checklists will include the expected safe behaviors.

URS SAFETY MANAGEMENT STANDARD

Behavior-Based Safety

- e. Peers will complete the checklist for applicable work tasks.
- f. Checklists may change throughout the project to include additional behaviors.

E. Feedback to Employees

1. Observers will immediately provide one-on-one feedback to the observed, noting both safe and at-risk behaviors.
2. Observer and observee will discuss the identified barriers to safe behavior, and potential solutions.
3. Near-Miss and Incident Reports will be reviewed to identify at-risk behaviors and corrective actions.
4. Management and Health, Safety, and Environment staff will verify compliance with this standard.

F. Feedback Follow-up

1. Observation checklists will be collected and discussed at periodic safety meetings.
2. The manager will review the trends for at-risk and safe behavior, and report the trends to the employees.
3. Project-specific trends are analyzed and areas of additional action are identified.

5. Documentation Summary

The following documentation will be maintained in the project file:

- A. Behavior-Based Safety Checklists.

6. Resources

Attachment 072-1 NA – Behavior-Based Safety Checklist



**Health, Safety and Environment
BEHAVIOR BASED SAFETY
CHECKLIST**

Attachment 072-1 NA

Issue Date: September 2003
Revision 2: February 2009

Job Location: _____ Date: _____

Task/Work Observed: _____ Observer: _____

	<u>Safe</u>	<u>Unsafe</u>	<u>Comments *</u>
Personal Protective Equipment			
Head	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hand	<input type="checkbox"/>	<input type="checkbox"/>	_____
Feet	<input type="checkbox"/>	<input type="checkbox"/>	_____
Eyes/Face	<input type="checkbox"/>	<input type="checkbox"/>	_____
Skin	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hearing	<input type="checkbox"/>	<input type="checkbox"/>	_____
Fall Protection	<input type="checkbox"/>	<input type="checkbox"/>	_____
Equipment / Tools			
Proper tool for the job	<input type="checkbox"/>	<input type="checkbox"/>	_____
Condition	<input type="checkbox"/>	<input type="checkbox"/>	_____
Proper Use	<input type="checkbox"/>	<input type="checkbox"/>	_____
Body Use / Position			
Lifting	<input type="checkbox"/>	<input type="checkbox"/>	_____
Pinch Point	<input type="checkbox"/>	<input type="checkbox"/>	_____
Ladder / stairs	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hand placement	<input type="checkbox"/>	<input type="checkbox"/>	_____
Travel path / speed	<input type="checkbox"/>	<input type="checkbox"/>	_____
Body position	<input type="checkbox"/>	<input type="checkbox"/>	_____
Work Practices			
Follow Safety Plan / Procedures	<input type="checkbox"/>	<input type="checkbox"/>	_____
Housekeeping	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other			
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____

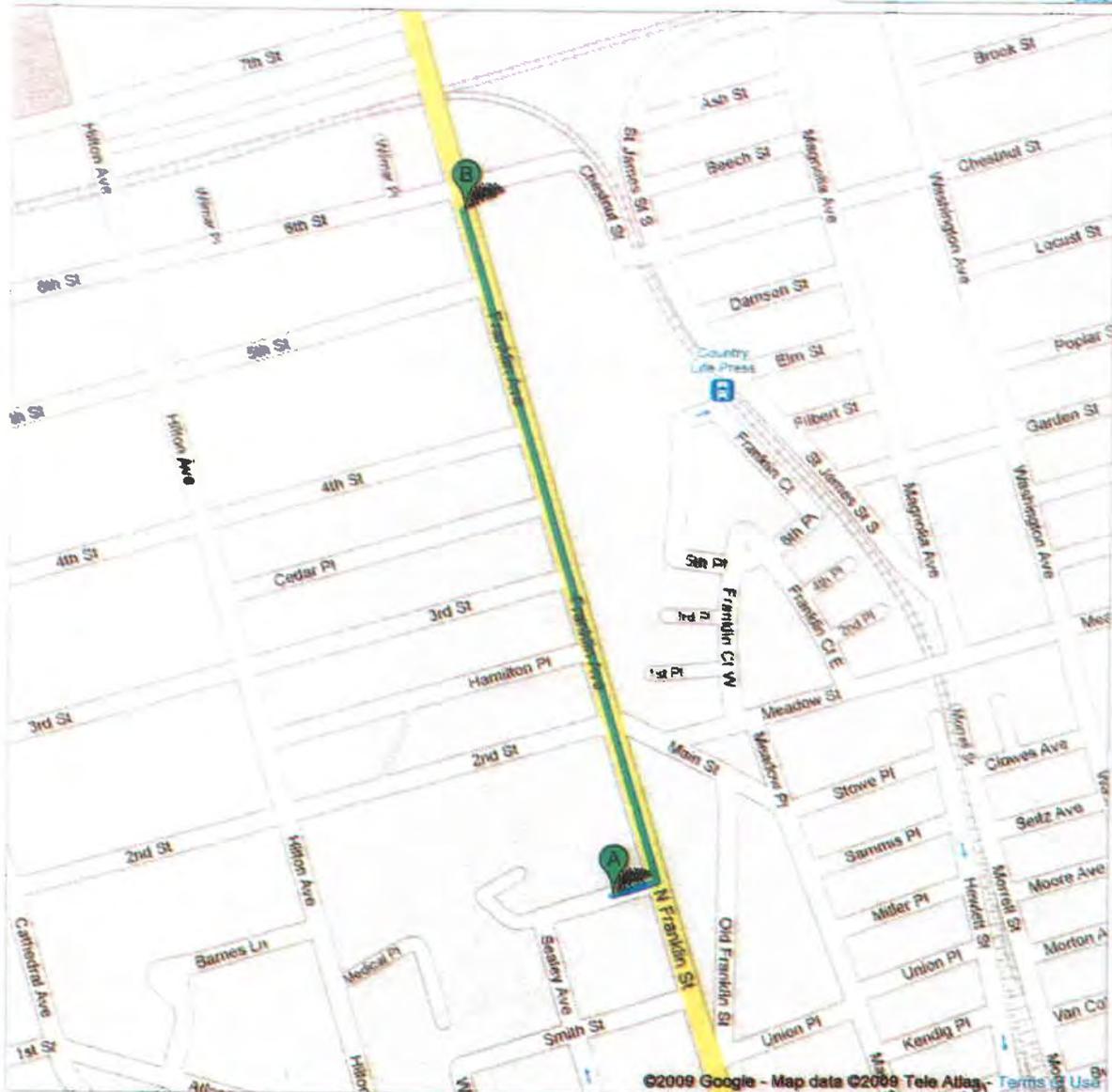
* Use comment column when unsafe behavior / conditions were observed. Describe what was observed and why this occurred.

ATTACHMENT 3
OCCUPATIONAL HEALTH CLINIC AND HOSPITAL ROUTE MAPS

DIRECTIONS TO OCCUPATIONAL HEALTH CLINIC



Directions to GARDEN CITY URGENT MEDICAL CARE
520 Franklin Ave, Garden City, NY 11530 - (516) 279-6911
0.5 mi - about 1 min



 45 Intersection St, Hempstead, NY 11550

1. Head **east** on **Intersection St** toward **N Franklin St**

go 184 ft
total 184 ft

 2. Turn **left** at **N Franklin St**
About 2 mins

go 0.5 mi
total 0.5 mi

 **GARDEN CITY URGENT MEDICAL CARE**
520 Franklin Ave, Garden City, NY 11530 - (516) 279-6911

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

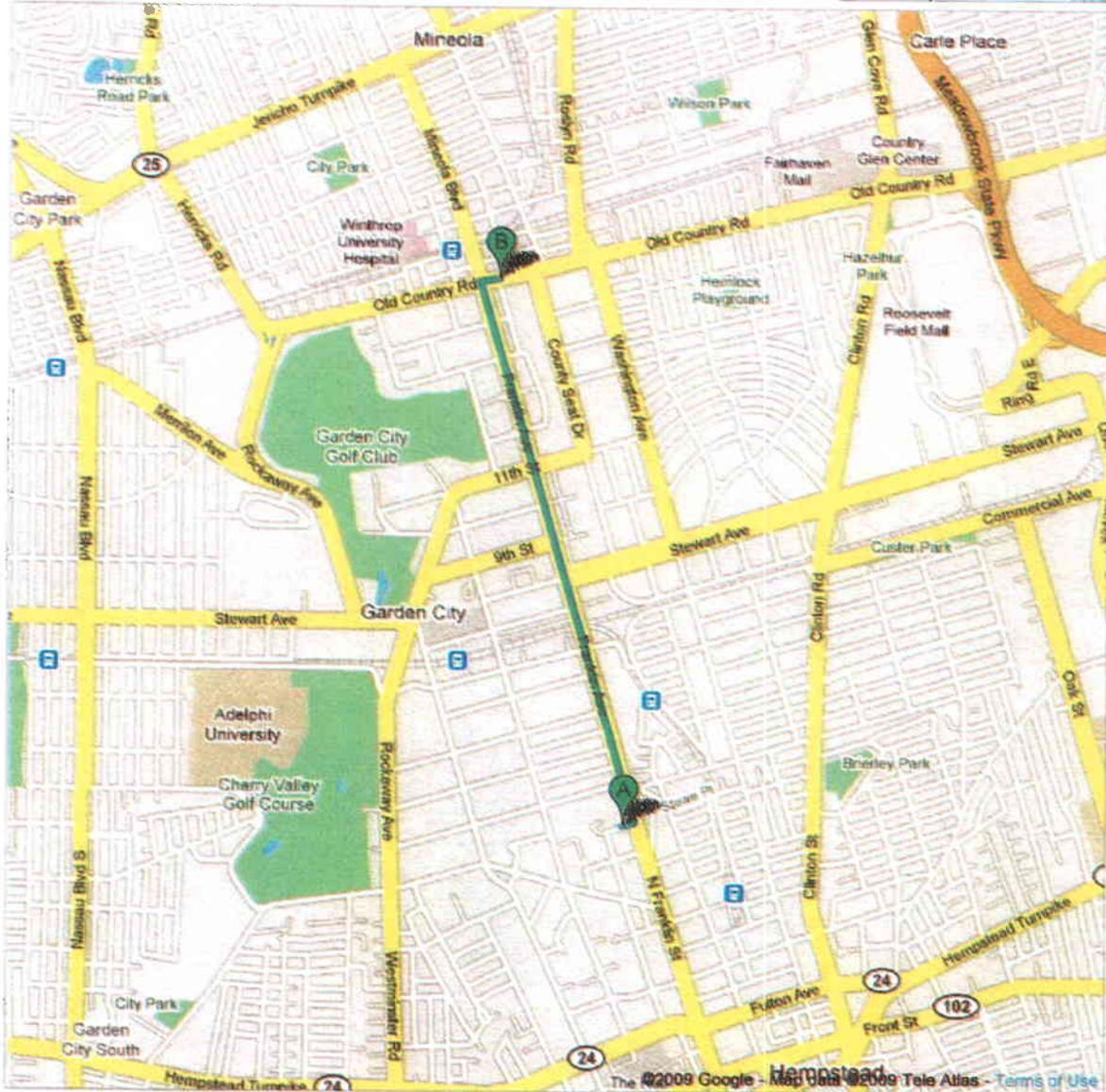
Map data ©2009 , Tele Atlas

DIRECTIONS TO HOSPITAL



Directions to Winthrop University Hospital
200 Old Country Rd, Mineola, NY 11501 - (516)
663-9012
1.7 mi - about 5 mins

Save trees. Go green!
Download Google Maps on your phone at google.com/gmm



 47 Intersection St, Hempstead, NY 11550

1. Head **east** on **Intersection St** toward **N Franklin St**

go 203 ft
total 203 ft

 2. Turn **left** at **N Franklin St**
About 5 mins

go 1.6 mi
total 1.7 mi

 3. Turn **right** at **Old Country Rd**

go 292 ft
total 1.7 mi

 **Winthrop University Hospital**
200 Old Country Rd, Mineola, NY 11501 - (516) 663-9012

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2009, Tele Atlas

ATTACHMENT 4
REAL-TIME MONITORING INSTRUMENTATION
SPECIFICATION SHEETS

DUSTTRAK™ Aerosol Monitor

The DUSTTRAK™ Aerosol Monitor measures aerosols in a wide variety of environments, from offices and industrial workplaces to outdoor environmental and construction sites. TSI's DUSTTRAK provides reliable exposure assessment by measuring particle concentrations corresponding to PM10, PM2.5, PM1.0 or respirable size fractions.

The DUSTTRAK is a portable, battery-operated laser photometer which gives you a real-time digital readout with the added benefits of a built-in data logger. Suitable for clean office settings as well as harsh industrial workplaces and outdoor applications, the DUSTTRAK detects potential problems with airborne contaminants such as dust, smokes, fumes and mists.

The DUSTTRAK is easy to use, too. You can perform quick spot checks or you can program the advanced logging modes for long-term sampling. You can program the start/stop times, recording intervals and other parameters. You can even set up the instrument for continuous unattended operation.

The DUSTTRAK's new continuous analog output and adjustable alarm output allow remote access to real-time particle concentration data. Applications include site perimeter monitoring, ambient monitoring, process area monitoring and other remote uses. The alarm output with user-defined setpoint alerts you when upset or changing conditions occur. This feature allows you to program a switch closure at a concentration value of your choosing.

*Now With
Analog and
Alarm
Outputs*



The DUSTTRAK provides a real-time measurement based on 90° light scattering. A pump draws the sample aerosol through an optics chamber where it is measured. A sheath air system isolates the aerosol in the chamber to keep the optics clean for improved reliability and low maintenance.

Specifications

Model 8520 DUSTTRAK Aerosol Monitor

Sensor Type	90° light scattering
Range	0.001 to 100 mg/m ³ (Calibrated to ISO 12103-1, A1 test dust)
Resolution	±0.1% of reading or ±0.001 mg/m ³ , whichever is greater
Zero Stability	±0.001 mg/m ³ over 24 hours using 10-second time-constant
Particle Size Range	0.1 to approximately 10 micrometers
Flow Rate	Adjustable 1.4 to 2.4 l/min (1.7 nominally)
Temperature Coefficient	+0.001 mg/m ³ per °C (for variations from temperature at which the DUSTTRAK was zeroed)
Operating Temperature	32° F to 120° F (0°C to 50°C)
Storage Temperature	-4° F to 140° F (-20°C to 60°C)
Operating Humidity	0 to 95% rh (non-condensing)
Time Constant	Adjustable from 1 to 60 seconds
Data Logging	31,000 data points (21 days of logging once/minute)
Logging Interval	Adjustable from 1 second to 1 hour
Physical External Dimensions	8.7 in. × 5.9 in. × 3.4 in. (221 mm × 150 mm × 87 mm)
Instrument Weight	3.3 pounds with batteries (1.5 kg)
Serial Interface	RS-232 1200 baud
Power AC	AC adapter (included)
Battery	Four C-size alkaline batteries (included)
Battery Run-time	Alkaline 16 hours
Analog Output Specifications	
Analog Output Voltage	0 to 5 VDC
Analog Output Scaling ¹	0 to 100 mg/m ³ 0 to 10.0 mg/m ³ 0 to 1.00 mg/m ³ 0 to 0.100 mg/m ³
Output Impedance	0.01 ohm
Maximum Output Current	15 mA



The DUSTTRAK comes complete with TSI's TRAKPRO™ Data Analysis Software to allow you to perform a more comprehensive analysis of your measurement results. This exclusive Windows®-based program helps you generate the detailed graphs and reports needed to effectively communicate your findings.

Specifications are subject to change without notice.
Windows is a registered trademark of the Microsoft Corporation.

Alarm Output Specifications

Type	Non-latching, MOSFET solid state (polarized) ² analog switch
Setpoint Range ¹	0.010 to 100 mg/m ³
Maximum Voltage	15 VDC
Maximum Current	1 Amp
Deadband	-5% of alarm setpoint
Connector	4-Pin, Mini-DIN connector

¹ User selectable through TRAKPRO™ Data Analysis Software.

² See TSI Application Note ITI - 074 for important wiring information.

Ordering Information

Model	Description
8520	The DUSTTRAK Aerosol Monitor and accessories includes: Auxiliary Analog and Alarm Outputs, Carrying Case, Alkaline Batteries, TRAKPRO™ Data Analysis Software, Filter, Computer Cable, 25-pin to 9-pin Adapter, Operation Service Manual, Calibration Certificate, 10 mm Nylon Dorr-Oliver Cyclone, Inlet Conditioning Kit 1.0 and 2.5 µm, Sampling Extension Tube, Miscellaneous Service Tools and Two-Year Warranty.

Optional Accessories

Model	Description
8520-1	Environmental Enclosure



TSI.

TSI Incorporated

500 Cardigan Road, Shoreview, MN 55126 USA

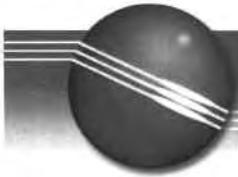
Tel: 651 490 2811 Toll Free: 1 800 874 2811 Fax: 651 490 3824 E-mail: answers@tsi.com

TSI Germany—Tel: +49-241-523030 Fax: +49-241-5230349 E-mail: tsigmbh@tsi.com

TSI Sweden—Tel: +46-18-52-70-00 Fax: +46-18-52-70-70 E-mail: tsi@tsi.se

For current information
www.tsi.com





MultiRAE Plus

One-to-Five Gas Monitor with VOC Detection

The **MultiRAE Plus** combines a PID (Photoionization Detector) with the standard four gases of a confined space monitor (O₂, LEL, and two toxic gas sensors) in one compact monitor with sampling pump. Like the Leatherman™ tool, the **MultiRAE Plus** gets the job done in more circumstances than any other gas detector. With more than 10,000 units in the field today, its versatility makes it the gas meter of choice for some of the highest profile HazMat/WMD teams in the United States. The **MultiRAE Plus** is quickly and easily changed from a sophisticated technician instrument to a simple text-only monitor. The same monitor can be used as a personal monitor, a hand-held sniffer or as a continuous-operation area monitor.

Key Features

- **O₂, LEL, PID and any two plug-in "smart" toxic sensors:** CO, H₂S, SO₂, NO, NO₂, Cl₂, HCN, NH₂, PH₂
- **0-2,000 ppm measurement of VOCs** (volatile organic compounds) with 0.1 ppm resolution
- **Measure more chemicals than with any other PID** With over 60 Correction Factors built into the **MultiRAE Plus** memory and the largest printed list of Correction Factors in the world (300+), RAE Systems offers the ability to accurately measure more ionizable chemicals than any other PID!
- **Drop-in Battery** When work schedules require putting in more than the 14 hours supplied by the advanced Lithium-ion (Li-ion) battery, the drop-in alkaline pack supplied with every **MultiRAE Plus** allows you to finish the job.

