DRY WELL AREA EXCAVATION
WORK PLAN
Operable Unit 1
Lockheed Martin Corporation
(Former Unisys Corp. Site)
365 Lakeville Road
Great Neck, New York

NYSDEC Site No. 130045

June 1998

Prepared for:
Lockheed Martin Corporation
Burbank Program Office
Burbank, California

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1.0 Introduction

This work plan describes the scope of work for the removal of soils and sludges located within and directly below three inactive dry wells at the Lockheed Martin Corporation (Lockheed Martin) site located at 365 Lakeville Road, Great Neck, New York (see Figure 1). The Lockheed Martin site has been listed by the New York State Department of Environmental Conservation (NYSDEC) in the Registry of Inactive Hazardous Waste Disposal sites in New York State (Site No. 130045). The site is classified by NYSDEC as a Class 2 Site due to the presence of contamination in soil and groundwater at the property.

In 1991, Unisys Corporation (a previous owner of the site) entered into an Administrative Order on Consent (W-1-0527-91-02) with NYSDEC which required implementation of IRMs for soil and groundwater and the completion of a remedial investigation/feasibility study (RI/FS). A groundwater IRM utilizing granulated activated carbon filters was initiated in April of 1993. In January 1994, the SVE system to address soil contamination in the Dry Well Area was initiated. This Dry Well Area consists of three interconnected dry wells located outside the east wall of the southeast corner of the main building. Soil within and immediately beneath these three dry wells have been found to contain volatile organic compounds (VOCs) at concentrations above the New York State Recommended Soil Cleanup Objectives (NYS RSCOs).

In 1995, NYSDEC divided the site into two operable units for administrative purposes. Operable Unit 1 (OU-1) includes the 94 acre on-site project area owned by Lockheed Martin and Operable Unit 2 (OU-2) includes the off-site areas immediately surrounding the site. The Record of Decision (ROD) detailing the selected remedies for OU-1 was signed by the NYSDEC on March 31, 1997. The existing SVE IRM system was selected in the ROD as the permanent remedy for the Dry Well Area soil. As a means of source removal, the soils within the dry wells is to be removed to a depth of 30 feet below grade. Additionally, the ROD requires that a subsurface investigation be conducted to investigate the presence or absence of two other dry

wells adjacent to the southeast loading bay, and the removal of any sludges, soil contamination and subsurface structure, if any are found to be present.

This Dry Well Area Excavation Work Plan focuses on the removal of sludges and soils from within and beneath the three out-of-service dry wells, the same dry wells that are being addressed by the IRM SVE system. Additionally, this work plan also include subsurface investigation activities to determine whether the two dry wells located adjacent to the southeast loading dock still exist. These remedial activities are being conducted under the executed Order on Consent for Operable Unit 1 (W1-0787-96-12) entered into between NYSDEC and Lockheed Martin.

1.1 Objectives

This work plan summarizes the procedures for the removal of the three dry wells located east of the southeast corner of the main plant, including soils and sludges to a depth of 30 feet below ground surface (bgs). Through the implementation of this work plan, the fine-grained sludges present within and beneath the three dry wells, which are not amenable to remediation via the SVE remedial technology, will be removed. The remaining soils that are not excavated will continue to be addressed by the SVE system.

In addition, concurrent with the removal of the three dry wells, limited subsurface trenching in the area of the southeast loading bay will be conducted to confirm the absence or presence of any additional dry wells or similar subsurface structures in the area of the southeast loading dock.

2.0 Background Information

2.1 Site Location

The Lockheed Martin facility is located at 365 Lakeville Road in Nassau County, New York. A portion of the site is situated in the Village of Lake Success and the remaining part is in the Town of North Hempstead and consists of approximately 94 acres. The property is identified on the Nassau County Land and Tax Map as Section 8, Block B-18, Lots 300H and 300K. The site is bordered to the north by Marcus Avenue, to the south by Union Turnpike and to the west by Lakeville Road. Immediately to the east of the site is the Triad Business Park. The property is located within 1/8 mile east of the Queens County, New York border, and approximately 1/8 mile south of the Northern State Parkway (see Figure 1).

2.2 Site History

The facility was originally designed and built in 1941 by the United States Government and was operated under contract by the Sperry Gyroscope Company, a division of Sperry Rand Company, until 1951. In 1951, the government sold the property to Sperry. Sperry merged with Burroughs Corporation in 1986 to form Unisys Corporation. In May, 1995 Loral Corporation (Loral) acquired the assets of Unisys Defense Systems, a division of Unisys Corp. In March of 1996, the electronics and systems integration businesses of Loral were acquired by Lockheed Martin. Originally, the property included an additional 55 acres with a large manufacturing building immediately to the east of the present property. However, this building was demolished, the property was sold to a developer in the 1970s, and the present day Triad Business Park was constructed.

At present, the site houses administration offices and engineering departments. In the past, the facility has been used to manufacture a wide range of defense-related products. Past manufacturing processes included a casting foundry, etching, degreasing, plating, painting, machining and assembly. Chemicals used during manufacturing at the plant included halogenated and non-halogenated hydrocarbon solvents, cutting oil, paints and fuel oils as well as inorganic plating compounds.

3.0 Dry Well Area

3.1 System Description

Historical site plans of the facility show the presence of five dry wells located outside of the southeast corner of the main building. Three of the dry wells are located on the east side of the southeast corner, and two of the dry wells are located on the south side of the southeast corner, west of the loading bay (see Figure 2).

The three interconnected dry wells on the east side of the building reportedly have been utilized for the disposal of process wastewater. According to Unisys Corporation, in the past, oils and solvents that were mixed with water were sent through a centrifuge to separate the water. The water drained to the dry wells while the solvents were piped to the former waste solvent storage tanks located outside the southeast corner of the building. Dry Well #1 is located closest to the building (see Figure 3). Overflow from Dry Well #1 drains to Dry Wells #2 and #3. These three dry wells are collectively referred to as the "Dry Well area" throughout this and earlier reports.

According to a 1941 site plan, Dry Well #3 is constructed of 8-inch concrete block with an 8 foot outside diameter, and extend down to approximately 16 feet below grade. The materials of construction and dimensions of Dry Wells #1 and 2 have not been confirmed. All three dry wells are currently inactive and have been filled in with soil and/or concrete debris to grade. Two of the dry wells are located beneath a concrete pad, while the third dry well is beneath soil and accessible via a manway.

The two other dry well structures located on the south side of the building and west of the southeast loading dock were reportedly removed in 1989 at the time that the former underground storage tanks, also located in this area, were removed. (See Figure 3.) According to the 1941 building plan, these dry wells are rectangular in shape with dimensions of 8 feet by 5 feet. The absence of these two dry wells adjacent to the loading dock will be confirmed through trenching and/or test pitting which will be conducted as part of this work plan.

3.2 Dry well Soil Analytical Data

Past subsurface investigations conducted in the Dry Well Area confirm that the soil located within the three out-of-service dry wells contain VOCs. These VOCs are the primary source of contamination to groundwater.

Previous soil investigations conducted in the Dry Well area as part of the Remedial Investigation (RI) included the collection of soil samples from the out-of-service dry wells as well as a soil-gas survey in the area surrounding the dry wells. Methods and results are described in detail in the RI report (H2M, 1996). These results are summarized below:

- The soil-gas survey detected elevated volatile organic compounds (VOCs) in the Dry Well area. These results are consistent with previous analytical results from this area which showed elevated levels of trichloroethene (TCE), tetrachloroethene (PCE) and cis-1,2-dichloroethene (1,2-DCE).

- Analysis of soil samples from the dry well soil borings confirmed the presence of elevated concentrations of VOCs and indicated that elevated concentrations of some metals are also present. The primary contaminants detected include tetrachloroethene, trichloroethene, toluene, ethylbenzene, xylenes, with lower levels of 1,2-dichloroethene. The highest concentrations of VOCs and metals detected during the dry well soil boring program were associated with sludge material contained within the inactive dry wells. In addition, low concentrations of semi-volatile organic compounds (SVOCs) and trace concentrations of pesticides and PCBs were detected.

In June 1997, soil samples were collected from each of the dry wells for analysis of waste characterization parameters (i.e., TCLP VOCs, TCLP Semi-Volatile Organic Compounds (SVOCs), TCLP Metals, TCLP Pesticides and Herbicides, and for PCBs, pH, ignitability and reactivity). From each of the three dry wells, two samples composited from between 0 to 30 feet were obtained. The "WU" samples from each dry well were collected by compositing individual soil samples from 12 through 18 feet below grade, while the "WM" samples from each dry well were composites of soil samples from 25 through 31 feet below grade. The analytical data for the waste characterization parameters is summarized in Table 1 of Appendix A.

4.0 Scope of Work

In accordance with the ROD, soil from within the three dry wells (Dry Wells #1, 2, and 3) will be excavated to a depth of approximately 30 feet below grade. In addition, subsurface investigation activities will be conducted in the southeast loading dock to confirm the presence or absence of dry well structures.

4.1 Southeast Loading Bay Subsurface Investigation

During previous soil sampling conducted for the RI, it could not be confirmed whether the dry wells that served the southeast loading bay, and the dry well located immediately west of the loading bay have been removed. To help determine this, shallow trenches or test pits will be dug in the area west of the southeast loading bay to determine if any evidence of the two dry wells shown in the original site plans in this area can be found. The trenches and/or test pits will allow for visual inspection of the subsurface to help confirm the presence or absence of these subsurface structures. The general area where trenching/test pitting will be performed is shown in Figure 3.

Trenching and/or test pitting will be performed utilizing a backhoe. Field screening during these activities will be performed using a portable photoionization detector (PID). The trenches and/or test pits will extend to a maximum depth of 6 feet below grade, unless a subsurface structure is encountered, at which time the trenches and/or test pits will extend deep enough to allow for a visual inspection and assessment of the structure and surrounding soil conditions. Samples will be collected from around and/or beneath the structure to determine if concentrations in soil warrant any remedial actions. Sampling will be performed utilizing the bucket of the backhoe or other sampling equipment to preclude the need for field personnel to enter the excavation. The samples collected will be analyzed for target Compound List (TCL) VOCs, TCL SVOCs, target analyte list (TAL) Metals, and TCL Pesticides/PCBs, utilizing

NYSDEC analytical services protocol (ASP) contract-laboratory protocols (CLP) procedures (see Table 1). The list of QA/QC samples to be utilized is included in Table 1.

If no subsurface structure is encountered in any of the trenches and/or test pits, two confirmatory soil samples will be collected from the loading dock area from the approximate location of each of the two dry wells being investigated. Their locations will be established based on the 1941 site plans. The soil samples will be collected from the bottom of the trenches and/or test pits (at a maximum depth of 6 feet below grade). The samples will be analyzed for TCL VOCs, TCL SVOCs, TAL Metals, and TCL Pesticides/PCBs, utilizing NYSDEC ASP CLP format. The list of QA/QC samples to be utilized is included in Table 1.

Following completion of sampling activities, the trenches and/or test pits will be backfilled to grade with the soil removed from the excavation.

4.2 Dry Well Excavation

The remediation of the soil and sludges within and beneath the three dry wells (#1, 2, and 3) will extend to 30 feet below grade. Piping connecting the three dry wells will be removed. In addition, piping connecting Dry Well #1 to the building will be cleaned and capped at the exterior building wall. Soil removed from the dry wells will be disposed of off-site at a RCRA permitted treatment/disposal facility.

Excavation of the three dry wells will be conducted in four phases as summarized below, and described in further detail in the sections to follow.

- Phase I: Pre-Construction Activities
  - Subsurface utility markouts
  - Obtain local excavation permits, as required
  - Sample dry wells to obtain waste approvals from disposal facility
- Phase II: Excavation Activities
  - Work zone delineation
  - Soil vapor extraction system temporary shutdown
  - Sheeting and shoring
  - Dry well soil excavation
  - Loading of soils for disposal
  - Confirmatory soil samples

4.2.1 Confirmatory Soil Samples

Upon excavating to approximately 30 feet below ground surface (bgs) at each dry well, bottom soil samples will be brought to the surface using the bucket of the excavator and examined visually and olfactory to determine if non-sludge material (e.g., native soils such as sand and gravel) are present. The excavation will be continued, as feasible and practicable, if sludge materials are still evident in the bottom soil samples.

One confirmatory soil sample will be collected from the bottom of each excavation, at approximately 30 feet bgs, once field inspections indicate native materials have been encountered. Soil samples will be collected utilizing the bucket of the excavator and analyzed for TCL SVOCs, TCL Pesticides/PCBs and TAL Metals using NYSDEC ASP CLP procedures, and for TCL VOCs using report-only format. Samples for TCL VOC and TCL SVOC analysis will be collected as grab samples from the center of each dry well excavation, while the samples for TAL Metals analysis will be a composite sample from the bottom of each excavation. QA/QC samples to accompany these soil matrix samples are included in Table 1.

The samples will be submitted to H2M Labs, Inc. for expedited turn-around, which will allow for evaluation of the analytical results prior to backfilling. Additional soil may be removed from the bottom of the excavation, to the extent practicable and feasible, depending on the results of the post-excavation soil samples.

- Dust Control Procedures
- Community Air Monitoring

- Phase III: Site Restoration
  - Backfill dry wells to grade
  - SVE system start-up
  - Decontamination of equipment

- Phase IV: Transport & Disposal
  - Manifesting

4.3 Phase I - Pre-Construction Activities

Phase I of this project, pre-construction activities, is anticipated to begin in April 1998. Activities conducted during the pre-construction phase are necessary to ensure the successful completion of this project in a timely and safe manner. Pre-construction activities will include the securing of local excavation permits (as required), coordination of the mark-out of subsurface utilities, and the characterization of the soil and sludge waste stream for off-site disposal.

4.3.1 Local Permits

Excavation permits, as may be required by the local municipality, will be obtained by the remediation contractor performing this work prior to initiation of field activities.

4.3.2 Subsurface Utility Mark-Outs

Several below grade utilities are known to be present in the area of the dry wells. These utilities include the SVE system piping, municipal water lines, storm water drainage and electrical lines. All subsurface utilities within the work area will be identified prior to any excavation activities. This will include notifying the New York City and Long Island One Call Center (516-661-6000) for utility mark-outs. Any live utilities will be identified and tagged.

4.3.3 Waste Characterization and Waste Stream Approval

Based upon source operations, Lockheed Martin has determined that the soils will be classified as F002-listed RCRA hazardous waste for solvent organic compounds from non-specific sources. The soils will be pre-treated at the disposal to meet Land Disposal Regulation (LDR) limits prior to secure landfill disposal. This disposal method was selected based on the results of the treatability test and the acceptance of the waste stream by the selected disposal facility (Michigan Disposal).

Waste stream approvals have been obtained from the treatment/disposal facility prior to initiating dry well soil excavation activities. This allows for direct loading of the soil for off-site disposal. To facilitate the pre-approval process, soil samples were obtained from each of the dry wells on February 13, 1998 for additional waste characterization analyses. The samples were analyzed for TCLP VOCs. Copies of the laboratory reports are included in Appendix A. Additional sample volume was also retained and sent to the disposal facility for treatability testing and profiling.

4.4 Phase II - Excavation Activities

4.4.1 Work Zone Delineation

Prior to mobilizing equipment to the facility, the limits of the work zones will be established. These work zones include:

- Exclusion zone
- Contaminant reduction zone
- Truck staging zone
- Clean/support zone

4.4.1.1 Exclusion Zone

The exclusion zone will be established around the perimeter of the three dry wells and around the area in which trenching is to be performed near the southeast loading bay. Excavation and truck loading activities will be conducted from within the exclusion zone. Only those persons with the proper training that are essential in performing the work will be allowed to enter the exclusion zone. All personnel entering the exclusion zone must have the appropriate personnel protective equipment as identified in the Health and Safety Plan (HASP), attached as Appendix C, or in accordance with the direction of the site Health and Safety Officer.

4.4.1.2 Contaminant Reduction Zone

A contaminant reduction zone will be established immediately adjacent to the exclusion zone for decontamination of personnel and cleaning of all heavy equipment, vehicles, tools and supplies. The decontamination station will be lined with a polyethylene tarp and perimeter of the contaminant reduction zone will be surrounded with an orange safety fence. This zone will include equipment to be utilized for personnel and equipment decontamination including:

- Boot wash and rack
- Eye wash station
- Recovery drum for personnel protective equipment materials
- Hand brushes
- Potable water supply

4.4.1.3 Truck Staging Zone

The truck staging area, to be utilized for the loading of excavated soils into dump trucks, will be established immediately adjacent to the exclusion zone. The dump trucks will be loaded via equipment operated by the excavation crew working from within the exclusion zone.

4.4.1.4 Clean/Support Zone

The clean/support zone will be established outside of the contaminant reduction zone. This area will be utilized for the storage and staging of non-contaminated equipment and materials. Personnel and equipment from the contaminant reduction zone may not be moved into this area until the proper decontamination procedures, as identified in the HASP, have been completed.

4.4.2 Temporary Shutdown of the SVE System

Immediately prior to initiating field activities, the SVE system will be temporarily shutdown to allow for selected disassembly of any SVE piping located within the dry well excavation work area. This will be conducted to minimize damage to the IRM subsurface piping system.

During dry well backfilling activities, the SVE piping will be reinstalled and the system will be brought back on line. It is estimated that the SVE system will be out of service for a total of two to three weeks to accommodate the dry well excavation activities. The NYSDEC will be notified at least two days prior to the planned shutdown of the SVE system.

4.4.3 Sheeting

Because excavation at each of the dry wells will be conducted to a depth of 30 feet bgs, sheeting/shoring is required to protect the side walls of each dry well and the foundation of the adjacent building, and to prevent excavation cave-ins. This will be accomplished utilizing interlocking steel sheeting measuring 10 feet by 10 feet installed surrounding each dry well. The sheeting boxes will be driven into the ground to the required depth by a sheeting contractor prior to the excavation of each drywell. Following soil removal to the desired depth, the sheeting boxes will be removed concurrent with backfilling of the excavation, and then driven around the next dry well to be excavated.

To prepare the ground surface for the installation of sheeting, the concrete slab overlying the dry wells will be saw cut and removed. Additionally, an area surrounding the three dry wells will be excavated to a depth of 4 feet bgs to:

- Confirm the location of the two dry wells which are currently not accessible at grade,
- Allow for equipment maneuvering during installation of the steel sheeting boxes, and
- Assist in the identification of any unknown underground utilities within the exclusion zone, including piping that interconnects the three dry wells, prior to installing the sheeting. Any utilities within the top 4 feet of the excavation will be disconnected, and temporarily removed. Piping from the building to Dry Well #1 will be removed and capped at the building exterior.

The top 4 feet of soil from within the circumference of each dry well will be loaded directly into trucks for off-site disposal. Soil from the top 4 feet from around the outside perimeter of the dry wells will be staged on plastic. The soil will be analyzed for TCL VOCs, TCL SVOCs, TAL Metals and TCL Pesticides/PCBs (report only format). The soil may be reused as fill if it does not exhibit signs of impact (based on analytical results). Otherwise, the staged soil will be combined with the dry well soil for off-site disposal.

4.4.4 Excavation Activities

Soil and sludge from within the 10 foot by 10 foot area sheeting box surrounding each dry well will be excavated utilizing a trackhoe excavator and clam shell crane with a vertical reach of at least 30 feet. The excavation will proceed to a depth of approximately 30 feet bgs. The total soil volume is estimated to be 474 tons, estimated based on the following:

Volume calculation: 10' x 10'
30' deep

Formula:	10' x 10' x 30'	=	3,000 cubic feet/dry well
	Cubic feet/27 cubic feet	=	111.1 cubic yards/dry well
Soil density:	105 lbs. per cubic feet 1 cubic yard	=	27 cubic feet
	105 lbs. per cu. ft. x 27 cu. ft. (1 cu. yd.) = 2,835 lbs./cu. yd.		
Density conversion:	$\frac{\text{2,835 lbs. per cubic yard}}{\text{2,000 lbs./ton}}$	=	1.42 tons/cu. yd.
Soil volume:	111.1 cu. yd. x 1.42	=	158 tons/dry well
Total Volume:	158 tons/dry well x 3 dry wells	=	474 tons

During soil removal activities, the excavated soil will be either directly loaded onto dump trucks, if logistically feasible, or will be temporarily staged within the exclusion zone on top of plastic, and then later loaded onto dump trucks for transport off-site. The piles of soil will be covered with plastic at all times except if the pile is in use.

At the end of each day, the excavation will be secured by placing plywood over the excavation and the placement of safety fencing and high visibility caution tape around the excavation's perimeter to warn against potential hazards and open excavations. The work area is located within the secured fenced-in area of the Lockheed Martin facility.

4.4.5 Traffic Flow Pattern

A traffic flow pattern will be established for movement of heavy equipment and dump trucks associated with this project. The soil transportation vehicles will travel south from the Long Island Expressway to New Hyde Park Road, head west on Union Turnpike, and will enter the site through a gate located off of Union Turnpike. Each truck will travel through the facility's parking lot and enter the work zone located outside the southeast corner of the main building. The parking lot will serve as a holding area for the trucks prior to being loaded, as well as allow for the drivers to maneuver the trucks into position. From the parking lot, the trucks will individually enter the truck staging zone for loading by backing up through a gate located immediately to the east of the Dry Well Area. Once each truck is loaded, the truck will reenter the parking lot where the driver will receive its shipping papers. The driver will also tarp, placard and inspect each vehicle prior to its leaving the site. Each vehicle will exit the site through the Union Turnpike gate heading east, and then north on New Hyde Park Road to the Long Island Expressway. This traffic pattern will limit the truck traffic to the eastern portion of the site while also avoiding Lakeville Road and Marcus Avenue. The anticipated traffic flow pattern is shown on Figure 4. Modification to this access route will be made as necessary based on site and local road conditions.

4.4.6 Dust Control Procedures

During the excavation of the dry well soils, the exposed surface area might cause excessive amounts of airborne dust particles. To minimize this hazard, water may be utilized for dust suppression. An on-site potable water source will be utilized to lightly spray water on the surface of the excavation. The frequency and amount of water required to control the dust will be determined by the characteristics of the soil and the ambient temperature. Stockpiled soil will be kept covered with plastic at all times when the pile is not in use to help minimize the release of dust.

4.4.7 Community Air Monitoring Plan

During excavation activities, air monitoring for volatile organic compounds and particulates will be conducted at the perimeter of the work zone, as well as within the work zone in accordance with the HASP. Real time monitoring will be conducted for volatile organic compounds (VOCs) utilizing an 11.7 eV portable photoionization detector (PID), and for dust utilizing an aerosol dust meter (PDM3).

Continuous ambient air monitoring will be conducted within the work/exclusion and at the perimeter of the clean/support zones. PID measurements will be recorded hourly if levels are within 5 parts per million (ppm) of background levels. If readings at the downwind perimeter of the work zone exceed 3 ppm above background in the breathing zone, air monitoring will be expanded to the downwind property perimeter. The air monitoring locations within the work/exclusion and clean/support zones, and the property perimeter will be selected to be downwind of site activities based upon wind direction at the time of monitoring. PID measurements shall be recorded hourly if levels are within 3 ppm of background levels. For PID readings above 3 ppm of background levels, readings shall be recorded in 15 minute intervals or whenever a new high PID reading is encountered. If total VOC levels at the clean/support perimeter exceeds 5 ppm above background, all site excavation and loading activities will be halted and the actions contained in the Vapor Emission Response Plan followed (see Appendix B).

Air monitoring and response levels for determining personnel respiratory upgrades for workers within the exclusion zone are specified within the project specific HASP (Appendix C).

Similarly, air monitoring will also be conducted for particulates at upwind, downwind and within the work area at temporary particulate monitoring stations. If the particulate levels exceed 100 ug/m^3 above background at the work zone perimeter, air monitoring will be conducted at the downwind property line. If downwind particulate levels at the work zone perimeter reach 150 ug/m^3 greater than the measured upwind particulate level, engineering controls will be employed. Dust suppression techniques may include the spraying of water over the area in which the dust is becoming airborne.

All real time air monitoring data will be recorded on daily log sheets and made available at the site for NYSDEC and/or Nassau County Department of Health personnel to review.

4.5 Phase III - Site Restoration

4.5.1 Backfill and Restoration

Following the removal of soil at each of the dry wells, the excavation will be backfilled to original grade level with certified clean soil or sand. The backfilling operation will be compacted to meet 95 percent proctor density of the fill material. The backfill material will be placed in 12-inch lifts and compacted to grade with a remote-control mini-single drum roller or a plate tamper mounted to a trackhoe excavator. This will preclude the need for personnel to enter the excavation. The steel sheeting will be removed at the time the excavation is being backfilled. At the completion of the project, any removed or relocated utilities will be replaced.

4.5.2 Restart of SVE System

During dry well backfilling activities, the SVE piping will be reinstalled and the system will be brought back on line to resume operations.

4.5.3 Decontamination of Equipment

Upon completion of soil removal activities from the Dry Well area, the excavation equipment, including all tools, equipment and vehicles, will be decontaminated. Decontamination procedures will include manually wiping or pressure washing of all apparatus that have come into contact with the contaminated soils with a detergent solution. Equipment rinsing will be conducted within a portable polypropylene tank that is large enough to hold the piece of equipment that is being decontaminated (e.g., tools, sampling equipment, crane bucket, etc.). Any residual solids collected will be placed in the designated soils staging area and combined with the soil for off-site disposal. The liquid washwaters generated from the decontamination procedures will be contained and transferred to the groundwater IRM system for treatment through the granular activated carbon filters. All decontamination activities will be performed on a decontamination pad. The decontamination pad will be removed from the site at the completion of the project.

4.6 Phase IV - Waste Transportation and Disposal

The soil will be transported to the off-site disposal facility using licensed waste haulers. The disposal facility that will be used will be permitted to accept the waste soil. All shipments for off-site disposal will be accompanied by the necessary hazardous waste manifests, bills of lading, and/or land ban certifications as required by local, state and federal regulations for the proper shipment and disposal of wastes generated by site activities. Lockheed Martin will sign the manifests as the Generator.

5.0 Reporting

5.1 Record Keeping

Daily activity reports will be maintained which will outline the day's activities, personnel onsite and equipment utilized. In addition, a project log book will detail the day's activities on a hourly and task related basis. Each morning a field safety meeting will be held with all workers to review the upcoming days activities and hazards of the site. In addition, a daily transportation log will be maintained for the day's outgoing loads of soil and will include the following information:

- Site Name and address
- Treatment Storage and Disposal facility and approval code
- Date
- Manifest Documentation No.
- Vehicle No. (trailer/tractor tag)
- Tare Weight

Each load's final gross and net weight will be confirmed by the final disposal facility. Copies of all manifests, land ban certifications and any other shipping papers will be retained.

5.2 Closure Report

Upon completion of all field activities, a Dry Well Closure Report will be prepared and submitted to the NYSDEC. This report will summarize and document all field activities performed on the site including but not limited to:

- Narrative of the excavation activities performed including final depths attained, volume of soil removed, procedures followed, etc.,
- Summary of analytical results from subsurface investigation at the southeast loading bay,
- Summary of findings and recommendations for any additional actions, as warranted, if a subsurface structure was found to be present in the area of the southeast loading bay,
- Photographs of the remedial activities,
- Summary of field observations,
- Duration that SVE system was temporarily shut down, and
- Copies of waste disposal manifests for the dry well soils.

6.0 Schedule

Field activities are scheduled to commence in April 1998, pending approval of this work plan. It is anticipated that field activities will be approximately two to three weeks in duration. A schedule for the loading bay subsurface investigation and dry well removal activities is attached as Figure 5.

FIGURES

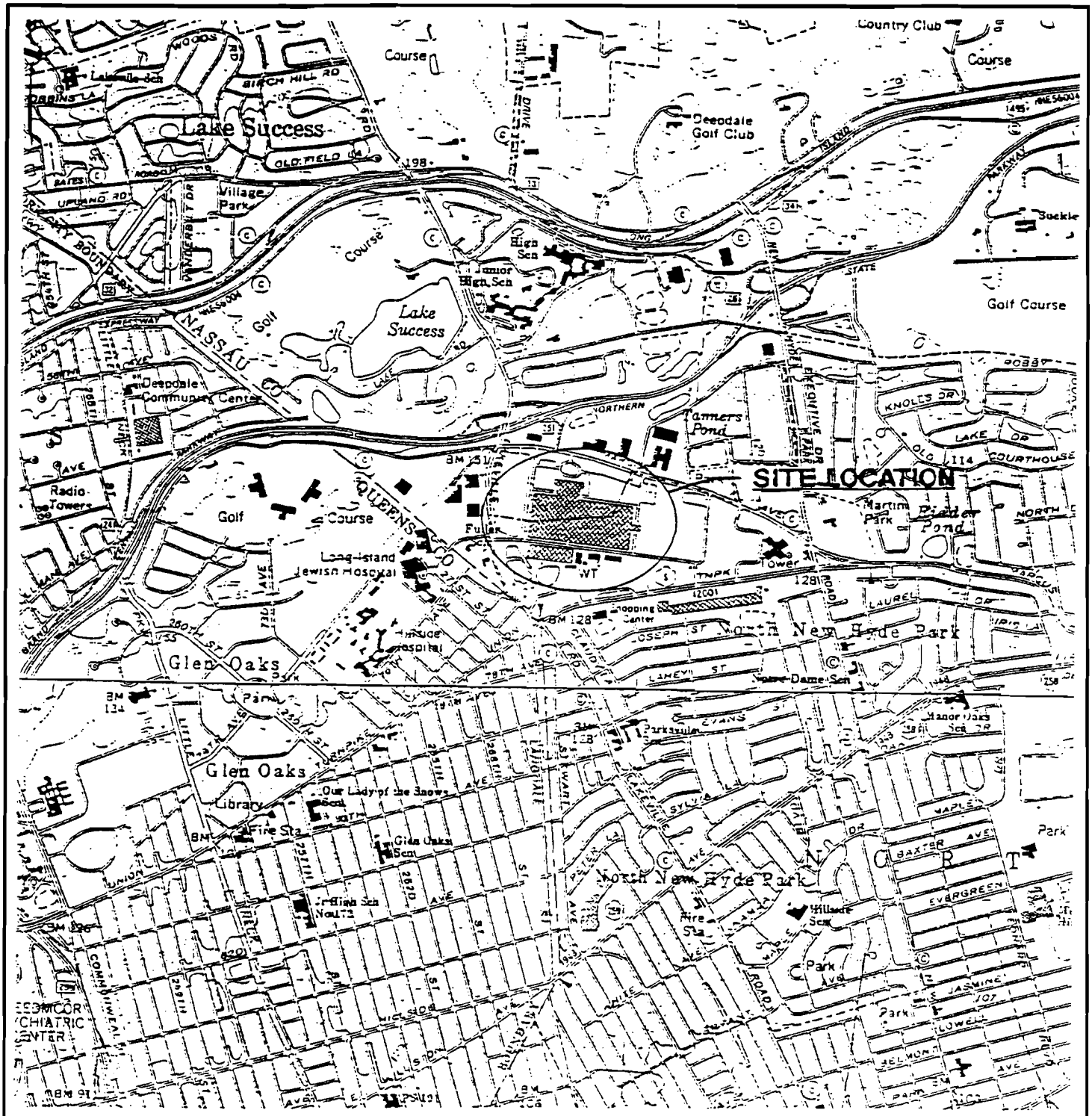


FIGURE 1

SITE LOCATION MAP

Lockheed Martin Corporation

Great Neck, York

References:
USGS 7.5 Minute Quadrangles
Sea Cliff, New York
Lynbrook, New York
Scale 1:24,000

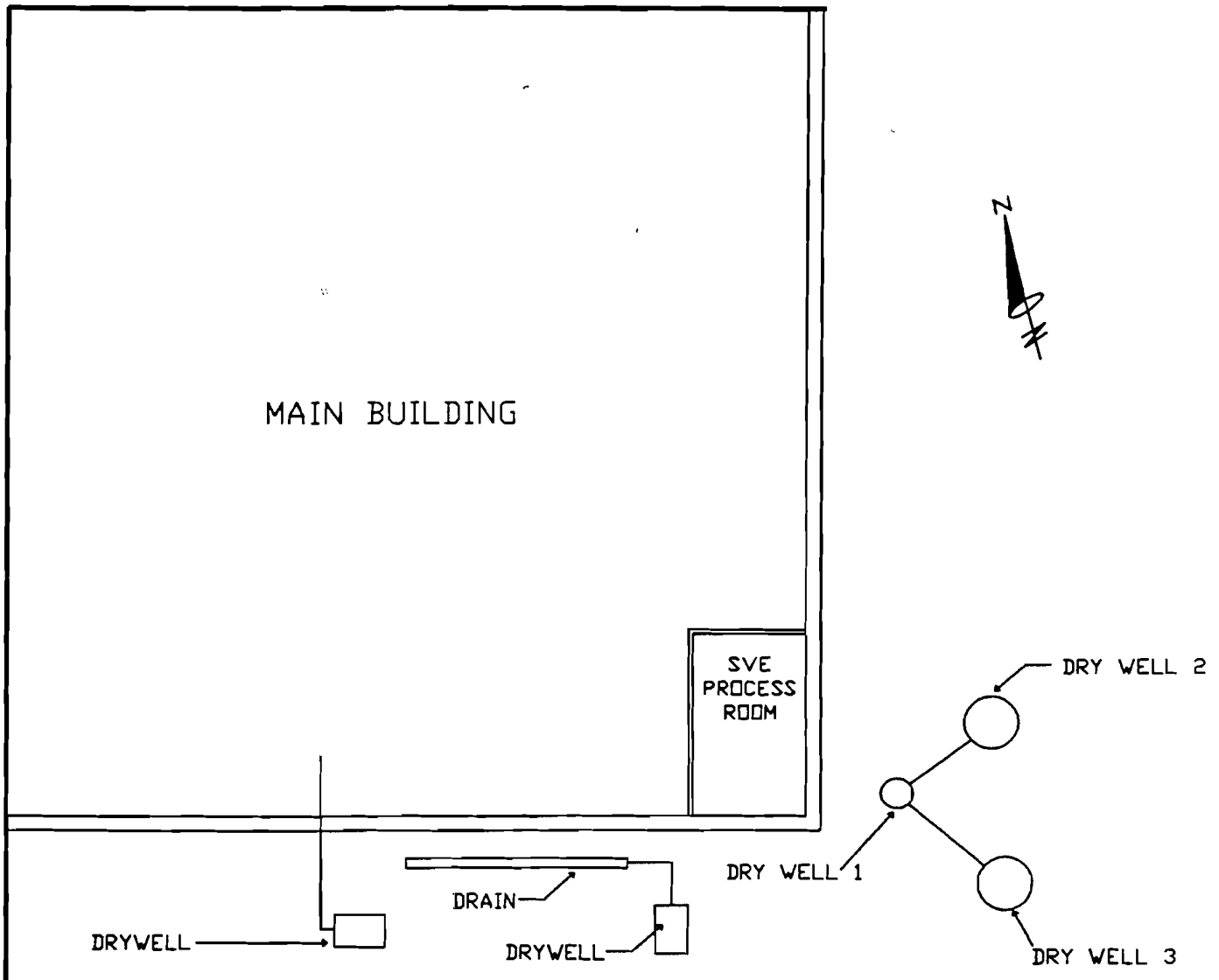
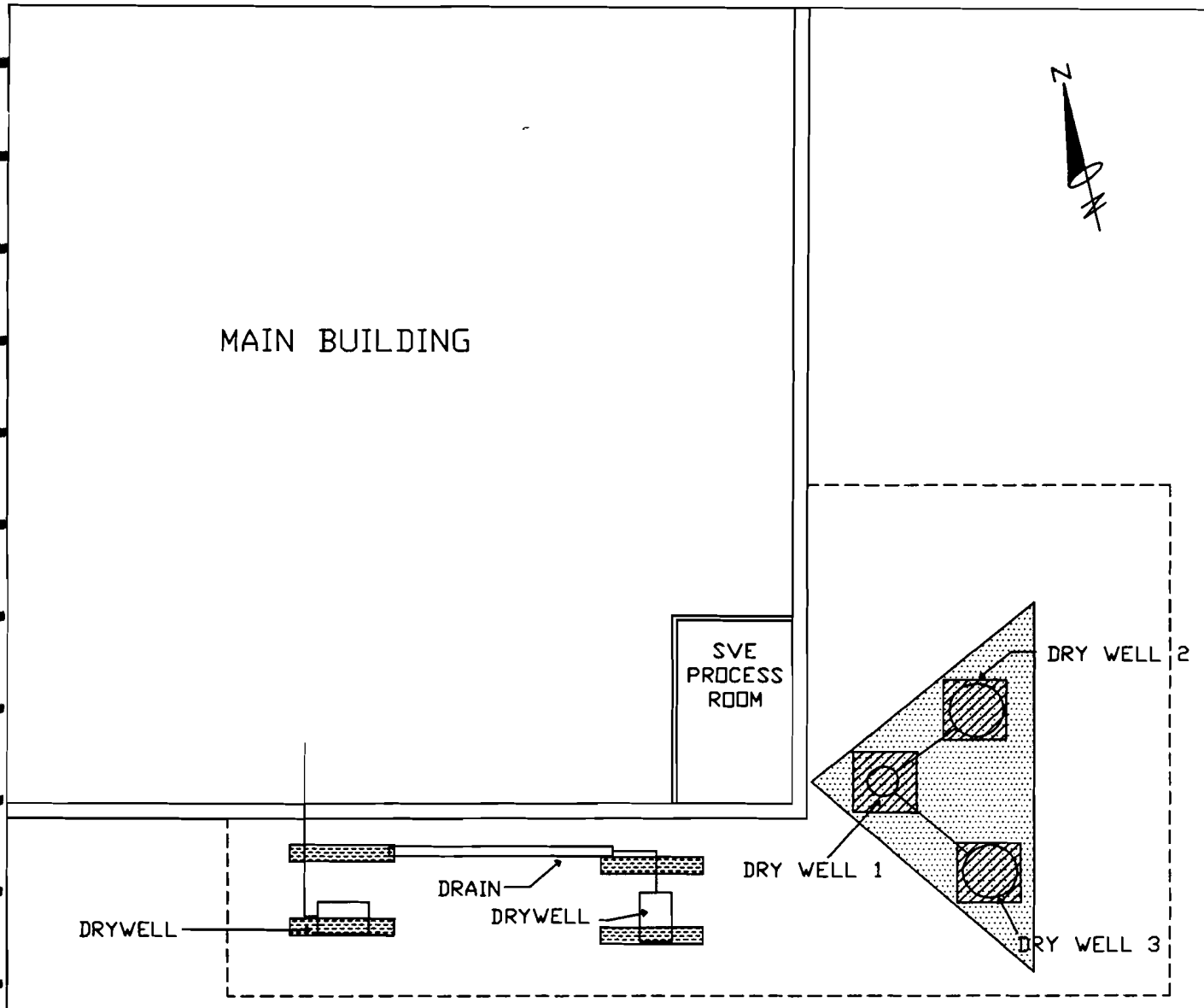


Figure 2
Dry Well Location Map
Lockheed Martin Corporation
Great Neck, New York



Approximate Scale

0′ 50′

Figure 3

Dry Well Excavation Map

Lockheed Martin Corporation

Great Neck, New York

Legend:

- Limit of Exclusion Zone
- Excavation to +/- 30' below grade
- Trench to a depth of +/- 6' below grade
- Soil removal to +/- 4' below grade

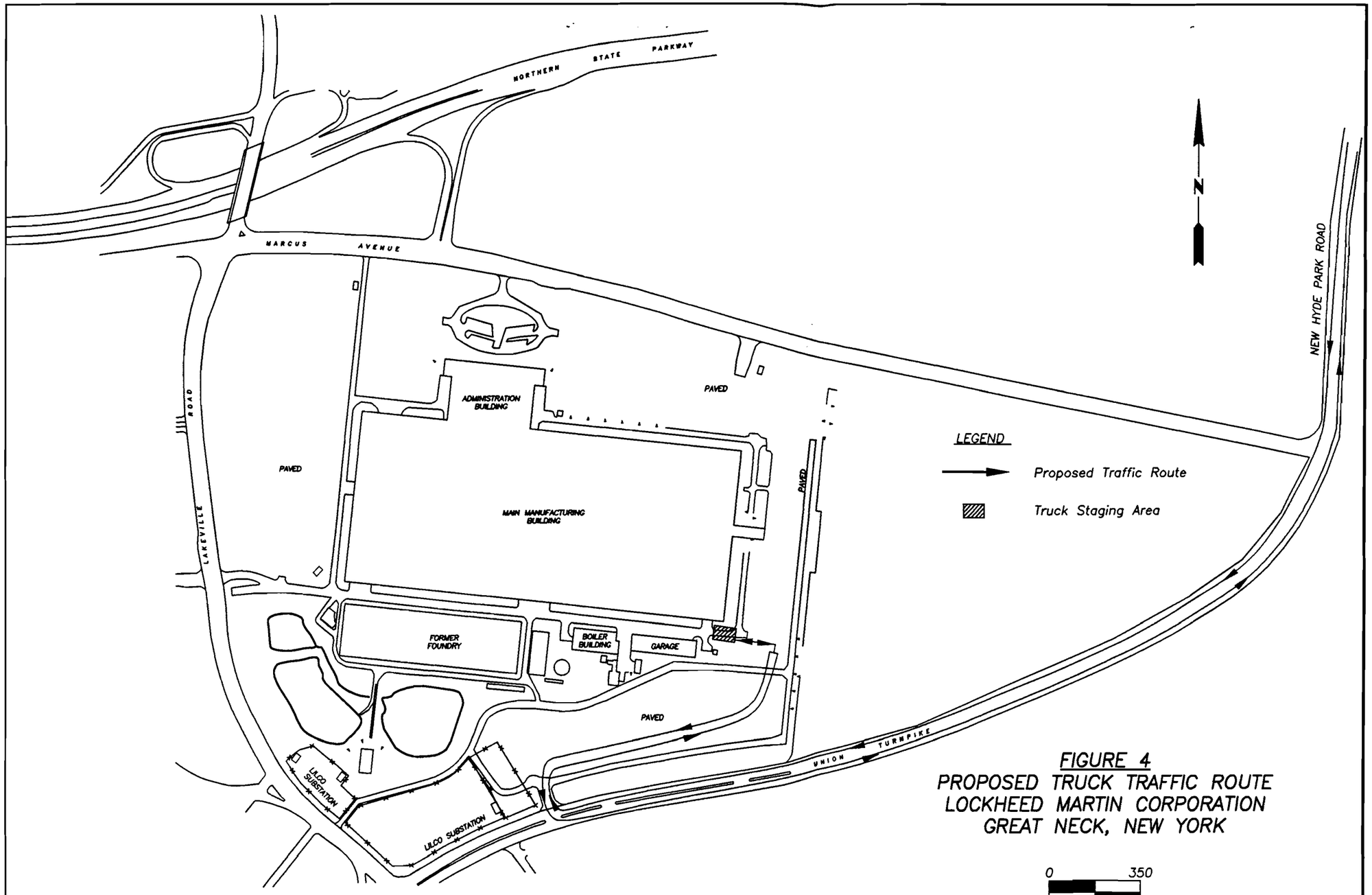
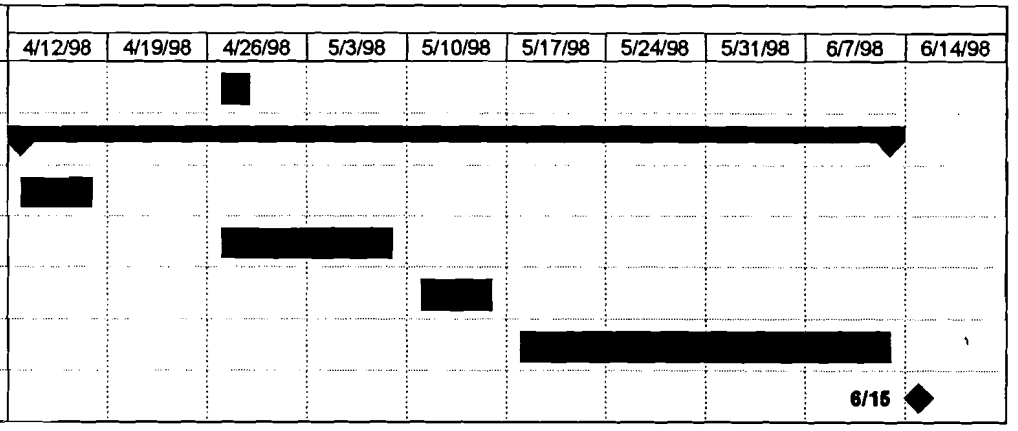


FIGURE 4
PROPOSED TRUCK TRAFFIC ROUTE
LOCKHEED MARTIN CORPORATION
GREAT NECK, NEW YORK

H:\ZLOR_96\ZLOR9601\CADD\TRKROUTE.DWG

Figure 5
Project Schedule
Lockheed Martin Great Neck

ID	Task Name	Duration	Start	Finish
1	**Trenching/Test Pits at Loading Dock**	**2d**	**4/27/98**	**4/28/98**
2	**Dry Well Area Excavation**	**45d**	**4/13/98**	**6/12/98**
3	Phase I - Pre-Construction Activities	5d	4/13/98	4/17/98
4	Phase II - Excavation Activities	10d	4/27/98	5/8/98
5	Phase III - Site Restoration	5d	5/11/98	5/15/98
6	Preparation of Report	20d	5/18/98	6/12/98
7	**Submit Report to NYSDEC**	**1d**	**6/15/98**	**6/15/98**



TABLES

H2MGROUP

TABLE 1
SOIL AND QA/QC SAMPLE MATRIX
LOCKHEED MARTIN
GREAT NECK, NEW YORK

Sampling Event	Number of Field Samples	Chemical Analyses	Level of QA/QC	QA/QC Samples				Total Number of Samples
				Field Blanks	Trip Blanks	Blind Duplicates	MS/MSD Samples	
Southeast Loading Bay Test Pits[1]	4	TCL VOCs[3], TCL SVOCs[4], TCL Pesticides/PCB[5]s and TAL Metals[6]	ASP CLP[8]	1	1[2]	1	2	9
Dry Well Excavations	3 (1 per Drywell)	TCL SVOCs[4], TCL Pesticides/PCBs[5] and TAL Metals[6]	ASP CLP[8]	1	NA	1	2	7
Top 4 Feet of Soil Around Dry Wells	1	TCL VOCs[3], TCL SVOCs[4], TCL Pesticides/PCB[5]s and TAL Metals[6]	Report Only	1	1[2]	0	0	3
Dry Well Excavations	3 (1 per Drywell)	TCL VOCs[7]	Report Only	0	3	1	0	7

Notes:

[1] Four test pits will be excavated and require sampling.

[2] The test pits are expected to be conducted in one day.

[3] All samples will be analyzed for TCL VOCs using NYSDEC Method 95-1. Analysis will include Freon 113.
The holding time for TCL VOCs is seven days and the samples must be cooled to 4°C for preservation.
One 2-oz glass jar is the required container.

[4] All samples will be analyzed for TCL SVOCs using NYSDEC Method 95-2.
The holding time for TCL SVOCs is 5 days for extraction and 40 days for analysis and the samples must be cooled to 4°C for preservation.
One 4-oz glass jar is the required container.

[5] All samples will be analyzed for TCL Pesticide/PCBs using NYSDEC Method 95-3.
The holding time for TCL PCBs is 5 days for extraction and 40 days for analysis and the samples must be cooled to 4°C for preservation.
One 4-oz glass jar is the required container.

[6] All samples will be analyzed for TAL Metals using NYSDEC 200.7 CLP-M.
The holding time for TAL Metals is six months.
One 4-oz glass jar is the required container.

[7] All samples will be analyzed for TCL VOCs using EPA Method 8240.
The holding time for TCL VOCs is seven days and the samples must be cooled to 4°C for preservation.
One 2-oz glass jar is the required container.

[8] Full ASP category B delivery package.