- **User friendly screens** make it easy to use for simple applications and flexible enough for sophisticated options.
- **Rugged Rubber Boot** assures that the **MultiRAE Plus** survives the bumps and knocks of tough field use
- **Strong, built-in sample pump** draws up to 100 feet (30m) horizontally or vertically. Large external filter and automatic low flowage
- **Large keys** are operable with 3 layers of gloves
- **Easy-to-read display** with backlight
- **Store up to 80 hours of data** at one minute interval for all 5 sensors for download to PC (with the optional datalogging)
- **Loud audible alarm** that varies for different alarm conditions and an optional external vibration alarm for noisy areas
- **Access sensors and battery in seconds** with the new, improved case

Applications

HazMat/Homeland Security

- Initial PPE (personal protective equipment) assessment
- Leak detection
- Perimeter establishment and maintenance
- Spill delineation
- Decontamination
- Remediation

Confined Space Entry

- Aviation/wing tank entry with jet fuel
- Shipyard and maritime confined spaces with diesel fuel
- Pulp and paper industry for confined space entry in turpentine environments

Environmental

- Soil and water headspace analysis
- Leaking underground storage tanks (LUST)
- Landfill monitoring

Industrial Hygiene, Plant Health & Safety

- Confined Space Entry
- Indoor Air Quality (IAQ)



ATEX



RAE Systems Inc.
3775 North First Street, San Jose, CA • 95134 • USA
Tel: 877.723.2878 • Fax: 408.952.8480
Email: raesales@raesystems.com • www.raesystems.com
rev11_10.04

RAE Systems Europe
Orestads Boulevard 69, 2300 Copenhagen S • Denmark
Tel: +45.8652.5155
RAE Systems (Hong Kong) Ltd.
Room 8, 6/F, Hong Leong Plaza, 33 Lok Yip Road, Fanling, N.T. • Hong Kong
Tel: 852.2669.0828



Specifications*

Sensor Specifications

Sensor	Range	Resolution
Oxygen	0-30%	0.1%
Combustible Gas	0-100% LEL	1% LEL
VOCs	0-200 ppm	0.1 ppm
	200-2000 ppm	1 ppm
Carbon Monoxide	0-500 ppm	1 ppm
Hydrogen Sulfide	0-100 ppm	1 ppm
Sulfur Dioxide	0-20 ppm	0.1 ppm
Nitric Oxide	0-250 ppm	1 ppm
Nitrogen Dioxide	0-20 ppm	0.1 ppm
Chlorine	0-10 ppm	0.1 ppm
Hydrogen Cyanide	0-100 ppm	1 ppm
Ammonia	0-50 ppm	1 ppm
Phosphine	0-5 ppm	0.1 ppm

Detector Specifications

Size	4.65"L x 3.0"W x 1.9"H (11.8 x 7.6 x 4.8 cm)
Weight	16 oz. with battery (454g)
Sensors	Up to 5 sensors including: <ul style="list-style-type: none"> • Photoionization detector for VOCs, 10.6 eV lamp standard • Protected catalytic bead for combustible gases • Interchangeable electrochemical sensors for oxygen and toxic gases (2)
Battery	<ul style="list-style-type: none"> • Interchangeable Li-ion and alkaline battery packs • Rechargeable units include Lithium-ion battery pack with internal smart charging, 120V AC/DC wall adapter, and spare alkaline battery pack
Operating Hours	<ul style="list-style-type: none"> • 14 hours continuous with Li-ion (typical) • Unit will run and charge simultaneously
Display	2 line, 16 digit LCD with LED backlighting automatically in dim light or alarm condition
Keypads	1 operation and 2 programming keys
Direct Readout	Instantaneous values (up to 5): <ul style="list-style-type: none"> • Oxygen as percentage by volume • Combustible gas as percentage of lower explosive level (LEL) • Toxic gases and VOCs as parts per million by volume (VOC scaleable using correction factors) • High and low values for all gases • STEL and TWA values of toxic gases and VOCs • Battery and shut down voltage • Date, time, elapsed time, temperature
Alarms	90 dB buzzer and flashing red LED to indicate exceeded preset limits: <ul style="list-style-type: none"> • High: 3 beeps and flashes per second • Low: 2 beeps and flashes per second • STEL and TWA: 1 beep and flash per second • Automatic reset or latching with manual override • Additional diagnostic alarms and display messages for low battery and pump stall
EM/RFI	Highly resistant to EMI/RFI. Compliant with EMC Directive 89/336/EEC
IP Rating	IP-55: protected against dust, protected against low pressure jets of water from all directions
Datalogging & Communication	Optional 80 hours, 5 channels at one minute intervals download to PC with serial number of unit, user ID, site number, and calibration date
Calibration	Two-point field calibration for zero span gas
Sampling Pump	Internal two-speed pump. Flow rates: <ul style="list-style-type: none"> • Low: ~150 cc/min • High: ~250 cc/min
Low Flow Alarm	Auto shut-off pump at low flow condition

Detector Specifications (continued)

Hazardous Area Approval	<ul style="list-style-type: none"> • US and Canada: UL, cUL, Classified as Intrinsically Safe for use in Class I, Division I Groups A, B, C, D, T3C • Europe: ATEX II 2G EEx ia d IIC T3 & T4
Temperature	-4° to 113 °F (-20 to 45°C)
Humidity	0% to 95% relative humidity (non-condensing)
Attachment	Durable yellow boot with belt clip and wrist strap; Shoulder strap; optional tripod/wall mounting bracket
Warranty	Lifetime on non-consuming components (per RAE Systems Standard Warranty), 2 years for O ₂ , LEL, CO, and H ₂ S sensors, 1 year all other sensors, 1 year pump, 1 year battery, 1 year for 10.6eV PID lamp

*Ongoing projects to enhance our products means that these specifications are subject to change

MultiRAE Plus Accessories

Monitor only includes:

- Sensors as specified
- Calibration adapter
- Training CDROM
- Operation and maintenance manual
- Rubber boot with belt clip
- Alkaline battery adapter
- Rechargeable units additionally include:
 - Standard Lithium-ion (Li-ion), optional extended duration Lithium-ion battery, or ATEX-certified charger and barrier kit
 - 120/230 V AC/DC Wall Adapter (if specified)
- 3 external filters
- 3-inch inlet probe

Monitor with accessories kit also includes:

- Hard transport case with pre-cut foam
- Sampling wand with 15 feet (5m) of self-coiling Teflon® tubing
- Tool Kit

Black boot is available for tactical operations (part number 027-3042-000)

Optional calibration kit also includes:

- Four-gas mix in a 34L cylinder; (50% LEL, 20.9% O₂, 25 ppm Hydrogen Sulfide, 50 ppm Carbon Monoxide)
- 100 ppm Isobutylene in 34L cylinder
- Calibration regulator(s) and tubing

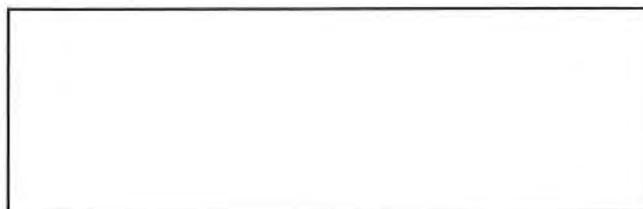
Datalogging Monitors also include:

- Software ProRAE Suite Package for Windows 98, NT, 2000 and XP
- Computer interface cable

Optional Guaranteed Cost of Ownership Program:

- 4-year repair and replacement guarantee
- Annual maintenance and servicing

DISTRIBUTED BY:



ATTACHMENT 5
HASP COMPLIANCE AGREEMENT

HASP COMPLIANCE AGREEMENT

I have attended a Site Safety Briefing for this project, and have been given an opportunity to review the project-specific HASP and to have my questions, if any, answered. I understand the HASP and agree to comply with all of its provisions. I understand that I could be prohibited from working on the Project for violating any of the health and safety requirements specified in the HASP.

URS CORPORATION

	<u>Signature</u>	<u>Name</u>	<u>Date</u>
URS Site Manager	_____	_____	_____
URS Site Safety Officer	_____	_____	_____
URS Site Personnel	_____	_____	_____
URS Site Personnel	_____	_____	_____
URS Site Personnel	_____	_____	_____
URS Site Personnel	_____	_____	_____

SUBCONTRACTORS

<u>Company</u>	<u>Signature</u>	<u>Name</u>	<u>Date</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

TABLES

TABLE 1
JOB HAZARD ANALYSES

URS Corporation National Grid Hempstead MGP Site	DATE Jan 15, 2015	Revised New	PAGE 1 of 1
WORK ACTIVITY (Description): Potential Drilling/Boring operations including utility clearance			
DEVELOPMENT TEAM	POSITION/TITLE	REVIEWED BY:	POSITION/TITLE
Mike Akerbergs	Project Manager	Phil Jones,	SH&E Area Manager
Rob Hurley	Site Geologist (SSO)		
MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)			
REFLECTIVE VEST HARD HAT SAFETY GLASSES PPE CLOTHING Level D with long pants or as required by changing conditions as determined by SSO	SAFETY SHOES Steel-toe HEARING PROTECTION AS REQUIRED	AIR PURIFYING RESPIRATOR required as specified in SSHP Addendum and determined by SSO	GLOVES nitrile/leather as required by task-specific critical actions of JSA OTHER All PPE must be worn as specified in task-specific critical actions of JSA
JOB STEPS¹	POTENTIAL HAZARDS²	CRITICAL ACTIONS TO MITIGATE HAZARDS³	
Mobilization, Equipment Lay Down, Boring/Well Markouts and Utility Clearance	Vehicular traffic	Reflective vests required	
		Use cones or other barricades as necessary	
		Be aware of traffic and Site traffic patterns. Try and place borings away from heavy traffic routes.	
	Underground Utilities	Contact Dig-Safe	
		Mark utility locations in the field prior to drilling. Pre-dig clearance prior to drilling	
		Receive Dig Permit/clearances. Coordinate with National Grid personnel and obtain approval for drilling locations	
	Adjacent Site Activities	Keep aware of any adjacent activities and traffic	
	Spray Paint	Keep can pointed away from face	
		Do not use damaged cans.	
		Wear gloves	
Wear appropriate PPE (safety glasses/goggles) to prevent flying debris from causing eye or other injuries			

TABLE 1 (CONT.)

JOB HAZARD ANALYSES

<p>URS Corporation National Grid Hempstead MGP Site</p>	<p>DATE January 14,2015</p>	<p>REVISED</p>	<p>PAGE 1 of 1</p>
<p>WORK ACTIVITY (Description): Potential Drilling and Well Installation</p>			
<p>DEVELOPMENT TEAM</p>	<p>POSITION/TITLE</p>	<p>REVIEWED BY:</p>	<p>POSITION/TITLE</p>
<p>Mike Akerbergs</p>	<p>Project Manager</p>	<p>Phil Jones</p>	<p>Area SH&E Manager</p>
<p>Rob Hurely</p>	<p>Site Geologist (SSO)</p>		
<p>MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)</p>			
<p>REFLECTIVE VEST HARD HAT SAFETY GLASSES PPE CLOTHING: Level D with long pants or as required by changing conditions as determined by SSO</p>	<p>SAFETY SHOES Steel-toe HEARING PROTECTION ear plugs not required for personnel outside 30-ft safety zone or if operator’s vehicle door and window is closed</p>	<p>AIR PURIFYING RESPIRATOR required as specified in SSHP Addendum and determined by SSO</p>	<p>GLOVES nitrile/leather as required by task-specific critical actions of JSA OTHER All PPE must be worn as specified in task-specific critical actions of JSA</p>
<p>JOB STEPS¹</p>	<p>POTENTIAL HAZARDS²</p>	<p>CRITICAL ACTIONS TO MITIGATE HAZARDS³</p>	
<p>Drilling and Monitoring Well Installation (may include air rotary, hollow stem auger, and/or direct push drilling techniques)</p>	<p>Vehicular traffic</p>	<p>Reflective vests required</p>	
		<p>Use cones, caution tape, or other barricades as necessary</p>	
		<p>Be aware of bus and other traffic and Site traffic patterns.</p>	
	<p>Particulates (airborne dust) and flying debris</p>	<p>Wear appropriate PPE, monitor particulates with appropriate and calibrated particulate monitors</p>	
	<p>Potential explosive/flammable or ignitable conditions</p>	<p>Monitor with O2/LEL meter, adhere to action limits as specified in the HASP. Use non- sparking equipment.</p>	
	<p>Chemical exposure to Site contaminants (PAHs, PCBs, VOCs,) (dermal and inhalation)</p>	<p>Use appropriate and calibrated monitoring equipment including: PID, O2 sensors, LEL</p>	
		<p>Wear nitrile gloves and other PPE as necessary.</p>	
		<p>Adhere to action limits as specified in HASP</p>	
	<p>Noise (>85 dB)</p>	<p>Hearing protection required.</p>	
	<p>Heavy Equipment</p>	<p>Avoid blind spots designated by operator.</p>	
		<p>Inspect equipment daily</p>	
		<p>Reflective vests required while working near rigs.</p>	
		<p>Wear appropriate PPE (hard hat safety glasses, steel-toed boots)</p>	
	<p>Heat Stress</p>	<p>Wear appropriate clothing</p>	
		<p>Take frequent breaks</p>	
<p>Drink plenty of liquids</p>			
<p>SSO will monitor work shifts</p>			

TABLE 1 (CONT.)

JOB HAZARD ANALYSES

<p>URS Corporation National Grid Hempstead MGP Site</p>	<p>DATE January 14, 2015</p>	<p>REVISED</p>	<p>PAGE 1 of 1</p>
<p>WORK ACTIVITY (Description): Groundwater Sampling/Purging/</p>			
<p>DEVELOPMENT TEAM</p>	<p>POSITION/TITLE</p>	<p>REVIEWED BY:</p>	<p>POSITION/TITLE</p>
<p>Mike Akerbergs</p>	<p>Project Manager</p>	<p>Phil Jones</p>	<p>Area SH&E Manager</p>
<p>Rob Hurley</p>	<p>Site Geologist (SSO)</p>		
<p>MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)</p>			
<p>REFLECTIVE VEST HARD HAT SAFETY GLASSES PPE CLOTHING Level D with long pants or as required by changing conditions as determined by SSO</p>	<p>SAFETY SHOES Steel-toe HEARING PROTECTION ear plugs not required for personnel outside 30-ft safety zone or if operator's vehicle door and window is closed</p>	<p>AIR PURIFYING RESPIRATOR required as specified in SSHP Addendum and determined by SSO</p>	<p>GLOVES nitrile/leather as required by task-specific critical actions of JSA OTHER All PPE must be worn as specified in task-specific critical actions of JSA</p>
<p>JOB STEPS¹</p>	<p>POTENTIAL HAZARDS²</p>	<p>CRITICAL ACTIONS TO MITIGATE HAZARDS³</p>	
<p>Groundwater Sampling/purging/ water level check</p>	<p>Vehicular traffic</p>	<p>Reflective vests required</p>	
		<p>Use cones, caution tape, or other barricades as necessary</p>	
		<p>Be aware of traffic and Site traffic patterns.</p>	
	<p>Splashing (airborne droplets)</p>	<p>Wear appropriate eye protection</p>	
	<p>Potential explosive/flammable or ignitable conditions</p>	<p>Monitor with O2/LEL meter, adhere to action limits as specified in the HASP. Use non- sparking equipment.</p>	
	<p>Chemical exposure to Site contaminants (PAHs, PCBs, VOCs,) (dermal and inhalation)</p>	<p>Use appropriate and calibrated monitoring equipment including: PID, O2 sensors, LEL</p>	
		<p>Wear nitrile gloves, Tyvek and other PPE as necessary.</p>	
		<p>Adhere to action limits as specified in HASP</p>	
	<p>Heavy Equipment</p>	<p>Avoid blind spots designated by operator.</p>	
		<p>Inspect equipment daily</p>	
		<p>Reflective vests required while working near rigs.</p>	
		<p>Wear appropriate PPE (hard hat safety glasses, steel-toed boots)</p>	
	<p>Heat Stress</p>	<p>Wear appropriate clothing</p>	
<p>Take frequent breaks (SSO to monitor work shifts)</p>			
<p>Drink plenty of liquids</p>			

TABLE 1 (CONT.)

JOB HAZARD ANALYSES

URS Corporation National Grid Hempstead MGP Site	DATE January 14, 2015	Revised	PAGE 1 of 1
WORK ACTIVITY (Description): NAPL recovery and disposal			
DEVELOPMENT TEAM	POSITION/TITLE	REVIEWED BY:	POSITION/TITLE
Mike Akerbergs	Project Manager	Phil Jones	Area SH&E Manager
Rob Hurley	Site Geologist (SSO)		
MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)			
REFLECTIVE VEST HARD HAT SAFETY GLASSES PPE CLOTHING Level D with long pants or as required by changing conditions as determined by SSO	SAFETY SHOES Steel-toe HEARING PROTECTION ear plugs not required for personnel outside 30-ft safety zone or if operator's vehicle door and window is closed	AIR PURIFYING RESPIRATOR required as specified in SSHP Addendum and determined by SSO	GLOVES nitrile/leather as required by task-specific critical actions of JSA OTHER All PPE must be worn as specified in task-specific critical actions of JSA
JOB STEPS¹	POTENTIAL HAZARDS²	CRITICAL ACTIONS TO MITIGATE HAZARDS³	
Product Sampling and Recovery	Vehicular traffic	Reflective vests required	
		Use cones, caution tape, or other barricades as necessary	
		Be aware of traffic and Site traffic patterns.	
	Chemical exposure to Site contaminants (PAHs, PCBs, VOCs,) (dermal and inhalation)	Use appropriate and calibrated monitoring equipment including: PID, O2 sensors, LEL	
		Wear nitrile gloves (inner) and outer chemical resistant gloves, coated Tyvek and other PPE as necessary.	
		Adhere to action limits as specified in HASP	
	Heat Stress	Wear appropriate clothing	
		Take frequent breaks	
		Drink plenty of liquids	
	Potential Electrical / Explosive Hazards	If using extension cords and powered equipment, check cords and equipment before use.	
		Use non-sparking and intrinsically safe equipment	
	Injury during lifting	Lift with knees	
Ask for assistance with heavy objects			
Keep back straight and do not twist			
Manage contaminated materials	Keep generation of excess contaminated materials to a minimum and manage according to work plan.		

TABLE 2

CHEMICAL CONTAMINANTS OF CONCERN

Volatile Organic Compounds (major constituents)

Specific Contaminant Known or Suspected (CAS #)	PEL, or TLV (ppm)	IDLH (ppm)	Acute Effects	Ionization Potential	Appropriate Monitoring Instrument
Benzene (C) (71-43-2)	1.0 – OSHA 0.5 – ACGIH	500	Human Carcinogen Irritation of eyes, nose, respiratory tract giddiness, headache, nausea, fatigue.	9.25 (NIOSH Occupational Health Guide 0049, 1988)	Drager or other benzene- specific PID
Toluene (108-88-3)	100 – NIOSH 200 - OSHA	500	Irritated eyes, nose, dizziness.	8.82	PID
Xylenes (p:106-42-3; m:108-38-3; o:95-47-6)	100	900	Irritated nose, eyes, dizziness.	8.56	
Ethylbenzene(100-41-4)	100	800	Eye, Mucous Membrane & Skin Irritant	8.76	

**TABLE 2 (cont.)
CHEMICAL CONTAMINANTS OF CONCERN**

Semi Volatile Organic Compounds (major components)

Specific Contaminant Known or Suspected (CAS#)	PEL, or TLV (ppm)	IDLH (ppm)	Acute Effects	Ionization Potential	Appropriate Monitoring Instrument
Phenol (108-95-2)	5.0 (skin adsorption hazard)	250	Irritated eyes, nose, throat Anorexia, weight loss Skin burns, convulsions	8.5	PID
4-Methylphenol (cresol) (106-44-5)	5.0 (skin adsorption hazard)	250	Irritated eyes, skin Mucous membrane Weakness, exhaustion Headache, drowsiness, CNS	8.93 - 8.97 (NIOSH Occupational Health Guide 0156, 1988)	
Naphthalene (91-20-3)	10 (skin adsorption hazard)	250	Irritated eyes, skin Mucous membrane Confusion, excitement	8.12	
2-methyl phenol (cresol) (95-48-7)	2.3 - NIOSH 5.0 - OSHA	250	Irritated eyes, skin Mucous membrane CNS, skin burns	8.93 - 8.97 (NIOSH Occupational Health Guide 0154, 1988)	
2,4-dimethylphenol (105-67-9)	NA	NA	Irritated eyes, skin Mucous membrane skin burns, headache	NA	

**TABLE 2 (cont.)
CHEMICAL CONTAMINANTS OF CONCERN**

Specific Contaminant Known or Suspected	PEL, REL or TLV	IDLH	Acute Effects	Ionization Potential	Appropriate Monitoring Instrument
Lead (7439-92-1)	0.05 mg/m ³	100 mg/m ³	Lassitude, insomnia, Facial pallor, tremor	N/A	Particulate monitor
Mercury (7439-97-6)	0.025 TLV 0.10 PEL (Ceiling)	2 mg/m ³	vision, hearing disturbance; spasticity jerking limbs; dizziness; salivation		
Coal Tar Pitch Volatiles	0.2 mg/m ³ (as benzene-soluble aerosol)		Dermatitis, bronchitis, Carcinogen		
Polychlorinated biphenyls (PCB)	0.5 mg/m ³ [54%]	5 mg/m ³	Carcinogen, skin/liver damage		Lab sample

**TABLE 2 (cont.)
CHEMICAL CONTAMINANTS OF CONCERN**

NOTES:

NS = No Standard

<=Less than

ppm = parts per million

eV = Electron Volt

AC=Avoid contact with media

TLV = Threshold Limit Value

IDLH = Immediately Dangerous to Life and Health

mg = milligrams

cu.m = cubic meters

NA = Not Applicable

H₂O = Water

PEL = Permissible Exposure Limit

C = Carcinogen

APPENDIX C2

EXAMPLE COMMUNITY AIR MONITORING PLAN

**HEMPSTEAD INTERSECTION STREET FORMER
MANUFACTURED GAS PLANT SITE
VILLAGES OF GARDEN CITY AND HEMPSTEAD, LONG
ISLAND, NEW YORK**

Prepared for:

**National Grid
One Metrotech Center
Brooklyn, New York 11201**

Prepared by:

**URS Corporation
257 West Genesee Street
Suite 400
Buffalo, New York 14203**

January 2015

1.0 COMMUNITY AIR MONITORING PLAN

Real time air monitoring for volatile organic compounds (VOCs) and particulates will be conducted at the perimeter of the Exclusion Zone during invasive activities such as excavation, drilling, well installation, soil sampling, groundwater sampling, and non-aqueous phase liquid (NAPL) recovery/disposal in accordance with the *New York State Department of Health Generic Community Air Monitoring Plan* (New York State Department of Environmental Conservation [NYSDEC] DER-10, Appendix 1A). The activity-specific Community Air Monitoring Plan (CAMP) will also provide a contingency plan that addresses potential site control measures that may be implemented in response to elevated levels of target compounds or odor. The CAMP requirements for this project are summarized below:

- VOCs and dust particulates will be monitored at the downwind perimeter of the Exclusion Zone on a continuous basis. If total organic vapor levels exceed 5 parts per million (ppm) above background, work activities will be halted and monitoring continued under the provisions of a Vapor Emission Response Plan. All readings will be recorded and be made available for the NYSDEC and the New York State Department of Health (NYSDOH) personnel to review if requested.
- If particulates levels at the downwind station exceed particulate levels at the upwind station by more than 100 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), work activities will be halted and appropriate dust suppression measures will be employed. All readings will be recorded and be made available for the NYSDEC and the NYSDOH personnel to review if requested.

1.1 Vapor Emission Response Plan

If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily suspended and monitoring continued. If the total organic vapor levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the exclusion zone, activities can resume provided the

**Hempstead Intersection Street
Former Manufactured Gas Plant Site
Villages of Hempstead and Garden City
Nassau County, New York**

total organic vapor levels 200 feet downwind of the exclusion zone or half the distance to the nearest residential or commercial structure (whichever is less) is below 5 ppm over background.