APPENDIX A
Waste Characterization Data
For Dry Wells

H2M GROUP

Table 1
Waste Characterization Data from Dry Well Samples
Lockheed Martin Corporation
Great Neck, New York
June 1997

Sample ID#	Dry Well #1		Dry Well #2		Dry Well #3	
	WU	WM	WU	WM	WU	WM
Lab ID#	9715572	9715573	9715569	9715570	9715576	9715575
TCLP Volatiles, ug/l						
Vinly Chloride	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10
Chloroform	<10	<10	<10	<10	<10	<10
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10
Carbon Tetrachloride	<10	<10	<10	<10	<10	<10
Trichloroethene	<10	10,000D	<10	11,000D	<10	3,000D
Tetrachloroethene	80	13,000D	<10	5,700D	36	11,000D
Chlorobenzene	<10	<10	<10	<10	<10	<10
Benzene	<10	<10	<10	<10	<10	<10
2-Butanone (MEK)	<10	<10	<10	<10	<10	<10
TCLP Semi-Volatiles, ug/l						
1,4-Dichlorobenzene	<10	<10	<10	<10	<10	<10
Hexachloroethane	<10	<10	<10	<10	<10	<10
Nitrobenzene	<10	<10	<10	<10	<10	<10
Hexachlorobutadiene	<10	<10	<10	<10	<10	<10
2,4-Dinitrotoluene	<10	<10	<10	<10	<10	<10
Hexachlorobenzene	<10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	<10	<10	<10	<10	<10	<10
Pentachlorophenol	<25	<25	<25	<25	<25	<25
2-Methlyphenol	<10	<10	<10	16	<10	<10
2,4,5-Trichlorophenol	<25	<25	<25	<25	<25	<25
4-Methylphenol	<10	11	<10	19	<10	<10
3-Methylphenol	<10	*	<10	*	<10	<10
Pyridine	<10	<10	<10	<10	<10	12
TCLP Herbicides, ug/l						
2,4,-D	<100	<100	<100	<100	<100	<100
2,4,5-TP (Silvex)	<10	<10	<10	<10	<10	<10
TCLP Pesticides, ug/l						
Lindane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlo Epoxide	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methoxychlor	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toxaphene	<10	<10	<10	<10	<10	<10
Chlordane	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Polychlorinated Biphenyls, mg/kg						
Aroclor 1016	<3.5	<3.7	<3.5	<3.6	<3.4	<3.6
Aroclor 1221	<3.5	<3.7	<3.5	<3.6	<3.4	<3.6
Aroclor 1232	<3.5	<3.7	<3.5	<3.6	<3.4	<3.6
Aroclor 1242	<3.5	<3.7	<3.5	<3.6	<3.4	<3.6
Aroclor 1248	<3.5	19	<3.5	4.6	<3.4	6.4
Aroclor 1254	<3.5	<3.7	<3.5	<3.6	<3.4	<3.6
Aroclor 1260	<3.5	3.1J	<3.5	0.9J	<3.4	0.9J
Inorganics, mg/l						
Silver	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01
Arsenic	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Barium	0.35	0.34	0.52	0.42	0.35	0.53
Cadmium	0.02	<0.005	0.01	<0.005	0.01	<0.005
Chromium	0.04	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury	<0.20 ug/l	<0.20 ug/l	<0.20 ug/l	<0.20 ug/l	<0.20 ug/l	<0.20 ug/l
Lead	0.87	0.28	1.8	0.08	0.1	0.2
Selenium	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
pH (Corros.)	6.6 units	7.5 units	7.6 units	7.4 units	9.7 units	7.1 units
Reactivity	No	No	No	No	No	No
Flashpoint	>60° C	>60° C	>60° C	>60° C	>60° C	>60° C

Notes :

< - Indicates that analyte was not detected above the instrument detection limit

WU Samples were composited from 12 to 18 feet, and WM samples were composited from 25 to 31 feet below grade.

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)420-8436 NYSDOH ID# 10478

LAB NO: 9804371

INTEGRATED TECHNICAL SERVICES
MARK LEWIS
P.O. BOX 156
WINSLOW, NJ 08095

TYPE..... SOIL
ROUTINE
METHOD.... GRAB

DATE COLLECTED. 02/13/98
DATE RECEIVED.. 02/13/98
COLLECTED BY... VA03
PROJECT NO..... 1475

POINT NO:
LOCATION: DW-2

REMARKS: LOCKHEED,GREAT NECK

TCLP VOLATILES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
VINYL CHLORIDE	<100		
1,1-DICHLOROETHENE	<100		
CHLOROFORM	<100		
1,2-DICHLOROETHANE	<100		
CARBON TETRACHLORIDE	<100		
TRICHLOROETHENE	590		
BENZENE	<100		
TETRACHLOROETHENE	1400		
CHLOROBENZENE	<100		
2-BUTANONE (MEK)	<100		

COPIES TO:

DATE ISSUED 02/27/98

DATE RUN..... 02/26/98
DATE REPORTED.. 02/27/98

J M Llewin
LABORATORY DIRECTOR

ORIGINAL

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)420-8436 NYSDOH ID# 10478

LAB NO: 9804372

INTEGRATED TECHNICAL SERVICES
MARK LEWIS
P.O. BOX 156
WINSLOW, NJ 08095

TYPE..... SOIL
ROUTINE
METHOD.... GRAB

DATE COLLECTED. 02/13/98
DATE RECEIVED.. 02/13/98
COLLECTED BY... VA03
PROJECT NO..... 1475

POINT NO:
LOCATION: DW-3

REMARKS: LOCKHEED,GREAT NECK

TCLP VOLATILES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
VINYL CHLORIDE	<10		
1,1-DICHLOROETHENE	<10		
CHLOROFORM	<10		
1,2-DICHLOROETHANE	<10		
CARBON TETRACHLORIDE	<10		
TRICHLOROETHENE	<10		
BENZENE	<10		
TETRACHLOROETHENE	22		
CHLOROBENZENE	<10		
2-BUTANONE (MEK)	<10		

COPIES TO:

DATE ISSUED 02/27/98

DATE RUN..... 02/24/98
DATE REPORTED.. 02/27/98

ORIGINAL

LABORATORY DIRECTOR

H2M LABS, INC.
575 Broad Hollow Road, Melville, N.Y. 11747
(516)694-3040 FAX:(516)420-8436 NYSDOH ID# 10478

LAB NO: 9804370

INTEGRATED TECHNICAL SERVICES
MARK LEWIS
P.O. BOX 156
WINSLOW, NJ 08095

TYPE..... SOIL
ROUTINE
METHOD.... GRAB

DATE COLLECTED. 02/13/98
DATE RECEIVED.. 02/13/98
COLLECTED BY... VA03
PROJECT NO..... 1475

POINT NO:
LOCATION: DW-1
REMARKS: LOCKHEED,GREAT NECK

TCLP VOLATILES - (ug/l)

PARAMETER (S)	RESULT	PARAMETER (S)	RESULT
VINYL CHLORIDE	<200		
1,1-DICHLOROETHENE	<200		
CHLOROFORM	<200		
1,2-DICHLOROETHANE	<200		
CARBON TETRACHLORIDE	<200		
TRICHLOROETHENE	590		
BENZENE	<200		
TETRACHLOROETHENE	2400		
CHLOROBENZENE	<200		
2-BUTANONE (MEK)	<200		

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DATE ISSUED 02/27/98

DATE RUN..... 02/24/98
DATE REPORTED.. 02/27/98

ORIGINAL

LABORATORY DIRECTOR

APPENDIX B
Community Air Monitoring Plan
For Intrusive Investigations

Community Air Monitoring Plan (Ground Intrusive Activities)

Real-time air monitoring, for volatile compounds and particulate levels at the perimeter of the work area is necessary. The plan must include the following:

- Volatile organic compounds must be monitored at the downwind perimeter of the work area on a continuous basis. If total organic vapor levels exceed 5 ppm above background, work activities must be halted and monitoring continued under the provisions of a Vapor Emission Response Plan. All readings must be recorded and be available for State (DEC & DOH) personnel to review.
- Particulates should be continuously monitored upwind, downwind and within the work area at temporary particulate monitoring stations. If the downwind particulate level is 150 $\mu g/m^3$ greater than the upwind particulate level, then dust suppression techniques must be employed. All readings must be recorded and be available for State (DEC & DOH) personnel to review.

Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- the organic vapor level 200 ft. downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

Community Air Monitoring Plan
(Ground Intrusive Activities)

Major Vapor Emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must 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 if the following levels persist for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect;

- if organic vapor levels are approaching 5 ppm above background.

However, the Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels are greater than 10 ppm above background.

Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in the Health and Safety Plan of the Work Plan will go into effect.
2. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation.
3. Frequent air monitoring will be conducted at 30 minutes intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Safety Officer.

92275PRO0524

APPENDIX C
CONTRACTOR'S HEALTH & SAFETY PLAN

HEALTH AND SAFETY PLAN
DRY WELL EXCAVATION PROJECT

LOCKHEED MARTIN CORPORATION
GREAT NECK, NEW YORK

SITE ID. 130045

Submitted by
INTEGRATED TECHNCIAL SERVICES
PO Box 156
Winslow, NJ 08095

April 1998

INTEGRATED TECHNICAL SERVICES, INC.

Dry Well Excavation Project

Health and Safety Plan

Lockheed Martin Corporation

Great Neck, New York

April 1998

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APPENDICES

INTEGRATED TECHNICAL SERVICES, INC.

Dry Well Excavation Project

Health and Safety Plan

Lockheed Martin Corporation

Great Neck, New York

April 1998

1.0 PURPOSE

The purpose of this Health and Safety Plan (HASP) is to establish a protocol for protecting ITS and other on-site and off-site personnel from incidents that may arise while performing field activities during the removal of contaminated soils at Lockheed Martin site located in Great Neck, New York. This HASP has been prepared in accordance with the United States Environmental Protection Agency (US EPA) document, "Emergency and Remedial Response Division's Standard Operating Safety Guides", November 1984. This plan establishes personnel protection standards, mandatory operations procedures, and provides contingencies for situations that may arise while field work is being conducted at the site. In addition, this Plan incorporates the requirements of Lockheed Martin's Contractor's ESH Handbook, which is appended to this Plan as Appendix 3. All ITS field personnel will be required to abide by the procedures set forth in this HASP. Adherence to this HASP will minimize the possibility that personnel at the site or the surrounding community will be injured or exposed to site-related contaminants during field activities. Subcontractor personnel will be provided with a copy of this plan for their consideration. A copy of this HASP will be maintained at the project site for the duration of the field project.

Personnel performing the environmental field work involving chemical substances may encounter conditions that are unsafe or potentially unsafe. In addition to the potential risks associated with the physical, chemical, biological and toxicological properties of the material(s) which may be encountered, other types of hazards (i.e., electricity, water, temperature, heavy equipment, falling objects, loss of balance, tripping, etc.) can have an adverse effect on the health and safety of personnel. It is important that personnel protective equipment (PPE) and safety requirements be appropriate to protect against potential and/or known hazards. PPE will be selected based on the type(s), concentration(s), and routes of personnel exposure from hazardous substances at a site. In situations where the type of materials and possibilities of contact are

unknown or the potential hazards are not clearly identifiable, a more subjective (but conservative) determination will be made of the PPE required for initial safety.

2.0 SITE CONDITIONS

The Lockheed Martin Site (Former Unisys Corporation Site) consists of several large buildings on 94 acres of land located at the intersection of Marcus Avenue and Lakeville Road between the Village of Lake Success and the Town of North Hempstead in Nassau County, New York. Three dry wells are located in the southwest corner of the property in which field activities will be conducted.

The Lockheed Martin site has been listed by the New York State Department of Environmental Conservation (NYSDEC) in the Registry of Inactive Hazardous Waste Disposal sites in New York State (Site No. 130045). The NYSDEC classified the site as a Class 2 Site due to the presence of volatile organic compound (VOC) contamination in soil and groundwater at the property. In addition to VOCs present in groundwater, VOCs are present in on-site subsurface soil in the area of the inactive Dry Wells, and metals and semi-volatile organic compounds (SVOCs) are present in the sediment of the recharge basins.

2.1 Proposed Field Activities

The field work that will be conducted will include the removal of contaminated soil from three (3) dry wells WM-1, WM-2 and WM-3. Once all soils are removed in accordance with LMC Work Plan, the three wells shall be backfilled to grade. Final restoration shall include final grading and placement of stone surface.

The primary site related contaminants of concern of impacted soils are volatile organic compounds (VOCs) including tetrachloroethene (PCE), trichloroethene (TCE). The most probable route of exposure is the inhalation of VOCs from contaminated and impacted soils. All soils removed shall be classified as a F002 RCRA hazardous soil (see Appendix 4-MSDS).

All proposed work will be completed in Level D, modified Level D, or Level C PPE depending on the nature of the site activity. A table summarizing the proposed level of PPE for each site activity is included in Section 4.0. Ambient air will be monitored using a PID during any intrusive activities. Upgrading to EPA Level C PPE (air-purifying respirators) or Level B (self-contained breathing apparatus) will be considered if ambient air concentrations of VOCs exceed appropriate guidelines. Guidance for Level B, C and D are summarized in Sections 4.2, 4.3 and 4.4, respectively.

2.2 Proposed Operational Technical Approach

Based upon the location of the three dry wells and depth of the soils to be removed, ITS shall implement a shoring/sheeting technique to protect the side walls of each well and the foundation of the adjacent building.

ITS shall utilize interlocking steel sheeting around each dry well. At which time a trackhoe excavator and clam shell crane will remove the soils to a depth of 30 to 32 feet. The contaminated soil will be transferred into 18-wheel dump trailers for offsite disposal.

Once the soils are removed from each well, post-excavation sampling will be performed and each well will be backfilled to grade.

The following are safety hazards relative to soil excavation activities:

- Crane and excavation operations near utility lines (water, electric)
- Overhead heavy equipment operations around each well
- Fall protection near each well during excavation activities
- Truck traffic awareness in soil loading lane during loading of trucks
- Noise and eye protection during sheeting operation and soil excavation when heavy equipment is operating.

3.0 PERSONNEL SAFETY

Personnel involved in field operations must often make complex decisions regarding safety. To make these decisions correctly requires more than elementary knowledge. For example, selecting the most effective PPE requires not only expertise in the technical areas of respirators, protective clothing, air monitoring, physical stress, etc., but also experience and professional judgment. Only competent, qualified personnel having the technical judgment to evaluate a particular situation and determine the appropriate safety requirements will perform field investigations at the site. These individuals, through a combination of professional education, on-the-job experience, specialized training, and continual study, have the expertise to make sound decisions.

3.1 Training and Medical Surveillance

All personnel involved in field work will be trained to carry out their designated field operations. Training will be provided in the use of all equipment, including respiratory protection

apparatus and protective clothing; safety practices and procedures; general safety requirements; and hazard recognition and evaluation. Each individual involved with the field work must provide documentation of training and medical surveillance, as per 29 CFR 1910.120. Pursuant to 29 CFR 1910.120 et seq., all ITS personnel who are involved in field operations potentially exposing them to hazardous substances and/or situations receive initial 40-hour training and three-day on-the-job training. These personnel also receive 8-hour annual refresher training. ITS's 40-hour and 8-hour training sessions are conducted off-premises by an experienced professional. The on-site Health and Safety officer as well as supervisory and management personnel have received an additional eight hours of supervisory training in the enforcement of the health and safety program. This training is typically conducted by qualified ITS supervisory-trained personnel.

ITS's medical surveillance program consists of baseline medical examinations and testing conducted immediately following hire, immediately prior to an individual leaving the firm, and annually in accordance with the OSHA standard. The medical program is conducted by a licensed physician knowledgeable in internal and occupational medicine who provides a report of fitness to the individual as well as ITS. The testing and examination includes but is not limited to blood pressure, spirometry, blood and urine testing for heavy metals and lyme disease, electrocardiogram, a chest X-ray, and a general physical examination.

A copy of the employee training and medical surveillance documentation must be maintained at the job site for the duration of the project. In addition, each individual must sign for, and be provided with, a copy of this Health and Safety Plan, indicating they have read and understood its contents. The Health and Safety Plan acknowledgment form is included in Appendix 1.

3.2 Health and Safety Manager

The Health and Safety Manager, Ted Budzynski, shall be responsible for overall implementation and coordination of the Health and Safety Program for field personnel at the site. Responsibilities include providing adequate staffing, materials, equipment, and time needed to safely accomplish the tasks under the site investigation. The Health and Safety Manager is also responsible for taking appropriate corrective actions when unsafe acts or practices arise. The Health and Safety Officer for the soil excavation project is David Wilder of ITS. The Health and Safety Manager shall approve any field changes or revisions made by the Health and Safety Officer

3.3 Site Health and Safety Officer

A designated individual(s) will perform the function of the project Site Health and Safety Officer (SHSO). Marc LaMorte will serve as the Site Health and Safety Officer during the site work. At all times the Site Health and Safety Officer will report directly to the Health and Safety Manager. As a minimum, the Site Health and Safety Officer will be responsible for the following:

1. Assuring that all personnel protective equipment is available and properly utilized by all field personnel at the site.

2. Assuring that all personnel are familiar with standard operating safety procedures and additional instructions contained in the Health and Safety Plan.

3. Assuring that all personnel are aware of the hazards associated with the field operations.

4. Conducting and documenting daily site safety briefings for field personnel.

5. Inspecting and documenting the site for hazards before field operations.

6. Conducting daily work area inspections to determine the effectiveness of the site HASP and identify and correct unsafe conditions in the responsible work area. Daily inspections and corrective actions taken shall be documented on daily inspection forms. A copy of the Daily Inspection Form is included in Appendix 5.

7. Determining personal protection levels including clothing and equipment for personnel and periodic inspection of protective clothing and equipment.

8. Monitoring of site conditions prior to initiation of field activities, and at various intervals during on-going operations as deemed necessary for any changes in site hazard conditions. (Monitoring parameters include, but are not limited to, volatile organic contaminant levels in the atmosphere, chemical hazard information, and weather conditions.)

9. Executing decontamination procedures.

10. Monitoring the work parties for signs of stress such as cold exposure, heat stress, or fatigue.

11. Prepare reports pertaining to incidents resulting in physical injuries or exposure to hazardous materials.

12. Assures that all ITS and subcontractor's employees have received the appropriate training and medical surveillance in accordance with this plan.

Marc LaMorte may designate another qualified ITS employee as Site Health and Safety Officer. All designees will be familiar with all aspects of the HASP and their responsibilities. At all times the Site Health and Safety Officer shall report directly to the Health and Safety Manager.

4.0 LEVELS OF PROTECTION

Anyone entering the investigation site must be protected against potential hazards. The purpose of the personal protection clothing and equipment is to minimize exposure to hazards while working on site. Careful selection and use of adequate PPE should protect the respiratory system, skin, eyes, face, hands, feet, head, body and hearing of all personnel.

The appropriate level of protection is determined prior to the initial entry on site based on available information and preliminary monitoring of the site. Subsequent information may warrant changes in the original level selected. Appropriate equipment to protect personnel against exposure to known or anticipated chemical hazards has been divided into four categories (i.e., Levels A, B, C and D) according to the degree of protection afforded.

The following subsections provide a general overview of the various levels of personal protection and their generic requirements associated with each (Level A, B, C and D), that are available for potential use during hazardous waste operations. Determination of the site specific levels of protection, and the rationale for selection is described in Section 6.0 of this Plan.

FIELD ACTIVITY	LEVEL OF PROTECTION
Mobilization	Level D
Soil excavation stepdown	Modified Level D
Sheeting installation	Modified Level D
Soil excavation	Modified Level D, Level C
Post-excavation	Modified Level D
Backfill	Level D
Demobilization	Level D

4.1 Level A Protection

The highest degree of protection is used in a Level A situation. It should be worn when the highest available level of respiratory, skin and eye protection is needed. This level of

protection is placed in effect when there is no historic information about the site and it is assumed that the worst possible conditions exist.

4.1.1 Personal Protective Equipment

a. Pressure demand, self-contained breathing apparatus-, approved by the Occupational Safety and Health Administration (OSHA) and National Institute of Occupational Safety and Health (NIOSH).

b. Fully encapsulating chemical-resistant suit.

c. Coveralls*.

d. Long cotton underwear*.

e. Gloves (outer), chemical-resistant.

f. Gloves (inner), chemical-resistant.

g. Boots, chemical-resistant, steel toe and shank. (Depending on suit construction, worn over or under suit boot.)

h. Hard hat (under suit), as required based on potential for head injuries.

i. Disposable protective suit, gloves and boots* (worn over fully-encapsulating suit).

j. Two-way radio communications (intrinsically safe).

*Optional

4.1.2 Criteria for Selection

Meeting any of the criteria listed below warrants use of Level A protection:

a. The chemical substance(s) has been identified and requires the highest level of protection for skin, eyes and the respiratory system based on:

   (1) Measured (or potential for) high concentrations-of atmospheric vapors, gases, or particulates; or

   (2) Site operations and work functions involving high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates.

b. Extremely hazardous substances are known or suspected to be present and skin contact is possible.

c. The potential exists for contact with substances that destroy skin.

d. Operations must be conducted in confined, poorly ventilated areas until the absence of hazards requiring Level A protection is demonstrated.

e. An oxygen deficient atmosphere where the oxygen level is less than 20.9 percent (%) by volume as measured with an oxygen meter. This condition, existing alone, could result in a down grade to EPA Level B PPE.

f. Total atmospheric readings on photoionization detector indicate readings above 500 parts per million (ppm) of calibration gas equivalents (cge) of unidentified substances.

4.1.3 Limiting Criteria

a. Fully encapsulating suit material must be compatible with the substances involved.

4.1.4 Minimum Decontamination Procedure

Station 1: Segregated equipment drop.

Station 2: Outer garment, boots and gloves wash and rinse.

Station 3: Outer boot and glove removal.

Station 4: Tank change.

Station 5: Boots, gloves and outer garment removal.

Station 6: SCBA removal.

Station 7: Field wash.

4.2 Level B Protection

Level B protection will be used by all personnel if the conditions outlined in Section 4.2.2 are encountered.

4.2.1 Personal Protective Equipment

a. Pressure-demand, self-contained breathing apparatus or cascade supplied air system (OSHA/NIOSH approved).

b. Chemical-resistant clothing (coveralls and long-sleeved jacket; coveralls, hooded, one or two-piece chemical-splash suit; disposable chemical-resistant coveralls).

c. Coveralls.*

d. Gloves (outer), chemical-resistant.

e. Gloves (inner), chemical-resistant.

f. Boots, chemical-resistant, steel toe and shank.

g. Boots (outer), chemical resistant (disposable*).

h. Hard hat must be worn in the vicinity of all heavy equipment and during situations or activities that may pose a potential for head injuries. Face shields must be worn where there is a splash hazard.

i. Two-way radio communications (intrinsically safe).

*Optional

4.2.2 Criteria for Selection

Meeting any one of these criteria warrants use of Level B protection:

a. The type(s) and atmospheric concentration(s) of toxic substances have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection than is required with Level A. These would be atmospheres:

(1) With concentrations immediately dangerous-to life and health (IDLH); or

(2) Exceeding limits of protection afforded by a full-face, air-purifying mask; or

(3) Containing substances for which air-purifying canisters do not exist or have low removal efficiency; and/or

(4) Containing substances requiring air-supplied equipment, but substances and/or concentrations do not represent a serious skin hazard.

b. The atmosphere contains less than 20.9 percent oxygen.

c. Site operations make it highly unlikely that the small, unprotected area of the head or neck will be contacted by splashes of extremely hazardous substances.

d. Total atmospheric concentrations in the breathing zone of unidentified vapors or gases range from 50 ppm to 500 ppm (calibration gas equivalence units) on monitoring instruments, and vapors are not suspected of containing high levels of chemicals toxic to skin.

4.2.3 Limiting Criteria

a. Use only when the vapor or gases present are not suspected of containing high concentrations of chemicals that are harmful to skin or capable of being absorbed through skin contact.

b. Use only when it is highly unlikely that the work being done will generate high concentrations of vapors, gases, or particulates or splashes of material that will affect exposed skin.

4.2.4 Minimum Decontamination Procedures

Station 1: Equipment drop.

Station 2: Outer garment, boots and gloves wash and rinse.

Station 3: Outer boot and glove removal.

Station 4: Tank change.

Station 5: Boot, gloves and outer glove removal.

Station 6: SCBA removal.

Station 7: Field wash.

4.3 Level C Protection

Level C protection will be used by all personnel if the conditions outline in Section 4.3.2 are encountered.

4.3.1 Personal Protective Equipment

a. Full-face, air purifying, canister-equipped respirator (Mine Safety and Health Administration (MSHA) and NIOSH approved).

- American Optical (Model 54000)
- Cartridge: Organic Vapor/HEPA Model R51HE

b. Chemical-resistant clothing-poly coated tyvek suits (coveralls; hooded, two-piece chemical splash suits; chemical-resistant hood and apron; disposable chemical-resistant coveralls).

c. Coveralls.*

d. Gloves, chemical-resistant. (Nitrile and PVC)

e. Boots, steel toe and shank. (PVC chemical boots)

f. Boots cover (outer), chemical-resistant – PVC (disposable*).

g. Hard hat must be worn in the vicinity of all drilling equipment and during situations or activities that may pose a potential for head injuries. Face shields must be worn where there is a splash hazard.

h. Escape mask, as may be required based on site hazards.

i. High-visibility vests**

*Optional

**Vests must be worn when working in high-traffic areas.

4.3.2 Criteria for Selection

Meeting all of these criteria permits use of Level C Protection:

a. Measured air concentrations of identified substances will be reduced by the respirator to, at or below the substance's exposure limit, and the concentration is below the assigned protection factor (APF) of the respirator.

b. Atmospheric contaminant concentrations do not exceed IDLH levels.

c. Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.

d. Job functions have been determined not to require self-contained breathing apparatus.

e. Total VOC readings register 5 ppm above background on instruments. If TVOC levels are greater than 1/2 PEL of the primary contaminants of concern (Section 6.0) respiratory protection shall be required (Level C, B, or A).

f. Air will be monitored periodically.

g. Cartridges are available and are approved by NIOSH and MSHA for the specific chemical(s) encountered.

4.3.3 Limiting Criteria

a. Atmospheric concentration of chemicals must not exceed IDLH levels.

b. The atmosphere must contain at least 20.9 percent oxygen.

c. Must have sufficient information available regarding specific compounds, and their concentrations, likely to be encountered.

d. The contaminant concentrations as measured using a PID do not exceed the assigned protection factor (APF) of the respirator.

4.3.4 Minimum Decontamination Procedures

Station 1: Equipment drop.
Station 2: Outer boot and glove removal.
Station 3: Canister or mask change.
Station 4: Boots, gloves and outer garment removal.
Station 5: Face piece removal.
Station 6: Field wash.

4.4 Modified Level D Protection

Modified Level D protection will be used by all personnel if the conditions outline in Section 4.4.2 are encountered.

4.4.1 Personal Protective Equipment

a. Chemical-resistant clothing – white tyvek or poly coated tyvek (coveralls; hooded, two-piece chemical splash suits; chemical-resistant hood and apron; disposable chemical-resistant coveralls).

b. Coveralls.*

c. Gloves, chemical-resistant. (Nitrile and PVC)

d. Boots, steel toe and shank. (PVC chemical boots)

f. Boots cover (outer), chemical-resistant (disposable*).

g. Hard hat must be worn in the vicinity of all drilling equipment and during situations or activities that may pose a potential for head injuries. Face shields must be worn where there is a splash hazard.

h. High-visibility vests**

*Optional

**Vests must be worn when working in high-traffic areas.

4.4.2 Criteria for Selection

Meeting all of these criteria permits use of Modified Level D Protection:

a. No hazardous air pollutants have been measured.

b. Atmospheric contaminant concentrations do not exceed IDLH levels.

c. Air will be monitored periodically.

4.4.3 Limiting Criteria

a. Atmospheric concentration of chemicals must not exceed IDLH levels.

b. The atmosphere must contain at least 20.9 percent oxygen.

c. Must have sufficient information available regarding specific compounds, and their concentrations, likely to be encountered.

d. The contaminant concentrations as measured using a PID do not exceed the assigned protection factor (APF) of the respirator.

4.4.4 Minimum Decontamination Procedures

Station 1: Equipment drop.
Station 2: Outer boot and glove removal.
Station 3: Canister or mask change.
Station 4: Boots, gloves and outer garment removal.
Station 5: Face piece removal.
Station 6: Field wash.

4.5 Level D Protection

Level D protection will be used by all personnel if the conditions outline in Section 4.4.2 are encountered.

4.5.1 Personal Protective Equipment

a. General work clothes or coveralls.

b. Gloves.

c. Boots/shoes, leather or chemical-resistant, steel toe and shank.

d. Boots (outer), chemical/resistant (disposable)*.

e. Safety glasses or chemical splash goggles when there is a splash hazard.*.

f. Hard hat must be worn in the vicinity of all drilling equipment and during situations or activities that may pose a potential for head injuries. Face shields must be worn when there is a splash hazard.

g. High-visibility vests**

*Optional

**Vests must be worn when working in high-traffic areas.

4.5.2 Criteria for Selection

Meeting all of these criteria allows the use of Level D protection:

a. No hazardous air pollutants have been measured.

b. Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

c. Extensive information on suspected hazards/risks are known.

4.5.3 Limiting Criteria

a. The atmosphere must contain at least 20.9 percent oxygen.

b. VOC concentrations in the breathing zone are below published permissible exposure limits.

4.5.4 Minimum Decontamination Procedure

Station 1: Equipment drop.

Station 2: Hand and face wash.

4.6 Duration of Work Period

The anticipated duration of the work period will be established prior to daily activities. The work will only be performed during daylight hours. Other factors that may affect the length of time personnel may work include:

a. Air supply consumption (however SCBA assisted work - Level A and Level B is not anticipated);

b. Suit/ensemble, air purifying chemical cartridge, permeation and penetration by chemical contaminants; and

c. Ambient temperature and weather conditions.

d. Contractual requirements.

4.6.1 Air Supply Consumption

The duration of the air supply must be considered before any SCBA-assisted work activity commences (however, Level A and B assisted work is not anticipated). Although the anticipated operating time of an SCBA is clearly indicated on the breathing apparatus the following variables should be considered and work actions and operating time adjusted accordingly:

Work Rate: The actual in-use duration of SCBA's may be reduced by one-third to one-half during strenuous work, e.g. drum handling, major lifting or any task requiring repetitive speed of motion.

Fitness: Well conditioned individuals generally utilize oxygen more efficiently and can extract more oxygen from a given volume of air than unfit individuals, thereby slightly increasing the SCBA operating time.

Body Size: Larger individuals generally consume air at a higher rate than smaller individuals, thereby decreasing the SCBA operating time.

Breathing Patterns: Quick, shallow or irregular breaths consume air more rapidly than deep, regular spaced breaths. Heat induced anxiety and lack of acclimatization may induce hyperventilation, resulting in decreased SCBA operating times.

It is not anticipated that site conditions to warrant use of SCBA's will be encountered during this field program.

4.6.2 Suit/Ensemble, Air Purifying Chemical Cartridge, Permeation and Penetration

The possibility of chemical permeation or penetration of chemical protective clothing (CPC) ensembles and air purifying respirators (APR) chemical cartridges during the work mission is always a matter of concern and may limit mission duration. It should be remembered that no

single clothing material is an effective barrier to all chemicals or all combinations of chemicals, and no material is an effective barrier to prolonged chemical exposure. Manufacturer recommendations should be followed.

In addition, when performing work in Level C respiratory protection, care shall be taken to inspect the respirators prior to usage. The chemical cartridges should be changed, at a minimum, on a daily basis, or when the cartridge becomes dirty, damaged or when breakthrough is suspected.

4.6.3 Ambient Temperature

The ambient temperature has a major influence on work period duration as it effects both the worker and the protective integrity of ensembles (see Section 11.4.1) as well as the operation of the monitoring equipment. When ambient temperatures rise or falls to a level which may hinder personnel performance or becomes a threat to personal safety, consideration should be given to stop work and recommence work when temperatures or conditions are less severe.

5.0 AMBIENT AIR MONITORING

Based on site-specific air monitoring data, elevated levels of volatile organic compounds (VOCs) in the atmosphere are not anticipated during site activities. The presence of VOCs will be evaluated using a photoionization detector (PID). Air monitoring shall be required during all intrusive investigation (monitoring well installation or soil sampling) or remedial activities being conducted onsite. Ambient air quality monitoring will be performed continuously in the Work/Exclusion Zone and the Contamination Reduction Zone (see Section 7.0). PID measurements shall be recorded hourly if levels are within 5 ppm of background levels. If readings exceed 5 ppm above background in the breathing zone, the activities will be evaluated for respirator upgrade and monitoring will continue until readings fall within 5 ppm of the background concentration. If concentrations remain greater than 5 ppm above background in the breathing zone, an upgrade in respiratory protection will be warranted. For PID readings above 5 ppm of background levels, readings shall be recorded in 15 minute intervals or whenever a new high PID reading is encountered. In addition, periodic air monitoring will be conducted in the Support Zone. Readings taken with a PID will be recorded every hour.

The PID used for ambient air monitoring shall be calibrated at the start and finish of each workday. Calibration will be performed in accordance with manufacturer's requirements.

If necessary, the level of personal protection required will be upgraded based upon ambient air monitoring results. PID measurements shall be recorded every hour, at a minimum, if VOC levels are within 5 ppm of background levels. If PID levels deviate from within 5 ppm of background, the readings shall be recorded every 15 minutes or whenever a new PID reading is encountered.

Air Monitoring Frequency: ITS has implemented an air monitoring program consistent with each individual task to be performed during this remedial action. All monitoring devices and calibration frequency is outlined in Section 5.1.

TASK	MONITORING EQUIP.	FREQUENCY
Mobilization	PDM3	Continuous
Soil excavation/sheeting Piling installation	PDM3/HNU	Continuous
Soil loading	PDM3/HNU	Continuous
Backfill	PDM3	Continuous
Demobilization	None	
Perimeter monitoring	HNU/PDM3	4 times daily

All monitoring results shall be documented on a daily air monitoring log (see attached). Each log will be in a three-ring binder stored onsite.

The following equipment or equivalent will be employed at the site.

CALIBRATION SETTINGS:

MAKE/MODEL	SCHEDULE	PROBE
Photoionization Detector HNU 101	Daily	11.7eV lamp 9.7 millivolts
PDM3 – Aerosol dust monitor	(Factory) Zeroed daily	---

6.0 DETERMINATION OF THE SITE-SPECIAL LEVEL OF HAZARD AND LEVEL OF PROTECTION

Categories of personnel protection required depend on the degree of hazard and probability of exposure by a route of entry into the body. For this site, the most probable

potential route of entry is via inhalation of VOCs, and potentially by dermal adsorbtion of contaminates released from field activities.

Based upon site data generated to date, it is anticipated that Level D or modified Level D will be required for most site activities. The determination of Level D or modified Level D protection is based on the fact that field work will be performed in open, well-ventilated areas and that the potential for accidents and injuries due to obstructions caused by and/or magnified by the use of level A, B, or C protection (i.e., slip/trip hazards) is greater than the potential for problems associated with potential exposure from contaminants using modified level D protection. Soil excavation will be initiated in modified Level D and potentially be upgraded to Level C depending upon air monitoring readings and whether action response levels are triggered. Should conditions change, re-evaluation of personnel protection will be conducted.

A PID will be used to monitor air quality throughout the course of field work. If readings recorded within the breathing zone during site activity are sustained at levels between 5 ppm above background concentrations, activities will be evaluated for respirator upgrade in the Work/Exclusion Zone will be evacuated. Monitoring of the Work/Exclusion Zone will continue until readings fall within 5 ppm of the background concentration. If concentrations are sustained at 5 ppm above background in the breathing zone, consideration will be given to upgrading the level of protection to Level C. An upgrade to the appropriate level of protection for field personnel will be required before re-entering the Work/Exclusion Zone. The Site Health and Safety Officer will be responsible for requesting an upgrade in the level of personnel protection. The final decision will be made by the Health and Safety Manager in conjunction with the Project Manager and the appropriate regulatory authorities. Use of 5 ppm as the criteria for respiratory protection upgrade to Level C is appropriate for this site since the primary constituents of concern for this site are trichlorethene and tetrachlorethene.

PPE LEVEL	ACTION LEVEL	AIR MONITORING REQUIREMENTS
Level D	< 5 ppm	Monitor once per hour
Level C	5 ppm	Monitor every 15 minutes
Level B	> 50 ppm	STOP WORK. Seek engineering controls.

In addition to potential chemical hazards, there also exists potentially greater physical hazards associated with the activities at the facility. Due to the nature of the facility operations, heavy equipment including pile drivers, excavation equipment and trucks will be on the soil excavation and restoration activities. Therefore, all personnel should always be aware of vehicular traffic while working at the facility. Further, hard hats must be worn at all times around heavy equipment and/or in the vicinity of suspended loads. All work must be performed in strict accordance with OSHA regulations.

Prior to initiating field activities, local police and fire departments will be notified of the schedule and location of the upcoming field activities.

7.0 DESIGNATED WORK ZONES

Work zones will be determined prior to commencement of a specific field activity. An area large enough to encompass the activity will be demarcated as the Work/Exclusion Zone. If necessary, the Work/Exclusion Zone will be demarcated with temporary barriers. Only qualified field personnel with the proper PPE and training will be allowed into the designated zone. Within the Work/Exclusion Zone, ambient air quality will be periodically monitored using a PID to determine any changes from background air quality. If subsequent measurements suggest a significant change in air quality, the work area will be immediately evacuated. An upgrade to the appropriate level of PPE for field personnel will be required before re-entering the Work/Exclusion Zone.

8.0 DECONTAMINATION STATIONS

Decontamination stations will be located within the Contaminant Reduction Zone to be used for the cleaning of all heavy equipment, vehicles, tools and supplies required for the completion of field operations. Personnel decontamination procedures for the appropriate levels of protection are described in Section 4.0.

9.0 SITE ACCESS CONTROL

Appropriate traffic controls and barricades will used in areas of vehicular and pedestrian traffic. Temporary safety fencing will be erected along the perimeter of the work area to prevent facility workers from entering into the active work area. Local requirements for traffic control will be adhered to (e.g., obtaining appropriate permits, and provisions for a flagman), as may be warranted.

At the end of each work day, ITS shall erect orange safety fence around each dry well excavation, including flashing warning lights at the entrance to the site.

During all field activities, orange safety fence will be erected to delineate the exclusion zone from the support zone.

In the event of an emergency, all workers will exit through the east gate and remain in the empty parking lot until notified by the HSO and onsite representative.

10.0 PERSONAL HYGIENE

The following personal hygiene rules must be followed while performing work at the site:

1. Eating, drinking, chewing gum or tobacco, smoking, or any other practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the work area.
2. Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, or any other activities.
3. Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.
4. No excessive facial hair (i.e., beards), which interferes with a satisfactory fit of the mask-to-face seal, is allowed on personnel required who wear respiratory protective equipment.
5. Contact with contaminated or suspected contaminated surfaces will be avoided. Whenever possible, walking through puddles, mud and discolored surfaces; kneeling on ground; leaning, sitting, or placing equipment on drums, containers, vehicles, or the ground will be avoided.
6. Medicine and alcohol can increase the effects from exposure to toxic chemicals. Prescribed drugs will not be taken by personnel on site where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Alcoholic beverage intake will be prohibited during all on-site field operations.

11.0 CONTINGENCY PLAN

Section 11.0 shall serve as the investigation Contingency Plan. It has been developed to identify precautionary measures, possible emergency conditions, and emergency procedures. The plan shall be implemented by the Site Health and Safety Officer.

11.1 Emergency Medical Care and Treatment

This section addresses emergency medical care and treatment of field personnel, resulting from possible exposures to toxic substances and injuries due to accidents. The following items will be included in emergency care provisions (see Appendix 2):

EMERGENCY CONTACT NUMBERS:

Poison Control:	800-962-1253
US EPA National Response Center:	800-438-2474
Integrated Technical Services:	888-294-5056

LOCKHEED MARTIN EMERGENCU CONTACT NUMBERS:

Great Neck facility internal emergency phone number	(516) 574-3333
Robert Gibbons, LMC Local Client Contact	(516) 574-1828
	(516) 560-3686 pager
Bob Gilbert, LMC Project Manager	(818) 847-0210
	(888) 609-0261 Pager
Brian Shaughnessey, LMC S&H Supervisor	(818) 847-0232
	(888) 609-0262 pager

SITE SPECIFIC: (Great Neck Site)

Fire:	516-466-4411	or	911
Police:	516-482-1000	or	911
Hospital:	718-470-7000	or	911

Long Island Jewish Medical Center
270-05 76th Avenue
New Hyde Park, NY 11042

DIRECTIONS:

The Long Island Jewish Medical Center is located on Lakeville Road just opposite the Lockheed Martin employee parking lot entrance and Security Gate 6. From Gate 6, go straight through the traffic light into the entrance of the hospital. The hospital location map is included in Appendix 2.

In addition, the following emergency equipment will be available at the project site at all times when any field activities are being performed.

1. Emergency eyewash fountains and first aid equipment will be readily available on site and located in an area known to all personnel. Eyewash stations shall be ANSI approved portable emergency eye wash station.

2. Readily available dry-chemical fire extinguisher.

11.2 Off-Site Emergency Medical Care

The Site Health and Safety Officer shall pre-arrange for access to emergency medical care services at a convenient and readily accessible medical facility and establish emergency routes. The Site Health and Safety Officer shall establish emergency communications with emergency response services.

11.3 Personnel Accidents

Bodily injuries which occur as a result of an accident during the operation at the site will be handled in the following manner:

a. First aid equipment will be available on site for minor injuries. If the injuries are not considered minor, proceed to the next step.

b. On-site personnel shall notify the Site Health and Safety Officer of the nature of the emergency, who in turn will call 911 for emergency response. The Site Health and Safety Officer will also notify Lockheed Martin security to allow provide assistance in directing emergency vehicles to the location of the emergency.

c. The injured employee shall be transported by the local emergency vehicle to the local hospital.

d. LMC shall be notified of the nature of the emergency.

e. A written report shall be prepared by the Site Health and Safety Officer detailing the events and actions taken during the emergency within 24 hours of the accident. A copy of this report will be provided to LMC.

f. See Appendix 2 for a list of emergency contacts in the Great Neck, New York area.

11.4 Personnel Exposure

In the event that any person is splashed or otherwise excessively contaminated by chemicals, the following procedure will be undertaken:

a. Disposable clothing contaminated with observable amounts of chemical residue is to be removed and replaced immediately.

b. In the event of direct skin contact in Level D, the affected area is to be washed immediately with soap and water, or other solutions as directed by medical personnel.

c. The Site Health and Safety Officer or other individuals who hold a current first aid certificate will determine the immediate course of action to be undertaken. This may involve using the first aid kit and/or eyewash stations.

11.4.1 Weather

Adverse weather conditions are an important consideration in planning and conducting site operations. Hot or cold weather can cause physical discomfort, loss of efficiency, and personal injury. Of particular importance is heat stress resulting when protective clothing decreases natural body ventilation. One or more of the following will help reduce heat stress:

a. Provide plenty of liquids. To replace body fluids (water and electrolytes) lost because of sweating, use a 0.1 percent salt water solution, more heavily salted foods, or commercial mixes. The commercial mixes may be preferable for those employees on a low sodium diet.

b. Provide cooling devices to aid natural body ventilation. These devices, however, add weight, and their use should be balanced against worker efficiency. Long cotton underwear help absorb moisture and protect the skin from direct contact with heat absorbing protective clothing.

c. Install mobile showers and/or hose down facilities to reduce body temperature and cool protective clothing.

d. In extremely hot weather, conduct operations in the early morning or evening.

e. Ensure that adequate shelter is available to protect personnel against heat, cold, rain, snow, etc.

f. In hot weather, rotate shifts of workers wearing impervious clothing.

11.4.2 Heat Stress

If field operations are conducted in the warm summer months, heat related fatigue will be closely monitored. Monitoring of personnel wearing impervious clothing or wearing respiratory protection shall commence when the ambient temperature is 70 degrees Fahrenheit or above. Frequency of monitoring should increase as the ambient temperature increases or as slow recovery rates are indicated. When temperatures exceeds 85 degrees Fahrenheit, workers should be monitored for heat stress after every work period. The following screening mechanism will be used to monitor for heat stress:

Heart rate (HR) will be periodically measured by the radial pulse for 30 seconds during a resting period. The HR should not exceed 110 beats per minute. If the HR is higher, the next work period should be shortened by 33 percent. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by 33 percent.

Heat-related illnesses range from heat fatigue to heat stroke, the most serious. Heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing may have to be cut off. Less serious forms of heat stress require prompt attention or they may lead to a heat stroke. Unless the victim is obviously contaminated, decontamination should be omitted or minimized and treatment begun immediately. Heat-related problems can be categorized into:

Heat Rash:	Caused by continuous exposure to hot and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat as well as being a nuisance.
Heat Cramps	Caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Signs: muscle spasm and pain in the extremities and abdomen.
Heat Exhaustion	Caused by increased stress on various organs to meet increased demands to cool the body. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.

Heat Stroke: The most severe form of heat stress. The body must be cooled immediately to prevent severe injury and/or death. Signs and symptoms are: red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

Some of the symptoms of heat stress are: hot dry skin, fever, nausea, cramps, red or spotted skin, confusion, lightheadedness, delirium, rapid pulse, convulsions and unconsciousness. For workers suffering from heat stress, the following actions should be taken:

1. Remove the victim to a cool area
2. Loosen clothing
3. Thoroughly soak the victim in cool water or apply cold compresses
4. Call for medical assistance.

11.4.3 Cold Stress

If field operations are conducted in the cold winter months, cold stress will be monitored. Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10 degrees Fahrenheit air with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18 degrees Fahrenheit.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

Frost Nip or Incipient Frostbite. Characterized by suddenly blanching or whitening of skin.

Superficial Frostbite. Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

Deep Frostbite. Tissues are cold, pale and solid; extremely serious injury.

Hypothermia. Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperatures. Its symptoms are usually exhibited in five stages: (1) shivering; (2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body temperature to less than 95 degrees Fahrenheit; (3) unconsciousness, glassy stare, slow pulse and slow respiratory rate; (4) freezing of the extremities; and finally, (5) death.

11.5 Fire

The telephone number to the local fire department will be posted along with other emergency numbers conspicuously on-site at all times. (see Appendix 2). In the event of a fire occurring at the site, the following actions will be undertaken by the Site Health and Safety Officer:

a. Evacuate all unnecessary personnel from the area of the fire and site, if necessary.

b. Contact the local fire and police departments informing them of the fire and any injuries if they have occurred.

b. Contact the local hospital of the possibility of fire victims.

c. Contact the Site Health and Safety Officer, Health and Safety Manager, and the ITS Project Manager.

d. Notify Robert Gibbons, Site Manager, of LMC of any emergencies. (See Section 11.1 for contacts/phone numbers.)

e. All site tenants shall also be notified.

11.6 Personnel Protective Equipment Failure

If any site worker experiences a failure or alteration of PPE that affects the protection factor, that person and his/her buddy shall immediately leave the Work/Exclusion Zone. Re-entry shall not be permitted until the equipment has been repaired or replaced to the satisfaction of the Site Health and Safety Officer.

11.7 Spill Prevention and Containment

Personnel onsite shall be adequately trained in the operation and maintenance of equipment used onsite. Equipment shall be inspected on a daily basis to minimize the potential for spillage of equipment related fluids. Personnel shall also be adequately trained to recognize and

respond to a spill situation. Absorbent materials will be maintained on-site for potential spill containment and mitigation.

12.0 COMMUNITY AIR MONITORING PLAN

During excavation activities, air monitoring for volatile organic compounds and particulates will be conducted at the perimeter of the work zone, as well as within the work zone in accordance with the HASP. Real time monitoring will be conducted for volatile organic compounds (VOCs) utilizing an 11.7 eV portable photoionization detector (PID), and for duct utilizing an aerosol dust meter (PDM3).

Continuous ambient air monitoring will be conducted within the work/exclusion and contaminant reduction zone. PID measurements will be recorded hourly if levels are within 5 parts per million (ppm) of background levels. If readings at the downwind perimeter of the work zone exceed 3 ppm above background in the breathing zone, air monitoring will be expanded to the downwind property perimeter. The air monitoring locations within the work/exclusion and contaminant reduction zones, and the property perimeter will be selected to be downwind of site activities based upon wind direction at the time of monitoring. PID measurements shall be recorded hourly if levels are within 3 ppm of background levels. For PID readings above 3 ppm of background levels, readings shall be recorded in 15 minute intervals or whenever a new high PID reading is encountered. If total VOC levels at the work zone perimeter exceeds 5 ppm above background, all site excavation and loading activities will be halted and the actions contained in the Vapor Emission Response Plan followed (see Appendix B).

Air monitoring and response levels for determining personnel respiratory upgrades for workers within the exclusion zone are specified within the project specific HASP.

Similarly, air monitoring will also be conducted for particulates at upwind, downwind and within the work area at temporary particulate monitoring stations. If the particulate levels exceed 150 ug/m^3 above background at the work zone perimeter, air monitoring will be conducted at the downwind property line. If downwind particulate levels at the work zone perimeter reach ug/m^3 greater than the measured upwind particulate level, engineering controls will be employed. Dust suppression techniques may include the spraying of water over the area in which the dust is becoming airborne.