If the total organic vapor level is above 10 ppm at the perimeter of the exclusion zone, activities will be shut down. When work shutdown occurs, downwind air monitoring as directed by the Site Safety Officer (SSO) will be implemented to ensure that vapor emissions do not impact the nearest residential or commercial structure levels exceeding those specified in the Major Vapor Response Plan described below.

If total organic vapor levels exceed 25 ppm, at the perimeter of the work area, activities will be shutdown.

1.2 Major Vapor Emission Response Plan

If any total organic vapor levels greater than 5 ppm over background are identified 200 feet downwind of the Exclusion Zone or half the distance to the nearest residential or commercial structure (whichever is less) all work activities will be halted.

If, following the cessation of work activities, or as a result of an emergency, total organic vapors persist above ppm above background 200 feet downwind from the Exclusion Zone or half the distance to the nearest residential or commercial structure (whichever is less), then the air quality will be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20-foot zone).

If efforts to abate the emission source are unsuccessful and total organic vapor levels approaching 5 ppm persist for more than 30 minutes in the 20-foot zone, then the Major Vapor Emission Response Plan shall be immediately placed into effect. Also the Major Vapor Emission Response Plan shall be immediately placed into effect if the 20-foot zone total organic vapor levels are greater than 10 ppm above background.

Upon activation of the Major Vapor Emission Response Plan, the following activities will be undertaken:

- All Emergency Response Authorities will be contacted by the SSO and advised of the situation (NYSDEC, NYSDOH, and Local Fire Dpt.)

**Hempstead Intersection Street
Former Manufactured Gas Plant Site
Villages of Hempstead and Garden City
Nassau County, New York**

- Air monitoring will be conducted at 30-minute intervals within the 20-foot zone. If two successive readings below the action levels are measured, air monitoring may be halted or modified by the SSO.

1.3 Particulate Monitoring, Response Levels and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations except on days where precipitation warrant suspension of such monitoring. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level of $150 \mu\text{g}/\text{m}^3$. In addition, fugitive dust migration will be visually assessed during all work activities.

If the downwind PM-10 particulate levels are $100 \mu\text{g}/\text{m}^3$ greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work may continue with dust suppression provided that downwind PM-10 particulate levels do not exceed $150 \mu\text{g}/\text{m}^3$ above the upwind concentration and provided that no visible dust is migrating from the work area.

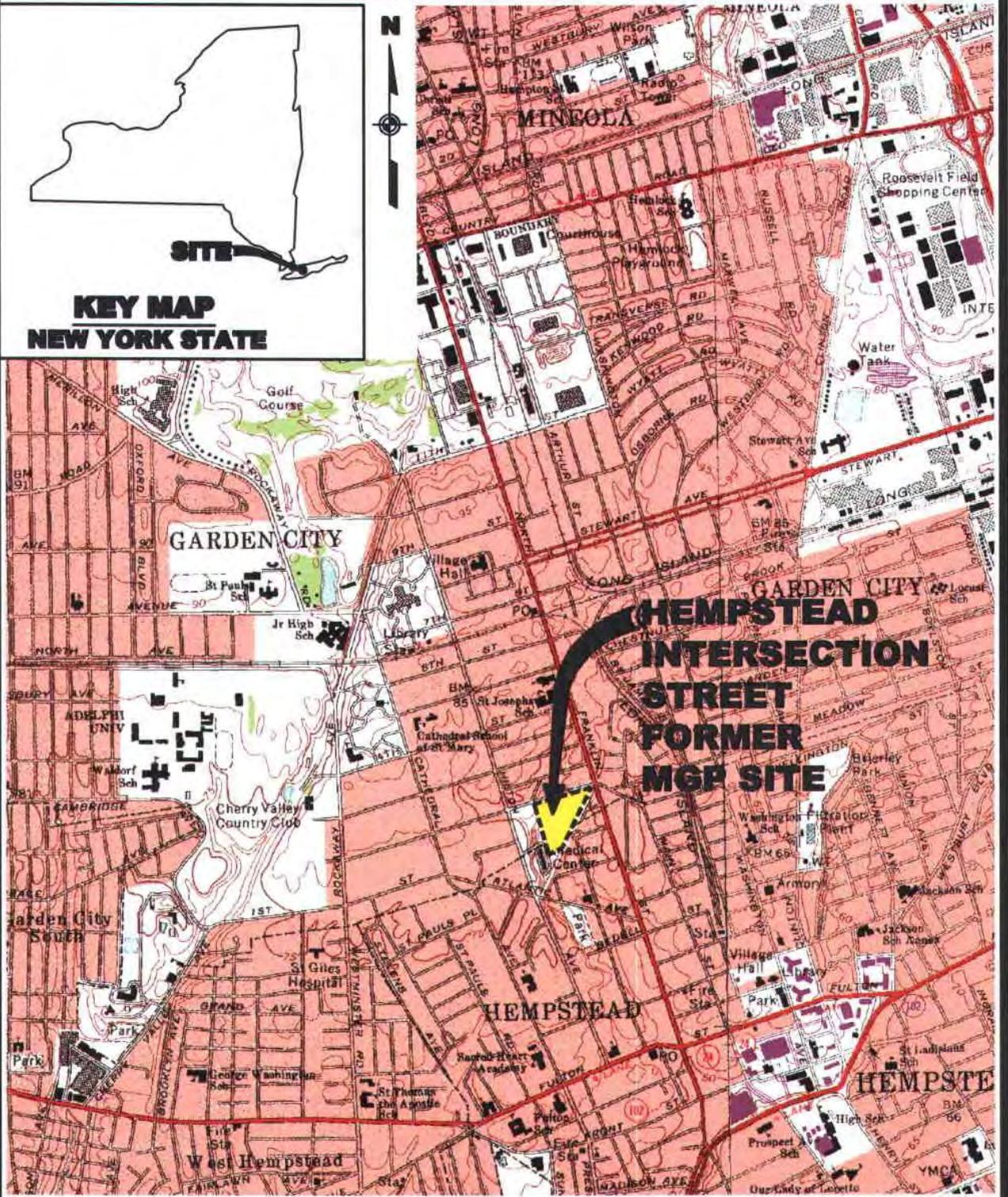
If, after the implementation of dust suppression activities, downwind PM-10 levels are greater than $150 \mu\text{g}/\text{m}^3$ above the upwind levels, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within $150 \mu\text{g}/\text{m}^3$ of the upwind level and visible dust migration is prevented.

All data will be recorded and made available to the NYSDEC and NYSDOH personnel for review.

J:\11175065.0000\CAD\TASK2\HEMPSTEAD\GROUNDWATER MONITORING\FIGURE-1.dwg 3/13/09 - 1 RAL

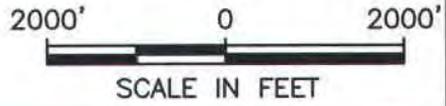


**KEY MAP
NEW YORK STATE**



**NATIONAL GRID
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
HEMPSTEAD/GARDEN CITY, NY**

SOURCE:
USGS 7.5 MINUTE SERIES
TOPOGRAPHICAL QUADRANGLES:
FREEPORT, NY (1969)
LYNBROOK, NY (1969)



SCALE IN FEET

URS Corporation

LOCATION MAP

FIGURE 1

APPENDIX D

INSTITUTIONAL AND ENGINEERING CONTROL INSPECTION FORMS

APPENDIX D

INSTITUTIONAL AND ENGINEERING CONTROL INSPECTION FORMS

**HEMPSTEAD INTERSECTION STREET FORMER
MANUFACTURED GAS PLANT SITE
VILLAGES OF GARDEN CITY AND HEMPSTEAD, LONG
ISLAND, NEW YORK**

Prepared for:

**National Grid
One Metrotech Center
Brooklyn, New York 11201**

Prepared by:

**URS Corporation
257 West Genesee Street
Suite 400
Buffalo, New York 14203**

January 2015

URS CORPORATION

**HEMPSTEAD INTERSECTION STREET FORMER MGP SITE
VILLAGES OF HEMPSTEAD AND GARDEN CITY, NASSAU COUNTY, NY
SITE-WIDE INSPECTION FORM**

GENERAL INFORMATION

Date:		Inspector:	
Weather:		Signature:	
Temperature:		Company:	
Season (circle one): Winter Spring Summer Fall			

SITE INSPECTION LOG SHEET*

Evidence of Change in Site Use	Yes No	Description of New/Additional Site Use	
Evidence of Site-Wide Disturbance(s)	Yes No	Description of Disturbance(s)	
Evidence of Site-Wide Excavation	Yes No	Description of Excavation	
Evidence of Cover System Disturbance(s)	Yes No	Description of Disturbance(s)	
Evidence of Cover System Excavation to Monolith	Yes No	Description of Excavation	
Evidence of Building Construction	Yes No	Description of Building Construction	
Comments:			

* If answering Yes, attach map showing locations and any other information as required.

APPENDIX E

FIELD SAMPLING AND ANALYSIS PLAN

**Hempstead Intersection Street
Former Manufactured Gas Plant Site
Villages of Hempstead and Garden City
Nassau County, New York**

APPENDIX E

FIELD SAMPLING AND ANALYSIS PLAN

**HEMPSTEAD INTERSECTION STREET FORMER
MANUFACTURED GAS PLANT SITE
VILLAGES OF GARDEN CITY AND HEMPSTEAD, LONG
ISLAND, NEW YORK**

Prepared for:

**National Grid
One Metrotech Center
Brooklyn, New York 11201**

Prepared by:

**URS Corporation
257 West Genesee Street
Suite 400
Buffalo, New York 14203**

January 2015

TABLE OF CONTENTS

FIELD SAMPLING AND ANALYSIS PLAN

	<u>Page No.</u>
1.0 INTRODUCTION	1-1
2.0 GROUNDWATER SAMPLING AND ANALYSIS PROCEDURES	2-1
2.1 Water Level Monitoring Procedures	2-1
2.2 Well Purging Procedures.....	2-2
2.3 Groundwater Sampling Procedures.....	2-3
2.4 Sample Labeling	2-4
2.5 Quality Assurance/ Quality Control Sampling	2-6
3.0 FIELD DOCUMENTATION	3-1
4.0 SAMPLE SHIPPING.....	4-1
5.0 FIELD SAMPLING INSTRUMENTATION.....	5-1
6.0 SAMPLING EQUIPMENT DECONTAMINATION PROCEDURES	6-2
7.0 INVESTIGATION-DERIVED WASTE CHARACTERIZATION AND DISPOSAL...	7-1
8.0 ANALYSIS.....	8-1

TABLES

Table 1	Water Level Measurements, NAPL Thickness Measurements, and Water Quality Sampling
---------	---

FIGURES

Figure	Groundwater Monitoring Well Locations
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1.0 INTRODUCTION

URS Corporation (URS) prepared this Field Sampling and Analysis Plan (FSAP) for National Grid for the Hempstead Intersection Street Former Manufactured Gas Plant (MGP) site (Site) located in the Villages of Hempstead and Garden City, in the Town of Hempstead, Nassau County, Long Island, New York. This FSAP was prepared as an appendix to the Site Management Plan (SMP) which defines the long term management of the remediated MGP Site. This FSAP provides a description of procedures to be followed during continued groundwater sampling and analysis which will be conducted post-remediation at the Site. Each sample will be collected utilizing low flow groundwater sampling collection methods. Each groundwater sample will be analyzed for BTEX by USEPA Method SW8260C and PAHs by USEPA Method SW8270D by a NYSDOH environmental laboratory approval program - certified laboratory. The groundwater samples will also be collected, handled, and analyzed according to the example Quality Assurance Project Plan (QAPP) (Appendix F of the Site Management Plan). Groundwater monitoring well locations are shown on the attached figure. A groundwater level measurement will be recorded at each sampled monitoring well. Table 1 lists, on a quarterly basis, which monitoring wells will undergo water level measurements, non-aqueous phase liquid (NAPL) thickness measurements, and water quality sampling.

2.0 GROUNDWATER SAMPLING AND ANALYSIS PROCEDURES

2.1 Water Level Monitoring Procedures

Summary: Determination of groundwater depths in monitoring wells is necessary to calculate required purge volumes prior to groundwater sampling and to make potentiometric surface maps. Water levels in monitoring wells scheduled to be sampled during the field work will be measured using an electronic interface probe/water level indicator. During each monitoring event, water levels to be used to generate potentiometric groundwater surface contour maps will be collected from all sampled monitoring wells. Water level measurement procedures are presented below.

Procedure:

- 1) Clean the water level probe and the lower portion of cable following standard decontamination procedures and test water level meter to ensure that the batteries are charged.
- 2) Lower the probe slowly into the monitoring well until the solid audible alarm indicates water.
- 3) Read the depth to the nearest hundredth of a foot from the graduated cable using the V-notch on the riser pipe as a reference.
- 3) Repeat the measurement for confirmation and record the water level.
- 4) Lower the probe slowly to the bottom of the monitoring well. Record the bottom depth of the well.
- 6) Remove the probe from the well slowly, drying the cable and probe with a clean paper towel.
- 7) Replace the well cap.
- 8) Decontaminate the water level meter if additional measurements are to be taken.

2.2 Well Purging Procedures

Well purging will be completed using the low-flow purging technique as follows:

- 1) The well cover will be carefully removed to avoid having any foreign material enter the well
- 2) Using an electronic interface probe, the water level below top of casing will be measured and will be checked for light non-aqueous phase liquid (LNAPL). The depth of the well will be measured to determine the volume of water in the well. The bottom of the well will also be checked for dense non-aqueous phase liquids (DNAPL) using the interface probe/water level indicator. The end of the probe will be decontaminated between wells. The depth to bottom of the well will be recorded from the V notch in the top of the casing.
- 3) Calibrate field instruments (e.g., pH, specific conductance, turbidity).
- 4) Start the flow rate low and maintain it between 100 and 500 ml/min, optimally 250 ml/min.
- 5) Purge the required water volume (i.e., until stabilization of pH, temperature, specific conductivity, and turbidity) using a low-flow pump (e.g., bladder pump) and dedicated high density polyethylene (HDPE) tubing. New dedicated tubing and bladder will be used for each well.
- 6) Purge the well until the water quality parameters have stabilized. Collect groundwater parameters every five minutes until the well has stabilized. The respective measurements of the parameters must fall within the stated range for three consecutive readings. If, after four hours, stability has not been achieved for the parameters listed below, the well can be sampled. The stabilization criteria are: specific conductivity - 3% full-scale range; pH - 0.10 pH unit; temperature - 0.2°C, and turbidity – 10% if greater than 1 nephelometric turbidity unit (NTU).

- 7) Purging of three well volumes is not necessary if the indicator parameters are stable. However, a minimum of thirty minutes of purging is required before sampling, even if the parameters are stable. During purging, it is permissible to by-pass the flow cell until the groundwater has cleared.
- 8) Well purging data are to be recorded on the Well Purging Log provided in Appendix D.

2.3 Groundwater Sampling Procedures

The following groundwater sampling procedures will be used for monitoring wells after purging has been conducted:

Procedures

- 1) After well purging is completed, the flow cell will be disconnected and drained and a sample will be collected into the appropriate laboratory supplied containers from the tubing from the well, without changing the purge rate.
- 2) Direct water flow toward the inside wall of the sample container to minimize volatilization. Fill volatile sample containers so no headspace (air bubbles) is present. If containers are pre-preserved, do not overfill sample containers. Note if effervescence is observed.
- 3) All sample bottles will be labeled in the field using a waterproof permanent marker.
- 4) Samples will be collected into sample bottles (containing required preservatives) and placed on ice in coolers for processing (preservation and packing) prior to shipment to the analytical laboratory. A chain-of-custody (COC) record will be initiated. The analytical laboratory will certify that the sample bottles are analyte-free prior to shipping.

- 5) Remove dedicated/disposable HDPE tubing and bladder pump. Decontaminate the bladder pump with laboratory grade soap and distilled water and rinse with distilled water before reassembling with an unused bladder.
- 5) Well sampling data are to be recorded in the field notebook and on the Well Purging Log.
- 6) Groundwater samples will be placed on ice, retrieved by the laboratory courier, and delivered to the laboratory under COC control. The volume of sample required, bottle type and required quality assurance/quality control (QA/QC) may be found in the QAPP. Samples will be received by the laboratory within a maximum of five days of collection, ideally on the day of collection.

Any observations of sheen, blebs, free-phase product/tar, staining or coating of the sampling equipment, odor, etc. that made during sampling of groundwater are to be included in the groundwater sample collection log.

2.4 Sample Labeling

Summary: In order to prevent misidentification and to aid in the handling of environmental samples collected during the field investigation, the following procedures will be used:

Procedure: Each will have the following information placed on the laboratory supplied sample label:

- Site name
- Sample identification
- Project number
- Date/time
- Sampler's initials
- Analysis required and preservatives

Sample identification numbers will be assigned based on the well identification and will be the same for all parameters collected. For example, a groundwater sample extracted from monitoring well HIMW-005S would have the same identifier assigned, HIMW-005S.

Field duplicate samples will be assigned a unique identification alphanumeric code that specifies the date of collection, the letters DUP (for field duplicate) and an ascending number that records the number of duplicate samples collected that day. For example, the first field duplicate collected on February 22, 2015 would be assigned the following sample number using the code shown below:

DUP-MMDDYY = DUP-021515

Subsequent duplicates collected on the same day would be assigned FD-0215215-2, FD-021515-3 etc. The field duplicate IDs are “blind”, so that the laboratory cannot trace them to their parent samples. Field sampling crew will record the duplicate sample information on the appropriate Sampling Field Data Sheets and also in the field notebook.

Matrix Spike/ Matrix Spike Duplicate (MS/MSD) samples will use the same well identification name as the groundwater sample, with the acronym MS/MSD after it; for example, HIMW-005S (MS/MSD). The sample will be added to the COC with a separate time of collection than the groundwater sample.

Field Blank samples will be labeled with the letters FB (field blank) and the date of collection in the same order as for the field duplicate and added to the COC (e.g., using the same date as above, FB-021515).

Trip blanks will be labeled with the letters TB (trip blank) and the date in the same order as the field duplicate and added to the COC (e.g., for example, using the same date as above, TB-021515).

2.5 Quality Assurance/ Quality Control Sampling

QA/QC procedures are described in the Quality Assurance Procedure Plan (QAPP). QA/QC groundwater samples will be collected as follows:

- Field duplicates will be collected as one per twenty groundwater samples collected. It will be collected directly following the groundwater sample collected at the selected well for the same parameters as the groundwater sample.
- Matrix Spike/ Matrix Spike Duplicate (MS/MSD) samples will be collected as one per twenty groundwater samples collected. It will be collected directly following the groundwater sample collected at the selected well for the same parameters as the groundwater sample.
- Field Blank samples will be collected one time per event. Laboratory provided deionized water will be run through the bladder pump and collected for the same parameters as the groundwater sampling program.
- Trip Blanks will be provided by the laboratory and returned as one set of VOCs per sample pickup. They will be filled with deionized water and preservative, if preservative is used for the groundwater VOC samples.

3.0 FIELD DOCUMENTATION

Field notebooks will be used during all on-site work. A dedicated bound field notebook will provide a legal record and will be maintained by the field technician overseeing the site activities. Entries will be written with waterproof ink and will be of sufficient detail that a complete daily record of significant events, observations, and measurements is developed. At the conclusion of each day of fieldwork, entries will be signed and dated. Erroneous entries will be corrected by the field technician that made the entries. Corrections will be made by drawing a line through the error, entering the correct information, and initialing/dating the correction.

The field sampling team will maintain the daily field notebook, which will minimally include the following information:

1. Project name and location of field activity
2. Date and time of entry
3. Names and titles of field team members onsite
4. Names, titles of any site visitors, as well as date and time entering and leaving site
5. Weather information e.g., temperature, precipitation, cloud coverage, wind speed and direction, etc.
6. Purpose of field activity and detailed description of fieldwork conducted
7. Sample media to be collected
8. Sample Identification
9. Date and time of sample collection
10. Field observations and measurements (e.g., PID, water levels)
11. Sampling methods and devices
12. Purge volumes (groundwater)
13. Groundwater purge parameters e.g., pH, temperature, ORP, DO, conductivity, water levels, turbidity, etc.
14. Sample volumes, preservatives used, and analytical parameters
15. Chain of custody and shipping information.

4.0 SAMPLE SHIPPING

Summary: Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody (COC) procedures. COC procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. COC procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in this study follow the chain-of-custody guidelines outlined in NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

Procedure:

- 1) A COC record is initiated at the analytical laboratory performing the sample analyses and will accompany the sample containers during preparation, delivery of the sample containers to the field, and during return shipment to the laboratory.
- 2) The COC record should be completely filled out by field personnel with all applicable/relevant information as samples are collected and packed for shipment e.g., project name and number, field technician name, sample ID, date/time of collection, matrix, requested parameters, number of sample bottles, relinquishing/receipt signatures, method of sample shipment with shipper airbill number, name of analytical laboratory, etc. Any erroneous markings will be crossed-out with a single line and initialed by the author.
- 3) The original COC accompanies the samples. It should be placed in a Ziplock bag and placed inside the cooler/box containing the samples. The sampler should retain a copy of the COC for the project records.

- 4) Groundwater samples should be placed and stored on ice in the laboratory supplied coolers.
- 5) The laboratory provides a courier to collect the samples from the site, ideally the day of collection. If that is not possible, the samples can be stored on ice in a secure storage area then shipped to the laboratory the next day, or as soon as possible. Samples should not to be held onsite for more than two days.
- 6) If the courier is not provided, samples can be shipped. Pack the coolers with the samples wrapped in bubble wrap, place ice in plastic baggies to prevent any melt from leaking out of the cooler, and make sure there is no extra room in the cooler. Place the lab address on top of sample box/cooler. Affix numbered custody seals across box lid flaps and cooler lid. Cover seals with wide, clear tape.
- 7) Ship samples via overnight carrier the same day that they are collected and must be delivered to the laboratory within 48 hours of collection.
- 8) The COC seal must be broken to open the shipping container. Breakage of the seal before receipt at the laboratory may indicate tampering. If tampering is evident, the laboratory must immediately contact the laboratory Project Manager, whom further contacts the URS Project Manager for further instructions i.e., cancel or proceed with analyses.

5.0 FIELD SAMPLING INSTRUMENTATION

URS-owned and rented field sampling equipment will require no maintenance beyond decontamination between sampling locations. Calibration procedures for electronic instruments can be found in the equipment operating manuals. Calibration and maintenance procedures for the common instrumentation that will be used during field investigations are discussed in the equipment operating manuals. A copy of the manufacturer's operating manual for each instrument will be kept with the instrument or the operator. All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions. The calibration procedures and results will be recorded in the field notebook. All changes to instrumentation will be noted in the field notebook.

The following field instruments will be used during project site work:

- 1) Particulate Monitor (TSI DustTrak aerosol monitor with PM-10 impactor and internal sampling pump) – Calibration of the monitor and a battery check will be performed daily with atmospheric zero, and again during the day if the performance of an instrument is in question. All calibration data will be recorded in the field notebook.
- 2) Multi-Parameter Meter (MultiRAE PLUS PGM-50 Monitor (10.6 eV lamp) with PID, %LEL) - Calibration of the meter and a battery check will be performed daily in accordance with manufacturer's specifications. Standards used for calibration will be National Institute of Standards and Technology (NIST) traceable. All calibration data will be recorded in the field notebook.
- 3) Turbidity Meter – The turbidity meter will be checked daily in accordance with manufacturer's specifications. All daily data will be recorded in the field notebook.
- 4) Drager Kit (benzene) or Drager CMS (or equivalent) – No calibration required.

6.0 SAMPLING EQUIPMENT DECONTAMINATION PROCEDURES

Summary: To assure that no outside contamination will be introduced into the samples/data, thereby invalidating the samples/data, the following cleaning protocols will apply for all equipment used to collect samples/data during the field investigations.

Procedures:

- 1) Thoroughly clean equipment with laboratory-grade soap and water, until all visible contamination is gone.
- 2) Rinse with water, until all visible evidence of soap is removed.
- 3) If equipment will not be used immediately, wrap in aluminum foil.

7.0 INVESTIGATION-DERIVED WASTE CHARACTERIZATION AND DISPOSAL

All decontamination water and purge water will be contained in a locked on-site above ground storage tank (AST).

URS will collect representative samples of the investigation-derived wastes (IDW) for proper waste characterization (as determined by the disposal facility) when the AST is near full capacity.

The IDW subcontractor will be responsible for removing IDW from the work site as needed. All waste will be disposed of at a permitted off-site disposal facility.

8.0 ANALYSIS

Each groundwater sample will be analyzed by a NYSDOH Environmental Laboratory Accreditation Program (ELAP) certified laboratory for BTEX by USEPA Method SW8260C and PAHs by USEPA Method SW8270D. URS will coordinate with the laboratory for the collection and delivery of the samples to their laboratory on the day of, or within a maximum of two days of, sample collection.

Table 1

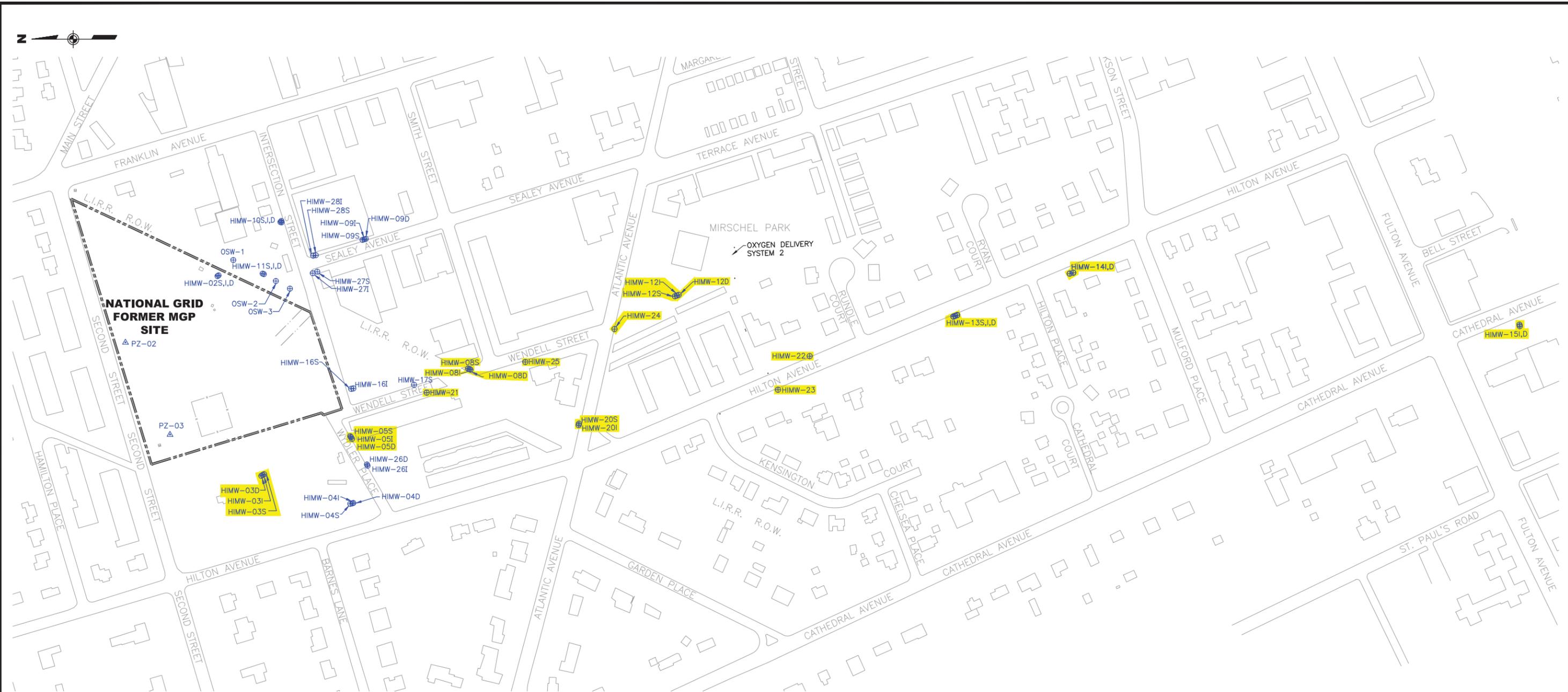
Water Level Measurements, NAPL Thickness Measurements, and Water Quality Sampling
Hempstead Intersection Street Former MGP Site

Well ID	First Quarter ^(1,2)			Second Quarter ^(1,2)			Third Quarter ^(1,2)			Fourth Quarter ^(1,2)		
	Water Level	NAPL Thickness	Water Quality ⁽³⁾	Water Level	NAPL Thickness	Water Quality ⁽³⁾	Water Level	NAPL Thickness	Water Quality ⁽³⁾	Water Level	NAPL Thickness	Water Quality ⁽³⁾
HIMW-003S	X	X	X	X	X		X	X	X	X	X	
HIMW-003I	X	X	X	X	X		X	X	X	X	X	
HIMW-003D	X	X	X	X	X		X	X	X	X	X	
HIMW-004S	X	X		X	X		X	X		X	X	X
HIMW-004I	X	X		X	X		X	X		X	X	X
HIMW-004D	X	X		X	X		X	X		X	X	
HIMW-005S	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-005I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-005D	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-008S	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-008I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-008D	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-009S	X	X		X	X		X	X		X	X	
HIMW-009I	X	X		X	X		X	X		X	X	
HIMW-009D	X	X		X	X		X	X		X	X	
HIMW-010S	X	X		X	X		X	X		X	X	X
HIMW-010I	X	X		X	X		X	X		X	X	X
HIMW-011S	X	X		X	X		X	X		X	X	X
HIMW-011I	X	X					X	X		X	X	X
HIMW-011D	X	X		X	X		X	X		X	X	X
HIMW-012S	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-012I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-012D	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-013S	X	X	X	X	X		X	X	X	X	X	
HIMW-013I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-013D	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-014I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-014D	X	X	X	X	X		X	X	X	X	X	
HIMW-015I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-015D	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-020S	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-020I	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-21	X	X		X	X		X	X		X	X	
HIMW-22	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-23	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-24	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-25	X	X	X	X	X	X	X	X	X	X	X	X
HIMW-26I	X		X	X	X	X	X	X	X	X	X	X
HIMW-26D	X		X	X	X	X	X	X	X	X	X	X
HIMW-27S	X		X	X	X	X	X	X	X	X	X	X
HIMW-27I	X		X	X	X	X	X	X	X	X	X	X
HIMW-28S	X		X	X	X	X	X	X	X	X	X	X
HIMW-28I	X		X	X	X	X	X	X	X	X	X	X
PZ-02							X	X		X	X	
PZ-03							X	X		X	X	
OSMW-02							X	X		X	X	X
OSMW-03							X	X		X	X	X

Notes:

- (1) Field marked with "X" indicates that the activity was performed.
- (2) Blank field indicates that the activity was not performed.
- (3) Water quality sampling includes BTEX, PAHs, and field parameters.

J:\Projects\11175065.00000\CAD\DRAWING\TASK2\HEMPSTEAD\SS SITE MANAGEMENT PLAN\JANUARY 2015 SUBMITTAL\GW MW LOCATIONS.dwg 1/22/15 - 1 - RAL



THIS FIGURE CONTAINS FEATURES INTENDED TO BE PRINTED IN COLOR. REPRODUCTION IN BLACK AND WHITE MAY OBSCURE THE INTENDED EFFECT OF THE COLOR FEATURES.



- LEGEND:**
- HIMW-13 ⊕ MONITORING WELL
 - PZ-03 ▲ PIEZOMETER
 - MONITORING WELL TO BE SAMPLED AS PART OF MONITORING PLAN
 - EXISTING HOUSE OR BUILDING
 - NATIONAL GRID PROPERTY BOUNDARY

URS Corporation

NATIONAL GRID
HEMPSTEAD INTERSECTION STREET
FORMER MGP SITE
HEMPSTEAD/GARDEN CITY, NY

IN-SITU SOLIDIFICATION
SITE MANAGEMENT PLAN

**GROUNDWATER MONITORING WELL
LOCATIONS**

DATE: JANUARY 2015

FIGURE

APPENDIX F

QUALITY ASSURANCE PROJECT PLAN

APPENDIX F

**HEMPSTEAD INTERSECTION STREET
FORMER MANUFACTURED GAS PLANT SITE
VILLAGES OF HEMPSTEAD AND GARDEN CITY,
NASSAU COUNTY, NEW YORK**

Prepared for:

**National Grid
175 East Old Country Road
Hicksville, NY 1801**

Prepared by:

**URS Corporation
257 West Genesee Street
Buffalo, New York 14202**

July 2008

TABLE OF CONTENTS
QUALITY ASSURANCE PROJECT PLAN

		<u>Page No.</u>
1.0	INTRODUCTION	1-1
2.0	PROJECT/SITE DESCRIPTION	2-1
3.0	PROJECT ORGANIZATION AND RESPONSIBILITIES	3-1
4.0	PROJECT QUALITY OBJECTIVES.....	4-1
4.1	Background	4-1
4.2	Environmental Problem	4-1
4.3	Sampling Techniques	4-1
4.4	Target Analytes/Contaminants and Analytical Methods	4-1
4.5	Measurement Performance Criteria	4-2
4.5.1	Precision	4-2
4.5.2	Accuracy	4-2
4.5.3	Representativeness.....	4-3
4.5.4	Comparability	4-3
4.5.5	Completeness.....	4-3
4.5.6	Sensitivity	4-4
5.0	SAMPLING LOCATIONS AND PROCEDURES	5-1
6.0	SAMPLE CUSTODY AND HOLDING TIMES	6-1
6.1	Custody Definitions	6-1
6.2	Responsibilities	6-1
6.3	Chain-of-Custody.....	6-2
6.4	Sample Containers and Holding Times.....	6-2
7.0	ANALYTICAL PROCEDURES	7-1
8.0	CALIBRATION PROCEDURES AND FREQUENCY	8-1
8.1	Analytical Support Areas	8-1
8.2	Laboratory Instruments	8-2
8.3	Field Instruments.....	8-3
9.0	INTERNAL QUALITY CONTROL CHECKS	9-1
9.1	Batch QC.....	9-1
9.2	Matrix-Specific QC.....	9-2
9.3	Additional QC.....	9-2

10.0 CALCULATION OF DATA QUALITY INDICATORS 10-1
 10.1 Precision..... 10-1
 10.2 Accuracy 10-1
 10.3 Completeness 10-2
 11.0 CORRECTIVE ACTIONS 11-1
 11.1 Incoming Samples..... 11-1
 11.2 Sample Holding Times..... 11-1
 11.3 Instrument Calibration 11-1
 11.4 Quantitation Limits 11-2
 11.5 Method QC..... 11-2
 11.6 Calculation Errors 11-2
 12.0 DATA REDUCTION, VALIDATION, AND USABILITY 12-1
 12.1 Data Reduction..... 12-1
 12.2 Data Validation 12-1
 12.3 Data Usability 12-2
 13.0 PREVENTIVE MAINTENANCE..... 13-1
 14.0 PERFORMANCE AND SYSTEMS AUDITS 14-1
 14.1 Performance Audits..... 14-1
 14.2 Systems Audits..... 14-1
 REFERENCES..... R-1

TABLES
(Following Text)

Table 1 (amended)	Summary of Samples to be Collected and Analytical Parameters
Table 2	Sample Container, Preservation, and Holding Time Requirements

ATTACHMENTS
(Following Tables)

Attachment B-1	Laboratory Certifications
Attachment B-2	Example Chain-Of-Custody Records
Attachment B-3	Data Usability Summary Report Requirements

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared by URS Corporation (URS) for National Grid's Hempstead Intersection Street Former Manufactured Gas Plant (MGP) site (Site) located in the Villages of Hempstead and Garden City, in the Town of Hempstead, Nassau County, Long Island, New York.

The QAPP was originally prepared in November 2007 to provide an overview of quality assurance/quality control (QA/QC) procedures and programs to be adhered to during field and laboratory activities in support of an Interim Remedial Measures (IRM) investigation that focuses on the removal of the shallow contaminated soils and recoverable non-aqueous phase liquid (NAPL).

This amended QAPP includes additional QA/QC procedures to be implemented during a Pre-Design Investigation (PDI) in support of a site-wide remedy, which include in-situ solidification of soil source material and treatment of an off-site dissolved phase groundwater plume. Table 1 has been amended to identify the number of samples to be collected and the associated analytical parameters. All other aspects of the PDI will be performed in accordance with the procedures and programs as presented in the original QAPP and included herein.

2.0 PROJECT/SITE DESCRIPTION

A complete description of the project and site is provided in the PDI Work Plans. A summary of the samples to be collected and the analytical parameters is provided in Table 1 (Amended for the PDI).

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The Project QA Officer will ensure that all project deliverables undergo a thorough QA review by senior staff members who are qualified and experienced in appropriate disciplines.

The Project Manager will be responsible for technical and financial management of the project, and for overall coordination and review of component work activities. The Project Manager will serve as the initial and primary contact with the client throughout the project and will be responsible for successful implementation of the field QA/QC activities. The Project Manager may delegate a portion of the tasks required for successful implementation of the work plans to a qualified individual who will be on site during the investigation (e.g., the Onsite Geologist). This person will work under the direction of the Project Manager and will be responsible for implementing applicable QC procedures in the field and verifying that all other field personnel adhere to these procedures and perform all activities as described in the project work plans.

The Project Chemist is responsible for verifying that the analytical laboratory(ies) adheres to the QA/QC requirements specified in this QAPP. The Project Chemist will be the point of contact for the Laboratory Project Manager and will be in continual contact with the Laboratory Project Manager to verify that all efforts are being made to perform sample analyses in a manner such that the resulting data will be of sufficient quality for its intended purpose.

The laboratory providing standard analytical testing services in support of this investigation is H2M. They hold applicable New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certifications for the analyses to be performed. Copies of the applicable ELAP certifications for H2M is provided in Attachment B-1. H2M maintains its own QA/QC program and employs the required staff to implement this program. Vanderbilt University will perform non-standard geochemical testing to support the groundwater modeling and leaching assessment. META Environmental, Inc. will perform environmental forensic analysis on NAPL saturated soil using fingerprinting methods that utilize gas chromatography/flame ionization detection (GC/FID) and gas chromatography/mass spectrometry (GC/MS) techniques. Results of the

forensic analysis will be used to determine if detected hydrocarbons are representative of pyrogenic and/or petrogenic substances. The QA Officer is responsible for verifying that all sample analyses are performed in accordance the analytical methods, laboratory QA/QC procedures, this QAPP, and other applicable regulations.

4.0 PROJECT QUALITY OBJECTIVES

4.1 Background

Project quality objectives (PQOs), such as those described in the *Uniform Federal Policy for Quality Assurance Project Plans* (USEPA, 2005), define the type, quantity, and quality of data that are needed to answer specific environmental questions and support proper environmental decisions. More specifically, the PQOs:

- Define the environmental problem;
- Identify target analytes/contaminants of concern and concentration levels;
- Establish the analytical techniques to be used (field-screening, on-site, and/or off-site);
- Establish the appropriate sampling techniques to be used;
- Establish project sampling/analytical measurement performance criteria (where applicable) for precision, accuracy/bias, representativeness, comparability, completeness, and sensitivity; and
- Determine the number of samples needed for each analytical group/matrix/concentration level.

4.2 Environmental Problem

The objective of the PDI is to better delineate areas warranting remediation, determining the depths and locations of buried MGP structures, and obtaining soil and groundwater samples for laboratory analytical, geotechnical, and bench-scale treatability studies. A summary of the samples to be collected is presented in Table 1 (Amended).

4.3 Sampling Techniques

Sampling techniques to be used during this investigation are described in the Sampling and Analysis Plan. Sample container, preservation, and holding time requirements for the collected samples are identified in Table 2.

4.4 Target Analytes/Contaminants and Analytical Methods

Target analytes and analytical methods are listed in Table 1.

4.5 Measurement Performance Criteria

The data quality indicators of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS) will be measured from data collected from offsite chemical analyses performed by the laboratory.

4.5.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in the field and/or laboratory handling procedures. Precision is evaluated using analyses of matrix spike/matrix spike duplicate/matrix duplicate (MS/MSD/MD) and field duplicate (FD) samples. These provide a measure not only of sampling and analytical precision, but also of analytical precision based on the reproducibility of the analytical results. Relative percent difference (RPD) is used to evaluate precision. RPD criteria for all analyses being performed as part of this work assignment will be performed in accordance with the methods listed in Table 1, where applicable.

4.5.2 Accuracy

Accuracy measures the analytical bias of a measurement system. Sources of measurement error may include the sampling process, field contamination, sample preservation and handling, sample matrix, and sample preparation and analysis techniques. Sampling accuracy may be assessed by evaluating the results of equipment rinsate blanks and trip blanks. These data help to assess the potential contamination contribution from various outside sources.

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. Accuracy can be estimated based on the recovery of spiked analytes in the MS/MSD and laboratory control samples (LCS) or matrix spike blanks (MSB). MS/MSD analyses, which will give an indication of matrix effects that may be affecting target compound identification and quantitation, are also a good gauge of method efficiency. Acceptable ranges of recovery for

all analyses being performed will be performed in accordance with the methods listed in Table 1, where applicable.

4.5.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represents the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter that is most concerned with the proper design of the sampling program or subsampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigation objectives. The sampling procedures, as described in PDI Work Plan, have been selected with the goal of obtaining representative samples for the media of concern.

4.5.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. An objective for this program is to produce data with the greatest possible degree of comparability. This goal is achieved using standard techniques to collect and analyze representative samples, and reporting analytical results in appropriate units. Complete field documentation using standardized data collection forms will support the assessment of comparability. Comparability is limited by the other parameters (e.g., precision, accuracy, representativeness, completeness, and sensitivity) because only when precision and accuracy are known can data sets be compared with confidence. For data sets to be comparable, it is imperative that the analytical methods and procedures be explicitly followed.

4.5.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that were expected to be obtained under normal conditions. To meet project needs, it is important that appropriate QC procedures be maintained to verify that valid data are obtained. For the data generated, a goal of 90% is required for completeness (or usability) of the analytical data. If this goal is not met, then the client and URS project personnel will determine whether the deviations may cause the

data to be rejected and what, if any, further actions need to be taken. Completeness of the analytical data obtained for the samples collected during this investigation will be evaluated during the validation process, and will be discussed in the Data Usability Summary Report (DUSR), which will be prepared in accordance with *Draft DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 2B*, (NYSDEC December 2002).