All real time air monitoring data will be recorded on daily log sheets and made available at the site for NYSDEC and/or Nassau County Department of Health personnel to review.

13.0 SUMMARY

The Health and Safety Plan establishes practices and procedures to be followed so that the welfare and safety of workers and the public are protected. It is important that personal equipment and safety requirements be appropriate to protect against the potential or known hazards at a site. Protective equipment will be based upon the type(s), concentration(s), and routes of personal exposure from substances at the site, as well as the potential for hazards due to heavy equipment use, vision impairment, weather, etc. All site operation planning incorporates an analysis of the hazards involved and procedures for preventing or minimizing the risk to personnel. The following summarizes the rules which must be obeyed:

a. The Health and Safety Plan will be made available to all personnel doing field work on site. All personnel must sign this plan, indicating they have read and understood its terms.

b. All personnel will be familiar with standard operating safety procedures and additional instructions contained in the Health and Safety Plan.

c. All personnel going on site will be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures and communications.

d. Any required respiratory protective devices and protective clothing will be worn by all personnel going into work areas.

APPENDIX 1

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT FORM

I acknowledge that I have read and understand the provisions of this Health and Safety Plan, and that I will, to the best of my ability, abide by the terms of this plan:

Name	Date	Name	Date

APPENDIX 2

EMERGENCY CONTACTS
AND
ROUTE TO HOSPITAL

EMERGENCY CONTACTS

EMERGENCY CONTACT NUMBERS:

Poison Control:	800-962-1253
US EPA National Response Center:	800-438-2474
Integrated Technical Services:	888-294-5056

LOCKHEED MARTIN EMERGENCY CONTACT NUMBERS:

Great Neck facility internal emergency phone number	(516) 574-3333
Robert Gibbons, LMC Local Client Contact	(516) 574-1828 (516) 560-3686 pager
Bob Gilbert, LMC Project Manager	(818) 847-0210 (888) 609-0261 Pager
Brian Shaughnessey, LMC S&H Supervisor	(818) 847-0232 (888) 609-0262 pager

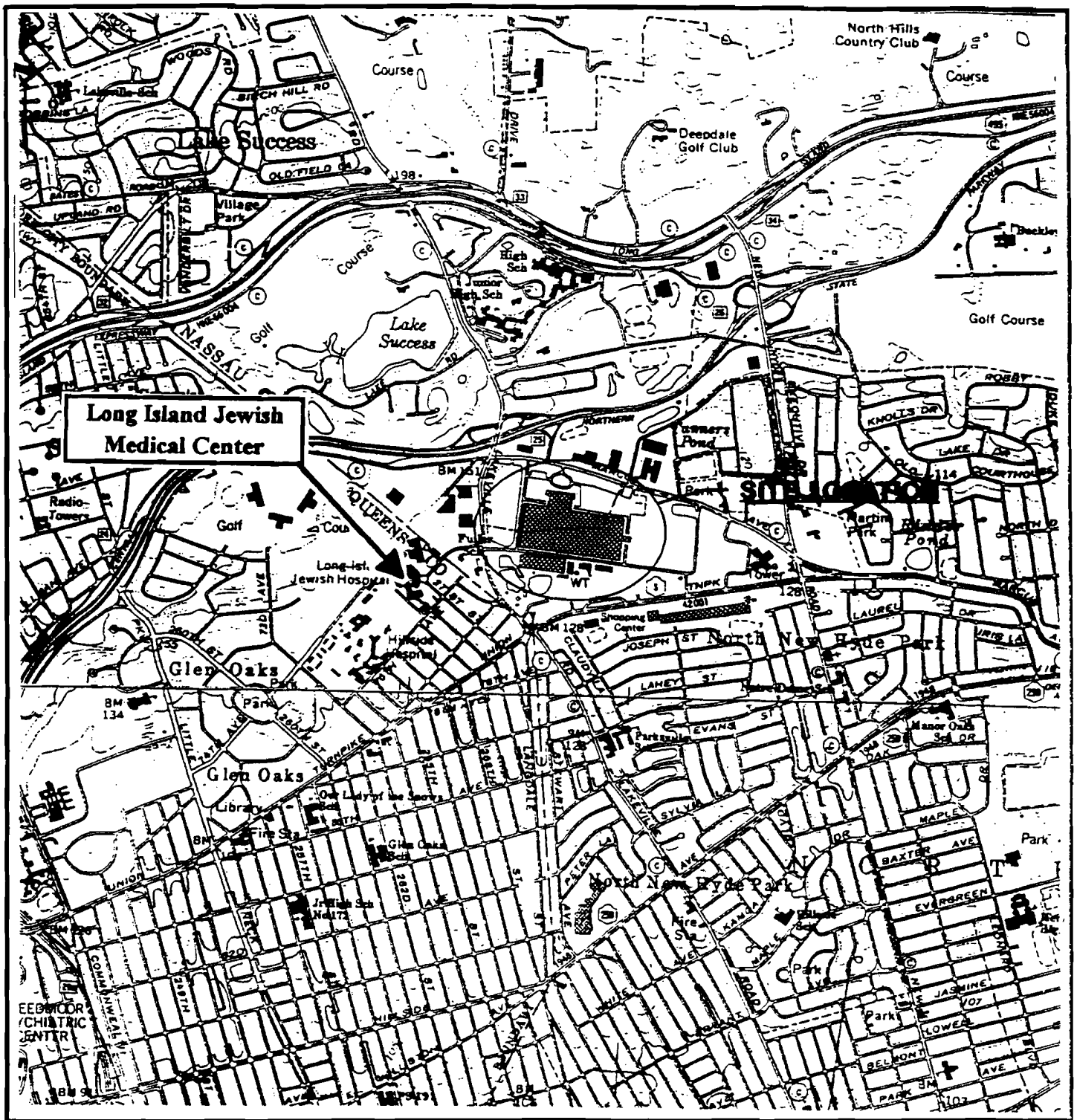
SITE SPECIFIC: (Great Neck Site)

Fire:	516-466-4411	or	911
Police:	516-482-1000	or	911
Hospital:	718-470-7000	or	911

Long Island Jewish Medical Center
270-05 76th Avenue
New Hyde Park, NY 11042

DIRECTIONS TO HOSPITAL:

The Long Island Jewish Medical Center is located on Lakeville Road just opposite the Lockheed Martin employee parking lot entrance and Security Gate 6. From Gate 6, go straight through the traffic light into the entrance of the hospital. The hospital location map is included in Appendix 2.



SOURCE: USGS QUADRANGLES
SEA CLIFF & LYNBROOK, N.Y.

HOSPITAL LOCATION MAP

H2MGROUP
ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y.
TOTOWA, N.J.

APPENDIX 3

LOCKHEED MARTIN CONTRACTOR ESH HANDBOOK

ATTACHMENT "D"

CONTRACTOR'S SAFETY HANDBOOK

GENERAL:

The Contractor agrees to comply with all rules and procedures contained in this document, known as the Contractors Safety Handbook, unless Lockheed Martin specifically agrees, in writing, to a modification or exemption. In addition, to the Contractors Safety Handbook provisions, the Contractor, Contractor's officers, employees and agents, subcontractors at any tier and subcontractor employees at any tier shall:

1) Take all prudent and proper environmental, health and safety precautions to protect Lockheed Martin employees, all other workers, and the public;

2) Comply with all applicable Federal, State, municipal, local, and any other applicable occupational safety and health statutes, rules, ordinances, regulations, and requirements issued or imposed by any governmental authority (including but not limited to *Title 29, Code of Federal Regulations Parts 1910* and *1926*);

3) Comply with all applicable Federal, State, municipal, local, and any other applicable air pollution statutes, rules, ordinances, regulations, and requirements issued or imposed by any governmental authority; and

4) Comply with all Federal, State, municipal, local and any other applicable hazardous materials, hazardous waste, and non-hazardous waste statutes, rules, ordinances, regulations, and requirements issued or imposed by any governmental authority (including but not limited to *Title 40, Code of Federal Regulations*).

Contractor also agrees:

1) To instruct, prior to commencement of operations, all agents and employees about relevant governmental laws and regulations, specific hazards expected to be encountered, and proper safety precautions to be observed;

2) To submit for Lockheed Martin review a copy of your company's written comprehensive Health and Safety/Accident Prevention Program.

3) To submit to Lockheed Martin a completed Contractor's Environmental, Safety, and Health Checklist (Attachment "F") before commencement of operations;

4) If contractor is to perform hazardous waste-type operations, submit for Lockheed Martin review a copy of your site specific safety and health plan. This plan shall meet the requirements of *Title 29, Code of Federal Regulations, Section 1910.120 - Hazardous Waste Operations and Emergency Response*;

5) To ensure Contractor's on-site foreman or supervisor has received a copy of the Contractors Safety Handbook, maintains a copy at the site, and that employees, Contractor's officers, agents, subcontractors at any tier and subcontractor employees are supplied a copy of the Contractor's Safety Handbook for their implementation;

6) That Lockheed Martin may immediately stop Contractor's work if Contractor violates any applicable Federal, State, municipal, or local, or any other rules, regulations, and requirements, Contractors Safety Handbook provisions, or other contract terms and conditions regarding environmental safety and health;

7) That Lockheed Martin may conduct periodic inspections of Contractor operations and document violations. Documented violations will be considered in evaluation of Contractor's performance. The Lockheed Martin inspection program in no way relieves the Contractor of the obligation to maintain its own safety program and conduct safety inspections as required by Federal, State, municipal, local and any other rules, regulations or requirements;

8) Maintain copies all pertinent health & safety records at the job site. These records will be made available to Lockheed Martin and will be subject to periodic audits by Lockheed Martin. Pertinent records include, but is not limited to, the following: personnel training documentation, medical surveillance, accident/injury reporting, daily site inspections, daily safety briefings, MSDS's, air monitoring data, etc.; and

RULES AND PROCEDURES

I. DEFINITIONS:

A. Contractor: the party entering into a construction, maintenance or service contract with Lockheed Martin; also that party's agent, or other person authorized to represent the Contractor, such as the Contractor's superintendent or foreman. For the purposes of this Contractor's Safety Handbook, "Contractor" shall also include Contractor's subcontractors at any tier.

B. Contractors Handbook: Contractors Safety Handbook.

C. EPA: the Environmental Protection Agency.

D. Fed/OSHA: the Federal Occupational Safety and Health Administration.

E. Hazard Communication Program: a program meeting the requirements of *Title 29, Code of Federal Regulations, Section 1910.1200 - Hazard Communication.*

F. Lockheed Martin: Lockheed Martin Corporation - Burbank Program Office.

G. Lockheed Martin Project Coordinator: the Lockheed Martin Project Coordinator, the individual that has been designated for each project.

H. Lockheed Martin Environmental, Safety and Health (ESH) Compliance: the Lockheed Martin Corporation - Burbank Program Office, Regulatory Affairs Department.

I. Lockheed Martin Contract Representative: the Lockheed Martin Corporation - Burbank Program Office contract representative for the project.

J. Lockheed Martin Safety and Health Coordinator: the Lockheed Martin Corporation - Burbank Program Office Injury and Illness Prevention Program Administrator, who will also-be-known as and referred to as the Safety & Health (S & H) Coordinator.

K. Lockheed Martin Hazardous Waste Coordinator: the Lockheed Martin Corporation - Burbank Program Office hazardous waste technical contact/coordinator, who will also-be-known as and referred to as the Environmental Coordinator.

L. RCRA: the Federal Resource Conservation and Recovery Act and all amendments or revisions.

M. Safety Program, Accident Prevention Program, or Injury and Illness Prevention Program: a comprehensive written safety and health program which includes all applicable OSHA required written programs. Contents of the written safety program are dependent on the contractors' primary type of work.

N. UFC: the Uniform Fire Code.

Attachment "D"

II. SAFETY AND HEALTH:

Contractor shall comply with applicable provisions of Federal, State, municipal, local, and any other applicable occupational safety and health statutes, rules, ordinances, regulations and requirements. Contractor shall take all precautions for the protection of the safety and health of Contractor employees and Lockheed Martin employees to prevent accidents or injury to them or to other persons on, about, or adjacent to site of work performance.

A. PROTECTIVE CLOTHING AND EQUIPMENT

1. Contractor personnel must obtain and utilize appropriate personal protective equipment for the work performed in accordance with applicable state and federal OSHA standards. This includes but is not limited to the use of eye protection, foot protection, respiratory protection, protective clothing, hearing protection and head protection.

   a. Eye Protection. Safety eyewear meeting ANSI Z87.1 shall be worn in areas designated as "Eye Protection Required" and on all jobs where a potential injury to the eyes is possible whether or not the area is posted. Special eye protection and/or face protection will be worn when applicable.

   b. Foot Protection. Affected employee(s) shall wear protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where such employee's feet are exposed to electrical hazards. Safety shoes and boot which meet the ANSI Z41 Standard shall be provided when impact and/or compression hazards exists. Soft shoes, including but not limited to, tennis shoes, athletic shoes, moccasins, sandals, and open-toed or open-heeled shoes shall not be worn.

   c. Respiratory Protection. Appropriate, MSHA/NIOSH-approved respiratory protective devices must be worn when applicable state and/or federal action levels or permissible exposure levels are exceeded. Contractor must have fully implemented a respiratory protection program meeting the requirements of *Title 29, Code of Federal Regulations, Section 1910.134 / 1926.103* prior to issuing and using respiratory equipment. Contractor shall supply and maintain appropriate air monitoring and respiratory protection equipment in areas expected to pose such hazards.

   d. Protection Clothing such as suits, aprons, boots, or gloves shall be worn where there is a hazard to the body through dermal contact with chemicals, dusts, heat or other harmful agents or conditions.

   e. Hearing Protection (muffs and/or plugs) must be worn in all areas posted to indicate high noise level or where Contractor employees are exposed to noise levels in excess of the OSHA permissible exposure limit.

2. Prior to performing any welding or cutting operation outside of a welding booth, Contractor will contact the local fire department to determine if cutting and welding permits are required. Notify the Lockheed Martin Project Coordinator of any permit requirements.

3. Contractor personnel must secure all oxygen and acetylene cylinders in a manner complying with OSHA regulations. Oxygen and acetylene cylinders must be stored separately. Oxygen cylinders in storage must be separated from fuel gas cylinders a distance of 20 feet or by a noncombustible barrier 5 feet high.
Acetylene cylinders shall not be stored horizontally; laying on their side.

4. When welding, Contractor personnel shall use welding curtains and/or suitable protective devices to protect persons from indirect exposure to welding flashes.

D. LOCK OUT/LINE BREAKING (Lockout/Tagout)

1. Contractor shall not perform work on electrical circuits, machinery, or lines (or connected equipment) carrying hazardous liquids or gases under pressure until Contractor institutes appropriate protective measures. Such measures shall include ensuring that controlling switches and valves have been identified, positively locked out, and appropriately tagged to prevent personal injury to its employees or others and/or damage to equipment due to unexpected start-up of electrical or mechanical equipment. This shall be done in accordance with *29 CFR 1910.147 - The control of hazardous energy (lockout/tagout)* and/or applicable state OSHA requirements.

2. If Contractor needs to lock-out Lockheed Martin equipment, Contractor(s) shall notify the Lockheed Martin Project Coordinator. Contractor(s) shall not, under any circumstances, lock-out Lockheed Martin equipment or enter an electrical control room unescorted by a Lockheed Martin representative.

3. Upon completion of the job, Contractor is to notify the Lockheed Martin Project Coordinator so power can be resumed to the equipment after the lock-outs have been removed.

E. USE OF Lockheed Martin MATERIALS AND EQUIPMENT

1. Contractor's employees shall not use Lockheed Martin tools, equipment, materials, or personal protective equipment unless otherwise authorized by Lockheed Martin.

2. Contractor shall not start or stop any production equipment without the approval of the Lockheed Martin Project Coordinator, who will contact appropriate Lockheed Martin production personnel.

3. Contractor shall not adjust or relocate any Lockheed Martin process equipment without the approval of the Lockheed Martin Project Coordinator, who will contact appropriate Lockheed Martin production personnel.

F. DANGEROUS OPERATIONS - WARNINGS AND BARRICADES

1. Contractor shall isolate Contractor's work areas from Lockheed Martin operations, employees, and the public by using warning tape or another effective means of isolation.

2. Prior to commencing work, Contractor must inform the Lockheed Martin Project Coordinator (who will contact appropriate Lockheed Martin production or supervisory personnel) of any work posing a potential danger to Lockheed Martin personnel.

3. Contractor personnel shall erect and properly maintain, at all times, all necessary safeguards for the protection of both Contractor personnel, Lockheed Martin employees and others. This includes:

   a. If doing any overhead work, Contractor must utilize warning signs and barricades, or station someone to warn passers-by;

   b. Contractor must effectively barricade excavations, floor openings, etc., as required by OSHA regulations;

   c. Contractor must construct and maintain all scaffolds and working platforms in accordance with OSHA regulations; and

   d. If Contractor's equipment, barricades or other safeguards restrict fire lanes or fire equipment access, the Contractor shall notify the Lockheed Martin Project Coordinator, who will inform the local fire department.

G. ELECTRICAL SAFETY

1. Contractor personnel shall properly ground all electrical tools, mechanical digging or concrete breaking equipment, and all other electrical equipment while in use.

2. All electrical equipment shall be appropriately rated (under OSHA and NEC regulations) for the work done.

H. HOUSEKEEPING/CLEANUP

1. Contractor shall continuously clean-up its work area. Contractor shall maintain its area free from all tripping and slipping hazards at all times.

2. The work area must be left free from accumulation of waste and rubbish at the end of each work shift.

3. At the end of each working day and/or the conclusion of work being performed, Contractor shall restore the work area to the same degree of neatness as when work commenced.

Attachment "D"

4. Contractor shall furnish necessary equipment and/or receptacles to remove waste and rubbish from the job site unless otherwise specified by the Lockheed Martin.

I. ACCIDENT/INJURY/SPILL REPORTING

1. Contractor shall promptly report all accidents and injuries to the Lockheed Martin Project Coordinator. This shall include all near-miss incidents which did not, but could have, resulted in serious personal injury or property damage. A written report of the incident and corrective action(s) taken shall be submitted to the Lockheed Martin Project Coordinator within one (1) day. Representatives from Lockheed Martin may conduct joint investigations with contractors if deemed necessary.

2. In case of a spill or release of hazardous chemicals, Contractor shall immediately notify the Lockheed Martin Project Coordinator and if the severity of the spill warrants, the local fire department or call 9-1-1. The Contractor shall be liable for the costs of any spill resulting from Contractor's actions, including, but not limited to, costs of containment, cleanup, and disposal.

J. LOSS PREVENTION (FIRE)

1. Contractor shall familiarize Contractor's employees with the locations of fire extinguishers in their respective work areas and ensure they are prepared to use them safely if necessary. In certain field locations or within abandoned facilities where fire extinguishers may not exist in the immediate work area, contractor agrees to provide fire extinguisher(s) in close proximity to the contractor's work area.

2. In case of fire, Contractor shall turn in an alarm to the local fire department or call 9-1-1. Contractor shall then inform all Contractor and Lockheed Martin employees in the area to evacuate to a safe place and direct arriving fire response personnel to the fire. Notify the Lockheed Martin Project Coordinator as soon as reasonably possible.

3. Contractor employees shall only attempt to put out a fire when such action can be performed safely.

4. Contractor shall not use water to extinguish fires near electrical equipment. CO_2 or dry chemical extinguishers shall be used.

5. If a Contractor's employee uses a Lockheed Martin fire extinguisher, Contractor shall report it to the Lockheed Martin Project Coordinator.

6. Contractor shall report all fires extinguished by the Contractor to the Lockheed Martin Project Coordinator. The Lockheed Martin Project Coordinator will determine if the local fire department is to be notified.

7. Contractor employees shall not smoke inside buildings. Smoking outside buildings is allowed only where a potential for fire does not exist. No smoking is allowed within 50 feet of aircraft, within paint hangers or spray booths, or within 20 feet of any painting operations or fueling operations.

8. Prior to commencing hot work (burning, cutting, welding or tar pot work), Contractor shall contact the local fire department to determine hot work or burn permit requirements.

9. Contractors are to store, dispense, and use flammable and combustible liquids in accordance with OSHA regulations and the Uniform Fire Code.

10. Contractor shall proved sufficient fire extinguishers necessary for their work activities.

K. USE OF HAZARDOUS MATERIALS - HAZARD COMMUNICATION

1. Contractor personnel shall not bring any hazardous substances (as defined by OSHA) onto Lockheed Martin premises unless accompanied by a Material Safety Data Sheets (MSDS). MSDS's must be maintained at the job site.

2. Contractor shall ensure all containers of hazardous materials are labeled in compliance with state and federal OSHA regulations with the product name, appropriate hazard warnings, and the name and address of the manufacturer.

3. The Lockheed Martin Project Coordinator shall inform the Contractor(s) of the identity of hazardous chemicals to which Contractor's employees may be exposed from Lockheed Martin operations. The Lockheed Martin Project Coordinator shall provide the following information:

   a) Where to obtain information concerning any hazardous substances used in Lockheed Martin operations that the Contractor's employees may come in contact with while performing their work;

   b) Lockheed Martin shall make available to the Contractor, Material Safety Data Sheets (MSDS), and sufficient information to permit the Contractor to train its employees;

   c) Appropriate protective measure Contractor's employees may take to protect themselves from exposure to known hazards from Lockheed Martin operations; and

   d) Appropriate work practice procedures (safety rules) for the location where work is to be performed.

4. Contractor shall ensure its' employees are trained in the safe handling and use of hazardous materials in accordance with *Title 29 CFR 1910.1200* - Hazard Communication.

5. Contractor shall ensure that all applicable employees are medically qualified (as defined by OSHA) to perform the work assigned.

L. INCIDENTAL CONTACT WITH ASBESTOS

1. This section applies to all contractors who incidentally come into contact with asbestos-containing materials or suspected asbestos-containing materials; i.e., contractors who have not been specifically hired to perform abatement, maintenance, construction, repair, renovation, demolition, salvage, or any other operation in which any material containing more than 0.1% asbestos is sanded, abrasive blasted, sawed, shoveled, removed, or otherwise handled in a manner that would generate airborne asbestos fibers.

2. All Contractors shall immediately report to the Lockheed Martin Project Coordinator, or if the Lockheed Martin Coordinator is not available, directly to Lockheed Martin S&H Coordinator, any discovery/spill of suspected asbestos. Contractor(s) is to cease all operations in the immediate area of the discovery/spill. The approval of Lockheed Martin is required before resuming operations.

3. Contractor shall not disturb any pipe insulation, boiler insulation, or any other material reasonably suspected of containing asbestos until the Contractor notifies the Lockheed Martin Project Coordinator. Lockheed Martin approval is required before operations may commence.

4. Abatement of asbestos can only be performed by persons properly trained and licensed to perform such activities.

M. ASBESTOS REMOVAL CONTRACTORS

1. This section applies to Contractors performing maintenance, construction, repair, renovation, demolition, salvage, or any other operation in which any material containing more than 0.1% asbestos is sanded, abrasive blasted, sawed, shoveled, removed, or otherwise handled in a manner that would generate airborne asbestos fibers. These requirements are in addition to any requirements contained in Contractor's scope of work.

2. All Contractors working with asbestos shall comply with applicable federal and state OSHA, EPA, local air district, and other applicable Federal, State, municipal, and local statutes, regulations, rules, and ordinances; specific contract terms and conditions; and specific instructions from Lockheed Martin regarding the handling of, use of, and work involving asbestos.

3. All Contractors working with asbestos must be approved by Lockheed Martin.

4. Before commencing work, all Contractors shall supply to Lockheed Martin proof of:

   a. Asbestos abatement contractor certification by the state Contractor's License Board;

   b. Liability insurance for Contractor employees engaged in asbestos work operations;

   c. Copies of asbestos work notification letters to state OSHA;

   d. Local air district Asbestos Demolition/Renovation Notification;

   e. Adequate health insurance to cover any asbestos-related medical monitoring for contractor employees; and

   f. Proof of employee medical surveillance examinations and asbestos training as required by federal and state OSHA regulations.

5. Contractors shall minimize the creation and spread of airborne asbestos fibers by using appropriate work practices and procedures, including HEPA filter vacuums, wet methods, negative pressure, clean rooms, etc.

6. Contractors shall barricade and post asbestos work areas with warning signs complying with federal and state OSHA, local air district, and other relevant regulatory requirements.

7. Contractors shall package and label asbestos waste in accordance with federal and state OSHA and federal and state hazardous waste regulations.

8. Contractors shall properly dispose of all asbestos waste. Proper disposal includes the use of hazardous waste manifests and Lockheed Martin approved and licensed waste haulers, and disposal facilities according to federal RCRA law and applicable state hazardous waste regulations. Contractor shall contact the Lockheed Martin Project Coordinator before transporting or disposing of any hazardous waste. Lockheed Martin must review all hazardous waste manifests prior to shipment.

9. Contractors shall ensure that employee exposure air monitoring is conducted as required by federal and state OSHA regulations. All other air monitoring (i.e. clearance sampling) shall be conducted by a third-party contracted air monitoring firm not affiliated with the Contractor.

10. Contractor shall allow Lockheed Martin or its designated representative to inspect the work area.

N. HAZARDOUS WASTE OPERATIONS

1. This section applies to Contractors performing hazardous aste-type activities. This includes operations that pose a potential or reasonable possibility for employee exposure to hazardous waste/chemical contaminants during site investigations, clean-up operations, abatement, or hazardous substance removal work (remedial actions). These requirements are in addition to any requirements contained in Contractor's scope of work.

2. All Contractors performing hazardous waste-type operations shall perform all site operations in accordance with *29 CFR 1910.120 - Hazardous Waste Operations and Emergency Response.*

3. Training: Contractor employees must have training for work on hazardous waste operations, in accordance with *29 CFR 1910.120(e)*. If respiratory protection devices are to be worn, contractor employees shall be medically qualified and trained in accordance with *29 CFR 1910.134*. Lockheed Martin does not provide training for contractor employees. In addition, contractor shall hold pre-entry briefings prior to initiating any site activity, and at such other times as necessary to ensure that employees are apprised of the site safety and health plan and that this plan is being followed. Documentation of the above mentioned training must be maintained at the job site and be available for Lockheed Martin inspection.

4. Medical Surveillance: Contractor employees must be enrolled in a medical surveillance program prior to performing hazardous waste operations, in accordance with *29 CFR 1910.120(f)*. Upon request, contractor must provide documentation of medical surveillance for project employees. Lockheed Martin does not provide medical surveillance examinations for contractor employees.

5. Site specific safety and health plan: Contractor must develop and implement a written site/task-specific safety and health plan. This plan must meet the requirements of *29 CFR 1910.120 (b)(4) - Site-specific safety and health plan part of the program.*

6. Daily work area inspections: Contractor agrees to perform daily work area inspections to determine the effectiveness of the site safety and health plan and to identify and correct unsafe conditions in contractor's responsible work area. These inspections shall be documented and available to Lockheed Martin upon request for review.

7. For contractors performing any remedial work, cleaning activity, or general earthmoving with heavy equipment; the contractor shall maintain in writing that maintenance and inspections are performed on equipment on a regularly scheduled basis in accordance with *29 CFR 1910/1926* and any other applicable state requirements.

III. ENVIRONMENTAL:

Contractors shall comply with all applicable provisions of Federal, State, municipal, local, and other environmental statutes, rules, and regulations. Contractor shall take all necessary precautions to protect the environment; and to store, transport, dispose, or otherwise handle hazardous wastes and non-hazardous wastes; and to prevent discharges of materials into the environment except in accordance with applicable governmental regulations.

A. HAZARDOUS WASTE HANDLING, STORAGE, TRANSPORT, AND DISPOSAL

1. Contractor shall handle, transport, and dispose of all hazardous wastes in accordance with Federal, State, municipal, local, and other rules, regulations, ordinances and requirements.

2. Contractor must segregate hazardous from non-hazardous waste; all hazardous waste generated by its operations must be labeled in accordance with all governmental regulations.

3. Contractor shall dispose of all hazardous waste within 60 days of its accumulation start date. Contractor shall not leave behind on Lockheed Martin property any containers of hazardous materials or waste (including drums, roll-offs, maintenance chemicals, etc.), empty or not, after the termination of operations.

4. All Contractors generating hazardous waste in its operations must have its own EPA Generator Identification Number (EPA ID Number) for use on manifests.

   a. Contractor shall use its own EPA ID Number, sign manifests, and arrange for transportation and disposal for all Contractor-generated hazardous wastes unless Lockheed Martin determines otherwise.

   b. Lockheed Martin accepts no liability for the transportation and disposal of wastes generated by the Contractor. The Contractor shall indemnify and hold harmless Lockheed Martin, its officers, employees, representatives, and agents from any and all liability, loss, cost, damage, or expense (including attorney's fees) arising out of Contractor's transportation or disposal of wastes.

   c. Where Lockheed Martin determines that hazardous wastes are Lockheed Martin-generated, Lockheed Martin's EPA ID Number shall be used on corresponding manifests. Only an authorized Lockheed Martin person may sign manifests for Lockheed Martin-generated waste.

5. Transporting, disposal, and landfill locations must be approved by Lockheed Martin prior to work commencement.

6. To ensure compliance with the above procedures, Contractor shall contact Lockheed Martin before transporting or disposing of any hazardous waste. Lockheed Martin must review all hazardous waste manifests prior to the shipment of any hazardous wastes.

7. If Contractor's transportation or disposal arrangements are inappropriate and require Lockheed Martin to dispose of Contractor's waste, Lockheed Martin reserves the right to bill the Contractor for the reasonable costs of transportation and disposal.

8. In case of a spill or release of hazardous chemicals or waste, Contractor shall immediately notify the Lockheed Martin Project Coordinator and if the severity of the spill warrants, notify the local fire department (Call 9-1-1). The Contractor shall be liable for the costs of any spill resulting from Contractor's actions, including, but not limited to, costs of containment, cleanup, and disposal.

B. NON-HAZARDOUS WASTE DISPOSAL

1. Contractor shall handle, transport, and dispose of all non-hazardous wastes in accordance with Federal, State, municipal, local and other rules, regulations, ordinances and requirements.

2. Contractor shall not dispose of any non-hazardous wastes on Lockheed Martin property without the express written permission of Lockheed Martin.

C. WORK INVOLVING AIR EMISSIONS

1. If Contractor's operations require an air pollution permit, Contractor must provide copies of local air district Permit(s) to Operate (or Applications for Permits to Operate) to the Buyer or the Lockheed Martin Project Coordinator for all equipment to be used by the Contractor on Lockheed Martin property. In the alternative, Contractor shall document an exemption from the permit requirements.

2. Contractor shall submit to the Lockheed Martin Project Coordinator daily records of all coatings, solvents and other materials used for which a local air district Permit is required, or for which documentation justifying a permit exemption is required.

D. WORK INVOLVING WATER DISCHARGES

1. Contractor shall notify the Lockheed Martin Project Coordinator and obtain the approval of Lockheed Martin before discharging any material into storm drains or sewers.

IV. FINES, PENALTIES AND COSTS:

Contractor shall indemnify and hold Lockheed Martin harmless from any and all liability (including but not limited to fines and penalties), loss, cost, damage, or expense (including attorney's fees) suffered or incurred by Lockheed Martin by reason of Contractor's failure to comply with Federal, State, municipal, local or other laws, rules, regulations, ordinances and requirements, or failure to comply with generally accepted environmental safety and health practices.

V. Lockheed Martin CONTACTS

Title	Name	Phone Number	Pager number
Project Coordinator	See Subcontract Agreement Article #32		
Environmental Coordinator (Hazardous Waste)	Bob Gilbert	(818) 847-0210	(818) 499-3025
Safety & Health Coordinator	Brian Shaughnessy	(818) 847-0232	(818) 499-3038
Lockheed Martin General Office	Receptionist	(818) 847-0828	
Lockheed Martin Procurement Representative	Dean Horton	(818) 847-0584	(818) 499-3027

ATTACHMENT "D"

CONTRACTOR'S SAFETY HANDBOOK ACKNOWLEDGEMENT

Contractor has read and understands the contents of the *Contractor's Safety Handbook*. Contractor agrees while performing work on Lockheed Martin-owned or Lockheed Martin-controlled premises, that the Contractor shall, and shall require its subcontractors at any tier, to comply with the contents of this *Contractor's Safety Handbook*. A copy of this handbook shall be maintained at the site, and employees, Contractor's officers, agents, subcontractors at any tier and subcontractor employees are supplied a copy of the *Contractor's Safety Handbook* for their implementation.

COMPANY _____

Name _____

Signature _____

Title _____

Date _____

Complete, sign and return this certificate to Lockheed Martin

APPENDIX 4

MSDS

CHEM SERVICE -- TRICHLOROETHENE, 0-664
MATERIAL SAFETY DATA SHEET
NSN: 681000N054678
Manufacturer's CAGE: 8Y898
Part No. Indicator: A
Part Number/Trade Name: TRICHLOROETHENE, 0-664

General Information

Company's Name: CHEM SERVICE INC
Company's P. O. Box: 3108
Company's City: WEST CHESTER
Company's State: PA
Company's Country: US
Company's Zip Code: 19381
Company's Emerg Ph #: 215-692-3026
Company's Info Ph #: 215-692-3026
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 07JAN93
Safety Data Review Date: 03NOV94
MSDS Serial Number: BVYRM
Hazard Characteristic Code: NK

Ingredients/Identity Information

Proprietary: NO
Ingredient: ETHYLENE, TRICHLORO-; (TRICHLOROETHYLENE) (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: KX4550000
CAS Number: 79-01-6
OSHA PEL: 100 PPM
ACGIH TLV: 50 PPM;100 PPM STEL

Proprietary: NO
Ingredient: SUPP DATA: BRTHG ADMIN ARTF RESPS.IF PATIENT IS IN CARD ARREST ADMIN CPR. CONTINUE LIFE SUPPORTING MEASURES UNTIL(ING 3)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: ING 2: MEDICAL ASSISTANCE HAS ARRIVED. INGESTION: CALL MD IMMEDIATELY (FP N).
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: EYE PROTECTION: FULL LENGTH FACESHIELD (FP N).
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS LIQUID.
Boiling Point: 189F,87C
Melting Point: -125F,-87C
Vapor Pressure (MM Hg/70 F): 58 @ 20C
Specific Gravity: 1.462

Solubility In Water: INSOLUBLE

Fire and Explosion Hazard Data

Flash Point: NON-FLAMMABLE
Lower Explosive Limit: 11%
Upper Explosive Limit: 41%
Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER OR SPRAY.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED PRESSURE DEMAND SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE HCL AND PHOSGENE (FP N).

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG BASES, STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: DECOMPOSITION LIBERATES TOXIC FUMES. DECOMPOSITION PRODUCTS ARE CORROSIVE. HCL, PHOSGENE (FP N).
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: LD50 (ORAL,RAT): 4920 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: CONT LENSES SHOULD NOT BE WORN IN LAB. ALL CHEMS SHOULD BE CONSIDERED HAZ-AVOID DIRECT PHYS CONT! SUSPECTED CARCIN-MAY PRDCE CANCER. MAY BE HARMFUL IF ABSORB THRU SKIN. MAY BE HARMFUL IF INHALED. MAY BE HARMFUL IF SWALLOWED. LACHRYMATOR-CAUSES SEV EYE IRRIT. VAPS &/OR DIRECT EYE CONT CAN CAUSE SEV EYE (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: HLTH HAZ: BURNS. CAN CAUSE EYE IRRIT. CAN CAUSE SKIN IRRIT. CAN CAUSE SKIN BURNS. CAN CAUSE SEV SKIN BURNS. EXPOS CAN CAUSE LIVER DMG. EXPOS CAN CAUSE KIDNEY DMG. CAN CAUSE GI DISTURB. CAN BE IRRIT TO MUC MEMBS. PRLNGD EXPOS MAY CAUSE NAUS/HDCH/DIZZ &/OR EYE DMG.CAN CAUSE SENSIT BY SKIN CONT. CHLOROCARBON MATLS(SUPDAT)
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: AN ANTIDOTE IS SUBSTANCE INTENDED TO COUNTERACT EFT OF POIS. IT SHOULD BE ADMIN ONLY BY PHYS/TRAINED EMER PERS. MED ADVICE CAN BE OBTAINED FROM POIS CNTRL CNTR. EYE: FLUSH CONTINUOUSLY W/ WATER FOR AT LST 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NOT BURNS HAVE OCCURED-USE SOAP & WATER TO CLEANSE SKIN. INHAL: REMOVE PATIENT TO FRESH AIR. ADMIN OXYGEN IF PATIENT IS HAVING DFCLTY (SUPDAT)

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP AND PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS (FP N).
Precautions-Handling/Storing: AVOID CONTACT WITH SKIN, EYES AND CLOTHING. KEEP TIGHTLY CLOSED IN COOL DRY PLACE. STORE ONLY WITH COMPATIBLE CHEMICALS.
Other Precautions: NO SMOKING IN AREA OF USE. DO NOT USE IN GENERAL

VICINITY OF ARC WELDING, OPEN FLAMES OR HOT SURFACES. HEAT AND/OR UV RADIATION MAY CAUSE FORMATION OF HCL AND/OR PHOSGENE (FP N).

Control Measures

Respiratory Protection: WEAR NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: CHEMICAL SHOULD BE HANDLED ONLY IN HOOD.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGG & (ING 4)
Other Protective Equipment: USE APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.EMER EYEWASH & DELUGE SHOWER WHICH MEET ANSI DESIGN STANDARDS(FP N).
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: EFTS OF OVEREXP: HAVE PRDCED SENSIT OF MYOCARDIUM TO EPINEPHRINE IN LAB ANIMALS & COULD HAVE SIMILAR EFT IN HUMANS. ADRENOMIMETICS (E.G., EPINEPHRINE) MAY BE CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY/CHRONICALLY EXPOS TO CHLOROCARBONS (FP N). FIRST AID PROC: BRTHG. IF PATIENT HAS STOPPED (ING 2)

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 03NOV94
Label Date: 26OCT94
Label Status: G
Common Name: TRICHLOROETHENE, 0-664
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Severe: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: INHALATION OF VAPORS MAY CONTRIBUTE TO THE OCCURRENCE OF IRREGULAR HEARTBEAT (FP N). MAY BE HARMFUL IF ABSORB THRU SEVERE BURNS/IRRITATION MAY CAUSE LIVER/KIDNEY DAMAGE, GASTROINTESTINAL DISTURBANCE. MAY CAUSE MUCOUS MEMBRANE IRRITATION. CHRONIC: NAUSEA, HEADACHE, DIZZINESS AND/OR EYE DAMAGE.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: CHEM SERVICE INC
Label P.O. Box: 3108
Label City: WEST CHESTER
Label State: PA
Label Zip Code: 19381
Label Country: US
Label Emergency Number: 215-692-3026

CHEM SERVICE -- TETRACHLOROETHENE, 0-663
MATERIAL SAFETY DATA SHEET
NSN: 681000N054677
Manufacturer's CAGE: 8Y898
Part No. Indicator: A
Part Number/Trade Name: TETRACHLOROETHENE, 0-663

General Information

Company's Name: CHEM SERVICE INC
Company's P. O. Box: 3108
Company's City: WEST CHESTER
Company's State: PA
Company's Country: US
Company's Zip Code: 19381
Company's Emerg Ph #: 215-692-3026
Company's Info Ph #: 215-692-3026
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 01JUL88
Safety Data Review Date: 03NOV94
MSDS Serial Number: BVYRL
Hazard Characteristic Code: NK

Ingredients/Identity Information

Proprietary: NO
Ingredient: ETHYLENE, TETRACHLORO-; (TETRACHLOROETHYLENE) (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: KX3850000
CAS Number: 127-18-4
OSHA PEL: 25 PPM
ACGIH TLV: 25 PPM;100 PPM STEL

Proprietary: NO
Ingredient: SUPP DATA: RESPS. IF PATIENT IS IN CARD ARREST ADMIN CPR. CONTINUE LIFE SUPPORTING MEASURES UNTIL MED ASSIST HAS (ING 3)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: ING 2: ARRIVED. INGESTION: CALL MD IMMEDIATELY (FP N).
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: EYE PROTECTION: FULL LENGTH FACESHIELD (FP N).
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS LIQUID.
Boiling Point: 250F,121C
Melting Point: 71.6F,22C
Vapor Pressure (MM Hg/70 F): 14 @ 20C
Vapor Density (Air=1): N/A
Specific Gravity: 1.623

Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: INSOLUBLE

Fire and Explosion Hazard Data

Flash Point: NON-FLAMMABLE
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER OR SPRAY.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MANUFACTURER.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG BASES, OXIDIZING AGENTS.
Hazardous Decomp Products: DECOMPOSITION LIBERATES TOXIC FUMES. DECOMPOSITION PRODUCTS ARE CORROSIVE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: LD50 (ORAL,RAT): 8850 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: CONT LENSES SHOULD NOT BE WORN IN LAB. ALL CHEMS SHOULD BE CONSIDERED HAZ-AVOID DIRECT PHYS CONT! CAN BE HARMFUL IF ABSORB THRU SKIN. CAN BE HARMFUL IF INHALED. CAN BE FATAL IF ABSORB THRU SKIN! CAN BE FATAL IF INHALED! MAY BE FATAL IF SWALLOWED! SUSPECTED CARCIN-MAY PRDCE CANCER. LACHRYMATOR-CAUSES (EFTS OF OVEREXP)
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: TETRACHLOROETHYLENE: IARC MONOGRAPHS SUPP, (SUPDAT)
Signs/Symptoms Of Overexp: HLTH HAZ: SEV EYE IRRIT. VAPS &/OR DIRECT EYE CONT CAN CAUSE SEV EYE BURNS. CAN CAUSE EYE IRRIT. VAPS &/OR DIRECT EYE CONT CAN CAUSE SEV EYE BURNS. CAN CAUSE EYE IRRIT. CAN CAUSE SKIN IRRIT. CAN CAUSE SKIN BURNS. CAN CAUSE SEV SKIN BURNS. CAN BE HARMFUL IF SWALLOWED. CAN CAUSE LIVER INJ. CAN CAUSE KIDNEY INJ. (SUPDAT)
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: AN ANTIDOTE IS SUBSTANCE INTENDED TO COUNTERACT EFT OF POIS. IT SHOULD BE ADMIN ONLY BY PHYS/TRAINED EMER PERS. MED ADVICE CAN BE OBTAINED FROM POIS CNTRL CNTR. EYE: FLUSH CONTINUOUSLY W/ WATER FOR AT LST 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NO BURNS HAVE OCCURRED-USE SOAP & WATER TO CLEANSE SKIN. INHAL: REMOVE PATIENT TO FRESH AIR. ADMIN OXYGEN IF PATIENT IS HAVING DFCLTY (SUPDAT)

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP AND PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: BURN IN CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N).
Precautions-Handling/Storing: AVOID CONTACT WITH SKIN, EYES AND CLOTHING. KEEP TIGHTLY CLOSED IN COOL DRY PLACE. STORE ONLY WITH COMPATIBLE CHEMICALS.

Other Precautions: NONE SPECIFIED BY MANUFACTURER.

Control Measures

Respiratory Protection: WEAR NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: CHEMICAL SHOULD BE HANDLED ONLY IN HOOD.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGG & (ING 4)
Other Protective Equipment: USE APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.EMER EYEWASH & DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N).
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
LIVER TUMORS. EFTS OF OVEREXP: CAN BE IRRIT TO MUC MEMB. PRLNGD EXPOS MAY CAUSE NAUS/HDCH, DIZZ &/OR EYE DMG. AVOID CONSUMPTION OF ALCOHOL BEFORE & BRTHG. IF PATIENT HAS STOPPED BRTHG ADMIN ARTF (ING 2)

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 03NOV94
Label Date: 26OCT94
Label Status: G
Common Name: TETRACHLOROETHENE, 0-663
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: CAN BE HARMFUL IF ABSORBED THROUGH SEVERE BURNS/IRRITATION. MAY CAUSE LIVER/KIDNEY INJURY, MUCOUS MEMBRANE IRRITATION. CHRONIC: CANCER HAZARD. CONTAINS TETRACHLOROETHYLENE, WHICH IS LISTED AS A LIVER CARCINOGEN TO ANIMALS (FP N). MAY CAUSE NAUSEA/HEADACHE/ DIZZINESS AND/OR EYE DAMAGE.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: CHEM SERVICE INC
Label P.O. Box: 3108
Label City: WEST CHESTER
Label State: PA
Label Zip Code: 19381
Label Country: US
Label Emergency Number: 215-692-3026

HACH -- 1,1,1-TRICHLOROETHANE - 1,1,1-TRICHLOROETHANE
MATERIAL SAFETY DATA SHEET
NSN: 681000D001402
Manufacturer's CAGE: 4T252
Part No. Indicator: A
Part Number/Trade Name: 1,1,1-TRICHLOROETHANE

General Information

Item Name: 1,1,1-TRICHLOROETHANE
Company's Name: HACH CO.
Company's Street: 100 DAYTON RD.
Company's P. O. Box: 907
Company's City: AMES
Company's State: IA
Company's Country: US
Company's Zip Code: 50010-6402
Company's Emerg Ph #: 800-227-4224 303-623-5716
Company's Info Ph #: 800-227-4224
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 002
Status: SE
Date MSDS Prepared: 01JAN95
Safety Data Review Date: 30MAY95
Supply Item Manager: CX
MSDS Preparer's Name: UNKNOWN
MSDS Serial Number: BWZKP
Specification Number: NONE
Spec Type, Grade, Class: NONE
Hazard Characteristic Code: T4
Unit Of Issue: NK
Unit Of Issue Container Qty: UNKNOWN
Type Of Container: UNKNOWN
Net Unit Weight: UNKNOWN

Ingredients/Identity Information

Proprietary: NO
Ingredient: METHYL CHLOROFORM (1,1,1-TRICHLOROEHANE) (SARA 313) (CERCLA)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: KJ2975000
CAS Number: 71-55-6
OSHA PEL: 350 PPM
ACGIH TLV: 350 PPM/450STEL;9495
Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance And Odor: LIQUID;COLORLESS;SWEET ODOR.
Boiling Point: 165F,74C
Melting Point: -36F,-38C
Vapor Pressure (MM Hg/70 F): 100
Vapor Density (Air=1): 4.6
Specific Gravity: 1.345
Decomposition Temperature: UNKNOWN
Solubility In Water: NEGLIGIBLE
Corrosion Rate (IPY): UNKNOWN
Autoignition Temperature: 998F

Fire and Explosion Hazard Data

Flash Point: NONE
Flash Point Method: CC
Lower Explosive Limit: 8

Upper Explosive Limit: 10.5
Extinguishing Media: WATER,DRY CHEMICAL,CARBON DIOXIDE,ALCOHOL FOAM.
Special Fire Fighting Proc: WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY.
Unusual Fire And Expl Hazrds: COMBUSTION OR HEAT OF FIRE MAY PRODUCE HAZARDOUS DECOMPOSITION PRODUCTS AND VAPORS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HIGH HEAT, OPEN FLAMES AND OTHER SOURCES OF IGNITION
Materials To Avoid: STRONG OXIDIZING AGENTS(OXYGEN GAS,NAOH,STRONG CAUSTICS).
Hazardous Decomp Products: WHEN INVOLVED IN FIRE, 1,1,1-TRICHLOROETHANE EMITS HIGHLY TOXIC AND IRRITATING HYDROGEN CHLORIDE AND PHOSGENE FUMES.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture: ORAL LD50 (RAT) = 9600 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: EYES:MAY CAUSE IRRITATION.SKIN:MAY CAUSE IRRITATION.INGEST:MAY CAUSE GI TRACT IRRITATION.INHAL:MAY CAUSE RESPIRATORY IRRITATION AND CARDIAC SENSITIZATION.CHRONIC:MAY DAMAGE LIVER,KIDNEYS,CNS, HEART.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: THIS ITEM HAS BEEN INVESTIGATED AS A TERATOGEN(CAUSING BIRTH DEFECTS).
Signs/Symptoms Of Overexp: INHAL:NARCOTIC EFFECTS,HEADACHE,DIZZINESS, DROWSINESS,UNCONSCIOUSNESS,IRREGULAR HEARTBEAT,DEPRESSED RESPIRATION.
Med Cond Aggravated By Exp: PERSONS WITH PRE-EXISTING SKIN AILMENTS MAY BE AT INCREASED RISK FROM EXPOSURE.
Emergency/First Aid Proc: SKIN:REMOVE CONTAMINATED CLOTHING;WASH WITH SOAP AND WATER.EYES:FLUSH WITH WATER FOR 15 MINUTES.GET MEDICAL ATTENTION. INHAL:REMOVE TO FRESH AIR.GIVE OXYGEN OR ARTIFICIAL RESPIRATION IF NEEDED. INGEST:DO NOT INDUCE VOMITING.GET PROMPT QUALIFIED MEDICAL ATTENTION.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SMALL SPILL: WIPE UP WITH RAGS OR TOWELS. LARGE SPILLS: WEAR NIOSH APPROVED RESPIRATOR. VENTILATE AREA. DIKE TO RETAIN FLUID. PUMP UP FREE LIQUID. RESIDUE WILL EVAPORATE QUICKLY. DO NOT FLUSH TO SEWER OR WATERWAY.
Neutralizing Agent: NONE
Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH FEDERAL,STATE AND LOCAL REGULATIONS.RCRA CODE U226.
Precautions-Handling/Storing: STORE IN A COOL, DRY, WELL-VENTILATED LOCATION, AWAY FROM ANY AREA WHERE THE FIRE HAZARD MAY BE ACUTE. KEEP CONTAINERS CLOSED WHEN NOT IN USE.
Other Precautions: DO NOT USE WITH ALUMINUM. READ AND FOLLOW DIRECTIONS ON LABEL. DO NOT REUSE CONTAINERS.