4.5.6 Sensitivity

Sensitivity, as it pertains to analytical methods/instrumentation, is defined as the lowest concentration that can be distinguished from background noise. Sensitivity is measured by method detection limit (MDL) determinations, which are performed by laboratories for each analyte and matrix following procedures specified in 40 CFR Part 136, Appendix B. The MDL is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The laboratory will be required to update MDLs for the parameters to be analyzed as part of this work assignment, as required by the analytical method.

5.0 SAMPLING LOCATIONS AND PROCEDURES

Proposed sampling locations and sampling procedures are discussed in the Sampling and Analysis Plan.

6.0 SAMPLE CUSTODY AND HOLDING TIMES

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody (COC) procedures. Chain-of-custody procedures are essential for presenting sample analytical results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in this work assignment will follow the COC guidelines of National Enforcement Investigations Center (NEIC) Policies and Procedures, prepared by the NEIC of the USEPA Office of Enforcement.

6.1 Custody Definitions

- Chain-of-Custody Officer - The employee responsible for oversight of all COC activities is the Onsite Geologist (or his/her designee).
- Under Custody - A sample is "Under Custody" if:
 - It is in one's possession, or
 - It is in one's view, after being in one's possession, or
 - It was in one's possession and one placed it under lock, or
 - It is in a designated secure area.

6.2 Responsibilities

The Onsite Geologist will be responsible for monitoring all COC activities and for collecting legally admissible COC documentation for the permanent project file, and will perform to following tasks:

- Review sample labels or tags, closure tapes, and COC records.
- Ensure that field sampling personnel are properly trained in the methodologies for carrying out COC activities and the proper use of all COC and record documents.
- Monitor the implementation of COC procedures.
- Submit copies of the completed COC records to the Project Chemist.

6.3 Chain-of-Custody

Chain-of-custody is initiated in the laboratory when the empty sample containers are shipped for use in the field. When the empty containers are received from the laboratory, they will be checked for any breach of custody including, but not limited to, incomplete COC records, broken COC seals, or any evidence of tampering. Filled sample containers will be returned to the laboratory using appropriate COC procedures. Upon receipt of the samples, the laboratory sample custodian will check for any breach of custody. The Laboratory Project Manager will notify the URS Project Chemist immediately if there are any problems with the COC documentation. Examples of COC records (i.e., for multi-media and air samples) are provided in Attachment B-2.

6.4 Sample Containers and Holding Times

Sample container and preservation requirements and analytical holding times for the analytical methods being used for this work assignment are listed in Table 2. All holding times begin with the validated time of sample receipt (VTSR) at the laboratory.

7.0 ANALYTICAL PROCEDURES

The specific analytical methods to be used for the analysis of samples collected during this work assignment are identified in Table 1. Quality control criteria to be followed by each laboratory when performing the analyses will be performed in accordance with the methods listed in Table 1.

8.0 CALIBRATION PROCEDURES AND FREQUENCY

In order to obtain a high level of precision and accuracy during sample processing and analysis procedures, laboratory and field instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

8.1 Analytical Support Areas

Prior to generating quality data, several analytical support areas must be considered:

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions will be obtained from sources traceable to National Institute of Standards and Technology (NIST), or other reliable commercial sources to ensure the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished as per the methods referenced in Table 1. All standards and standard solutions are to be formally documented (i.e., in a bound logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparer's name, method of preparation, expiration date, and any other pertinent information. All standard solutions will be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory will continually monitor the quality of the standards and reagents through well-documented procedures.

Balances - The analytical balances will be calibrated and maintained in accordance with manufacture specifications. Calibration is conducted with two American Society of Testing Materials (ASTM) Class 1 weights that bracket the expected balance use range. The laboratory will check the accuracy of the balances daily and properly document results in permanently bound logbooks.

Refrigerators/Freezers - The temperature of the refrigerators and freezers within the laboratory will be monitored and recorded daily. This will verify that the quality of the standards and reagents is not compromised and the integrity of the analytical samples is

upheld. Appropriate acceptance ranges ($4^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for refrigerators) will be clearly posted on each unit in service.

Water Supply System – Laboratories performing water/solid/waste sample analyses must maintain a sufficient supply of analyte-free water for all project needs. The grade of the water must be of the highest quality in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses, and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis by the laboratory.

Sample Containers - All sample containers supplied by the laboratories will meet the requirements of the analytical methods identified in Table 1 and/or the requirements specified in the NYSDEC Analytical Services Protocol (most current), whichever is more stringent. Pre-cleaned sample containers may be purchased by the laboratory and provided for sample collection as long as the containers meet the requirements of each analytical method identified in Table 1 and/or the NYSDEC Analytical Services Protocol (most current), whichever is more stringent. Documentation of sample cleaning procedures and/or certifications provided by vendors will be maintained by the laboratories.

8.2 Laboratory Instruments

Calibration of laboratory instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet the project-required quantitation limits for each analytical method. Each instrument for organic analysis will be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s) and/or the specific requirements of the work assignment. Calibration of laboratory instruments will be performed according to the analytical methods specified in Table 1.

Calibration of an instrument must be performed prior to the analysis of any samples (initial calibration) and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still properly calibrated. If the contract laboratory cannot meet the method-required calibration requirements, corrective action shall be taken as discussed in Section 11.0. All corrective action procedures taken by the contract laboratory

are to be documented, summarized within the report case narrative, and submitted with the analytical results.

8.3 Field Instruments

Various types of portable instruments may be used in the field during this work assignment, which may include one or more of the following: multi-purpose meters capable of measuring pH, conductivity, dissolved oxygen, oxidation/reduction (redox) potential, and/or temperature; photoionization detectors (PID) and/or flame ionization detectors (FID) used to monitor organic vapors; dust monitors to measure concentrations of particulates; multi-gas meters and analyte-specific devices (e.g., Drager tubes/chips) for health and safety purposes; and helium detectors used for leak-checking during soil vapor sample collection. Other instruments may also be used as needed based on the requirements of the work assignment. The calibration and maintenance of field instrumentation will be performed according the manufacturer's requirements or as otherwise documented by the Onsite Geologist.

9.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect that sample matrix may have on data being generated. Two types of internal checks are performed - batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the laboratory will be determined by the analytical methods listed in Table 1 and the specific requirements of this work assignment. Acceptable criteria and/or target ranges for these QC samples will be performed in accordance with the methods listed in Table 1.

QC results that vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers to the analytical data, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples, including any project-specific QC samples, will be analyzed as discussed below.

9.1 Batch QC

Method Blanks - A method blank is defined as laboratory demonstrated analyte-free water, solid, or humidified ultra pure zero air that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch or as required by the analytical methods listed in Table 1. Concentrations of all analytes in the method blanks should be below the method quantitation limits. The Laboratory Project Manager will contact the URS Project Chemist to determine the appropriate course of action if analyte concentrations in any blank are greater than the quantitation limit.

Laboratory Control Samples (LCS) – An LCS, or matrix spike blank (MSB), is an aliquot of laboratory demonstrated analyte-free water, solid, or humidified ultra pure zero air spiked (fortified) with all, or a representative group, of the analytes being analyzed. The LCS (or MSB) recoveries and RPD are a measure of precision and accuracy that are used to verify that the analysis being performed is in control. LCS (or MSB) analyses shall be performed for each matrix as required by the methods listed in Table 1. Acceptance criteria

for LCS (or MSB) analyses will be performed in accordance with the methods listed in Table 1.

9.2 Matrix-Specific QC

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples – MS/MSD samples consist of an aliquot of a sample that is spiked (fortified) with known concentrations of specific compounds as stipulated by the methodology. The MS/MSD samples are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery (%R) for each analyte and the RPD between the concentrations of each analyte in the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs samples will be collected and analyzed at the frequency specified in Table 1. Acceptance criteria for MS/MSD analyses will be performed in accordance with the methods listed in Table 1. In those instances where no MS/MSD sample will be collected, the laboratory will provide results for batch MS/MSD analyses.

Matrix Duplicates (MD) - The matrix duplicate (MD) is a second aliquot of a sample that is prepared and analyzed in a manner identical to that used for the parent sample. Collection of matrix duplicate samples provides for the evaluation of precision both in the field and at the laboratory by comparing the analytical results of two samples taken from the same location. A matrix duplicate will be performed instead of the matrix spike duplicate for metals, cyanide, and sulfide analyses only. Every effort will be made to obtain replicate samples; however, due to interferences, lack of homogeneity, and the nature of soil samples, the analytical results are not always reproducible.

9.3 Additional QC

Additional QC samples that may be collected as part of this work assignment are described in this section. The specific number and type of QC samples to be collected are listed in Table 1.

Equipment/Rinsate Blanks – An equipment or rinsate blank is used to indicate potential contamination from sample instruments used to collect and transfer samples, and also serves as a measure of potential contamination from ambient sources during sample

collection. When collecting solid or water samples, the equipment blank is a sample of laboratory demonstrated analyte-free water passed over and/or through cleaned sampling equipment. The water must originate from one common source within the laboratory and must be the same water used by the laboratory when performing the analyses (i.e., for method blanks). Equipment blanks will be collected, transported, and analyzed in the same manner as the samples acquired that day. Equipment blanks typically are not needed when dedicated and/or disposable sampling equipment is used.

Trip Blanks - Trip blanks are only required when collecting aqueous samples for volatile organic or dissolved gas analyses. They are not required for non-aqueous matrices or for analysis of any other parameters. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte-free water. Trip blanks accompany the empty sample containers that are shipped from the laboratory into the field, and then back to the laboratory along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the laboratory with the same set of containers they accompanied to the field.

10.0 CALCULATION OF DATA QUALITY INDICATORS**10.1 Precision**

Precision is evaluated using results from field or matrix duplicate, MS/MSD, and/or LCS/LCSD (MSB/MSBD) analyses. The RPD between the concentrations detected in the above-listed sample pairs is calculated using the following formula:

$$RPD = \left| \frac{(X_1 - X_2)}{[(X_1 + X_2) / 2]} \right| \times 100\%$$

where:

X_1 = Measured value of sample, MS, or LCS (MSB)

X_2 = Measured value of field (or matrix) duplicate, MSD, or LCSD (MSBD)

RPD criteria for this work assignment shall be consistent with the analytical methods listed in Table 1.

10.2 Accuracy

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. Analytical accuracy is expressed as the percent recovery (%R) of a compound or analyte that has been added to the environmental sample or laboratory demonstrated analyte-free matrix at known concentrations before analysis. Accuracy will be determined from MS, MSD, LCS (MSB) samples as well as from surrogate compounds that are added to samples prior to extraction and analysis (typically used for organic fractions only). Accuracy is calculated using the following formula:

$$\% R = \frac{(X_s - X_u)}{K} \times 100\%$$

where:

X_s - Measured value of the spike sample

X_u - Measured value of the unspiked sample

K - Known amount of spike in the sample

Accuracy criteria for this work assignment shall be consistent with the analytical methods listed in Table 1.

10.3 Completeness

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$\% \text{ Completeness} = \frac{(N - X_n)}{N} \times 100\%$$

where:

N - Number of valid measurements expected to be obtained

X_n - Number of invalid measurements

11.0 CORRECTIVE ACTIONS

The Onsite Geologist will discuss with and receive approval from the URS Project Manager or National Grid prior to taking any corrective actions in the field that may need to be implemented in order to meet project objectives. The Onsite Geologist will document any corrective actions taken in the Field Log Book.

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

11.1 Incoming Samples

The laboratory shall document problems noted during sample receipt. The Laboratory Project Manager will contact the URS Project Chemist as soon as possible if any problems are encountered. All corrective actions shall be documented thoroughly.

11.2 Sample Holding Times

If any sample extractions and/or analyses exceed method holding time requirements, the Laboratory Project Manager will contact the Engineer's Project Chemist immediately for problem resolution. All corrective actions shall be documented thoroughly.

11.3 Instrument Calibration

Sample analysis shall not be allowed until all laboratory instrumentation is properly calibrated in accordance with method requirements. If any initial/continuing calibration standards fail to meet the required criteria, recalibration must be performed and, if necessary, all samples going back to the previous acceptable continuing calibration standard must be reanalyzed.

11.4 Quantitation Limits

The laboratory must make every attempt to meet all quantitation limits as specified for each method listed in Table 1. Sample-specific quantitation limits may be affected by any dilution that is needed because of elevated analyte concentrations, moisture content (soil/solids), and/or matrix interferences. If difficulties arise in achieving the required quantitation limits due to a particular sample matrix, the Laboratory Project Manager will contact the URS Project Chemist for problem resolution. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory shall report results from both the initial analyses and secondary dilution analyses. Dilution should only be used to bring target analytes within the linear range of calibration. If samples are analyzed at a dilution with no target analytes detected, the Laboratory Project Manager shall contact the Engineer's Project Chemist so that appropriate corrective actions can be initiated.

11.5 Method QC

All QC samples, including blanks, matrix spikes, matrix spike duplicates, matrix duplicates, surrogate recoveries, laboratory control samples, and other method-specified QC samples, shall meet the method-specific acceptance criteria. Failure to these criteria will result in the possible qualification of all affected data. When the criteria are not met, the affected sample(s) should be reanalyzed within the required holding times to verify the presence or absence of matrix effects. It should be noted that reanalysis is not always required. The Laboratory Project Manager shall contact the Engineer's Project Chemist to discuss possible corrective actions should unusually difficult sample matrices be encountered. The laboratory shall follow the requirements of the analytical methods and any instructions provided by the Project Chemist when determining if samples require reanalysis. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria as defined by the data validation guidelines identified in Section 12.2, or as otherwise identified for the work assignment.

11.6 Calculation Errors

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review, calculation and/or reporting errors exist, the laboratory will

be requested to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

12.0 DATA REDUCTION, VALIDATION, AND USABILITY

NYSDEC ASP Category B deliverable requirements (or equivalent) will be required for documentation and reporting of all data. Where applicable, the standard NYSDEC Data Package Summary Forms should be completed by the analytical laboratories and included in the deliverable data packages.

12.1 Data Reduction

Laboratory analytical data are first generated in raw form at the instrument. These data may be either graphic or printed tabular form. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Results for aqueous samples will be reported in concentration units of micrograms per liter ($\mu\text{g/L}$) or milligrams per liter (mg/L). Results for solid and NAPL samples will be reported in concentration units of micrograms per kilogram ($\mu\text{g/kg}$) or milligrams per kilogram (mg/kg) and adjusted for moisture content.

Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to NIST or other reliable commercial sources. Data reduction will be performed by individuals experienced with a particular analysis and knowledgeable of requirements.

12.2 Data Validation

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use.

Data validation will be performed by a qualified URS chemist. All analytical samples collected will receive a data review including a review of holding times, completeness of all required deliverables, review of QC results (blanks, instrument tunings, calibration standards, calibration verifications, surrogates recoveries, spike recoveries, replicate analyses, and laboratory controls) to determine if the data are within the protocol-required limits and specifications, a determination that all samples were analyzed using established and agreed upon analytical protocols, an evaluation of the raw data to confirm the results provided in the data summary sheets, and a review of laboratory data qualifiers.

The methods referenced in Table 1 as well as the general guidelines presented in the following USEPA Region II documents will be used to aide the chemist during the data review.

- Validating Volatile Organic Compounds by SW-846 Method 8260B, HW-24, Revision 1, June 1999;
- Validating Semivolatile Organic Compounds by SW-846 Method 8270C, HW-22, Revision 2, June 2001;
- Validating PCB Compounds by SW-846 Method 8082, HW-23B, Revision 1.0, May 2002;
- Evaluation of Metals Data for the CLP Program, SOP HW-2, Revision 13, September 2005; and
- TCLP Data Validation, SOP HW-7, Revision 3, 1994.

12.3 Data Usability

A DUSR will be submitted to National Grid and will describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations, and quality control problems will be identified and their effect on the data will be discussed. The DUSR will also include recommendations on resampling/reanalysis. A copy of the DUSR requirements is provided in Attachment B-3.

13.0 PREVENTIVE MAINTENANCE

The laboratory is responsible for maintaining its analytical equipment. Preventive maintenance is provided on a regular basis to minimize down-time and the potential interruption of analytical work. Instruments are maintained in accordance with the manufacturer's recommendations. If instruments require maintenance, only trained laboratory personnel or manufacturer-authorized service specialists are permitted to do the work. Maintenance activities will be documented and kept in permanent logs. These logs are available for inspection by auditing personnel.

Maintenance of field instrumentation will be performed as needed by the vendor and/or URS personnel according to the manufacturer's requirements.

14.0 PERFORMANCE AND SYSTEMS AUDITS

Audits are evaluations of laboratory QA/QC procedures, and are performed before or shortly after systems are operational, and on an ongoing basis thereafter. Problems detected during these audits shall be reviewed by the Laboratory QA Manager and other laboratory management personnel, and corrective action shall be instituted as necessary.

14.1 Performance Audits

Performance audits are conducted by introducing control samples into the data measurement, reduction, and reporting processes. These control samples may include performance evaluation samples, or field samples spiked with known amounts of analytes. In addition to conducting internal reviews and performance audits as part of its established quality assurance program, the laboratory is required to take part in regularly-scheduled performance audits/evaluations from state and federal agencies. They are typically conducted as part of the certification process and to evaluate laboratory performance and analytical measurement systems. Acceptable performance on evaluation samples and audits is required for certification and accreditation. The laboratory shall use the information provided from these audits to monitor and assess the quality of its performance, and to take appropriate corrective actions as needed.

14.2 Systems Audits

Systems audits are thorough, on-site qualitative audits of facilities, equipment, instrumentation, personnel, training procedures, record keeping, data review/management, and reporting aspects of a system. They provide a qualitative measure of the data produced by one section of, or the entire, measurement process. The audits are performed against a set of requirements, which may include laboratory standard operating procedures, a quality assurance project plan or work plan, a standard method, and/or a project statement of work. The primary objective of the systems audits is to verify that all procedures are being performed according to the requirements specified above. Systems audits are performed internally by the Laboratory QA Manager, and also by external parties such as state and federal regulatory agencies and private-sector clients. Typically, state and federal agencies perform systems audits in conjunction with performance audits/evaluations during the

laboratory certification process. As part of its QA program, the Laboratory QA Manager shall also conduct periodic checks and audits of the analytical, data reduction, and reporting systems. The purpose of these is to verify that the systems are operating properly, and that personnel are adhering to established procedures and documenting the required information. These checks and audits assist in determining or detecting where problems are occurring.

REFERENCES

- NYSDEC. 2002. Draft DER-10 Technical Guidance for Site Investigation and Remediation. December.
- NYSDEC. 2000. Analytical Services Protocol. June (or most current).
- USEPA. 2005. Evaluation of Metals Data for the CLP Program, SOP HW-2, Revision 13. September.
- USEPA. 2005. Uniform Federal Policy for Quality Assurance Project Plans; Evaluating, Assessing, and Documenting Environmental Data Collection and Use Programs, Final, Version 1. March. EPA-505-B-04-900A.
- USEPA. 2002. Validating PCB Compounds by SW-846 Method 8082, HW-23B, Revision 1.0. May.
- USEPA. 2001. Validating Semivolatile Organic Compounds by SW-846 Method 8270, HW-22, Revision 2. June.
- USEPA. 1999. Validating Volatile Organic Compounds by SW-846 Method 8260B, HW-24, Revision 1. Region II. June.
- USEPA. 1993. TCLP Data Validation, SOP HW-7, Revision 3. March.
- USEPA. National Enforcement Investigations Center (NEIC) Office of Enforcement. NEIC Policies and Procedures. Washington.

TABLES

TABLE 1
SUMMARY OF SAMPLES TO BE COLLECTED AND ANALYTICAL PARAMETERS
HEMPSTEAD INTERSECTION STREET FORMER MANUFACTURED GAS PLANT SITE
NATIONAL GRID

Parameter	Analytical Method ²	Estimated Number of Samples	Field QC Samples				Total No. of Samples	Samples Shipped To	Lab Analysis By
			Field Duplicates/Replicates	MS/MSD/MD	Rinsate Blanks	Trip Blanks			
I. ISS Delineation Soil Samples									
BTEX	EPA 8260B	varies	0	≥ 10%	0	0	varies	H2M	H2M
PAHs	EPA 8270C	varies	0	≥ 10%	0	0	varies	H2M	H2M
II. Geotechnical Soil Samples									
USCS Classification	ASTM D2487	2	0	0	0	0	2	URS Geolab	URS Geolab
Particle Size Analysis	ASTM D422	2	0	0	0	0	2	URS Geolab	URS Geolab
III. ISCO Screening Evaluation									
Groundwater									
Total Alkalinity	EPA 310.1	1	0	0	0	0	1	H2M	H2M
Total Iron	EPA 6010B	1	0	1	0	0	2	H2M	H2M
Bench-scale treatment test ³	ISOTech, LLC (or equal)	2	0	0	0	0	2	ISOTech	ISOTech
Soil									
Bench-scale treatment test ⁴	ISOTech, LLC (or equal)	2	0	0	0	0	2	ISOTech	ISOTech
IV. Aquifer Geochemistry									
Groundwater									
pH	EPA 9045	4	1	0	0	0	5	H2M	H2M
Specific Conductance	EPA 9050A	4	1	0	0	0	5	H2M	H2M
Total Alkalinity	EPA 310.1	4	0	0	0	0	4	H2M	H2M
BTEX	EPA 8260B	4	0	1	0	1	6	H2M	H2M
PAHs	EPA 8270C	4	0	1	0	0	5	H2M	H2M
Anions	EPA 300.0	4	0	0	0	0	4	Vanderbilt U	Vanderbilt U
TAL Metals (Cations)	EPA 6010B/7471A	4	0	1	0	0	5	Vanderbilt U	Vanderbilt U
DOC/DIC	Shimadzu TOC 5000	4	0	0	0	0	4	Vanderbilt U	Vanderbilt U
Soil									
Particle Size Analysis	ASTM D422	1	0	0	0	0	1	URS Geolab	URS Geolab
Moisture Content	ASTM D2216	1	0	0	0	0	1	URS Geolab	URS Geolab
BTEX	EPA 8260B	1	0	1	0	0	2	H2M	H2M
PAHs	EPA 8270C	1	0	1	0	0	2	H2M	H2M
Total Organic & Inorganic Carbon	Shimadzu TOC 5000	1	0	0	0	0	1	Vanderbilt U	Vanderbilt U
pH	EPA 9045	1	0	0	0	0	1	H2M	H2M
pH Equilibrium Test Leachates									
<i>(Soil Samples Shipped to Vanderbilt University)</i>									
pH	EPA 9045	12	0	0	0	0	12	Vanderbilt U	H2M
Specific Conductance	EPA 9050A	12	0	0	0	0	12	Vanderbilt U	H2M
Total Alkalinity	EPA 310.1	12	0	0	0	0	12	Vanderbilt U	H2M
BTEX	EPA 8260B	12	0	0	0	0	12	Vanderbilt U	H2M
PAHs	EPA 8270C	12	0	0	0	0	12	Vanderbilt U	H2M
Anions	EPA 300.0	12	0	0	0	0	12	Vanderbilt U	Vanderbilt U
TAL Metals (Cations)	EPA 6010B/7471A	12	0	0	0	0	12	Vanderbilt U	Vanderbilt U
DOC/DIC	Shimadzu TOC 5000	12	0	0	0	0	12	Vanderbilt U	Vanderbilt U

TABLE 1
SUMMARY OF SAMPLES TO BE COLLECTED AND ANALYTICAL PARAMETERS
HEMPSTEAD INTERSECTION STREET FORMER MANUFACTURED GAS PLANT SITE
NATIONAL GRID

Parameter	Analytical Method ²	Estimated Number of Samples	Field QC Samples				Total No. of Samples	Samples Shipped To	Lab Analysis By
			Field Duplicates/Replicates	MS/MSD/MD	Rinsate Blanks	Trip Blanks			
V. Solidification Testing Samples (Soil from Split Spoons)									
Moisture Content	ASTM D2216	8	0	0	0	0	8	URS Geolab	URS Geolab
Composite Auger Flight Soil Samples									
Moisture Content	ASTM D2216	4	0	0	0	0	4	Remedius	Remedius
Unit Weight	ASTM D2937	4	0	0	0	0	4	Remedius	Remedius
Atterberg Limits	ASTM D4318	4	0	0	0	0	4	Remedius	Remedius
Particle Size	ASTM D422	4	0	0	0	0	4	Remedius	Remedius
USCS Classification	ASTM D2487	4	0	0	0	0	4	Remedius	Remedius
BTEX	EPA 8260B	4	0	0	0	0	4	Remedius	H2M
PAHs	EPA 8270C	4	0	0	0	0	4	Remedius	H2M
Total Hydrocarbons/Oil & Grease	EPA 9071B	4	0	0	0	0	4	Remedius	H2M
pH	EPA 9045	4	0	0	0	0	4	Remedius	H2M
Solidified Soil Specimens (Solidified Soil Samples Created by Remedius)									
Moisture Content	ASTM D2216	varies	0	0	0	0	varies		Remedius
Unconfined Compressive Strength	ASTM D2216	varies	0	0	0	0	varies		Remedius
Hydraulic Conductivity	ASTM D5084	varies	0	0	0	0	varies		Remedius
BTEX	EPA 8260B	6	1	0	0	0	7	Vanderbilt U	H2M
PAHs	EPA 8270C	6	1	0	0	0	7	Vanderbilt U	H2M
Total Organic & Inorganic Carbon	Shimadzu TOC 5000	6	1	0	0	0	7	Vanderbilt U	Vanderbilt U
Grout Mixes (Grout Mixes Created by Remedius)									
Slump	ASTM C143	5	0	0	0	0	5		Remedius
Moisture Content	ASTM D2216	5	0	0	0	0	5		Remedius
Density	ASTM D2937	5	0	0	0	0	5		Remedius
Solidified Soil Leaching Tests (Solidified Soil Samples Created by Remedius)									
Tank Leach Test	MT03.1	6	1	0	0	0	varies	Vanderbilt U	Vanderbilt U
pH	EPA 9045	varies	0	0	0	0	varies	Vanderbilt U	Vanderbilt U
Specific Conductance	EPA 9050A	varies	0	0	0	0	varies	Vanderbilt U	Vanderbilt U
Total Alkalinity	EPA 310.1	varies	0	0	0	0	varies	Vanderbilt U	Vanderbilt U
BTEX	EPA 8260B	varies	0	0	0	0	varies	Vanderbilt U	H2M
PAHs	EPA 8270C	varies	0	0	0	0	varies	Vanderbilt U	H2M
Anions	EPA 300.0	varies	0	0	0	0	varies	Vanderbilt U	Vanderbilt U
TAL Metals (Cations)	EPA 6010B/7471A	varies	0	0	0	0	varies	Vanderbilt U	Vanderbilt U
DOC/DIC	Shimadzu TOC 5000	varies	0	0	0	0	varies	Vanderbilt U	Vanderbilt U
VI. NAPL Saturated Soil Samples									
Fuel Forensic Analysis	8100 (mod.)/8270C (mod.)	2	0	0	0	0	2	H2M	META Env.

TABLE 1
SUMMARY OF SAMPLES TO BE COLLECTED AND ANALYTICAL PARAMETERS
HEMPSTEAD INTERSECTION STREET FORMER MANUFACTURED GAS PLANT SITE
NATIONAL GRID

Parameter	Analytical Method ²	Estimated Number of Samples	Field QC Samples				Total No. of Samples	Samples Shipped To	Lab Analysis By
			Field Duplicates/Replicates	MS/MSD/MD	Rinsate Blanks	Trip Blanks			
VII. Groundwater Treatment System Samples									
Soil									
BTEX	EPA 8260B	30	0	3	0	0	33	H2M	H2M
PAHs	EPA 8270C	30	0	3	0	0	33	H2M	H2M
TOC	EPA 9060 (mod.)	30	0	0	0	0	30	H2M	H2M
Particle Size	ASTM D422	9	0	0	0	0	9	URS	URS
Groundwater									
BTEX	EPA 8260B	15	2	2	1	1	21	H2M	H2M
PAHs	EPA 8270C	15	2	2	1	0	20	H2M	H2M
DO	EPA 360.1	15	2	0	0	0	17	Field Measurement	Field Measurement
pH	EPA 9045	15	2	0	0	0	17	Field Measurement	Field Measurement
Specific Conductance	EPA 9050A	15	2	0	0	0	17	Field Measurement	Field Measurement
Alkalinity	EPA 310.1	15	2	0	0	0	17	H2M	H2M
ORP	Low-Flow Cell, Electrode	15	2	0	0	0	17	H2M	H2M
Ferrous Iron	Colorimetric	15	2	0	0	0	17	Field Measurement	Field Measurement
Nitrate-Nitrogen	EPA 352.1	15	2	0	0	0	17	H2M	H2M
Nitrite-Nitrogen	EPA 354.1	15	2	0	0	0	17	H2M	H2M
Phosphate (ortho)	EPA 365	15	2	0	0	0	17	H2M	H2M

Notes:

1. NYSDEC Analytical Services Protocol (ASP), July 2005 Edition.
2. ASTM Methods as listed in "Annual Book of ASTM Standards, Vol. 04.08 Soil and Rock; Dimension Stone; Geosynthetics (most recent edition)
3. Approximately 10 - 20 L required.
4. Approximately 10 lbs required

MS/MSD/MD - Matrix spike/matrix spike duplicate/matrix duplicate
NAPL - Non-Aqueous Phase Liquid

TABLE 2
SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS
HEMPSTEAD INTERSECTION STREET FORMER MANUFACTURING GAS PLANT SITE
NATIONAL GRID

Analytical Method/Parameter	Container Size/Type*	Number of Containers to Be Collected	Preservation	Maximum Holding Time (from VTSR)
Groundwater Samples				
BTEX	40 mL glass vial	3	HCl to pH<2, 4 °C	Analysis: 10 days (7 days if not preserved to pH<2)
PAHs	1L amber glass	2	4 °C	Extraction: 5 days Analysis: 40 days
Anions	100 mL plastic	1	None	Analysis: 28 days
TAL Metals (Cations)	1L plastic	1	HNO ₃ pH < 2	Analysis: 180 days
Total Alkalinity	100 mL plastic	1	4 °C	Analysis: 14 days
DOC/DIC	200 mL amber glass	1	4 °C	Analysis: 28 days
Dissolved Oxygen	Low-Flow Cell	1	None	Analyze immediately
Specific Conductance	100 mL plastic	1	4 °C	Analysis: 28 days
Oxidation Reduction Potential	Low-Flow Cell	1	None	Analyze immediately
pH	60 mL plastic	4	None	Analyze immediately
Ferrous Iron	10 - 25 mL glass	2	None	Analyze immediately
Nitrate-Nitrogen	100 mL glass	1	4 °C	Analysis: 48 hours
Nitrite-Nitrogen	50 mL glass	1	4 °C	Analysis: 48 hours
Phosphate (ortho)	50 mL plastic	1	Filter, 4° C	Analysis: 48 hours
Soil Samples				
BTEX	2 oz. glass jar	2	4 °C	Analysis: 7 days
PAHs	4 oz. glass jar	1	4 °C	Extraction: 5 days Analysis: 40 days
TAL Metals (Cations)	4 oz. glass jar	1	4 °C	Analysis: 180 days
Total Hydrocarbons/Oil & Grease	2 oz. glass jar	1	4 °C	Extraction: 5 days Analysis: 40 days
TOC/TIC	4 oz. glass jar	1	4 °C	Analysis: 28 days
pH	25 mL plastic	1	None	Analyze immediately
NAPL Saturated Soil Samples				
Environmental Forensic Analysis	40 mL glass vial	2	4 °C	Extraction: 5 days Analysis: 40 days

*Number and size of containers may vary based on laboratory sample volume requirements. Refer to PDI Workplan for specific volume requirements.

VTSR - Validated time of sample receipt

ATTACHMENT B-1

LABORATORY CERTIFICATIONS

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
RICHARD F. DAINES, M.D.



Expires 12:01 AM April 01, 2008
Issued April 01, 2007
Revised July 06, 2007

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. JOHN J. MOLLOY
H2M LABS INC
575 BROAD HOLLOW ROAD
MELVILLE, NY 11747

NY Lab Id No: 10478
EPA Lab Code: NY00026

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D. W. Methylcarbamate Pesticides

3-Hydroxy Carbofuran	EPA 531.1
Aldicarb	EPA 531.1
Aldicarb Sulfone	EPA 531.1
Aldicarb Sulfoxide	EPA 531.1
Carbaryl	EPA 531.1
Carbofuran	EPA 531.1
Methomyl	EPA 531.1
Oxamyl	EPA 531.1

Disinfection By-products

Bromochloroacetic acid	EPA 552.2
Dibromoacetic acid	EPA 552.2
Dichloroacetic acid	EPA 552.2
Monobromoacetic acid	EPA 552.2
Monochloroacetic acid	EPA 552.2
Trichloroacetic acid	EPA 552.2

Drinking Water Bacteriology

Coliform, Total / E. coli (Qualitative)	Colilert
	Colisure
	Readycult Coliforms 100 P/A Test
	SM 18-20 9221D
	SM 18-20 9223B (97) (Colilert)
Standard Plate Count	SM 18 9215B

Drinking Water Chlorinated Acids

2,4,5-TP (Silvex)	EPA 515.1
2,4-D	EPA 515.1
Dalapon	EPA 515.1
Dicamba	EPA 515.1

Drinking Water Chlorinated Acids

Dinoseb	EPA 515.1
Pentachlorophenol	EPA 515.1
	EPA 525.2
Picloram	EPA 515.1

Drinking Water Metals I

Arsenic, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Barium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Cadmium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Chromium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Copper, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Iron, Total	EPA 200.7 Rev. 4.4
Lead, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Manganese, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Mercury, Total	EPA 200.8 Rev. 5.4
	EPA 245.1 Rev. 3.0
Selenium, Total	EPA 200.8 Rev. 5.4
Silver, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Zinc, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4

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Drinking Water Metals II

Aluminum, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4
Antimony, Total	EPA 200.8 Rev. 5.4
Beryllium, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4
Molybdenum, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4
Nickel, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4
Thallium, Total	EPA 200.8 Rev. 5.4
Vanadium, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4

Drinking Water Miscellaneous

Hexachlorocyclopentadiene	EPA 505 EPA 525.2
Methyl tert-butyl ether	EPA 502.2/ SEE ITEM 198.5 EPA 524.2
Odor	EPA 140.1
Organic Carbon, Total	EPA 415.1
Perchlorate	EPA 314.0
Propachlor	EPA 525.2
Surfactant (MBAS)	EPA 425.1
Temperature	EPA 170.1
UV 254	SM 19-20 5910B

Drinking Water Metals III

Boron, Total	EPA 200.7 Rev. 4.4
Calcium, Total	EPA 200.7 Rev. 4.4
Magnesium, Total	EPA 200.7 Rev. 4.4
Potassium, Total	EPA 200.7 Rev. 4.4
Sodium, Total	EPA 200.7 Rev. 4.4

Drinking Water Non-Metals

Alkalinity	EPA 310.1 SM 18-20 2320B (97)
Calcium Hardness	EPA 200.7 Rev. 4.4
Chloride	EPA 300.0 Rev. 2.1 EPA 325.2
Color	EPA 110.2 SM 18-20 2120B (01)
Corrosivity	SM 18-19 2330
Cyanide, Free	SM 18-20 4500-CN E (99)
Cyanide, Total	EPA 335.2 SM 18-20 4500-CN E (99)
Fluoride, Total	EPA 300.0 Rev. 2.1 EPA 340.2 SM 18-20 4500-F C (97)
Hydrogen Ion (pH)	EPA 150.1
Nitrate (as N)	EPA 300.0 Rev. 2.1

Drinking Water Miscellaneous

Benzo(a)pyrene	EPA 525.2
Bis(2-ethylhexyl) phthalate	EPA 525.2
Butachlor	EPA 525.2
Di (2-ethylhexyl) adipate	EPA 525.2
Diquat	EPA 549.2
Endothall	EPA 548.1
Glyphosate	EPA 547
Hexachlorobenzene	EPA 505 EPA 525.2

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Drinking Water Non-Metals

Nitrate (as N)	EPA 353.2 Rev. 2.0
Nitrite (as N)	EPA 300.0 Rev. 2.1
	EPA 353.2 Rev. 2.0
Orthophosphate (as P)	EPA 300.0 Rev. 2.1
	EPA 365.1 Rev. 2.0
	EPA 365.2
	SM 18-20 4500-P E
Silica, Dissolved	EPA 200.7 Rev. 4.4
Solids, Total Dissolved	EPA 160.1
	SM 18-20 2540C (97)
Specific Conductance	EPA 120.1 Rev. 1982
	SM 18-20 2510B (97)
Sulfate (as SO4)	EPA 300.0 Rev. 2.1
	EPA 375.4
	SM 18-20 4500-SO4 E

Drinking Water Organohalide Pesticides

Dieldrin	EPA 508.1
	EPA 525.2
Endrin	EPA 505
	EPA 508.1
	EPA 525.2
Heptachlor	EPA 505
	EPA 508.1
	EPA 525.2
Heptachlor epoxide	EPA 505
	EPA 508.1
	EPA 525.2
Lindane	EPA 505
	EPA 508.1
	EPA 525.2
Methoxychlor	EPA 505
	EPA 508.1
	EPA 525.2
Metolachlor	EPA 525.2
Metribuzin	EPA 525.2
Simazine	EPA 505
	EPA 525.2
Toxaphene	EPA 505
	EPA 508.1
	EPA 525.2

Drinking Water Organohalide Pesticides

Alachlor	EPA 505
	EPA 508.1
	EPA 525.2
Aldrin	EPA 505
	EPA 508.1
	EPA 525.2
Atrazine	EPA 505
	EPA 525.2
Chlordane Total	EPA 505
	EPA 508.1
	EPA 525.2
Dieldrin	EPA 505

Drinking Water Trihalomethanes

Bromodichloromethane	EPA 502.2
	EPA 524.2
Bromoform	EPA 502.2

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Drinking Water Trihalomethanes

Bromoform	EPA 524.2
Chloroform	EPA 502.2
	EPA 524.2
Dibromochloromethane	EPA 502.2
	EPA 524.2
Total Trihalomethanes	EPA 502.2
	EPA 524.2

Microextractibles

1,2-Dibromo-3-chloropropane	EPA 504.1
1,2-Dibromoethane	EPA 504.1

Polychlorinated Biphenyls

PCB Screen	EPA 505
	EPA 508.1
	EPA 525.2
PCB, Total (as decachlorobiphenyl)	EPA 508A

Volatile Aromatics

1,2,3-Trichlorobenzene	EPA 502.2
	EPA 524.2
1,2,4-Trichlorobenzene	EPA 502.2
	EPA 524.2
1,2,4-Trimethylbenzene	EPA 502.2
	EPA 524.2
1,2-Dichlorobenzene	EPA 502.2
	EPA 524.2
1,3,5-Trimethylbenzene	EPA 502.2
	EPA 524.2
1,3-Dichlorobenzene	EPA 502.2

Volatile Aromatics

1,3-Dichlorobenzene	EPA 524.2
1,4-Dichlorobenzene	EPA 502.2
	EPA 524.2
2-Chlorotoluene	EPA 502.2
	EPA 524.2
4-Chlorotoluene	EPA 502.2
	EPA 524.2
Benzene	EPA 502.2
	EPA 524.2
Bromobenzene	EPA 502.2
	EPA 524.2
Chlorobenzene	EPA 502.2
	EPA 524.2
Ethyl benzene	EPA 502.2
	EPA 524.2
Hexachlorobutadiene	EPA 502.2
	EPA 524.2
Isopropylbenzene	EPA 502.2
	EPA 524.2
n-Butylbenzene	EPA 502.2
	EPA 524.2
n-Propylbenzene	EPA 502.2
	EPA 524.2
p-Isopropyltoluene (P-Cymene)	EPA 502.2
	EPA 524.2
sec-Butylbenzene	EPA 502.2
	EPA 524.2
Styrene	EPA 502.2
	EPA 524.2

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Volatile Aromatics

tert-Butylbenzene	EPA 502.2
	EPA 524.2
Toluene	EPA 502.2
	EPA 524.2
Total Xylenes	EPA 502.2
	EPA 524.2

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 502.2
	EPA 524.2
1,1,1-Trichloroethane	EPA 502.2
	EPA 524.2
1,1,2,2-Tetrachloroethane	EPA 502.2
	EPA 524.2
1,1,2-Trichloroethane	EPA 502.2
	EPA 524.2
1,1-Dichloroethane	EPA 502.2
	EPA 524.2
1,1-Dichloroethene	EPA 502.2
	EPA 524.2
1,1-Dichloropropene	EPA 502.2
	EPA 524.2
1,2,3-Trichloropropane	EPA 502.2
	EPA 524.2
1,2-Dichloroethane	EPA 502.2
	EPA 524.2
1,2-Dichloropropane	EPA 502.2
	EPA 524.2
1,3-Dichloropropane	EPA 502.2

Volatile Halocarbons

1,3-Dichloropropane	EPA 524.2
2,2-Dichloropropane	EPA 502.2
	EPA 524.2
Bromochloromethane	EPA 502.2
	EPA 524.2
Bromomethane	EPA 502.2
	EPA 524.2
Carbon tetrachloride	EPA 502.2
	EPA 524.2
Chloroethane	EPA 502.2
	EPA 524.2
Chloromethane	EPA 502.2
	EPA 524.2
cis-1,2-Dichloroethene	EPA 502.2
	EPA 524.2
cis-1,3-Dichloropropene	EPA 502.2
	EPA 524.2
Dibromomethane	EPA 502.2
	EPA 524.2
Dichlorodifluoromethane	EPA 502.2
	EPA 524.2
Methylene chloride	EPA 502.2
	EPA 524.2
Tetrachloroethene	EPA 502.2
	EPA 524.2
trans-1,2-Dichloroethene	EPA 502.2
	EPA 524.2
trans-1,3-Dichloropropene	EPA 502.2
	EPA 524.2

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Volatile Halocarbons

Trichloroethene	EPA 502.2
	EPA 524.2
Trichlorofluoromethane	EPA 502.2
	EPA 524.2
Vinyl chloride	EPA 502.2
	EPA 524.2

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All approved analytes are listed below:*

Acrylates		Amines	
Acrolein (Propenal)	EPA 624	Pyridine	EPA 625
	EPA 8260B		EPA 8260B
Acrylonitrile	EPA 624		EPA 8270C
	EPA 8260B	Bacteriology	
Ethyl methacrylate	EPA 8260B	Coliform, fecal	SM 18-20 9221E (99)
Methyl acrylonitrile	EPA 8260B	Coliform, Total	SM 18-20 9221B (99)
Methyl methacrylate	EPA 8260B	E. coli (Enumeration)	SM 18-20 9221B (99)
		Enterococci	Enterolert
Amines		Standard Plate Count	SM 18 9215B
1,4-Phenylenediamine	EPA 8270C	Benzidines	
1-Naphthylamine	EPA 8270C	3,3' -Dichlorobenzidine	EPA 625
2-Naphthylamine	EPA 8270C		EPA 8270C
2-Nitroaniline	EPA 8270C	3,3'-Dimethylbenzidene	EPA 8270C
3-Nitroaniline	EPA 8270C	Benzidine	EPA 625
4-Chloroaniline	EPA 8270C		EPA 8270C
4-Nitroaniline	EPA 8270C	Chlorinated Hydrocarbon Pesticides	
5-Nitro-o-toluidine	EPA 8270C	4,4'-DDD	EPA 608
Aniline	EPA 8270C		EPA 8081A
Carbazole	EPA 8270C	4,4'-DDE	EPA 608
Diphenylamine	EPA 8270C		EPA 8081A
Methapyriline	EPA 8270C	4,4'-DDT	EPA 608
Pronamide	EPA 8270C		
Propionitrile	EPA 8260B		

Serial No.: 33959

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NEW YORK STATE DEPARTMENT OF HEALTH
 WADSWORTH CENTER
 RICHARD F. DAINES, M.D.



Expires 12:01 AM April 01, 2008
 Issued April 01, 2007
 Revised June 21, 2007

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. JOHN J. MOLLOY
 H2M LABS INC
 575 BROAD HOLLOW ROAD
 MELVILLE, NY 11747

NY Lab Id No: 10478
 EPA Lab Code: NY00026

*is hereby APPROVED as an Environmental Laboratory in conformance with the
 National Environmental Laboratory Accreditation Conference Standards for the category
 ENVIRONMENTAL ANALYSES NON POTABLE WATER
 All approved analytes are listed below:*

Chlorinated Hydrocarbon Pesticides

4,4'-DDT	EPA 8081A
Aldrin	EPA 608
	EPA 8081A
alpha-BHC	EPA 608
	EPA 8081A
alpha-Chlordane	EPA 8081A
beta-BHC	EPA 608
	EPA 8081A
Chlordane Total	EPA 608
	EPA 8081A
Chlorobenzilate	EPA 8270C
delta-BHC	EPA 608
	EPA 8081A
Diallate	EPA 8270C
Dichloran	SM 18-20 6630B
Dieldrin	EPA 608
	EPA 8081A
Endosulfan I	EPA 608
	EPA 8081A
Endosulfan II	EPA 608
	EPA 8081A
Endosulfan sulfate	EPA 608
	EPA 8081A

Chlorinated Hydrocarbon Pesticides

Endrin	EPA 608
	EPA 8081A
Endrin aldehyde	EPA 608
	EPA 8081A
Endrin Ketone	EPA 8081A
gamma-Chlordane	EPA 8081A
Heptachlor	EPA 608
	EPA 8081A
Heptachlor epoxide	EPA 608
	EPA 8081A
Isodrin	EPA 8081A
Lindane	EPA 608
	EPA 8081A
Methoxychlor	EPA 8081A
Mirex	SM 18-20 6630B
PCNB	EPA 8270C
Strobane	SM 18-20 6630C
Toxaphene	EPA 608
	EPA 8081A
Trifluralin	SM 18-20 6630B

Chlorinated Hydrocarbons

1,2,3-Trichlorobenzene	EPA 8260B
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Chlorinated Hydrocarbons

1,2,4,5-Tetrachlorobenzene	EPA 8270C
1,2,4-Trichlorobenzene	EPA 625
	EPA 8121
	EPA 8270C
1-Chloronaphthalene	EPA 8270C
2-Chloronaphthalene	EPA 625
	EPA 8121
	EPA 8270C
Hexachlorobenzene	EPA 625
	EPA 8121
	EPA 8270C
Hexachlorobutadiene	EPA 625
	EPA 8121
	EPA 8270C
Hexachlorocyclopentadiene	EPA 625
	EPA 8121
	EPA 8270C
Hexachloroethane	EPA 625
	EPA 8121
	EPA 8270C
Hexachloropropene	EPA 8270C
Pentachlorobenzene	EPA 8270C

Chlorophenoxy Acid Pesticides

2,4,5-T	EPA 8151A
2,4,5-TP (Silvex)	EPA 1978, p.115
	EPA 8151A
	SM 18-20 6640B
2,4-D	EPA 8151A
Dicamba	EPA 8151A
Dinoseb	EPA 8151A
	EPA 8270C

Demand

Biochemical Oxygen Demand	EPA 405.1
Carbonaceous BOD	SM 18-20 5210B (01)
Chemical Oxygen Demand	EPA 410.4 Rev. 2.0

Fuel Oxygenates

Ethanol	EPA 8260B
Methyl tert-butyl ether	EPA 8021B
	EPA 8260B
t-Butyl alcohol	EPA 8015 B
	EPA 8260B

Haloethers

4-Bromophenylphenyl ether	EPA 625
	EPA 8270C

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Haloethers		Mineral	
4-Chlorophenylphenyl ether	EPA 625	Sulfate (as SO4)	EPA 300.0 Rev. 2.1
	EPA 8270C		EPA 375.4
Bis (2-chloroisopropyl) ether	EPA 625	Nitroaromatics and Isophorone	
	EPA 8270C	1,3,5-Trinitrobenzene	EPA 8270C
Bis(2-chloroethoxy)methane	EPA 625	1,3-Dinitrobenzene	EPA 8270C
	EPA 8270C	1,4-Naphthoquinone	EPA 8270C
Bis(2-chloroethyl)ether	EPA 625	2,4-Dinitrotoluene	EPA 625
	EPA 8270C		EPA 8270C
Microextractables		2,6-Dinitrotoluene	EPA 625
1,2-Dibromo-3-chloropropane	EPA 8011		EPA 8270C
1,2-Dibromoethane	EPA 8011	Isophorone	EPA 625
Mineral			EPA 8270C
Acidity	EPA 305.1	Nitrobenzene	EPA 625
Alkalinity	EPA 310.1		EPA 8270C
Calcium Hardness	EPA 200.7 Rev. 4.4	Nitrosoamines	
Chloride	EPA 300.0 Rev. 2.1	N-Nitrosodiethylamine	EPA 8270C
	EPA 325.2	N-Nitrosodimethylamine	EPA 625
Fluoride, Total	EPA 300.0 Rev. 2.1		EPA 8270C
	EPA 340.2	N-Nitrosodi-n-butylamine	EPA 8270C
Hardness, Total	EPA 130.2	N-Nitrosodi-n-propylamine	EPA 625
	EPA 200.7 Rev. 4.4		EPA 8270C
	SM 18-20 2340C (97)	N-Nitrosodiphenylamine	EPA 625

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Nitrosoamines

N-Nitrosodiphenylamine	EPA 8270C
N-nitrosopiperidine	EPA 8270C
N-Nitrosopyrrolidine	EPA 8270C

Nutrient

Ammonia (as N)	EPA 350.1 Rev. 2.0
Kjeldahl Nitrogen, Total	EPA 351.1 Rev. 1978
	EPA 351.2 Rev. 2.0
Nitrate (as N)	EPA 300.0 Rev. 2.1
	EPA 353.2 Rev. 2.0
Nitrite (as N)	EPA 300.0 Rev. 2.1
	EPA 353.2 Rev. 2.0
	EPA 354.1
Orthophosphate (as P)	EPA 300.0 Rev. 2.1
	EPA 365.1 Rev. 2.0
	EPA 365.2
Phosphorus, Total	EPA 365.1 Rev. 2.0 EPA 365.2

Organophosphate Pesticides

Atrazine	EPA 8141A
Azinphos methyl	EPA 8141A
Demeton-O	EPA 8141A
Demeton-S	EPA 8141A

Organophosphate Pesticides

Diazinon	EPA 8141A
Dimethoate	EPA 8141A EPA 8270C
Disulfoton	EPA 8141A
	EPA 8270C
Famphur	EPA 8141A
Malathion	EPA 8141A
Parathion ethyl	EPA 8141A
Parathion methyl	EPA 8141A
Phorate	EPA 8270C

Phthalate Esters

Benzyl butyl phthalate	EPA 625
	EPA 8270C
	EPA 625
Bis(2-ethylhexyl) phthalate	EPA 8270C
	EPA 625
	EPA 8270C
Diethyl phthalate	EPA 625
	EPA 8270C
Dimethyl phthalate	EPA 625
	EPA 8270C
Di-n-butyl phthalate	EPA 625
	EPA 8270C
Di-n-octyl phthalate	EPA 625
	EPA 8270C

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Phthalate Esters

Di-n-octyl phthalate EPA 8270C

Polychlorinated Biphenyls

PCB-1016 EPA 608
EPA 8082
PCB-1221 EPA 608
EPA 8082
PCB-1232 EPA 608
EPA 8082
PCB-1242 EPA 608
EPA 8082
PCB-1248 EPA 608
EPA 8082
PCB-1254 EPA 608
EPA 8082
PCB-1260 EPA 608
EPA 8082

Polynuclear Aromatics

Acenaphthylene EPA 8270C
Anthracene EPA 625
EPA 8270C
Benzo(a)anthracene EPA 625
EPA 8270C
Benzo(a)pyrene EPA 625
EPA 8270C
Benzo(b)fluoranthene EPA 625
EPA 8270C
Benzo(ghi)perylene EPA 625
EPA 8270C
Benzo(k)fluoranthene EPA 625
EPA 8270C
Chrysene EPA 625
EPA 8270C
Dibenzo(a,h)anthracene EPA 625
EPA 8270C
Fluoranthene EPA 625
EPA 8270C
Fluorene EPA 625
EPA 8270C
Indeno(1,2,3-cd)pyrene EPA 625
EPA 8270C

Polynuclear Aromatics

3-Methylcholanthrene EPA 8270C
7,12-Dimethylbenzyl (a) anthracene EPA 8270C
Acenaphthene EPA 625
EPA 8270C
Acenaphthylene EPA 625

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Polynuclear Aromatics

Naphthalene	EPA 625
	EPA 8270C
Phenanthrene	EPA 625
	EPA 8270C
Pyrene	EPA 625
	EPA 8270C

Priority Pollutant Phenols

2,3,4,6 Tetrachlorophenol	EPA 8270C
2,4,5-Trichlorophenol	EPA 625
	EPA 8270C
2,4,6-Trichlorophenol	EPA 625
	EPA 8270C
2,4-Dichlorophenol	EPA 625
	EPA 8270C
2,4-Dimethylphenol	EPA 625
	EPA 8270C
2,4-Dinitrophenol	EPA 625
	EPA 8270C
2,6-Dichlorophenol	EPA 8270C
2-Chlorophenol	EPA 625
	EPA 8270C
2-Methyl-4,6-dinitrophenol	EPA 625

Priority Pollutant Phenols

2-Methyl-4,6-dinitrophenol	EPA 8270C
2-Methylphenol	EPA 8270C
2-Nitrophenol	EPA 625
	EPA 8270C
3-Methylphenol	EPA 8270C
4-Chloro-3-methylphenol	EPA 625
	EPA 8270C
4-Methylphenol	EPA 8270C
4-Nitrophenol	EPA 625
	EPA 8270C
Cresols, Total	EPA 625
	EPA 8270C
Pentachlorophenol	EPA 625
	EPA 8270C
Phenol	EPA 625
	EPA 8270C

Purgeable Aromatics

1,2-Dichlorobenzene	EPA 601
	EPA 602
	EPA 624
	EPA 625
	EPA 8021B

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Purgeable Aromatics		Purgeable Aromatics	
1,2-Dichlorobenzene	EPA 8260B	Chlorobenzene	EPA 8260B
	EPA 8270C	Ethyl benzene	EPA 602
1,3-Dichlorobenzene	EPA 601		EPA 624
	EPA 602		EPA 8021B
	EPA 624		EPA 8260B
	EPA 625	Styrene	EPA 8260B
	EPA 8021B	Toluene	EPA 602
	EPA 8260B		EPA 624
	EPA 8270C		EPA 8021B
1,4-Dichlorobenzene	EPA 601		EPA 8260B
	EPA 602	Total Xylenes	EPA 602
	EPA 624		EPA 624
	EPA 625		EPA 8021B
	EPA 8021B		EPA 8260B
	EPA 8260B	Purgeable Halocarbons	
	EPA 8270C	1,1,1,2-Tetrachloroethane	EPA 8260B
Benzene	EPA 602	1,1,1-Trichloroethane	EPA 601
	EPA 624		EPA 624
	EPA 8021B		EPA 8021B
	EPA 8260B		EPA 8260B
Chlorobenzene	EPA 601	1,1,2,2-Tetrachloroethane	EPA 601
	EPA 602		EPA 624
	EPA 624		

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Purgeable Halocarbons

1,1,2,2-Tetrachloroethane	EPA 8021B
	EPA 8260B
1,1,2-Trichloroethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
1,1-Dichloroethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
1,1-Dichloroethene	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
1,2,3-Trichloropropane	EPA 8260B
1,2-Dichloroethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
1,2-Dichloropropane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B

Purgeable Halocarbons

1,3-Dichloropropane	EPA 8260B
2,2-Dichloropropane	EPA 8260B
2-Chloro-1,3-butadiene (Chloroprene)	EPA 8260B
2-Chloroethylvinyl ether	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
3-Chloropropene (Allyl chloride)	EPA 8260B
Bromochloromethane	EPA 8260B
Bromodichloromethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Bromoform	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Bromomethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Carbon tetrachloride	EPA 601
	EPA 624

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Purgeable Halocarbons

Carbon tetrachloride	EPA 8260B
Chloroethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Chloroform	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Chloromethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
cis-1,2-Dichloroethene	EPA 624
	EPA 8021B
	EPA 8260B
cis-1,3-Dichloropropene	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Dibromochloromethane	EPA 601
	EPA 624
	EPA 8021B

Purgeable Halocarbons

Dibromochloromethane	EPA 8260B
Dichlorodifluoromethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Methylene chloride	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Tetrachloroethene	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
trans-1,2-Dichloroethene	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
trans-1,3-Dichloropropene	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Trichloroethene	EPA 601
	EPA 624

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Purgeable Halocarbons

Trichloroethene	EPA 8021B
	EPA 8260B
Trichlorofluoromethane	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B
Vinyl chloride	EPA 601
	EPA 624
	EPA 8021B
	EPA 8260B

Purgeable Organics

1,4-Dioxane	EPA 8260B
2-Butanone (Methylethyl ketone)	EPA 8015 B
	EPA 8260B
2-Hexanone	EPA 8260B
4-Methyl-2-Pentanone	EPA 8260B
Acetone	EPA 8015 B
	EPA 8260B
Acetonitrile	EPA 8260B
Carbon Disulfide	EPA 8260B
Isobutyl alcohol	EPA 8015 B
	EPA 8260B

Purgeable Organics

Methyl iodide	EPA 8260B
o-Toluidine	EPA 8270C
Vinyl acetate	EPA 8260B

Residue

Solids, Total	EPA 160.3
Solids, Total Dissolved	EPA 160.1
Solids, Total Suspended	EPA 160.2

Semi-Volatile Organics

2-Methylnaphthalene	EPA 8270C
4-Amino biphenyl	EPA 8270C
Acetophenone	EPA 8270C
Benzoic Acid	EPA 8270C
Benzyl alcohol	EPA 8270C
Dibenzofuran	EPA 8270C
Ethyl methanesulfonate	EPA 8270C
Isosafrole	EPA 8270C
Methyl methanesulfonate	EPA 8270C
O,O,O-Triethyl phosphorothioate	EPA 8270C
p-Dimethylaminoazobenzene	EPA 8270C
Phenacetin	EPA 8270C
Safrole	EPA 8270C

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Volatile Chlorinated Organics		Wastewater Metals I	
Benzyl chloride	EPA 8260B	Lead, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4 EPA 6010B
Wastewater Metals I			EPA 6020
Barium, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4 EPA 6010B EPA 6020	Magnesium, Total	EPA 200.7 Rev. 4.4 EPA 6010B
Cadmium, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4 EPA 6010B EPA 6020	Manganese, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4 EPA 6010B EPA 6020
Calcium, Total	EPA 200.7 Rev. 4.4 EPA 6010B	Nickel, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4 EPA 6010B EPA 6020
Chromium, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4 EPA 6010B EPA 6020	Potassium, Total	EPA 200.7 Rev. 4.4 EPA 6010B
Copper, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4 EPA 6010B EPA 6020	Silver, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4 EPA 6010B EPA 6020 EPA 7760A
Iron, Total	EPA 200.7 Rev. 4.4 EPA 6010B	Sodium, Total	EPA 200.7 Rev. 4.4 EPA 6010B

Serial No.: 33959

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
RICHARD F. DAINES, M.D.



Expires 12:01 AM April 01, 2008
Issued April 01, 2007
Revised June 21, 2007

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. JOHN J. MOLLOY
H2M LABS INC
575 BROAD HOLLOW ROAD
MELVILLE, NY 11747

NY Lab Id No: 10478
EPA Lab Code: NY00026

*is hereby APPROVED as an Environmental Laboratory in conformance with the
National Environmental Laboratory Accreditation Conference Standards for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:*

Wastewater Metals I

Strontium, Total
EPA 200.7 Rev. 4.4
EPA 200.8 Rev. 5.4
EPA 6010B
EPA 6020

Wastewater Metals II

Aluminum, Total
EPA 200.7 Rev. 4.4
EPA 200.8 Rev. 5.4
EPA 6010B
EPA 6020

Antimony, Total
EPA 200.7 Rev. 4.4
EPA 200.8 Rev. 5.4
EPA 6010B
EPA 6020

Arsenic, Total
EPA 200.7 Rev. 4.4
EPA 200.8 Rev. 5.4
EPA 6010B
EPA 6020

Beryllium, Total
EPA 200.7 Rev. 4.4
EPA 200.8 Rev. 5.4
EPA 6010B
EPA 6020

Chromium VI
EPA 7196A

Wastewater Metals II

Chromium VI
SM 18-19 3500-Cr D
Mercury, Total
EPA 200.8 Rev. 5.4
EPA 245.1 Rev. 3.0
EPA 6020
EPA 7470A

Selenium, Total
EPA 200.7 Rev. 4.4
EPA 200.8 Rev. 5.4
EPA 6010B
EPA 6020

Vanadium, Total
EPA 200.7 Rev. 4.4
EPA 200.8 Rev. 5.4
EPA 6010B
EPA 6020

Zinc, Total
EPA 200.7 Rev. 4.4
EPA 200.8 Rev. 5.4
EPA 6010B
EPA 6020

Wastewater Metals III

Cobalt, Total
EPA 200.7 Rev. 4.4
EPA 200.8 Rev. 5.4
EPA 6010B
EPA 6020

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Wastewater Metals III

Molybdenum, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4 EPA 6010B EPA 6020
Thallium, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4 EPA 6010B EPA 6020
Tin, Total	EPA 200.7 Rev. 4.4 EPA 6010B
Titanium, Total	EPA 200.7 Rev. 4.4 EPA 6010B

Wastewater Miscellaneous

Hydrogen Ion (pH)	EPA 150.1 EPA 9040B
Oil & Grease Total Recoverable	EPA 1664A EPA 413.1 EPA 9070
Organic Carbon, Total	EPA 415.1
Phenols	EPA 420.1 Rev. 1978 EPA 9065
Silica, Dissolved	EPA 200.7 Rev. 4.4 EPA 6010B
Specific Conductance	EPA 120.1 Rev. 1982
Sulfide (as S)	EPA 376.1 EPA 9034
Surfactant (MBAS)	EPA 425.1
Temperature	EPA 170.1
Total Recoverable Petroleum Hydrocarb	EPA 1664A

Wastewater Miscellaneous

Boron, Total	EPA 200.7 Rev. 4.4 EPA 6010B
Bromide	EPA 300.0 Rev. 2.1 EPA 320.1
Color	EPA 110.2 SM 18-20 2120B (01)
Corrosivity	SM 18-19 2330
Cyanide, Total	EPA 335.2 EPA 9014

Sample Preparation Methods

EPA 9030B	EPA 9010B	EPA 3010A	EPA 3005A
EPA 3510C	EPA 3520C	EPA 5030B	

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Acrylates		Characteristic Testing	
Acrolein (Propenal)	EPA 8260B	Corrosivity	EPA 9045C
Acrylonitrile	EPA 8260B	Ignitability	EPA 1010
Ethyl methacrylate	EPA 8260B	Reactivity	SW-846 Ch7, Sec. 7.3
Methyl acrylonitrile	EPA 8260B		
Methyl methacrylate	EPA 8260B	Chlorinated Hydrocarbon Pesticides	
		4,4'-DDD	EPA 8081A
Amines		4,4'-DDE	EPA 8081A
1,2-Diphenylhydrazine	EPA 8270C	4,4'-DDT	EPA 8081A
1,4-Phenylenediamine	EPA 8270C	Aldrin	EPA 8081A
1-Naphthylamine	EPA 8270C	alpha-BHC	EPA 8081A
2-Naphthylamine	EPA 8270C	alpha-Chlordane	EPA 8081A
2-Nitroaniline	EPA 8270C	beta-BHC	EPA 8081A
3-Nitroaniline	EPA 8270C	Chlordane Total	EPA 8081A
4-Chloroaniline	EPA 8270C	Chlorobenzilate	EPA 8270C
4-Nitroaniline	EPA 8270C	delta-BHC	EPA 8081A
5-Nitro-o-toluidine	EPA 8270C	Diallate	EPA 8270C
Aniline	EPA 8270C	Dieldrin	EPA 8081A
Carbazole	EPA 8270C	Endosulfan I	EPA 8081A
Diphenylamine	EPA 8270C	Endosulfan II	EPA 8081A
Methapyriline	EPA 8270C	Endosulfan sulfate	EPA 8081A
Pronamide	EPA 8270C	Endrin	EPA 8081A
		Endrin aldehyde	EPA 8081A
Benzidines		Endrin Ketone	EPA 8081A
3,3'-Dichlorobenzidine	EPA 8270C	gamma-Chlordane	EPA 8081A
3,3'-Dimethylbenzidine	EPA 8270C	Heptachlor	EPA 8081A
Benzidine	EPA 8270C	Heptachlor epoxide	EPA 8081A
		Lindane	EPA 8081A
Characteristic Testing		Methoxychlor	EPA 8081A
Corrosivity	EPA 1110	Pentachloronitrobenzene	EPA 8270C
	EPA 9040B		

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Chlorinated Hydrocarbon Pesticides

Toxaphene EPA 8081A

Chlorinated Hydrocarbons

1,2,4,5-Tetrachlorobenzene EPA 8270C

1,2,4-Trichlorobenzene EPA 8121
EPA 8270C

1-Chloronaphthalene EPA 8270C

2-Chloronaphthalene EPA 8121
EPA 8270C

Hexachlorobenzene EPA 8121
EPA 8270C

Hexachlorobutadiene EPA 8121
EPA 8270C

Hexachlorocyclopentadiene EPA 8121
EPA 8270C

Hexachloroethane EPA 8121
EPA 8270C

Hexachloropropene EPA 8270C

Pentachlorobenzene EPA 8270C

Chlorophenoxy Acid Pesticides

2,4,5-T EPA 8151A

2,4,5-TP (Silvex) EPA 8151A

2,4-D EPA 8151A

Dicamba EPA 8151A

Haloethers

4-Bromophenylphenyl ether EPA 8270C

4-Chlorophenylphenyl ether EPA 8270C

Bis (2-chloroisopropyl) ether EPA 8270C

Haloethers

Bis(2-chloroethoxy)methane EPA 8270C

Bis(2-chloroethyl)ether EPA 8270C

Metals I

Barium, Total EPA 6010B

EPA 6020

Cadmium, Total EPA 6010B

EPA 6020

Calcium, Total EPA 6010B

Chromium, Total EPA 6010B

EPA 6020

Copper, Total EPA 6010B

EPA 6020

Iron, Total EPA 6010B

Lead, Total EPA 6010B

EPA 6020

Magnesium, Total EPA 6010B

Manganese, Total EPA 6010B

EPA 6020

Nickel, Total EPA 6010B

EPA 6020

Potassium, Total EPA 6010B

Silver, Total EPA 6010B

EPA 6020

EPA 7760A

Sodium, Total EPA 6010B

Strontium, Total EPA 6010B

Metals II

Aluminum, Total EPA 6010B

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Metals II

Aluminum, Total	EPA 6020
Antimony, Total	EPA 6010B
	EPA 6020
Arsenic, Total	EPA 6010B
	EPA 6020
Beryllium, Total	EPA 6010B
	EPA 6020
Chromium VI	EPA 7196A
Mercury, Total	EPA 7471A
Selenium, Total	EPA 6010B
	EPA 6020
Vanadium, Total	EPA 6010B
	EPA 6020
Zinc, Total	EPA 6010B
	EPA 6020

Metals III

Cobalt, Total	EPA 6010B
	EPA 6020
Molybdenum, Total	EPA 6010B
	EPA 6020
Silica, Dissolved	EPA 6010B
Thallium, Total	EPA 6010B
	EPA 6020
Tin, Total	EPA 6010B

Minerals

Bromide	EPA 9056
Chloride	EPA 9056
	EPA 9250

Minerals

Fluoride, Total	EPA 9056
	EPA 9214
Sulfate (as SO4)	EPA 9038

Miscellaneous

Boron, Total	EPA 6010B
Cyanide, Total	EPA 9014
Hydrogen Ion (pH)	EPA 9040B
	EPA 9045C
Lead in Dust Wipes	EPA 6010B
Lead in Paint	EPA 6010B
Phenols	EPA 9065
Sulfide (as S)	EPA 9034

Nitroaromatics and Isophorone

1,4-Naphthoquinone	EPA 8270C
2,4-Dinitrotoluene	EPA 8270C
2,6-Dinitrotoluene	EPA 8270C
Isophorone	EPA 8270C
	OLM 4.2 BNA
Nitrobenzene	EPA 8270C
Pyridine	EPA 8270C

Nitrosoamines

N-Nitrosodiethylamine	EPA 8270C
N-Nitrosodimethylamine	EPA 8270C
N-Nitrosodi-n-butylamine	EPA 8270C
N-Nitrosodi-n-propylamine	EPA 8270C
N-Nitrosodiphenylamine	EPA 8270C
N-nitrosomethylethylamine	EPA 8270C

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Nitrosoamines

N-nitrosopiperidine EPA 8270C
N-Nitrosopyrrolidine EPA 8270C

Nutrients

Nitrate (as N) EPA 9056
Nitrite (as N) EPA 9056
Orthophosphate (as P) EPA 9056

Organophosphate Pesticides

Azinphos methyl EPA 8141A
Demeton-O EPA 8141A
Demeton-S EPA 8141A
Diazinon EPA 8141A
Dimethoate EPA 8141A
EPA 8270C
Dioxathion EPA 8141A
Disulfoton EPA 8141A
EPA 8270C
Famphur EPA 8141A
Malathion EPA 8141A
Parathion ethyl EPA 8141A
Parathion methyl EPA 8141A
Phorate EPA 8141A
EPA 8270C
Thionazin EPA 8141A
EPA 8270C

Phthalate Esters

Benzyl butyl phthalate EPA 8270C
Bis(2-ethylhexyl) phthalate EPA 8270C

Phthalate Esters

Diethyl phthalate EPA 8270C
Dimethyl phthalate EPA 8270C
Di-n-butyl phthalate EPA 8270C
Di-n-octyl phthalate EPA 8270C

Polychlorinated Biphenyls

PCB-1016 EPA 8082
PCB-1221 EPA 8082
PCB-1232 EPA 8082
PCB-1242 EPA 8082
PCB-1248 EPA 8082
PCB-1254 EPA 8082
PCB-1260 EPA 8082

Polynuclear Aromatic Hydrocarbons

3-Methylcholanthrene EPA 8270C
7,12-Dimethylbenzyl (a) anthracene EPA 8270C
Acenaphthene EPA 8270C
Acenaphthylene EPA 8270C
Anthracene EPA 8270C
Benzo(a)anthracene EPA 8270C
Benzo(a)pyrene EPA 8270C
Benzo(b)fluoranthene EPA 8270C
Benzo(ghi)perylene EPA 8270C
Benzo(k)fluoranthene EPA 8270C
OLM 4.2 BNA
Chrysene EPA 8270C
Dibenzo(a,h)anthracene EPA 8270C
Fluoranthene EPA 8270C
Fluorene EPA 8270C

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Polynuclear Aromatic Hydrocarbons

Indeno(1,2,3-cd)pyrene	EPA 8270C
Naphthalene	EPA 8260B
	EPA 8270C
Phenanthrene	EPA 8270C
Pyrene	EPA 8270C

Purgeable Aromatics

1,3,5-Trimethylbenzene	EPA 8260B
1,3-Dichlorobenzene	EPA 8021B
	EPA 8260B
	EPA 8270C
1,4-Dichlorobenzene	EPA 8021B
	EPA 8260B

Priority Pollutant Phenols

2,3,4,6 Tetrachlorophenol	EPA 8270C
2,4,5-Trichlorophenol	EPA 8270C
2,4,6-Trichlorophenol	EPA 8270C
2,4-Dichlorophenol	EPA 8270C
2,4-Dimethylphenol	EPA 8270C
2,4-Dinitrophenol	EPA 8270C
2,6-Dichlorophenol	EPA 8270C
2-Chlorophenol	EPA 8270C
2-Methyl-4,6-dinitrophenol	EPA 8270C
2-Methylphenol	EPA 8270C
2-Nitrophenol	EPA 8270C
3-Methylphenol	EPA 8270C
4-Chloro-3-methylphenol	EPA 8270C
4-Methylphenol	EPA 8270C
4-Nitrophenol	EPA 8270C
Pentachlorophenol	EPA 8270C
Phenol	EPA 8270C

2-Chlorotoluene	EPA 8260B
4-Chlorotoluene	EPA 8260B
Benzene	EPA 8021B
	EPA 8260B
Bromobenzene	EPA 8260B
Chlorobenzene	EPA 8021B
	EPA 8260B
Ethyl benzene	EPA 8021B
	EPA 8260B
Isopropylbenzene	EPA 8260B
n-Butylbenzene	EPA 8260B
n-Propylbenzene	EPA 8021B
	EPA 8260B
p-Isopropyltoluene (P-Cymene)	EPA 8021B
	EPA 8260B
sec-Butylbenzene	EPA 8260B
Styrene	EPA 8260B
tert-Butylbenzene	EPA 8260B
Toluene	EPA 8021B
	EPA 8260B
Total Xylenes	EPA 8021B
	EPA 8260B

Purgeable Aromatics

1,2,4-Trimethylbenzene	EPA 8260B
1,2-Dichlorobenzene	EPA 8021B
	EPA 8260B
	EPA 8270C

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Purgeable Halocarbons		Purgeable Halocarbons	
1,1,1,2-Tetrachloroethane	EPA 8260B	Bromoform	EPA 8260B
1,1,1-Trichloroethane	EPA 8021B	Bromomethane	EPA 8021B
	EPA 8260B		EPA 8260B
1,1,2,2-Tetrachloroethane	EPA 8021B	Carbon tetrachloride	EPA 8021B
	EPA 8260B		EPA 8260B
1,1,2-Trichloroethane	EPA 8021B	Chloroethane	EPA 8021B
	EPA 8260B		EPA 8260B
1,1-Dichloroethane	EPA 8021B	Chloroform	EPA 8021B
	EPA 8260B		EPA 8260B
1,1-Dichloroethene	EPA 8021B	Chloromethane	EPA 8021B
	EPA 8260B		EPA 8260B
1,1-Dichloropropene	EPA 8260B	cis-1,2-Dichloroethene	EPA 8260B
1,2,3-Trichloropropane	EPA 8260B	cis-1,3-Dichloropropene	EPA 8021B
1,2-Dibromo-3-chloropropane	EPA 8260B		EPA 8260B
1,2-Dibromoethane	EPA 8260B		OLM 4.2 Volatiles
1,2-Dichloroethane	EPA 8021B	Dibromochloromethane	EPA 8021B
	EPA 8260B		EPA 8260B
1,2-Dichloropropane	EPA 8021B	Dibromomethane	EPA 8260B
	EPA 8260B	Dichlorodifluoromethane	EPA 8021B
1,3-Dichloropropane	EPA 8260B		EPA 8260B
2,2-Dichloropropane	EPA 8260B	Methylene chloride	EPA 8021B
2-Chloro-1,3-butadiene (Chloroprene)	EPA 8260B		EPA 8260B
2-Chloroethylvinyl ether	EPA 8021B	Tetrachloroethene	EPA 8021B
	EPA 8260B		EPA 8260B
3-Chloropropene (Allyl chloride)	EPA 8260B	trans-1,2-Dichloroethene	EPA 8260B
Bromochloromethane	EPA 8260B	trans-1,3-Dichloropropene	EPA 8021B
Bromodichloromethane	EPA 8021B		EPA 8260B
	EPA 8260B	Trichloroethene	EPA 8021B
Bromoform	EPA 8021B		EPA 8260B

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Purgeable Halocarbons

Trichlorofluoromethane	EPA 8021B
	EPA 8260B
Vinyl chloride	EPA 8021B
	EPA 8260B

Purgeable Organics

1,4-Dioxane	EPA 8015 B
	EPA 8260B
2-Butanone (Methylethyl ketone)	EPA 8015 B
	EPA 8260B
2-Hexanone	EPA 8260B
4-Methyl-2-Pentanone	EPA 8260B
Acetone	EPA 8015 B
	EPA 8260B
Acetonitrile	EPA 8260B
Carbon Disulfide	EPA 8260B
Isobutyl alcohol	EPA 8015 B
	EPA 8260B
Methyl tert-butyl ether	EPA 8021B
	EPA 8260B
o-Toluidine	EPA 8270C
Propionitrile	EPA 8260B
Vinyl acetate	EPA 8260B

Semi-Volatile Organics

2-Methylnaphthalene	EPA 8270C
4-Amino biphenyl	EPA 8270C
Acetophenone	EPA 8270C
Benzoic Acid	EPA 8270C
Benzyl alcohol	EPA 8270C

Semi-Volatile Organics

Dibenzofuran	EPA 8270C
Ethyl methanesulfonate	EPA 8270C
Isosafrole	EPA 8270C
Methyl methanesulfonate	EPA 8270C
O,O,O-Triethyl phosphorothioate	EPA 8270C
Phenacetin	EPA 8270C
Safrole	EPA 8270C

Volatile Chlorinated Organics

Benzyl chloride	EPA 8260B
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Sample Preparation Methods

EPA 1311
EPA 3005A
EPA 3010A
EPA 3050B
EPA 3060A
EPA 3545
EPA 3550B
EPA 3585
EPA 5030B
EPA 5035
EPA 9010B
EPA 9030B

Serial No.: 34058

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
RICHARD F. DAINES, M.D.



Expires 12:01 AM April 01, 2008
Issued April 01, 2007
Revised April 17, 2007

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. JOHN J. MOLLOY
H2M LABS INC
575 BROAD HOLLOW ROAD
MELVILLE, NY 11747

NY Lab Id No: 10478
EPA Lab Code: NY00026

*is hereby APPROVED as an Environmental Laboratory in conformance with the
National Environmental Laboratory Accreditation Conference Standards for the category
ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:*

Acrylates

Acrylonitrile EPA TO-15

Metals I

Lead, Total EPA 200.7 Rev. 4.4

Metals II

Mercury, Total EPA 245.1 Rev. 3.0

Priority Pollutant Phenols

2-Chlorophenol EPA 625

Pentachlorophenol EPA 625

Phenol EPA 625

Purgeable Aromatics

1,2,4-Trimethylbenzene EPA TO-15

1,2-Dichlorobenzene EPA TO-15

1,3,5-Trimethylbenzene EPA TO-15

1,4-Dichlorobenzene EPA TO-15

Benzene EPA TO-15

Chlorobenzene EPA TO-15

Ethyl benzene EPA TO-15

Toluene EPA TO-15

Total Xylenes EPA TO-15

Purgeable Halocarbons

1,1,2,2-Tetrachloroethane EPA TO-15

1,1,2-Trifluoro-1,2,2-Trichloroethane EPA TO-15

1,1-Dichloroethane EPA TO-15

1,1-Dichloroethene EPA TO-15

1,2-Dichloro-1,1,2,2-tetrafluoroethane EPA TO-15

1,2-Dichloroethane EPA TO-15

1,2-Dichloropropane EPA TO-15

Bromoform EPA TO-15

Carbon tetrachloride EPA TO-15

Chloroform EPA TO-15

Dichlorodifluoromethane EPA TO-15

Methylene chloride EPA TO-15

Tetrachloroethene EPA TO-15

Trichlorofluoromethane EPA TO-15

Vinyl chloride EPA TO-15

Volatile Chlorinated Organics

Benzyl chloride EPA TO-15

Volatile Organics

1,3-Butadiene EPA TO-15

Serial No.: 33471

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NY Lab Id No: 10478
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ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved subcategories and/or analytes are listed below:*

Chlorinated Hydrocarbons

1,2,4-Trichlorobenzene	EPA TO-15
Hexachlorobutadiene	EPA TO-15
Hexachloroethane	EPA TO-15

Purgeable Aromatics

1,3-Dichlorobenzene	EPA TO-17
Benzene	EPA TO-1
	EPA TO-2
Ethyl benzene	EPA TO-1
Isopropylbenzene	EPA TO-17
Styrene	EPA TO-15
	EPA TO-17
	EPA TO-17
Toluene	EPA TO-1
	EPA TO-2
Total Xylenes	EPA TO-1

Purgeable Halocarbons

1,1,1-Trichloroethane	EPA TO-15
	EPA TO-17
1,1,2-Trichloroethane	EPA TO-15
1,1-Dichloroethene	EPA TO-2
1,2-Dichloroethane	EPA TO-1
	EPA TO-2
1,2-Dichloropropane	EPA TO-1

Purgeable Halocarbons

Bromoform	EPA TO-17
Bromomethane	EPA TO-15
Carbon tetrachloride	EPA TO-1
	EPA TO-2
Chloroethane	EPA TO-15
Chloroform	EPA TO-1
	EPA TO-2
Chloromethane	EPA TO-15
	EPA TO-17
cis-1,2-Dichloroethene	EPA TO-15
	EPA TO-17
cis-1,3-Dichloropropene	EPA TO-15
	EPA TO-17
Methylene chloride	EPA TO-2
Tetrachloroethene	EPA TO-1
trans-1,2-Dichloroethene	EPA TO-15
	EPA TO-17
trans-1,3-Dichloropropene	EPA TO-15
	EPA TO-17
Trichloroethene	EPA TO-15
Vinyl bromide	EPA TO-15
	EPA TO-17
	EPA TO-2
Vinyl chloride	EPA TO-2

Serial No.: 33472

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
RICHARD F. DAINES, M.D.



Expires 12:01 AM April 01, 2008
Issued April 01, 2007
Revised April 17, 2007

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EPA Lab Code: NY00026

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ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved subcategories and/or analytes are listed below:*

Volatile Organics

1,4-Dioxane	EPA TO-17
2,2,4-Trimethylpentane	EPA TO-15
2-Butanone (Methylethyl ketone)	EPA TO-15
	EPA TO-17
4-Methyl-2-Pentanone	EPA TO-15
	EPA TO-17
Carbon Disulfide	EPA TO-17
Hexane	EPA TO-15
Methyl tert-butyl ether	EPA TO-15
	EPA TO-17
Vinyl acetate	EPA TO-15
	EPA TO-17

Serial No.: 33472

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER
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Expires 12:01 AM April 01, 2008
Issued April 20, 2007

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575 BROAD HOLLOW ROAD
MELVILLE, NY 11747

NY Lab Id No: 10478
EPA Lab Code: NY00026

*is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES ANALYTICAL SERVICES PROTOCOL
All approved subcategories and/or analytes are listed below:*

CLP PCB/Pesticides
CLP Semi-Volatile Organics
CLP Volatile Organics
CLP Inorganics

Serial No.: 33548

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ATTACHMENT B-2

EXAMPLE CHAIN-OF-CUSTODY RECORDS

ATTACHMENT B-3

DATA USABILITY SUMMARY REPORT

REQUIREMENTS

Guidance for the Development of Data Usability Summary Reports

Background:

The Data Usability Summary Report (DUSR) provides a thorough evaluation of analytical data without the costly and time consuming process of third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use.

The DUSR and the data deliverables package will be reviewed by the DER Quality Assurance Unit. If data validation is found to be necessary (e.g. pending litigation) this can be carried out at a later date on the same data package used for the development of the DUSR.

Personnel Requirements:

The Environmental Scientist preparing the DUSR must hold a Bachelors Degree in a relevant natural or physical science or field of engineering and must submit a resume to the Division's Quality Assurance Unit documenting experience in environmental sampling, analysis and data review.

Preparation of a DUSR:

The DUSR is developed by reviewing and evaluating the analytical data package. During the course of this review the following questions must be asked and answered:

1. Is the data package complete as defined under the requirements for the NYSDEC ASP Category B or USEPA CLP deliverables?
2. Have all holding times been met?
3. Do all the QC data: blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?
4. Have all of the data been generated using established and agreed upon analytical protocols?
5. Does an evaluation of the raw data confirm the results provided in the data summary sheets and quality control verification forms?
6. Have the correct data qualifiers been used?

Evaluation of NYSDEC ASP Matrix Spike Blank (MSB) data - If the MSB recovery is less than the ASP criteria, the positive results should be qualified as J, estimated biased low. If the MSB recovery is less than the ASP criteria, but greater than 10%, the nondetects should be qualified J, biased low. If the MSB recovery is less than 10%, the nondetect data must be rejected.

Any Quality Control exceedances must be numerically specified in the DUSR and the corresponding QC summary sheet from the data package should be attached to the DUSR. All data that would be rejected by the EPA Region 2 Data Validation Guidelines must also be rejected in the DUSR.

Once the data package has been reviewed and the above questions asked and answered the DUSR proceeds to describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations and quality control problems are identified and their effect on the data is discussed. The DUSR shall also include recommendations on resampling/reanalysis. All data qualifications must be documented following the NYSDEC ASP '95 Rev. guidelines.