Control Measures

Respiratory Protection: IN HIGH VAPOR AREA, USE NIOSH/MSHA APPROVED RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE. USE SELF-CONTAINED BREATHING APPARATUS IF VAPOR LEVELS EXCEED 1000 PPM.
Ventilation: LOCAL EXHAUST RECOMMENDED TO CONTROL VAPORS BELOW 50% OF TLV.

Protective Gloves: NITRILE
Eye Protection: CHEMICAL SPLASH GOGGLES
Other Protective Equipment: APRON AND WORK CLOTHING TO MINIMIZE EXPOSURE. EYE WASH STATION & SAFETY SHOWER RECOMMENDED.
Work Hygienic Practices: WASH THOROUGHLY AFTER USE AND BEFORE EATING, SMOKING OR USING TOILET FACILITIES. DO NOT BREATH VAPORS OR MIST.
Suppl. Safety & Health Data: NONE

Transportation Data

Trans Data Review Date: 95150
DOT PSN Code: OQD
DOT Proper Shipping Name: 1,1,1- TRICHLOROETHANE *
DOT Class: 6.1
DOT ID Number: UN2831
DOT Pack Group: III
DOT Label: KEEP AWAY FROM FOOD
IMO PSN Code: OVK
IMO Proper Shipping Name: 1,1,1- TRICHLOROETHANE *
IMO Regulations Page Number: 6272-1 *
IMO UN Number: 2831
IMO UN Class: 6.1
IMO Subsidiary Risk Label: -
IATA PSN Code: YLY
IATA UN ID Number: 2831
IATA Proper Shipping Name: 1,1,1- TRICHLOROETHANE *
IATA UN Class: 6.1
IATA Label: TOXIC
AFI PSN Code: YLY
AFI Prop. Shipping Name: 1,1,1- TRICHLOROETHANE *
AFI Class: 6.1
AFI ID Number: UN2831
AFI Pack Group: III
AFI Special Prov: N36
AFI Basic Pac Ref: 10-10
MMAC Code: NR
Additional Trans Data: NONE

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 30MAY95
MFR Label Number: UNKNOWN
Label Status: F
Common Name: 1,1,1-TRICHLOROETHANE
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Slight: X
Fire Hazard-Slight: X
Reactivity Hazard-None: X
Special Hazard Precautions: EYES:MAY CAUSE IRRITATION.SKIN:MAY CAUSE IRRITATION.INGEST:MAY CAUSE GI TRACT IRRITATION.INHAL:MAY CAUSE RESPIRATORY IRRITATION AND CARDIAC SENSITIZATION.CHRONIC:MAY DAMAGE LIVER,KIDNEYS,CNS, HEART. STORE IN A COOL, DRY, WELL-VENTILATED LOCATION, AWAY FROM ANY AREA WHERE THE FIRE HAZARD MAY BE ACUTE. KEEP CONTAINERS CLOSED WHEN NOT IN USE. FLUSH WITH WATER FOR 15 MINUTES.GET MEDICAL ATTENTION.INHAL:REMOVE TO FRESH AIR.GIVE OXYGEN OR ARTIFICIAL RESPIRATION IF NEEDED.INGEST:DO NOT INDUCE VOMITING.GET PROMPT QUALIFIED MEDICAL ATTENTION.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: HACH CO.

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID WITH BENZENE-LIKE ODOR.

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4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 4 C (40 F) NFPA 704M RATING: 2-3-0

FLAMMABLE LIMITS: UPPER - 7.1 % LOWER - 1.2 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

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5 - HEALTH HAZARD DATA

ACCEPTABLE MAXIMUM PEAK ABOVE THE ACCEPTANCE CEILING CONCENTRATION FOR AN EIGHT-HOUR SHIFT = 500 PPM FOR 10 MINUTES. (PEL) CEILING = 300 PPM.

THRESHOLD LIMIT VALUE (TLV/TWA): 375 MG/M3 (100 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 560 MG/M3 (150 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): MG/M3 (200 PPM)

TOXICITY:	LD50 (ORAL-RAT) (MG/KG)	- 5000
	LD50 (IPR-MOUSE) (MG/KG)	- 1.12
	LD50 (SKN-RABBIT) (G/KG)	- 14
	LC50 (INHL-MOUSE-8H) (PPM)	- 5320

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION AND INGESTION ARE HARMFUL AND MAY BE FATAL.
INHALATION MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS, SUFFOCATION, LOWER BLOOD PRESSURE, CENTRAL NERVOUS SYSTEM DEPRESSION.
INHALATION OF VAPORS MAY CAUSE COUGHING, CHEST PAINS, DIFFICULTY BREATHING, OR UNCONSCIOUSNESS.
LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAGE.
INGESTION MAY CAUSE HEADACHE, NAUSEA, VOMITING, GASTROINTESTINAL IRRITATION, UNCONSCIOUSNESS, CONVULSIONS.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS
CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, SKIN

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: TOLUENE
FORMULA: C6H5CH3
FORMULA WT: 92.14
CAS NO.: 108-88-3
NIOSH/RTECS NO.: XS5250000
COMMON SYNONYMS: METHYLBENZENE; PHENYLMETHANE; TOLUOL
PRODUCT CODES: 9472,9456,9466,9462,V963,9351,9460,9457,9459,9336,5375,9461
EFFECTIVE: 09/08/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	3	SEVERE (FLAMMABLE)
REACTIVITY	-	0	NONE
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING
FLAMMABLE
CAUSES IRRITATION
MAY BE FATAL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
TOLUENE	90-100	108-88-3

3 - PHYSICAL DATA

BOILING POINT: 111 C (232 F) VAPOR PRESSURE(MM HG): 22

MELTING POINT: -95 C (-139 F) VAPOR DENSITY(AIR=1): 3.2

SPECIFIC GRAVITY: 0.87 (H2O=1) EVAPORATION RATE: 2.24 (BUTYL ACETATE=1)

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

SPECIAL PRECAUTIONS
BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	BENZENE (BENZOL)
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1114
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	BENZENE
HAZARD CLASS	3.2
UN/NA	UN1114
LABELS	FLAMMABLE LIQUID

RESPIRATORY SYSTEM

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INGESTION, INHALATION, EYE CONTACT, SKIN CONTACT, ABSORPTION

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
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.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, SULFURIC ACID, NITRIC ACID

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO

CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U019 (TOXIC WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS ABOVE 10 PPM, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, POLYVINYL ALCOHOL GLOVES ARE RECOMMENDED.

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: CLEAR COLORLESS LIQUID HAVING CHARACTERISTIC AROMATIC ODOR.

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4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP: -11 C (12 F) NFPA 704M RATING: 2-3-0

FLAMMABLE LIMITS: UPPER - 8.0 % LOWER - 1.3 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

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5 - HEALTH HAZARD DATA

THIS SUBSTANCE IS LISTED AS ACGIH SUSPECT HUMAN CARCINOGEN, NTP HUMAN CARCINOGEN, IARC HUMAN CARCINOGEN (GROUP 1). ACCEPTABLE MAXIMUM PEAK ABOVE THE ACCEPTANCE CEILING CONCENTRATION FOR AN EIGHT-HOUR SHIFT = 50 PPM FOR 10 MINUTES; (PEL) CEILING = 25 PPM.

THRESHOLD LIMIT VALUE (TLV/TWA): 30 MG/M3 (10 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 75 MG/M3 (25 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 30 MG/M3 (10 PPM)

TOXICITY:

LD50 (ORAL-RAT) (MG/KG)	-	4894
LD50 (ORAL-MOUSE) (MG/KG)	-	4700
LD50 (IPR-RAT) (MG/KG)	-	2.9
LC50 (INHL-MOUSE-7H) (PPM)	-	9980

CARCINOGENICITY: NTP: YES IARC: YES Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS, SUFFOCATION, LOWER BLOOD PRESSURE, CENTRAL NERVOUS SYSTEM DEPRESSION. INHALATION OF VAPORS MAY CAUSE SEVERE IRRITATION OR BURNS OF THE RESPIRATORY SYSTEM, PULMONARY EDEMA, OR LUNG INFLAMMATION. LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAGE. INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTRO-INTESTINAL IRRITATION, BLURRED VISION, LOWERING OF BLOOD PRESSURE. IRREVERSIBLE INJURY TO BLOOD FORMING TISSUE MAY RESULT FROM CHRONIC LOW LEVEL EXPOSURE.

TARGET ORGANS
BLOOD, CENTRAL NERVOUS SYSTEM, EYES, SKIN, BONE MARROW,

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: BENZENE
FORMULA: C6H6
FORMULA WT: 78.10
CAS NO.: 71-43-2
NIOSH/RTECS NO.: CY1400000
COMMON SYNONYMS: BENZOL; PHENYL HYDRIDE; COAL NAPHTHA
PRODUCT CODES: 9156,9256,9153,9154,9155,B717,9149
EFFECTIVE: 01/22/87
REVISION #04

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	4	EXTREME (CANCER CAUSING)
FLAMMABILITY	-	3	SEVERE (FLAMMABLE)
REACTIVITY	-	0	NONE
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

POISON DANGER
EXTREMELY FLAMMABLE
CAUTION: CONTAINS BENZENE, CANCER HAZARD
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN
EXCEPTIONAL HEALTH HAZARD - READ MATERIAL SAFETY DATA SHEET

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
BENZENE	90-100	71-43-2

3 - PHYSICAL DATA

BOILING POINT: 80 C (176 F)
VAPOR PRESSURE(MM HG): 74.6

MELTING POINT: 6 C (43 F)
VAPOR DENSITY(AIR=1): 2.77

SPECIFIC GRAVITY: 0.88 (H2O=1)
EVAPORATION RATE: N/A (BUTYL ACETATE=1)

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: SKIN: MAY BE HARMFUL IF ABSORBED. CAN CAUSE IRRITATION. INHALATION: MAY BE HARMFUL. DUST &/VAPORS CAN CAUSE RESPIRATORY TRACT IRRITATION. CAN BE IRRITATING TO MUCOUS MEMBRANCES. INGESTION: MAY BE HARMFUL. EYES: IRRITATION. EXPOSURE CAN CAUSE LIVER DAMAGE. NARCOTIC AT HIGH CONCENTRATIONS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: IRRITATION, NARCOTIC.
Emergency/First Aid Proc: EYES: FLUSH CONTINUOUSLY W/WATER FOR 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NOT BURNED, WASH W/SOAP & WATER TO CLEANSE. INHALATION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEEDED & CONTINUE LIFE SUPPORT UNTIL MEDICAL ASSISTANCE ARRIVES. INGESTION: RINSE MOUTH OUT W/WATER, IF CONSCIOUS. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPRORPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE/SIMILAR MATERIAL. SWEEP UP & PLACE IN APPROPRIATE CONTAINER/HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER IAW/FEDERAL, STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN A COOL DRY PLACE ONLY W/COMPATIBLE CHEMICALS. KEEP TIGHTLY CLOSED. STORE UNDER REFRIGERATION.
Other Precautions: AVOID CONTACT W/SKIN, EYES & CLOTHING. DON'T BREATH VAPORS. CONTACT LENSES SHOULDN'T BE WORN IN THE LABORATORY. ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS. AVOID DIRECT PHYSICAL CONTACT.

Control Measures

Respiratory Protection: WEAR APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.
Ventilation: CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.
Eye Protection: EYE SHIELDS

Transportation Data

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: 0-659 CIS 1,2-DICHLOROETHENE
Special Hazard Precautions: SKIN: MAY BE HARMFUL IF ABSORBED. CAN CAUSE IRRITATION. INHALATION: MAY BE HARMFUL. DUST &/VAPORS CAN CAUSE RESPIRATORY TRACT IRRITATION. CAN BE IRRITATING TO MUCOUS MEMBRANCES. INGESTION: MAY BE HARMFUL. EYES: IRRITATION. EXPOSURE CAN CAUSE LIVER DAMAGE. NARCOTIC AT HIGH CONCENTRATIONS. IRRITATION, NARCOTIC.
Label Name: CHEM SERVICE INC
Label Street: 660 TOWER LN
Label P.O. Box: 3108
Label City: WEST CHESTER
Label State: PA
Label Zip Code: 19381-3108
Label Country: US
Label Emergency Number: 215-692-3026/800-452-9994

CHEM SERVICE -- 0-659 CIS 1,2-DICHLOROETHENE - LABORATORY STANDARD
MATERIAL SAFETY DATA SHEET
NSN: 655000F037480
Manufacturer's CAGE: 8Y898
Part No. Indicator: A
Part Number/Trade Name: 0-659 CIS 1,2-DICHLOROETHENE

General Information

Item Name: LABORATORY STANDARD
Company's Name: CHEM SERVICE INC
Company's Street: 660 TOWER LN
Company's P. O. Box: 3108
Company's City: WEST CHESTER
Company's State: PA
Company's Country: US
Company's Zip Code: 19381-3108
Company's Emerg Ph #: 215-692-3026/800-452-9994
Company's Info Ph #: 215-692-3026/800-452-9994
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 02JUN92
Safety Data Review Date: 06DEC94
Preparer's Company: CHEM SERVICE INC
Preparer's St Or P. O. Box: 660 TOWER LN
Preparer's City: WEST CHESTER
Preparer's State: PA
Preparer's Zip Code: 19381-3108
MSDS Serial Number: BWJDT

Ingredients/Identity Information

Proprietary: NO
Ingredient: DICHLOROETHENE
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: KV9420000
CAS Number: 156-59-2

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS LIQUID
Boiling Point: 140F
Melting Point: -112F
Solubility In Water: INSOLUBLE

Fire and Explosion Hazard Data

Flash Point: 42.8F
Extinguishing Media: CO2, DRY CHEMICAL POWDER/SPRAY.
Unusual Fire And Expl Hazrds: FLAMMABLE CHEMICAL. VAPORS MAY TRAVEL CONSIDERABLE DISTANCE TO IGNITION SOURCE & FLASH BACK. DECOMPOSITION PRODUCTS ARE CORROSIVE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): MOISTURE, AIR, LIGHT, HEAT & OTHER IGNITION SOURCES.
Materials To Avoid: STRONG OXIDIZING AGENTS, MAGNESIUM, ALUMINUM.
Hazardous Decomp Products: TOXIC FUMES
Hazardous Poly Occur: NO

Health Hazard Data

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS

BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	TOLUENE
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1294
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	TOLUENE
HAZARD CLASS	3.2
UN/NA	UN1294
LABELS	FLAMMABLE LIQUID

NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, ABSORPTION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
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 RE-USE.

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6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, NITRIC ACID, SULFURIC ACID, CHLORINE

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

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7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U220 (TOXIC WASTE)

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8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, POLYVINYL ALCOHOL GLOVES ARE RECOMMENDED.

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9 - STORAGE AND HANDLING PRECAUTIONS

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: XYLENES
FORMULA: C6H4(CH3)2
FORMULA WT: 106.17
CAS NO.: 1330-20-7
NIOSH/RTECS NO.: ZE2100000
COMMON SYNONYMS: DIMETHYLBENZENE; XYLOL
PRODUCT CODES: 9489,9499,5377,9491,9493,9490,X516,9492,9516
EFFECTIVE: 09/11/86
REVISION #03

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	3	SEVERE (FLAMMABLE)
REACTIVITY	-	0	NONE
CONTACT	-	2	MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING
FLAMMABLE
CAUSES IRRITATION
HARMFUL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
M-XYLENE	40-65	108-38-3
O-XYLENE	15-20	95-47-6
P-XYLENE	0-20	106-42-3
ETHYL BENZENE	15-25	100-41-4

3 - PHYSICAL DATA

BOILING POINT: 137 C (279 F)
MELTING POINT: -48 C (-54 F)
SPECIFIC GRAVITY: 0.87 (H2O=1)
VAPOR PRESSURE(MM HG): 5.1
VAPOR DENSITY(AIR=1): 3.7
EVAPORATION RATE: 0.7 (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: COLORLESS LIQUID WITH SWEET PLEASANT ODOR.

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4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 27 C (80 F) NFPA 704M RATING: 2-3-0

FLAMMABLE LIMITS: UPPER - 7.0 % LOWER - 1.1 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

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5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 435 MG/M3 (100 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 655 MG/M3 (150 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 435 MG/M3 (100 PPM)

TOXICITY:
LD50 (ORAL-RAT)(MG/KG) - 4300
LD50 (IPR-MOUSE)(MG/KG) - 1.6
LD50 (SCU-RAT)(MG/KG) - 1700

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INHALATION AND INGESTION ARE HARMFUL AND MAY BE FATAL.
INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS.
INHALATION OF VAPORS MAY CAUSE NARCOSIS.
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTRO-INTESTINAL IRRITATION, BLURRED VISION, LOWERING OF BLOOD PRESSURE.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS
CENTRAL NERVOUS SYSTEM, EYES, SKIN, GI TRACT, BLOOD, LIVER AND KIDNEYS

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INGESTION, INHALATION, SKIN CONTACT, EYE CONTACT, ABSORPTION

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
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.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.
J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U239 (TOXIC WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, NITRILE GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS
BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	XYLENE
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1307
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	XYLENES
HAZARD CLASS	3.3
UN/NA	UN1307
LABELS	FLAMMABLE LIQUID

DUPONT -- FREON 113 - TRICHLOROTRIFLUOROETHANE, TECHNICAL
MATERIAL SAFETY DATA SHEET
NSN: 6830005842957
Manufacturer's CAGE: 25827
Part No. Indicator: A
Part Number/Trade Name: FREON 113

General Information

Item Name: TRICHLOROTRIFLUOROETHANE, TECHNICAL
Company's Name: DU PONT
Company's Street: 1007 MARKET STREET
Company's City: WILMINGTON
Company's State: DE
Company's Country: US
Company's Zip Code: 19898
Company's Emerg Ph #: 800-424-9300/800-441-3637
Company's Info Ph #: 800-441-7515
Record No. For Safety Entry: 006
Tot Safety Entries This Stk#: 008
Status: SH
Date MSDS Prepared: 20MAR91
Safety Data Review Date: 16FEB95
Supply Item Manager: GSA
MSDS Preparer's Name: W J BROCK
Preparer's Company: DU PONT CHEMICALS
Preparer's St Or P. O. Box: PO BOX 80709/CHESTNUT RUN
Preparer's City: WILMINGTON
Preparer's State: DE
Preparer's Zip Code: 19880-0709
MSDS Serial Number: BNRQB
Specification Number: BB-F-1421
Spec Type, Grade, Class: TYPE 113
Hazard Characteristic Code: N1
Unit Of Issue: LB
Unit Of Issue Container Qty: 100 LB DR
Type Of Container: METAL
Net Unit Weight: 100 LBS

Ingredients/Identity Information

Proprietary: NO
Ingredient: 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE (FREON 113) (SARA 313).
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: KJ4000000
CAS Number: 76-13-1
OSHA PEL: 1000 PPM/1250 STEL
ACGIH TLV: 1000 PPM/1250 STEL
Other Recommended Limit: NONE SPECIFIED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS WITH SLIGHT ETHERAL ODOR.
Boiling Point: 48 DEG C
Vapor Pressure (MM Hg/70 F): 6.46 PSIA
Vapor Density (Air=1): 2.9 @ 25 C
Specific Gravity: 1.57
Evaporation Rate And Ref: >1 (CC L4 = 1.0)
Solubility In Water: 0.02 WT% AT 25 C
Percent Volatiles By Volume: 100 %
pH: NEUTRL

Fire and Explosion Hazard Data

Flash Point: WILL NOT BURN
Extinguishing Media: AS APPROPRIATE FOR COMBUSTIBLES IN AREA.
Special Fire Fighting Proc: USE WATER SPRAY OR FOG TO COOL CONTAINER. SELF-CONTAINED BREATHING APPARATUS IS REQUIRED IF DRUMS RUPTURE AND CONTENTS ARE SPILLED UNDER FIRE CONDITIONS.
Unusual Fire And Expl Hazrds: DRUMS MAY RUPTURE UNDER FIRE CONDITIONS. DECOMPOSITION MAY OCCUR.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): OPEN FLAMES AND HIGH TEMPERATURES.
Materials To Avoid: INCOMPATIBLE WITH ALKALI OR ALKALINE EARTH METALS - POWDERED AL, ZN, BE, ETC.
Hazardous Decomp Products: THIS COMPOUND CAN BE DECOMPOSED BY HIGH TEMPERATURES (OPEN FLAMES, GLOWING METAL SURFACES, ETC.) FORMING HYDROCHLORIC**
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): N/K **AND HYDROFLUORIC ACIDS AND POSSIBLY CARBONYL HALIDES.

Health Hazard Data

LD50-LC50 Mixture: LC50: 110,000 PPM/ORAL LD50 43,000 PPM
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: INHAL OF HIGH CONC OF VAPOR IS HARMFUL/MAY CAUSE HEART IRREGULARITIES/UNCONSCIOUSNESS/DEATH. INTENTIONAL MISUSE CAN BE FATAL. VAPOR REDUCES OXYGEN AVAIL FOR BREATH/IS HEAVIER THAN AIR. COMPOUND IS MILD SKIN/EYE IRRIT. ANIMAL TESTS SHOWS COMPND DOES NOT HAVE CARCINOGENIC, MUTAGENIC, EMBRYOTOXIC OR REPRODUCTIVE EFFECTS.
Explanation Carcinogenicity: NONE OF THE COMPONENTS IN THIS MATERIAL IS LISTED BY IARC, NTP, OSHA, OR ACGIH AS A CARCINOGEN.
Signs/Symptoms Of Overexp: EYE: IRRIT W/DISCOMFORT/TEARING/BLURRING OF VISION. SKIN: IRRIT W/DISCOMFORT/RASH. INHAL: TEMP NERV SYS DEPRESS W/ ANESTHETIC EFFECTS: DIZZINESS/HEADACHE/CONFUSION/INCOORDINATION/LOSS OF CONSCIOUSNESS, TEMPORARY ALTERATION OF HEART'S ELECT ACTIVITY W/IRREG PULSE/PALPITATIONS/INADEQ CIRC/ABNORMAL LIVER FUNCTION/FATALITY
Med Cond Aggravated By Exp: NOTE TO PHYSICIAN: BECAUSE OF POSSIBLE DISTURBANCES OF CARDIAC RHYTHM, CATECHOLAMINE DRUGS, SUCH AS EPINEPHRINE, SHOULD ONLY BE USED WITH SPECIAL CAUTION IN SITUATIONS OF EMERGENCY LIFE SUPPORT.
Emergency/First Aid Proc: INHAL: IMMED RMV TO FRESH AIR, KEEP CALM. IF NOT FLUSH W/PLENT OF WATER. GET MED ATTN IF IRRIT PRESENT. EYE: IMMED FLUSH W/PLENT OF COLD WATER. CALL DR. INGEST: NO SPECIFIC INTERVENTION IS INDICATED AS THE COMPOUND IS NOT LIKELY TO BE HAZARDOUS BY INGESTION. DO NOT INDUCE VOMITING. HOWEVER, CONSULT A DR IF NECESSARY.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: REVIEW FIRE & EXPLOSION HAZ & SFTY PRECAUTIONS BEFORE PROCEEDING W/CLEAN UP. USE APPROP PERSONAL PROTECTIVE EQUIP DURING CLEAN UP. VENT AREA. DONT FLUSH INTO SEWERS. DIKE SPILL. COLLECT ON ABSORB MATL & TRANSFER TO STEEL DRUMS FOR RECOVERY/DISPOSAL.#
Neutralizing Agent: N/K #USE SCBA FOR LG SPILLS. COMPLY W/FED/ST & LOCAL REG ON REPORTING RELEASES
Waste Disposal Method: COMPLY WITH FEDERAL, STATE AND LOCAL REGULATIONS. REMOVE TO A PERMITTED WASTE DISPOSAL FACILITY. EPA HAZARDOUS WASTE NOS. F001 AND F002 MAY APPLY TO WASTE MATERIALS.
Precautions-Handling/Storing: CLEAN, DRY AREA. DO NOT HEAT ABOVE 125 DEGREES F.
Other Precautions: AVOID BREATHING VAPORS AND PROLONGED SKIN EXPOSURE. USE WITH SUFFICIENT VENTILATION TO KEEP EMPLOYEE EXPOSURE BELOW RECOMMENDED LIMITS.

Control Measures

Respiratory Protection: SELF-CONTAINED BREATHING APPARATUS IS REQUIRED IF A LARGE SPILL OCCURS.
Ventilation: NORMAL VENT IS GENERALLY ADEQ. LOCAL EXHST SHOULD BE USED WHEN LG AMTS RELEASED. MECH VENT SHOULD BE USED IN LOW PLACES.
Protective Gloves: BUTYL.
Eye Protection: CHEM SPLASH GOGGLES.
Suppl. Safety & Health Data: INHAL 2 HOUR LC50: 110,000 PPM IN RATS. SKIN ABSORPTION ALD: > 11,000 MG/KG IN RABBITS. ORAL LD50: 43,000 MG/KG IN RATS. AQUATIC TOXICITY: 96 HOUR LC50, FATHEAD MINNOW: 1250 PPM.

Transportation Data

Trans Data Review Date: 92188
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
MMAC Code: NK

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: FREON 113
Special Hazard Precautions: INHAL OF HIGH CONC OF VAPOR IS HARMFUL/MAY CAUSE HEART IRREGULARITIES/UNCONSCIOUSNESS/DEATH. INTENTIONAL MISUSE CAN BE FATAL. VAPOR REDUCES OXYGEN AVAIL FOR BREATH/IS HEAVIER THAN AIR. COMPOUND IS MILD SKIN/EYE IRRIT. ANIMAL TESTS SHOWS COMPND DOES NOT HAVE CARCINOGENIC, MUTAGENIC, EMBRYOTOXIC OR REPRODUCTIVE EFFECTS. EYE: IRRIT W/ DISCOMFORT/TEARING/BLURRING OF VISION. SKIN: IRRIT W/DISCOMFORT/RASH. INHAL: TEMP NERV SYS DEPRESS W/ANESTHETIC EFFECTS: DIZZINESS/HEADACHE/ CONFUSION/INCOORDINATION/LOSS OF CONSCIOUSNESS, TEMPORARY ALTERATION OF HEART'S ELECT ACTIVITY W/IRREG PULSE/PALPITATIONS/INADEQ CIRC/ABNORMAL LIVER FUNCTION/FATALITY
Label Name: DU PONT
Label Street: 1007 MARKET STREET
Label City: WILMINGTON
Label State: DE
Label Zip Code: 19898
Label Country: US
Label Emergency Number: 800-424-9300/800-441-3637

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: O-DICHLOROBENZENE
FORMULA: C6H4CL2
FORMULA WT: 146.20
CAS NO.: 00095-50-1
NIOSH/RTECS NO.: CZ4500000
COMMON SYNONYMS: 1,2-DICHLOROBENZENE; ORTHO-DICHLOROBENZENE; DCB
PRODUCT CODES: 9233,9217
EFFECTIVE: 08/28/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	2	MODERATE
REACTIVITY	-	0	NONE
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING
COMBUSTIBLE
CAUSES IRRITATION
HARMFUL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING. KEEP IN TIGHTLY CLOSED CONTAINER. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE WATER SPRAY, ALCOHOL FOAM, DRY CHEMICAL, OR CARBON DIOXIDE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
O-DICHLOROBENZENE	90-100	95-50-1

3 - PHYSICAL DATA

BOILING POINT: 180 C (356 F)
MELTING POINT: -18 C (0 F)
VAPOR PRESSURE(MM HG): 1.2
VAPOR DENSITY(AIR=1): 5.1

SPECIFIC GRAVITY: 1.30 (H2O=1)
EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: COLORLESS TO PALE YELLOW LIQUID WITH PLEASANT ODOR.

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4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 66 C (151 F) NFPA 704M RATING: 2-2-0

FLAMMABLE LIMITS: UPPER - 9.2 % LOWER - 2.2 %

FIRE EXTINGUISHING MEDIA
USE WATER SPRAY, ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
HYDROGEN CHLORIDE, CHLORINE, CARBON MONOXIDE, CARBON DIOXIDE

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5 - HEALTH HAZARD DATA

PEL AND TLV LISTED DENOTE CEILING LIMIT.

THRESHOLD LIMIT VALUE (TLV/TWA): 300 MG/M3 (50 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 300 MG/M3 (50 PPM)

TOXICITY:	LD50 (ORAL-RAT)(MG/KG)	- 500
	LD50 (ORAL-RABBIT)(MG/KG)	- 500
	LD50 (IPR-RAT)(MG/KG)	- 840

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS, SUFFOCATION, LOWER BLOOD PRESSURE, CENTRAL NERVOUS SYSTEM DEPRESSION. INHALATION OF VAPORS MAY CAUSE COUGHING, CHEST PAINS, DIFFICULTY BREATHING, OR UNCONSCIOUSNESS.
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.

SUBSTANCE IS READILY ABSORBED THROUGH THE SKIN.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS
LIVER, KIDNEYS, SKIN, EYES

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, INGESTION, ABSORPTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER.
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 WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, ALUMINUM

DECOMPOSITION PRODUCTS: HYDROGEN CHLORIDE, CHLORINE, CARBON MONOXIDE, CARBON DIOXIDE

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U070 (TOXIC WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, RUBBER GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA OR CABINET.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	DICHLOROBENZENE, ORTHO, LIQUID (AIR ONLY)
HAZARD CLASS	ORM-A
UN/NA	UN1591
LABELS	NONE
REPORTABLE QUANTITY	100 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	O-DICHLOROBENZENE
HAZARD CLASS	6.1
UN/NA	UN1591
LABELS	HARMFUL - STOW AWAY FROM FOOD STUFFS

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: CHROMIUM
FORMULA: CR
FORMULA WT: 52.00
CAS NO.: 7440-47-3
NIOSH/RTECS NO.: CB4200000
PRODUCT CODES: 4961
EFFECTIVE: 09/10/86
REVISION #03

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	0	NONE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	0	NONE
CONTACT	-	0	NONE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

DURING USE AVOID CONTACT WITH EYES, SKIN, CLOTHING. WASH THOROUGHLY AFTER HANDLING. WHEN NOT IN USE KEEP IN TIGHTLY CLOSED CONTAINER.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
CHROMIUM	90-100	7440-47-3

3 - PHYSICAL DATA

BOILING POINT: 2200 C (3992 F)
VAPOR PRESSURE(MM HG): N/A

MELTING POINT: 1900 C (3452 F)
VAPOR DENSITY(AIR=1): N/A

SPECIFIC GRAVITY: 7.14 (H2O=1)
EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: STEEL GRAY TO SILVER PELLETS.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE WATER SPRAY, ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
CAN BE AN EXPLOSION HAZARD, ESPECIALLY WHEN HEATED.

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5 - HEALTH HAZARD DATA

NOTE: WHILE THE SPECIFIC COMPOUNDS CANNOT BE IDENTIFIED, THERE IS EVIDENCE THAT CERTAIN CHROMIUM COMPOUNDS CAUSE CANCER IN HUMANS AND EXPERIMENTAL ANIMALS. CHROMIUM IS WIDELY DISTRIBUTED IN AIR, WATER, SOIL AND FOOD. TRIVALENT CHROMIUM MAY BE AN ESSENTIAL TRACE INGREDIENT IN THE HUMAN DIET. ALL CHROMIUM COMPOUNDS ARE REGULATED BY THE EPA, BUT NO SPECIFIC DATA IS AVAILABLE TO LINK TRIVALENT CHROMIUM TO CANCER. PRUDENT JUDGEMENT DICTATES THAT EXPOSURE SHOULD BE MINIMIZED AS MUCH AS POSSIBLE. (SEE IARC MONOGRAPH ON EVALUATION OF CARCINOGENIC RISK OF CHEMICALS TO HUMANS, VOLUME 23 LYON, FRANCE IARC, 1980, PP. 205-323).

THRESHOLD LIMIT VALUE (TLV/TWA): 0.5 MG/M3 (PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 1 MG/M3 (PPM)

CARCINOGENICITY: NTP: YES IARC: YES Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
CONTACT WITH SKIN OR EYES MAY CAUSE SEVERE IRRITATION OR BURNS.
DUST MAY ULCERATE MUCOUS MEMBRANES.
EXCESSIVE INHALATION OF DUST IS IRRITATING AND MAY BE SEVERELY DAMAGING TO RESPIRATORY PASSAGES AND/OR LUNGS.
INGESTION MAY RESULT IN SEVERE INTESTINAL IRRITATION WITH BURNS TO MOUTH.
NOTE: PRODUCT IS A SOLID MASS; HOWEVER, WARNINGS ARE BASED ON INHALATION DUST, MIST OR FUME EMISSIONS THAT ARE POSSIBLE DURING MANUFACTURING OR CHEMICAL REACTIONS.

TARGET ORGANS
RESPIRATORY SYSTEM

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INGESTION, INHALATION

EMERGENCY AND FIRST AID PROCEDURES

INGESTION:	IF SWALLOWED AND THE PERSON IS CONSCIOUS, IMMEDIATELY GIVE LARGE AMOUNTS OF WATER. GET MEDICAL ATTENTION.
INHALATION:	IF A PERSON BREATHES IN LARGE AMOUNTS, MOVE THE EXPOSED PERSON TO FRESH AIR. GET MEDICAL ATTENTION.
EYE CONTACT:	IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.
SKIN CONTACT:	IMMEDIATELY WASH WITH PLENTY OF SOAP AND WATER FOR AT LEAST 15 MINUTES.

6 - REACTIVITY DATA

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: FLAME

INCOMPATIBLES: CARBONATES, STRONG BASES, MINERAL ACIDS

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SUITABLE PROTECTIVE CLOTHING. CAREFULLY SWEEP UP AND REMOVE.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D007 (EP TOXIC WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP FUME OR DUST LEVELS AS LOW AS POSSIBLE.

RESPIRATORY PROTECTION: A RESPIRATOR WITH DUST/MIST FILTER IS RECOMMENDED. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GLASSES WITH SIDESHIELDS, PROPER GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	CHROMIUM
HAZARD CLASS	ORM-E
LABELS	NONE
REPORTABLE QUANTITY	1 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: COPPER
FORMULA: CU
FORMULA WT: 63.55
CAS NO.: 07440-50-8
NIOSH/RTECS NO.: GL5325000
COMMON SYNONYMS: BRONZE POWDER; C.I. 77400; ARWOOD COPPER
PRODUCT CODES: 1732,1736,1720,1714,1728
EFFECTIVE: 06/25/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	0	NONE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	0	NONE
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

CAUTION
MAY CAUSE IRRITATION
DURING USE AVOID CONTACT WITH EYES, SKIN, CLOTHING. WASH THOROUGHLY AFTER HANDLING. WHEN NOT IN USE KEEP IN TIGHTLY CLOSED CONTAINER.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
COPPER	90-100	07440-50-8

3 - PHYSICAL DATA

BOILING POINT: 2595 C (4703 F)
MELTING POINT: 1083 C (1981 F)
SPECIFIC GRAVITY: 8.92 (H2O=1)
VAPOR PRESSURE(MM HG): N/A
VAPOR DENSITY(AIR=1): N/A
EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: REDDISH, LUSTROUS, MALLEABLE METAL.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

TOXIC GASES PRODUCED
COPPER FUMES

5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 1.0 MG/M3 (PPM)

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
DUST MAY CAUSE SNEEZING AND COUGHING.
DUST MAY IRRITATE SKIN OR EYES.
PROLONGED EXPOSURE MAY CAUSE DERMATITIS.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION.
NOTE: PRODUCT IS A SOLID MASS; HOWEVER, WARNINGS ARE BASED ON INHALATION DUST, MIST OR FUME EMISSIONS THAT ARE POSSIBLE DURING MANUFACTURING OR CHEMICAL REACTIONS.

TARGET ORGANS
NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
NONE INDICATED

EMERGENCY AND FIRST AID PROCEDURES

INGESTION:	IF SWALLOWED AND THE PERSON IS CONSCIOUS, IMMEDIATELY GIVE LARGE AMOUNTS OF WATER. GET MEDICAL ATTENTION.
INHALATION:	IF A PERSON BREATHES IN LARGE AMOUNTS, MOVE THE EXPOSED PERSON TO FRESH AIR. GET MEDICAL ATTENTION.
EYE CONTACT:	IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.
SKIN CONTACT:	IMMEDIATELY WASH WITH PLENTY OF SOAP AND WATER FOR AT LEAST 15 MINUTES.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: MOISTURE

INCOMPATIBLES: STRONG ACIDS, ACTIVE HALOGEN COMPOUNDS, CHLORINE, FLUORINE, IODINE, BROMINE, AMMONIA

DECOMPOSITION PRODUCTS: COPPER FUMES

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SUITABLE PROTECTIVE CLOTHING. CAREFULLY SWEEP UP AND REMOVE.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

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8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
RESPIRATORY PROTECTION:	NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A DUST/MIST RESPIRATOR IS RECOMMENDED. IF CONCENTRATION EXCEEDS CAPACITY OF RESPIRATOR, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.
EYE/SKIN PROTECTION:	SAFETY GLASSES WITH SIDESHIELDS, PROPER GLOVES ARE RECOMMENDED.

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9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

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10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	COPPER, HEAVY FOIL

HAZARD CLASS	ORM-E
LABELS	NONE
REPORTABLE QUANTITY	5000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	CHEMICALS, N.O.S. (NON-REGULATED)

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: NICKEL, SHOT
FORMULA: NI
FORMULA WT: 58.71
CAS NO.: 07440-02-0
NIOSH/RTECS NO.: QR5950000
PRODUCT CODES: 2748
EFFECTIVE: 09/03/86
REVISION #03

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	3	SEVERE (CANCER CAUSING)
FLAMMABILITY	-	0	NONE
REACTIVITY	-	0	NONE
CONTACT	-	3	SEVERE (LIFE)

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

PRECAUTIONARY LABEL STATEMENTS

WARNING
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN
MAY CAUSE ALLERGIC REACTION.
EXCEPTIONAL CONTACT HAZARD - READ MATERIAL SAFETY DATA SHEET
NOTE: REPORTED AS CAUSING CANCER IN LABORATORY ANIMALS. EXERCISE DUE CARE.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
AVOID BREATHING DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
NICKEL	90-100	7440-02-0

3 - PHYSICAL DATA

BOILING POINT: 2732 C (4950 F) VAPOR PRESSURE(MM HG): N/A

MELTING POINT: 1453 C (2647 F) VAPOR DENSITY(AIR=1): N/A

SPECIFIC GRAVITY: 8.90 (H2O=1) EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: GRAY, SPHERICAL PELLETS.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (OPEN CUP N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

TOXIC GASES PRODUCED
NICKEL FUMES

5 - HEALTH HAZARD DATA

THIS SUBSTANCE IS LISTED AS NTP ANTICIPATED HUMAN CARCINOGEN, IARC PROBABLE HUMAN CARCINOGEN (GROUPS 2A AND 2B).

THRESHOLD LIMIT VALUE (TLV/TWA): 1 MG/M3 (PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 1 MG/M3 (PPM)

CARCINOGENICITY: NTP: YES IARC: YES Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
DUST MAY CAUSE HEADACHE, COUGHING, DIZZINESS OR DIFFICULT BREATHING.
PROLONGED EXPOSURE MAY CAUSE DERMATITIS.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION.
NOTE: PRODUCT IS A SOLID MASS; HOWEVER, WARNINGS ARE BASED ON INHALATION DUST, MIST OR FUME EMISSIONS THAT ARE POSSIBLE DURING MANUFACTURING OR CHEMICAL REACTIONS.

TARGET ORGANS
NASAL CAVATIES, LUNGS, SKIN

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, IF CONSCIOUS, IMMEDIATELY INDUCE VOMITING.
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.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: NONE DOCUMENTED

INCOMPATIBLES: STRONG ACIDS, AMMONIA, ALUMINUM, STRONG OXIDIZING AGENTS

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A DUST/MIST RESPIRATOR IS RECOMMENDED. IF CONCENTRATION EXCEEDS CAPACITY OF RESPIRATOR, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, RUBBER GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN SECURE POISON AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	NICKEL
HAZARD CLASS	ORM-E
LABELS	NONE
REPORTABLE QUANTITY	1 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: MERCURY (METAL)
FORMULA: HG
FORMULA WT: 200.59
CAS NO.: 07439-97-6
NIOSH/RTECS NO.: OV4550000
COMMON SYNONYMS: QUICKSILVER; LIQUID SILVER
PRODUCT CODES: 2569,2567,2564,2572
EFFECTIVE: 09/05/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	4	EXTREME (POISON)
FLAMMABILITY	-	0	NONE
REACTIVITY	-	1	SLIGHT
CONTACT	-	3	SEVERE (LIFE)

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

PRECAUTIONARY LABEL STATEMENTS

POISON DANGER
EXCEPTIONAL CONTACT HAZARD - READ MATERIAL SAFETY DATA SHEET
MAY BE FATAL IF SWALLOWED OR INHALED
EMITS TOXIC VAPORS, ESPECIALLY WHEN HEATED.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
DO NOT BREATHE DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
MERCURY (METAL)	90-100	7439-97-6

3 - PHYSICAL DATA

BOILING POINT: 357 C (675 F)
MELTING POINT: -39 C (-38 F)
VAPOR PRESSURE(MM HG): .002
VAPOR DENSITY(AIR=1): 1.01

SPECIFIC GRAVITY: 13.53 (H2O=1)
EVAPORATION RATE: 4 (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: SILVER-WHITE, HEAVY, MOBILE LIQUID METAL.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.

5 - HEALTH HAZARD DATA

TLV LISTED DENOTES (TLV-SKIN).

THRESHOLD LIMIT VALUE (TLV/TWA): 0.05 MG/M3 (PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 0.1 MG/M3 (PPM)

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION OF VAPORS MAY CAUSE COUGHING, CHEST PAINS, NAUSEA AND VOMITING.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE CENTRAL NERVOUS SYSTEM DEPRESSION.
CHRONIC EFFECTS OF MERCURY POISONING INCLUDE A BUILDUP OF THE METAL IN THE BRAIN, LIVER AND KIDNEYS. SYMPTOMS INCLUDE HEADACHE, TREMORS, LOOSE TEETH, LOSS OF APPETITE, BLISTERS ON THE SKIN AND IMPAIRED MEMORY.

TARGET ORGANS
EYES, SKIN, RESPIRATORY SYSTEM, CENTRAL NERVOUS SYSTEM, KIDNEYS

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, ABSORPTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.

IF SWALLOWED, IF CONSCIOUS, IMMEDIATELY INDUCE VOMITING.
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 RE-USE.

PEL LISTED DENOTES CEILING LIMIT.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT

INCOMPATIBLES: STRONG ACIDS

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7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. CLEAN UP SPILL IMMEDIATELY. COLLECT AND STORE USING A SUCTION PUMP WITH A CAPILLARY TUBE. CALCIUM POLYSULFIDE WITH EXCESS SULFUR SHOULD BE SPRINKLED INTO CRACKS OR INACCESSIBLE SITES. KEEP COLLECTED MERCURY IN A TIGHTLY CLOSED BOTTLE FOR RECOVERY OR DISPOSAL.

J.T. BAKER CINNASORB(R) AND RESISORB(R) ARE RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U151 (TOXIC WASTE)

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8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
RESPIRATORY PROTECTION:	NONE REQUIRED WHERE APPROPRIATE VENTILATION CONDITIONS EXIST. IF THE TLV IS EXCEEDED, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.
EYE/SKIN PROTECTION:	SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, RUBBER GLOVES ARE RECOMMENDED.

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9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN SECURE POISON AREA.

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10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	MERCURY, METALLIC (AIR ONLY)
HAZARD CLASS	ORM-B
UN/NA	NA2809
LABELS	NONE
REPORTABLE QUANTITY	1 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	MERCURY, METAL
HAZARD CLASS	8
UN/NA	UN2809
LABELS	CORROSIVE

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: ZINC
FORMULA: ZN
FORMULA WT: 65.37
CAS NO.: 7440-66-6
NIOSH/RTECS NO.: ZG8600000
COMMON SYNONYMS: BLUE POWDER
PRODUCT CODES: 4244,4290,4240,4252,4260,4248,4274,5828,4264,4270
EFFECTIVE: 06/25/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	0	NONE
FLAMMABILITY	-	1	SLIGHT
REACTIVITY	-	2	MODERATE
CONTACT	-	0	NONE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

WARNING
CAUSES IRRITATION
DURING USE AVOID CONTACT WITH EYES, SKIN, CLOTHING. WASH THOROUGHLY AFTER HANDLING. WHEN NOT IN USE KEEP IN TIGHTLY CLOSED CONTAINER.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
ZINC	90-100	7440-66-6

3 - PHYSICAL DATA

BOILING POINT: 908 C (1666 F)
MELTING POINT: 420 C (788 F)
SPECIFIC GRAVITY: 7.14 (H2O=1)
VAPOR PRESSURE(MM HG): 1
VAPOR DENSITY(AIR=1): N/A
EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: BLUISH-WHITE ODORLESS SOLID.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

UNUSUAL FIRE & EXPLOSION HAZARDS
REACTS VIOLENTLY WITH WATER LIBERATING AND IGNITING HYDROGEN.

5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 10 MG/M3 (PPM)

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
CONTACT WITH SKIN OR EYES MAY CAUSE SEVERE IRRITATION OR BURNS.
INHALATION OF DUST MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT.
PROLONGED EXPOSURE MAY CAUSE DERMATITIS.
NOTE: PRODUCT IS A SOLID MASS; HOWEVER, WARNINGS ARE BASED ON INHALATION DUST, MIST OR FUME EMISSIONS THAT ARE POSSIBLE DURING MANUFACTURING OR CHEMICAL REACTIONS.

TARGET ORGANS
NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
NONE INDICATED

EMERGENCY AND FIRST AID PROCEDURES
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 RE-USE.

6 - REACTIVITY DATA

STABILITY: UNSTABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: MOISTURE

INCOMPATIBLES: STRONG ACIDS, STRONG BASES, STRONG OXIDIZING AGENTS, ALKALI METALS, HALOGENATED HYDROCARBONS

DECOMPOSITION PRODUCTS: OXIDES OF ZINC

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SUITABLE PROTECTIVE CLOTHING. CAREFULLY SWEEP UP AND REMOVE.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP FUME OR DUST LEVELS AS LOW AS POSSIBLE.
RESPIRATORY PROTECTION:	NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION IS HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK.
EYE/SKIN PROTECTION:	SAFETY GLASSES WITH SIDESHIELDS, PROPER GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	ZINC
HAZARD CLASS	ORM-E
LABELS	NONE
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	CHEMICALS, N.O.S. (NON-REGULATED)

APPENDIX 5

DAILY INSPECTION REPORT

DAILY LOG SHEET

Page ____ of ____

PROJECT NAME:	
DATE:	PROJECT NO.:
LOCATION:	
TIME START:	TIME END:
PERSONNEL ON SITE:	
SUMMARY OF SITE SAFETY BRIEFING:	
SUMMARY OF ACTIVITIES:	

Signature

DAILY AIR MONITORING LOG

Date: Location:

Wind Speed: mph Direction:

Ambient Temperature: ° F Humidity: %

INSTRUMENT Make / Model	Settings	Time	Readings	CALIBRATION Standard	Response

Comments: