Tioga Castings
Inactive Hazardous Waste Site # 7-54-012
Operation and Maintenance Manual

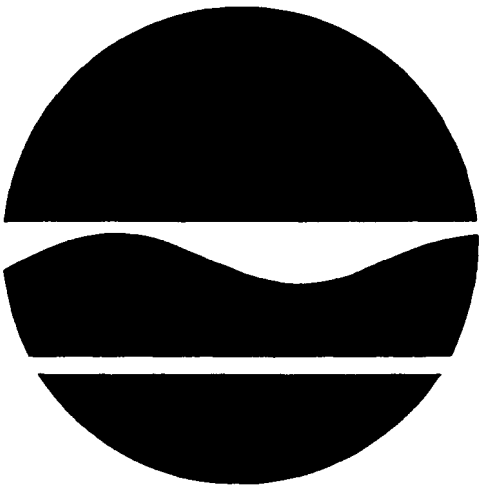
Table of Contents

TIOGA CASTINGS

Village of Owego, Tioga County, New York
Site No. 7-54-012

OPERATION AND MAINTENANCE MANUAL

January 1998



Prepared by:
Division of Environmental Remediation
New York State Department of Environmental Conservation

Tioga Castings
Site No. 7-54-012

Operation and Maintenance Manual

Section 1 Introduction

Tioga Castings, New York State Department of Environmental Conservation (NYSDEC) Inactive Hazardous Waste Disposal Site Registry Number 7-54-012, is located on Foundry Street, off McMaster Street, in the Village of Owego, Tioga County (Figure 1). This site operated as a foundry from the 1940s until 1988. On July 11, 1989 the facility had a fire which destroyed most of the foundry structure. Shortly after the fire this facility was listed as a class 2 site, as a result of the material that was found abandoned at the facility.

Section 2 Site Description

The site is approximately seven acres in size. The former foundry building occupied the front (eastern) portion of the site while the former landfill occupies approximately one acre in the back (western) portion of the site. The site is located in a residential/ commercial area, adjacent to the Owego-Apalachin Middle School. The Owego Creek is located approximately one-half mile to the west and the Susquehanna River is located approximately one-half mile to the south.

2.1 Site History

The Tioga Castings facility began operations on site between 1945 and 1947, and continued through 1988. The facility operated a cupola type foundry for the production of gray iron castings. Operations at the facility included smelting of pig iron, scrap iron (including engine blocks), coke, limestone and the use of phenol-formaldehyde treated sand to cast the iron. The process produced solid wastes which included sand molds, bentonite, fly ash, cast iron grindings, and fine baghouse ash/cupola dust. These wastes were reportedly disposed of at an off-site landfill until March 1979. The facility then operated an on site landfill for the disposal of its foundry wastes. The facility ceased operations in 1988. The following materials were left on site; sand casts, various drums, a number of one-ton plastic lined bags of cupola dust as well as the material contained in the on-site landfill. [redacted] On July 11, 1989, the facility had a fire which destroyed most of the foundry structure and left the remaining building structurally unsafe.

Due to the conditions at the site, two Interim Remedial Measures (IRMs) were carried out to address potential physical/chemical hazards. In the fall of 1989, a perimeter fence was erected to

limit access to the property. By early 1990, the drums, which had been left on site, were removed from the site and disposed of properly.

In addition, analytical results from a landfill surface soil sample showed a total lead concentration of 15,000 ppm (the cleanup goal for lead was set at 250 ppm for surface soil). A temporary cover was placed over the landfill in August 1991 in order to minimize the potential for the erosion (wind, surface water) of this material.

The following summarizes the investigations/actions that were performed prior to the initiation of the RI/FS:

August 1989 - Thirteen surface soil samples were collected, from the grassy area north of the Owego-Apalachin middle school, and analyzed for total lead and cadmium as well as for EP Toxicity. Cadmium was detected at two locations at 3.7 ppm; lead was present at concentrations ranging from 43 - 960 ppm; the results of the EP Toxicity analyses did not indicate the presence of hazardous waste.

Sept. 1989 - Thirty one additional surface soil samples were collected from the grassy area north of the school, six from the former landfill area, and five from northeast of the former facility. All of the samples were analyzed for lead. Total lead concentrations in the schoolyard were between 51 -350 ppm; west of the former landfill, levels were between 40 -50 ppm; northeast of the former foundry lead was present from 120 -270 ppm; and one surface soil sample from the former landfill indicated a lead concentration of 15,000 ppm.

Fall 1989 - A perimeter fence is placed around the former foundry to limit access.

Feb. 1990 - An IRM, to remove waste material abandoned at the site, was completed. The IRM was initiated by the responsible party, however it became necessary for the State to complete the work.

July 1991 - Prior to the demolition of the building, grid sampling was conducted to characterize the dust that blanketed the floor of the former foundry building. Thirty-one samples were collected and analyzed for lead. Twenty-eight of the samples had concentrations at or below 210 ppm; three of the samples had elevated concentrations of lead (1,400, 9,300, and 28,000 ppm). Dust from these areas was containerized and disposed of prior to the demolition of the building.

August 1991 - An IRM was conducted to place a temporary cap over the landfill area. Since this work involved heavy truck traffic along Foundry Street (a dirt road), ten surface soil samples were collected from the roadway. The highest lead concentration detected was 400 ppm (eight of the samples indicated concentrations below 140 ppm).

Under the State Superfund law, NYSDEC attempted to obtain cooperation from the Potentially Responsible Party (PRP) to undertake a remedial program for the site. The PRP was not financially able to undertake the remedial program and, as a result, the NYSDEC contracted with Dvirka and Bartilucci Consulting Engineers to perform a Remedial Investigation and Feasibility Study (RI/FS) using State Superfund resources.

2.2 Site Geology and Hydrogeology

During the installation of groundwater monitoring wells during site investigations, geological sampling was conducted at 5 foot intervals down to a depth of approximately 17 feet. Materials encountered below the site include silt, sand, and gravel. Groundwater below the site is generally encountered at approximately 10 to 15 feet below the ground surface. The first round of groundwater levels were 2 to 5 feet below ground surface. However, these levels were taken in April 1993 when groundwater was elevated as a result of snow melt and heavy rain. Groundwater flow direction is generally to the south-southeast.

2.3 Remedial Investigation Results

The RI/FS was completed in December 1994. The RI consisted of the installation of groundwater monitoring wells; groundwater, surface soil and subsurface soil sampling. The following summarizes the findings of the RI:

Soil

Elevated levels of certain metals were found in soils on site as well as adjacent to the site. The metals found at elevated concentrations included cadmium, lead, and chromium. Generally, lead and cadmium were the most predominant contaminants which drove the remediation at this site.

The analysis of on-site surface soil samples indicated lead concentrations from approximately 10 - 917 ppm with one exception (22,200 ppm). Subsurface soil sample results indicated lead concentrations from 15 - 2600 ppm; lead concentrations in off-site surface soil samples ranged from approximately 25 - 800 ppm. This site's cleanup level for lead was set at 250 ppm for surface soils and 500 ppm for subsurface soils (below 12 inches).

The on-site surface soil results indicated cadmium concentrations from 0.4 - 3.7 ppm with one exception (48.6 ppm). Subsurface soil concentrations ranged from 0.35 - 3 ppm with one exception (5.6 ppm). Cadmium levels in off-site surface soils (except 8/94 samples, as summarized in the next paragraph) ranged from 0.2 - 3.4 ppm with one exception (9.5 ppm).
The site's cleanup level for cadmium is 10 ppm for surface soils.
In August 1994, twenty two soil samples were taken from the waste piles located on the Stakmore property and were analyzed for total metals. The total cadmium concentrations ranged from 2 - 8 ppm, the total lead concentrations ranged from 90-240 ppm.

During the RI, three subsurface soil samples collected from inside the landfill were analyzed for TCLP metals. Although the RI samples did not exceed TCLP regulatory levels, historical analyses for total lead indicate there is still material in the landfill which would likely be classified as hazardous waste (i.e. samples from the surface of the landfill and from the south-central perimeter of the site [which were consolidated to the landfill during the implementation of the remedial program] indicated lead concentrations of 15,000 ppm and 22,200, respectively).

Sediment

There are floor drains and a septic tank present on site. Sediment samples were collected from these areas. Lead concentrations ranged from 7.6 - 410 ppm; cadmium was present at concentrations of 4.1 - 6.8 ppm.

Groundwater

As a part of the RI, five monitoring wells were installed around the perimeter of the site. Two rounds of groundwater samples were collected (April '93 and December '93).

The analysis of groundwater samples indicated concentrations of site related contaminants above groundwater standards. In the first round of groundwater samples, one sample exceeded the 25 ug/l [ppb] standard for lead (26.7 ug/l). The results of the second round indicated that three of the five groundwater samples exceeded the standard for lead with concentrations of 26.8, 39.6, and 41.8 ug/l. Two of the samples exceeded the 10 ug/l standard for cadmium with concentrations of 12.8 and 14 ug/l.

Surface Water

There is no surface water near the site; the topography is very flat and surface drainage from the site is in the form of sheet flow/ infiltration.

Section 3 Remedial Action

The Record of Decision (ROD) for this site was signed in March 1995 and details the selection of the site remedy (Appendix A). The remedy included the following:

- Maintaining a fence around the landfill to limit site access as well as seeking deed restrictions to prevent site development activities in areas where contaminated material is present.

- Consolidation of the on-site and off-site soils and waste piles that contain material above the cleanup goals for the site. These materials have been placed in the existing on-site landfill.

- Placement of a low permeability cover over the on-site landfill.
- The on-site septic tank was cleaned and filled with cement.
- Operation and maintenance of the remedy.
- Monitoring of groundwater. This will be done to determine if the chosen alternative was successful in reducing the amount of infiltration, through contaminated material, to an amount which will not have an adverse impact upon groundwater quality.

Section 4 Groundwater Monitoring

Initially all five monitoring wells will be sampled annually (Table 1). The groundwater sampling should be performed at the same time of year, each year it is performed (i.e. the middle-to-end of May every year). Based on the results of the annual monitoring, the frequency may be modified in the future.

Groundwater sampling protocols are located in Appendix B. Groundwater obtained from these wells will be analyzed by an ELAP certified lab for metals using EPA 6010 (metals). The laboratory will be required to provide a standard one page report listing analytes, detection limits and results. The standard data reports will be reviewed by the NYSDEC O&M section. In the event that the data reports an unexpected or unexplainable variation in results, analysis at an ELAP CLP certified lab will be required for the next sampling event. In addition, a category B deliverables package may be required.

Section 5 Site Maintenance

There are two separate areas that currently exist within the property boundaries of the former Tioga Castings Facility: the front portion of the property where part of the former office remains standing (but unstable), and where there is extensive debris on top of the cement pad (foundation for the former foundry building); the rear portion of the property is the landfill area. The inspection and maintenance described below pertains to the landfill area only.

The cover system over the on-site landfill, shown in Figure 4, consists of a final cover layer over the fill material, a 60-mil geomembrane, a geocomposite drainage layer, an 18-inch-thick barrier protection layer, a 6-inch-thick vegetative layer and vegetative cover material (i.e., grasses). The purpose of this system is to:

- Eliminate the potential for direct human or animal contactwith fill material and contaminated site soils; and
- Mitigate the migration of site contaminats from the landfill.

Inspection of the landfill cover system should focus on the following areas:

- Cover subsidence/ponding;
- Erosion of the cover soil layers;
- Cover slope stability;
- Cover vegetation;
- Perimeter drainage (to make sure it is unobstructed and functional);
- Fencing around the landfill; and
- Vectors.

The Tioga Castings landfill cap will be inspected quarterly. Inspections of monitoring wells will take place concurrently. Following each quarterly inspection, the Site Inspection Form will be completed within ten days. Site Inspection Forms are located in Appendix C. If cap maintenance, perimeter fence or monitoring well repair is required, it will be noted on the site inspection form, and appropriate corrective measures will be identified. The recommended maintenance actions are presented in Appendix E. Repairs or other required maintenance will take place within six weeks of completion of the Site Inspection Form.

The landfill cap will be mowed once a year; this will take place after September 15th in order to protect grass nesting birds.

Section 6 Site Access

At the time of the drafting of this O&M Plan, the local municipality was considering taking over the property on unpaid back taxes. In the event that the ownership of the site property changes, the cooperation of the future property owner would be required to provide access for the NYSDEC to carry out site maintenance and monitoring. At the present time, a perimeter chain link fence surrounds the site.

Section 7 Reporting

Annual O&M reports will be completed by the NYSDEC within six weeks of obtaining groundwater analytical results from the laboratory. Annual reports will include analytical data from site wells and completed site inspection reports for the year.

Annual reports will be provided to the agencies/interested parties listed in Appendix D.

Section 8 Citizen Participation

Annual Reports will be provided to the project document repositories at the Owego Village Clerk's Office and the NYSDEC Region 7 Office. The citizen participation mailing list developed for the RI/FS will be maintained for use if future mailings are necessary.

Section 9 Health and Safety

The Health and Safety Plan developed by Dvirka and Bartilucci for the RI will be used for maintenance and monitoring activities at the site. It has been reproduced as Appendix F in this manual.

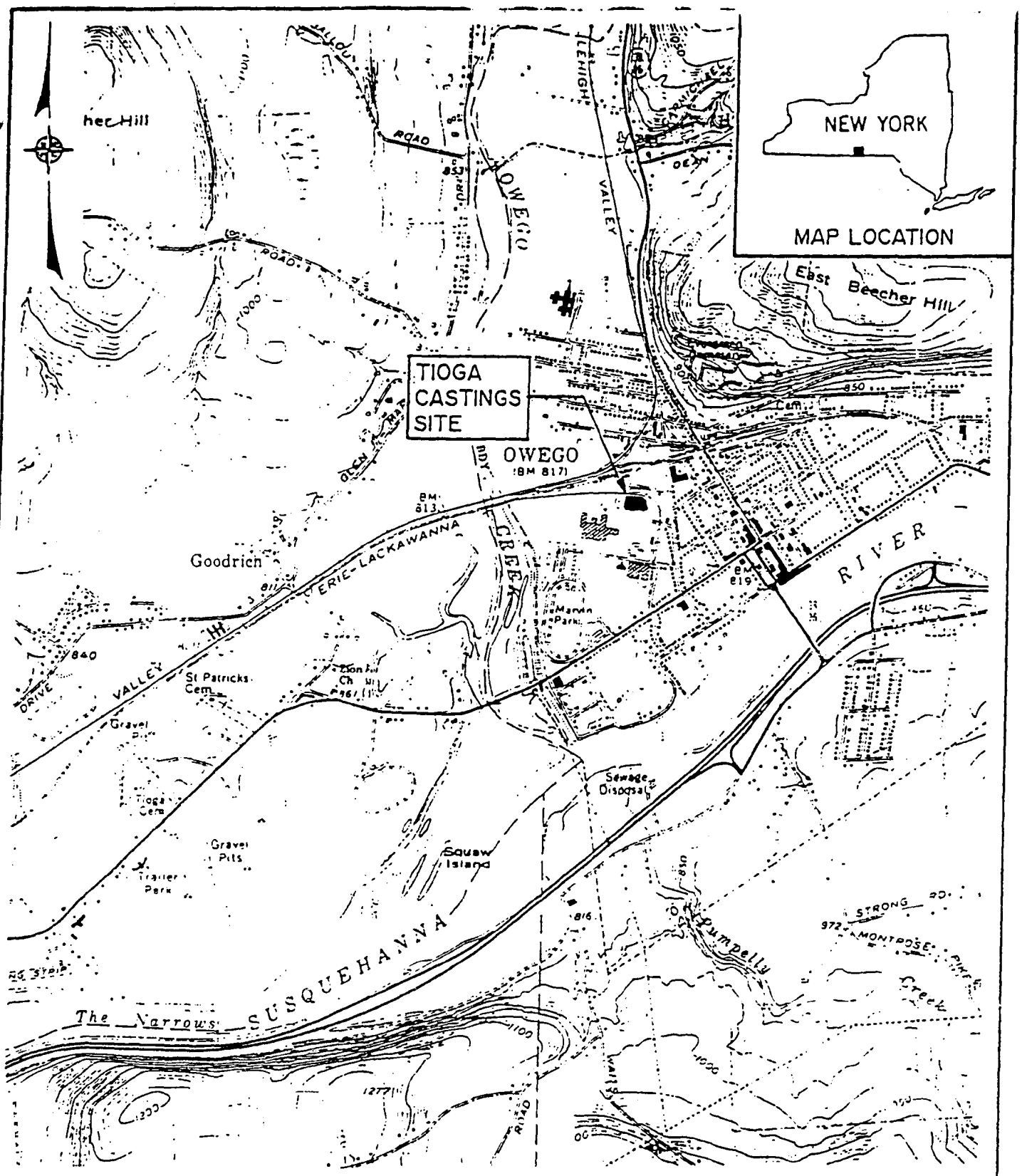
Section 10 Emergency Phone Numbers

Police Department	911	Owego Police Department 90 Temple Street Owego, NY 13827 (607) 687-2233
Fire Department and Rescue Service	911	Owego Fire Department 90 Temple Street Owego, NY 13827 (607) 687-1313
Medical Facility (Hospital) and Poison Control Center		Robert Parker Hospital Gutherie Square Sayre, PA 18840 (717) 888-6666 (General) (717) 882-4225 (Emergency Room)

Emergency Contacts - In case of an emergency, the following groups should be notified:

NYSDEC Region 7- Syracuse (315) 426-7551 during work hours
Charles Branagh, Reg. Hazardous Waste Engineer
NYSDEC Central Office (518) 457-0927 during work hours
Gerald J. Rider, Jr., Chief, Operation & Maintenance
John Strang, Project Manager

Tioga County Health Department (607) 687-4535
NYS Department of Health (518) 458-6310



SOURCE: USGS OWEGO, N.Y. QUADRANGLE

TIOGA CASTINGS SITE
OWEGO, NEW YORK

Dvirka and Bartilucci CONSULTING ENGINEERS

SITE LOCATION MAP

FIGURE 1

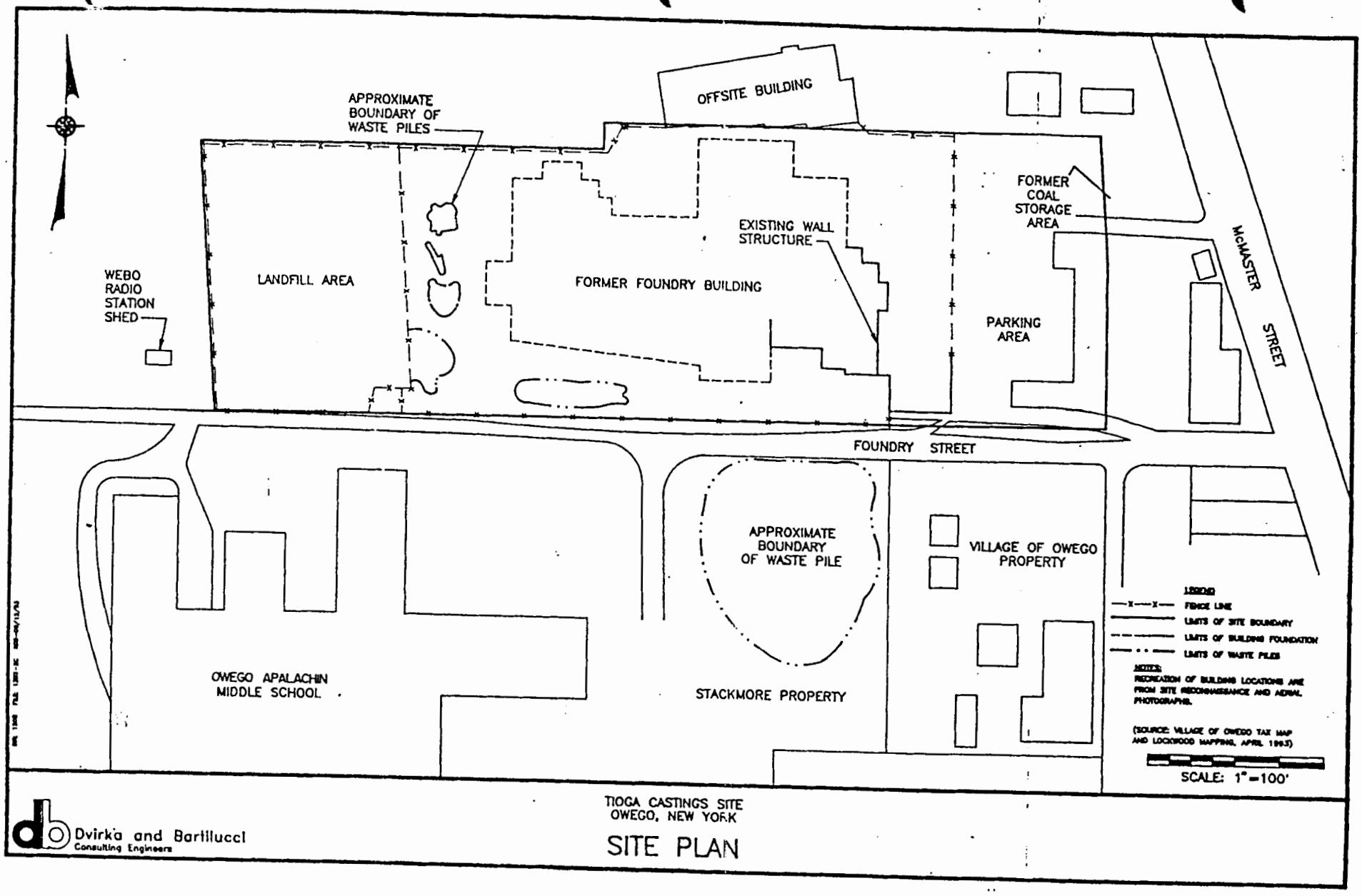
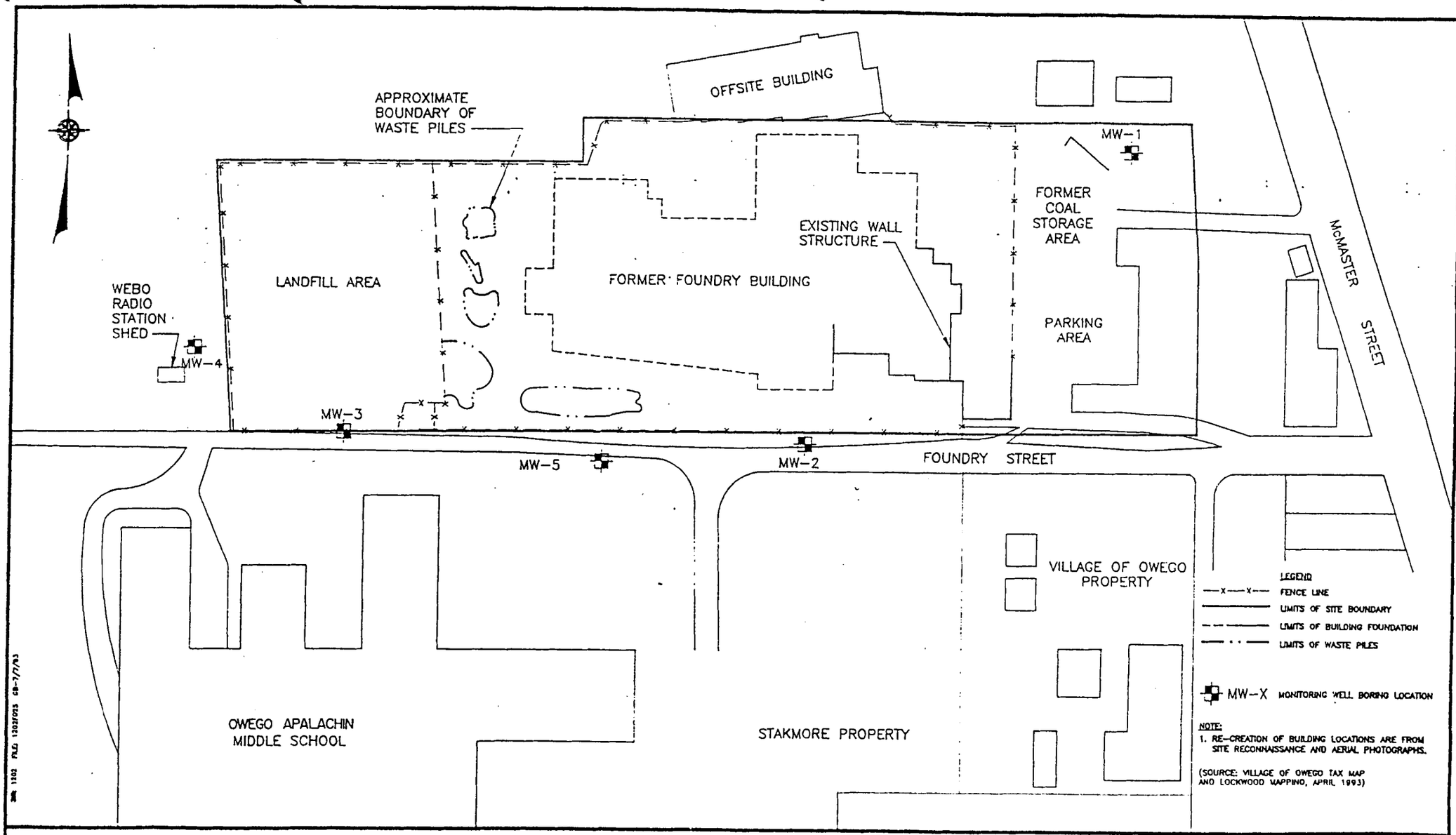

APPROXIMATE BOUNDARY OF WASTE PILES
OFFSITE BUILDING
FORMER COAL STORAGE AREA
McMASTER STREET
EXISTING WALL STRUCTURE
WEBO RADIO STATION SHED
LANDFILL AREA
FORMER FOUNDRY BUILDING
PARKING AREA
FOUNDRY STREET
APPROXIMATE BOUNDARY OF WASTE PILE
VILLAGE OF OWEGO PROPERTY
OWEGO APALACHIN MIDDLE SCHOOL
STACKMORE PROPERTY
LEGEND
FENCE LINE
LIMITS OF SITE BOUNDARY
LIMITS OF BUILDING FOUNDATION
LIMITS OF WASTE PILES
NOTES:
RECREATION OF BUILDING LOCATIONS ARE FROM SITE RECONNAISSANCE AND AERIAL PHOTOGRAPHS.
(SOURCE: VILLAGE OF OWEGO TAX MAP AND LOCKWOOD MAPPING, APRIL 1993)
SCALE: 1"=100'
Dvirka and Bartilucci Consulting Engineers
TIOGA CASTINGS SITE
OWEGO, NEW YORK
SITE PLAN

FIGURE 2

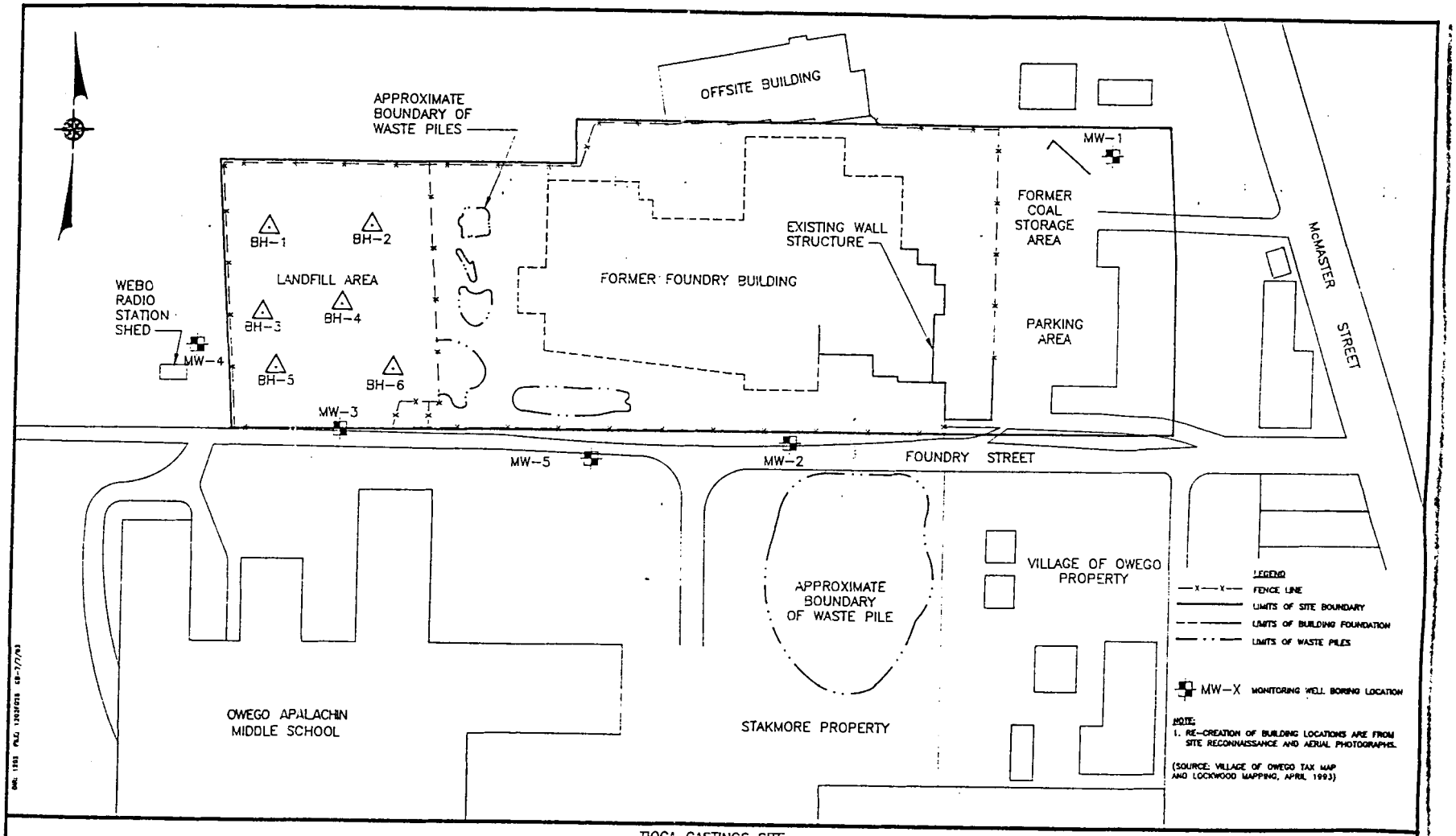


TIOGA CASTINGS SITE
OWEGO, NEW YORK

Dvirka and Bartilucci Consulting Engineers

MONITORING WELL LOCATION MAP

FIGURE 3

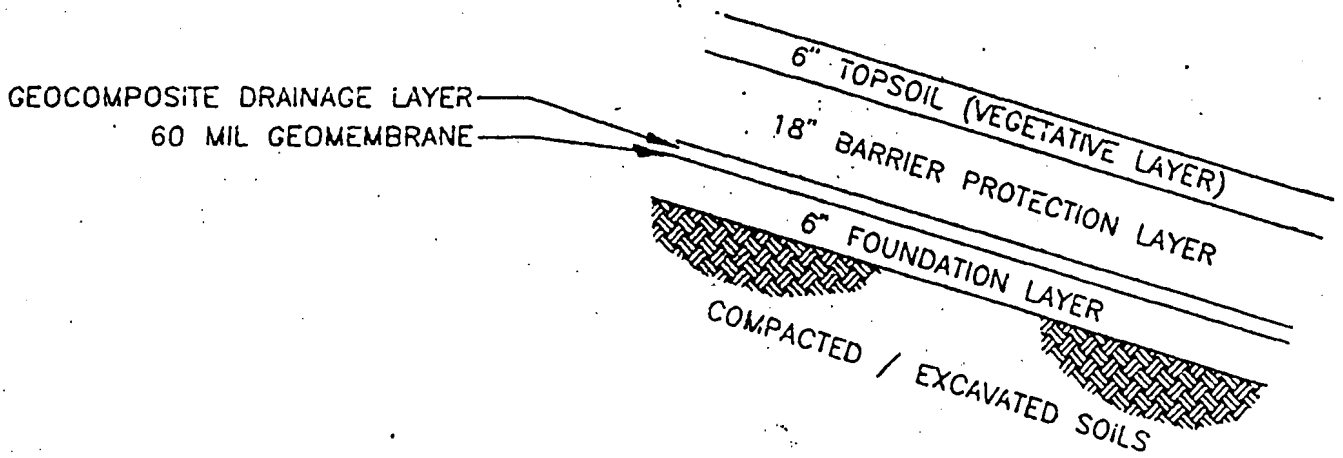


TIOGA CASTINGS SITE
OWEGO, NEW YORK

Dvirka and Bartilucci Consulting Engineers

MONITORING WELL LOCATION MAP

FIGURE 3



TYPICAL CAP CROSS SECTION

NTS

FIGURE 4

Annual Sampling 6/29/98
7/01/99
7/25/01

Table 1
Tioga Castings
Long-term Monitoring Wells

Monitoring Well	Elevation of Top of Casing (feet)	Depth of Well (feet below ground surface)	depth to Bottom DTB
MW-1	810.49	16 [flush mount]	15.62' (7/25/01)
MW-2	807.68	17	19.50' (7/25/01)
MW-3	812.61	16	18.45' (7/25/01)
MW-4 near ~~NOET~~ E RADIO Tower	806.33	16 [flush mount]	15.85 (7/25/01)
MW-5	803.89	16 [flush mount]	16.2' (7/25/01)

newlock #3284

New lock #3284

To locate MW1
25' from corner of concrete well
12.5' from Spruce Tree
7' from Benchmark

MW1 has been dry in 1999 and 2001
MW3 has had very little gw and does not recharge.
Not sampled in 1999 and 2001.

TABLE
TIOGA CASTINGS SITE
REMEDIAL INVESTIGATION REPORT
SUMMARY OF PHASE I GROUNDWATER CONTAMINATION
FOR PRIMARY ANALYTES OF CONCERN

SAMPLE ID	Total VOCs (ug/l)	Total PAHs (ug/l)	Total CPAHs (ug/l)	Total Pesticides (ug/l)	Total PCBs (ug/l)	Total Iron (ug/l)	Total Lead (ug/l)	Total Manganese (ug/l)	Sodium (ug/l)
Guideline*	***	***	***	***	***	300**	25	300**	20000
TCMWGW1	ND	ND	ND	ND	ND	**604**	ND	**69**	**24400**
TCMWGW2	1	ND	ND	ND	ND	**3560**	1.9	**295**	**86800**
TCMWGW3	ND	ND	ND	ND	ND	**11000**	5.5	**324**	**38700**
TCMWGW4	NA	NA	NA	NA	NA	216	ND	31.8	**23500**
TCMWGW5	NA	NA	NA	NA	NA	**1310**	**26.7**	**56.3**	14400

QUALIFIERS
NA: Not analyzed for
ND: Analyzed for but not detected
: Value exceeds guideline
*: NYSDEC Class GA Groudwater standards/guidelines
**: Standard for iron and manganese is 500 ug/l
***: Guidelines are compound specific

TABLE 2 (cont.)

TIOGA CASTINGS SITE
REMEDIAL INVESTIGATION REPORT
PHASE II GROUNDWATER ANALYTICAL RESULTS

SAMPLE ID	TC93-MW1	TC93-MW2	TC93-MW3	TC93-MW4	TC93-MW5	NYSDEC CLASS GA
DATE OF COLLECTION	12/9/93	12/9/93	12/9/93	12/9/93	12/9/93	GROUNDWATER
DILUTION FACTOR	1	1	1	1	1	STANDARDS/GUIDELINES
PARAMETER	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
Cadmium	12.8	14	7	6	5	10
Lead	26.8	20.8	41.8	13.2	39.6	25

: Value exceeds standard/guideline

Appendix A

Record of Decision

Department of Environmental Conservation

Division of Hazardous Waste Remediation

Record of Decision

Tioga Castings Site
Village of Owego, Tioga County
Site Number 7-54-012

March 1995

New York State Department of Environmental Conservation
GEORGE PATAKI, *Governor* MICHAEL ZAGATA, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

Tioga Castings Inactive Hazardous Waste Site
Village of Owego, Tioga County, New York
Site No. 9-07-010
Funding Source: 1986 Environmental Quality Bond Act

Statement of Purpose and Basis

This Record of Decision presents the selected remedial action for the Tioga Castings Inactive Hazardous Waste Disposal Site which was chosen in accordance with the New York State Environmental Conservation Law (ECL). The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40 CFR Part 300).

This decision is based upon the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Tioga Castings Inactive Hazardous Waste Site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A bibliography of the documents included as a part of the Administrative Record is included in Appendix B.

Assessment of the Site

Actual or threatened release of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this Record of Decision, may present a current or potential threat to public health and the environment.

Description of Selected Remedy

Based upon the results of the Remedial Investigation/Feasibility Study (RI/FS) for the site and the criteria identified for the evaluation of alternatives, the NYSDEC has selected a remedy to consolidate contaminated material and place it on the existing on-site landfill followed by the placement of a low permeability cover over the landfill area.

The major elements of the selected remedy include:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Uncertainties identified during the RI/FS will be resolved.

2. Maintaining a fence around the landfill to limit site access as well as seeking deed restrictions to prevent site development activities in areas where contaminated material is present.

3. Consolidation of the on-site and off-site soils and waste piles that contain material above the cleanup goals for the site. These materials will be placed on the existing on-site landfill.

4. Placement of a low permeability cover over the on-site landfill.

5. Operation and maintenance of the remedy after the remedial construction is complete.

6. Monitoring of groundwater. This will be done to determine if the chosen alternative was successful in reducing the amount of infiltration, through contaminated material, to an amount which will not have an adverse impact upon groundwater quality.

New York State Department of Health Acceptance

The New York State Department of Health concurs with the remedial action selected for this site as being protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that employ treatment that reduces toxicity, mobility, or volume as principal element.

3/20/95
Date

Michael J. O'Toole Jr.
Michael J. O'Toole
Director, Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation

TABLE OF CONTENTS

Glossary of Acronyms

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
ECL	Environmental Conservation Law
FWIA	Fish and Wildlife Impact Analysis
NA	Not Available
NCP	National Contingency Plan
ND	Not Detected
NYCRR	N.Y. Codes, Rules and Regulations
NYSDEC	N.Y. State Department of Environmental Conservation
NYSDOH	N.Y. State Department of Health
O&M	Operation and Maintenance
ppb	parts per billion
ppm	parts per million
PRAP	Proposed Remedial Action Plan
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
SCG	Standards, Criteria, and Guidance
SPDES	State Pollution Discharge Elimination System
TCLP	Toxic Characteristic Leaching Procedure
TWA	Time-Weighted Average

Notice

The mention of any trade names or commercial products in this document does not constitute any endorsement or recommendation for use by the New York State Department of Environmental Conservation.

RECORD OF DECISION

TIOGA CASTINGS SITE
Owego(V), Tioga County, New York
Site No. 7-54-012
January, 1995

SECTION 1: INTRODUCTION

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected a remedial program for the Tioga Castings inactive hazardous waste site. The main elements of the remedy include the consolidation of contaminated soils into the on-site landfill and the placement of an impermeable cap over the landfill.

This remedy will address the threat to human health and the environment created by the presence of elevated levels of metals (mainly lead and cadmium) in the soils at, as well as adjacent to, the site. This Record of Decision (ROD) identifies the selected remedy, summarizes the other alternatives considered, and discusses the rationale for this selection.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Tioga Castings (Site No. 7-54-012) site is approximately 7 acres in size and is located on Foundry Street, off of McMaster Street, in the Village of Owego, Tioga County (see Figure 1 on next page).

The former foundry building occupied the front (eastern) portion of the facility while the former landfill can be found at the western edge of the former facility. The former landfill is approximately one acre in size. The site is located in a residential/ commercial area, adjacent to the Owego-Apalachin Middle School (see Figure 2 for the site plan). The Owego Creek is located approximately one-half mile to the west and the Susquehanna River is located approximately one-half mile to the south. During the installation of groundwater monitoring wells during site investigations, geological sampling was conducted at 5 foot intervals down to a depth of approximately 17 feet. Materials encountered below the site include silt, sand, and gravel.

Groundwater below the site is generally encountered at approximately 10 to 15 feet below the ground surface. The first round of groundwater levels were 2 to 5 feet below ground surface. However, these levels were taken in April 1993 when groundwater was elevated as a result of snow melt and heavy rain. Groundwater flow direction is generally to the south-southeast.

The Weitsman Property site is a class 2a site located approximately 1500 feet south of the Tioga Castings site (On New York's registry of inactive hazardous waste disposal sites, "2a" is a temporary classification assigned to sites that have insufficient data for inclusion in any of the other classifications).

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

The Tioga Castings facility began operations on site between 1945 and 1947, and continued through 1988. The facility operated a cupola type foundry for the production of gray iron castings. Operations at the facility included smelting of pig iron, scrap iron (including engine blocks), coke, limestone and the use of phenol-formaldehyde treated sand to cast the iron. The process produced solid wastes which included sand molds, bentonite, fly ash, cast iron grindings, and fine baghouse ash/cupola dust. These wastes were reportedly disposed of at an off-site landfill until March 1979. The facility then operated an on site landfill for the disposal of its foundry wastes. The facility ceased operations in 1988. The following materials were left on site; sand casts, various drums, a number of one-ton plastic lined bags of cupola dust as well as the material contained in the on-site landfill. On July 11, 1989, the facility had a fire which destroyed most of the foundry structure and left the remaining building structurally unsafe.

EP Toxicity analyses of the cupola dust have shown it to be a hazardous waste as a result of the presence of lead and cadmium. An EP Toxicity analysis is a procedure which determines the ability of the soil to "leach" contaminants; that is, it determines how readily the contamination in the soil will contaminate water that passes through it. This is important in determining potential impacts to groundwater and in determining the waste's regulatory status as a hazardous waste. Total lead (or cadmium) analyses, on the other hand, simply determines how much lead (or cadmium) is present in the soil.

Due to the conditions at the site, two Interim Remedial Measures (IRMs) were carried out to address potential physical/chemical hazards (see Section 4.2 for the definition of an IRM). In the fall of 1989, a perimeter fence was erected to limit access to the property. By early 1990, the drums, which had been left on site, were removed from the site and disposed of properly.

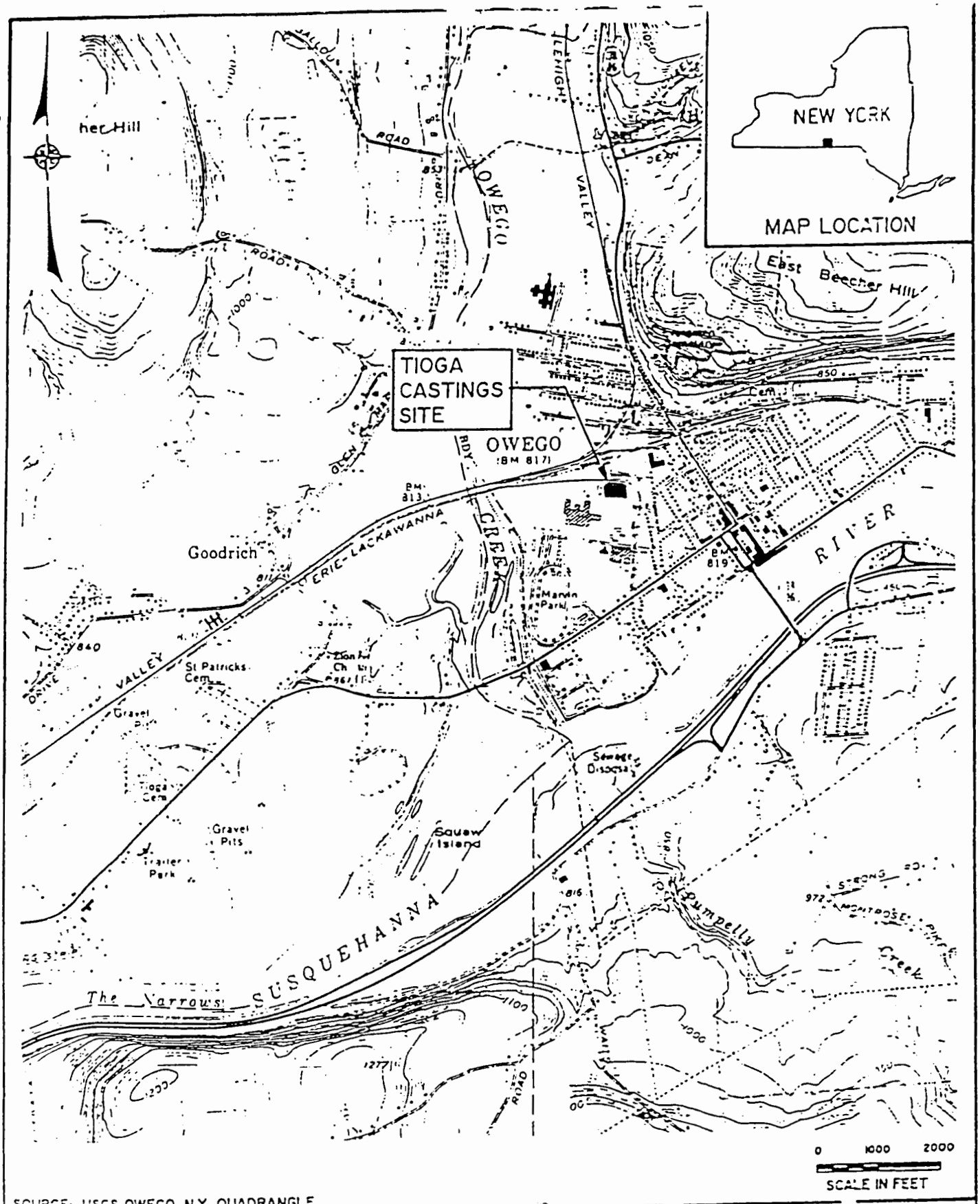
In addition, analytical results from a landfill surface soil sample showed a total lead concentration of 15,000 ppm (as discussed in Section 6, the cleanup goal for lead has been identified as 250 ppm). A temporary cover was placed over the landfill in August 1991 in order to minimize the potential for the erosion (wind, surface water) of this material.

3.2: Previous Investigations/Actions:

(see Figure 3 for a map of previous soil sample locations/results)

August 1989 - Thirteen surface soil samples were collected, from the grassy area north of the Owego-Apalachin middle school, and analyzed for total lead and cadmium as well as for EP Toxicity. Cadmium was detected at two locations at 3.7 ppm; lead was present at concentrations ranging from 43 - 960 ppm; the results of the EP Toxicity analyses did not indicate the presence of hazardous waste.

Sept. 1989 - Thirty one additional surface soil samples were collected from the grassy area north of the school, six from the former landfill area, and five from northeast of the former facility. All of the samples were analyzed for lead. Total lead concentrations in the schoolyard were between 51 -350 ppm; west of the former landfill, levels were between 40 -50 ppm; northeast of the former foundry lead was present from 120 -270 ppm; and one surface soil sample from the former landfill indicated a lead concentration of 15,000 ppm.



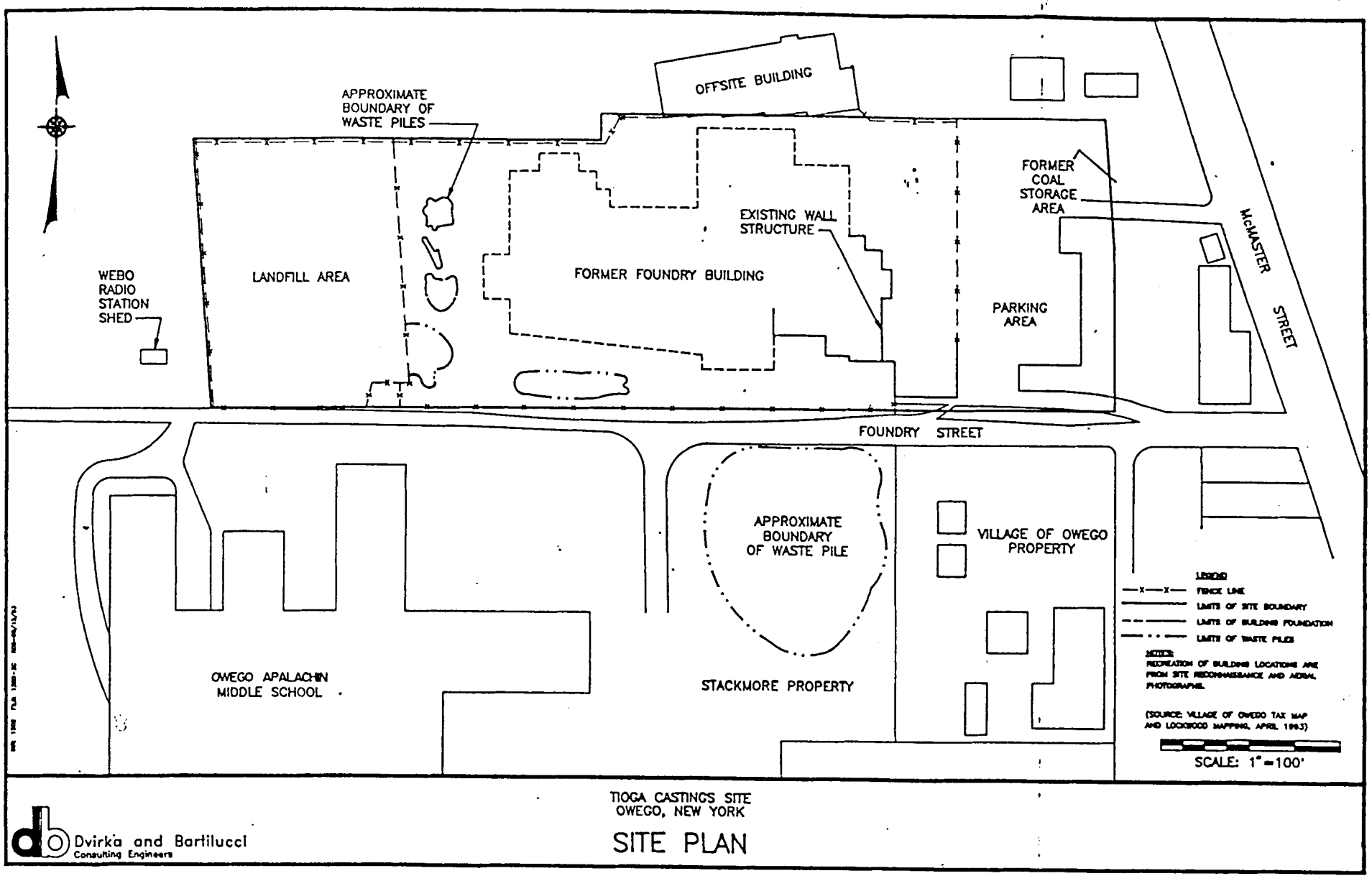
SOURCE: USGS OWEGO, N.Y. QUADRANGLE

TIOGA CASTINGS SITE
OWEGO, NEW YORK

SITE LOCATION MAP

Dvirka and Bertlucci
CONSULTING ENGINEERS

FIGURE 1



TIOGA CASTINGS SITE
OWEGO, NEW YORK

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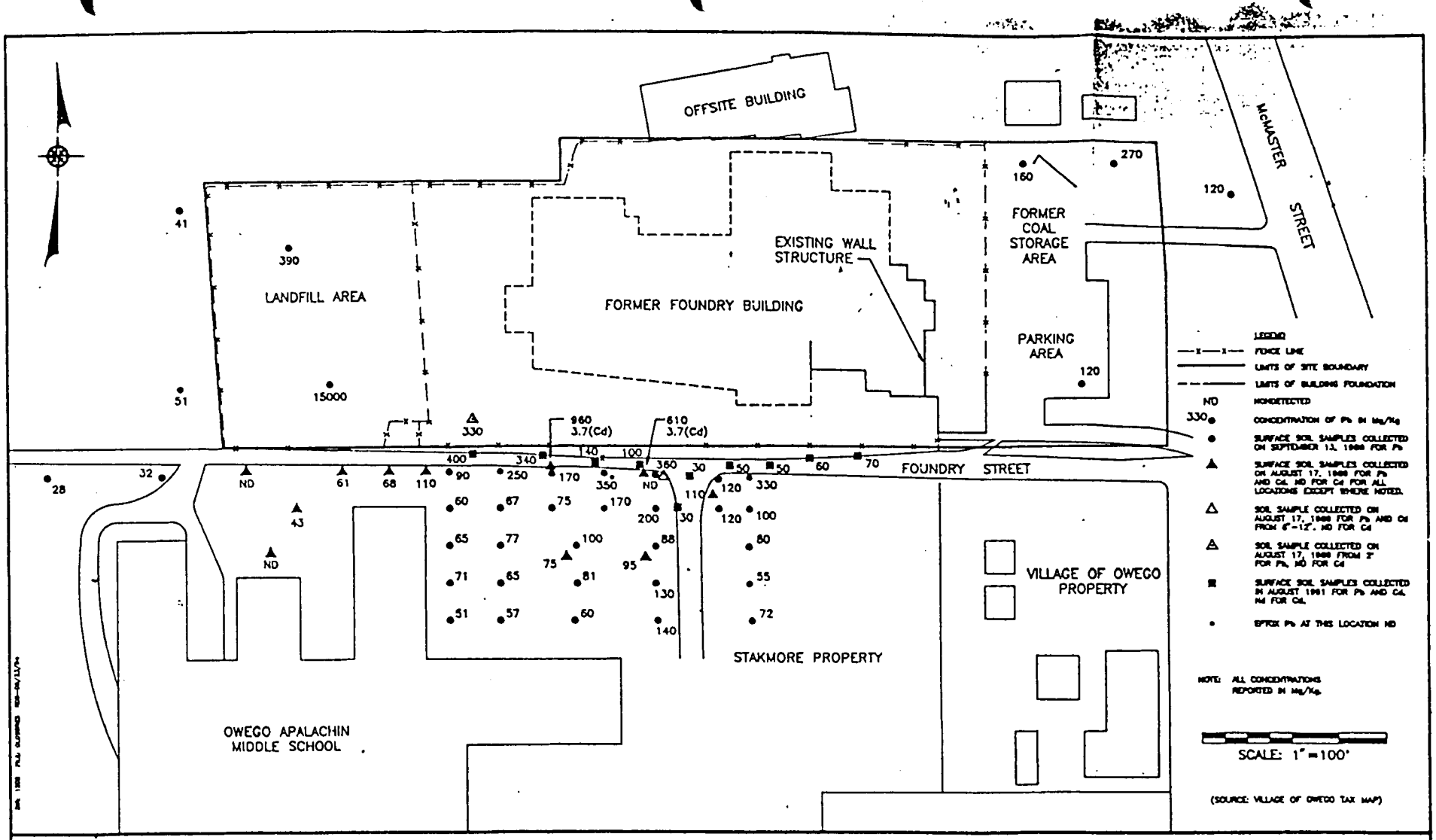
SITE PLAN

FIGURE 2



TIOGA CASTINGS SITE
OWEGO, NEW YORK

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PREVIOUS SURFACE SOIL SAMPLING RESULTS

FIGURE 3

Fall 1989 - A perimeter fence is placed around the former foundry to limit access.

Feb. 1990 - An IRM, to remove waste material abandoned at the site, was completed. The IRM was initiated by the responsible party, however it became necessary for the State to complete the work.

July 1991 - Prior to the demolition of the building, grid sampling was conducted to characterize the dust that blanketed the floor of the former foundry building. Thirty-one samples were collected and analyzed for lead. Twenty-eight of the samples had concentrations at or below 210 ppm; three of the samples had elevated concentrations of lead (1,400, 9,300, and 28,000 ppm). Dust from these areas was containerized and disposed of prior to the demolition of the building.

August 1991 - An IRM was conducted to place a temporary cap over the landfill area (see Section 4.2). Since this work involved heavy truck traffic along Foundry Street (a dirt road), ten surface soil samples were collected from the roadway. The highest lead concentration detected was 400 ppm (eight of the samples indicated concentrations below 140 ppm).

3.3: Enforcement Status

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The Potential Responsible Party (PRP) for this site is the Tioga Castings Facility. On August 14, 1989, an order on consent between the PRP and the Department was signed (Index No. A702068909) which obligated the PRP to construct a perimeter fence around the site to restrict access and to remove hazardous waste abandoned on the property.

The PRP failed to carry out the RI/FS at the site when requested by the NYSDEC (the PRP was not financially able to perform the necessary work). After the remedy is selected, the PRP will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRP, the NYSDEC will evaluate the site for further action under the State Superfund. The PRP is subject to legal actions by the State for recovery of all response costs the State has incurred.

SECTION 4: SUMMARY OF SITE CHARACTERISTICS

In response to a determination that the presence of hazardous waste at the Site presents a significant threat to human health and the environment, the NYSDEC has recently completed a Remedial Investigation/Feasibility Study (RI/FS).

4.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site.

The RI was completed in two phases. The first phase field work was completed between April 5, 1993 and May 4, 1993. The second phase field work was carried out in December, 1993. A report entitled Phase I/Phase II Remedial Investigation has been prepared describing the field activities and findings of the RI in detail. The RI activities consisted of the following:

- On-site sampling of surface soils, subsurface soils, and sediments from floor drains.

- Off-site surface and subsurface soil sampling as well as the collection of background soil samples.

- Soil borings in the on-site landfill in order to characterize the fill material.

- The installation of groundwater monitoring wells to determine the impact this site is having on the groundwater.

To determine which media (soil, groundwater, etc.) are contaminated at levels of concern, the analytical data obtained from the RI were compared to environmental Standards, Criteria, and Guidance (SCGs, defined in Section 8.2 below). Groundwater, drinking water, and surface water SCGs identified for this site were based on NYSDEC Ambient Water Quality Standards and Guidance Values. For the evaluation and interpretation of soil and sediment analytical results, NYSDEC soil cleanup guidelines for the protection of groundwater, background conditions, and risk-based remediation criteria were used to develop remediation goals.

Based upon the results of the remedial investigation in comparison to the SCGs and potential public health and environmental exposure rates, certain areas and media of the site require remediation. These are summarized below. Complete information can be found in the RI Report.

Chemical concentrations are reported in parts per billion (ppb) or parts per million (ppm). For comparison purposes, SCGs are given for each medium.

Soil

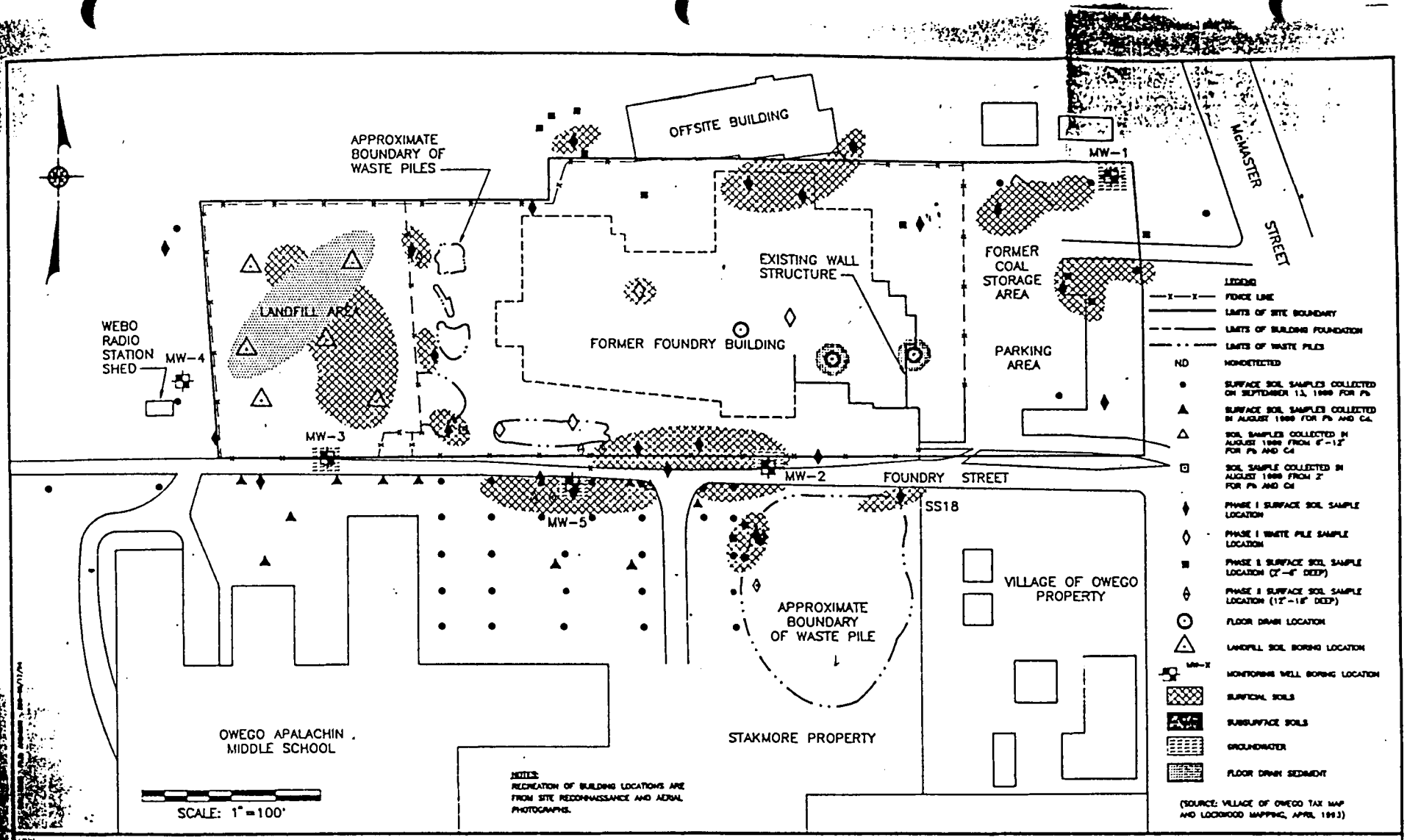
Elevated levels of certain metals have been found in soils on site as well as adjacent to the site. The metals found at elevated concentrations include cadmium, lead, and chromium. Generally, lead and cadmium are the most predominant contaminants which will drive the remediation at this site. Figure 4 identifies areas where cleanup goals have been exceeded.

The analysis of on-site surface soil samples indicated lead concentrations from approximately 10 - 917 ppm with one exception (22,200 ppm). Subsurface soil sample results indicated lead concentrations from 15 - 2600 ppm; lead concentrations in off-site surface soil samples ranged from approximately 25 - 800 ppm. This site's cleanup level for lead has been set at 250 ppm (for surface soils).

The on-site surface soil results indicated cadmium concentrations from 0.4 - 3.7 ppm with one exception (48.6 ppm). Subsurface soil concentrations ranged from 0.35 - 3 ppm with one exception (5.6 ppm). Cadmium levels in off-site surface soils (except 8/94 samples, as summarized in the next paragraph) ranged from 0.2 - 3.4 ppm with one exception (9.5 ppm).

In August 1994, twenty two soil samples were taken from the waste piles located on the Stakmore property and were analyzed for total metals. The total cadmium concentrations ranged from 2 - 8 ppm, the total lead concentrations ranged from 90-240 ppm. Figure 5 identifies the locations of the samples taken from the Stakmore property.

During the RI, three subsurface soil samples collected from inside the landfill were analyzed for TCLP metals (the TCLP analysis is similar to, and has replaced, the EP Toxicity analysis previously discussed). Although the RI samples did not exceed TCLP regulatory levels, historical analyses for total lead indicate there is still material on site which would likely be classified as hazardous waste (i.e. samples from the surface of the



TIOGA CASTINGS SITE
OWEGO, NEW YORK

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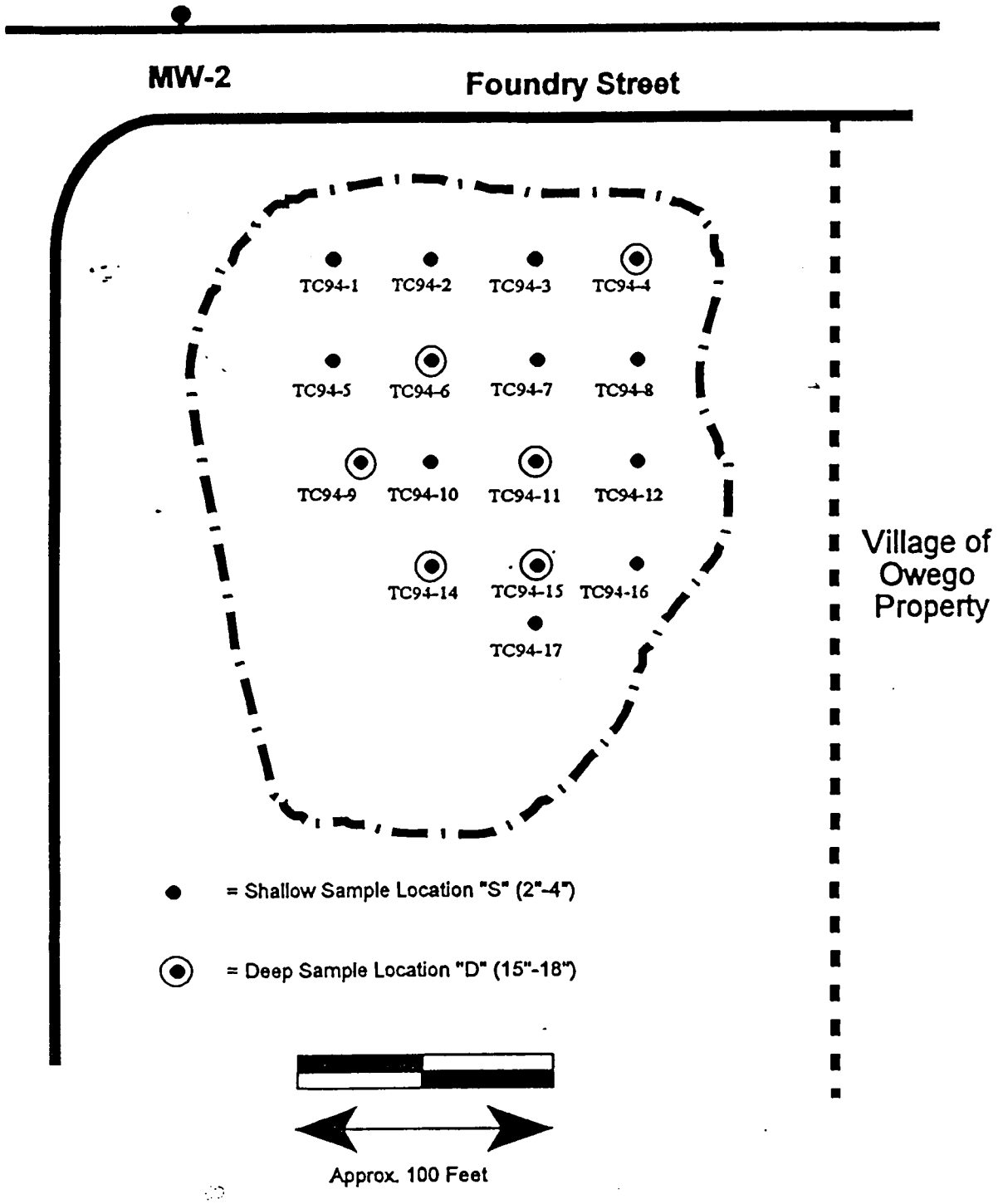
AREAS OF CONCERN

FIGURE 4

Figure 5
Stakmore Property
Sample Locations
August 10, 1994



landfill and from the south-central perimeter of the site indicated lead concentrations of 15,000 ppm and 22,200, respectively).

Sediment

There are floor drains and a septic tank present on site. Sediment samples were collected from these areas. Lead concentrations ranged from 7.6 - 410 ppm; cadmium was present at concentrations of 4.1 - 6.8 ppm.

Groundwater

As a part of the RI, five monitoring wells were installed around the perimeter of the site. Two rounds of groundwater samples were collected (April '93 and December '93). The results of these groundwater sampling events are summarized on Figure 6 and Table 1.

The analysis of groundwater samples indicated concentrations of site related contaminants above groundwater standards. In the first round of groundwater samples, one sample exceeded the 25 ug/l [ppb] standard for lead (26.7 ug/l). The results of the second round indicated that three of the five groundwater samples exceeded the standard for lead with concentrations of 26.8, 39.6, and 41.8 ug/l. Two of the samples exceeded the 10 ug/l standard for cadmium with concentrations of 12.8 and 14 ug/l.

Surface Water

There is no surface water near the site; the topography is very flat and surface drainage from the site is in the form of sheet flow/ infiltration.

4.2 Interim Remedial Measures:

Interim Remedial Measures (IRMs) are conducted at sites when a source of contamination or an exposure pathway can be effectively addressed before completion of the RI/FS.

Three IRMs were performed prior to the initiation of the RI/FS. A description of these IRMs can be found in the Site History (Section 3).

SECTION 5: SUMMARY OF SITE RISKS

5.1 Summary of Human Exposure Pathways:

An exposure pathway is the process by which an individual is exposed to a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental media (e.g., soil, groundwater) and transport mechanisms; 3) the point of exposure; 4) the route of exposure (e.g., ingestion, inhalation); and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

Completed pathways known to or that may exist at the site include:

- Dust could become airborne and migrate from the site. This would provide the potential for inhalation or ingestion of these materials.

- Although the perimeter fence limits access to the site there is potential for unauthorized access to the site. In addition, there are elevated levels of contaminants located outside the fenced area. As a result there is potential for skin contact and ingestion of contaminated soils.

The available information indicates that the residential population in the area of the site is using municipal water. Therefore, the ingestion of contaminated groundwater is currently not considered to be a complete pathway by which exposure could occur. During the remedial design, additional information will be gathered regarding water usage in the area of the site to confirm this indication.

5.2 Summary of Environmental Exposure Pathways:

The presence of contaminants in an ecosystem can result in a variety of effects on wildlife population, ranging from a reduction in population size to changes in the community structure. The area on and adjacent to this site is, for the most part, disturbed land which does not support an abundance of ecological organisms. In addition, there is a lack of surface water near the site minimizing the potential for uptake of contaminants by this route.

In the case of the Tioga Castings site, the pathways for potential contaminant exposure to wildlife would be limited to:

- Terrestrial animals burrowing through contaminated soils and waste piles.

- Animals feeding on the sparse vegetation which have accumulated contaminants.

- Animals drinking from any water which may pond, as a result of precipitation events, in areas associated with contaminated surface soils.

SECTION 6: REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR 375-1.10. These goals are established under the overall goal of protecting human health and the environment and meeting all Standards, Criteria, and Guidance (SCGs).

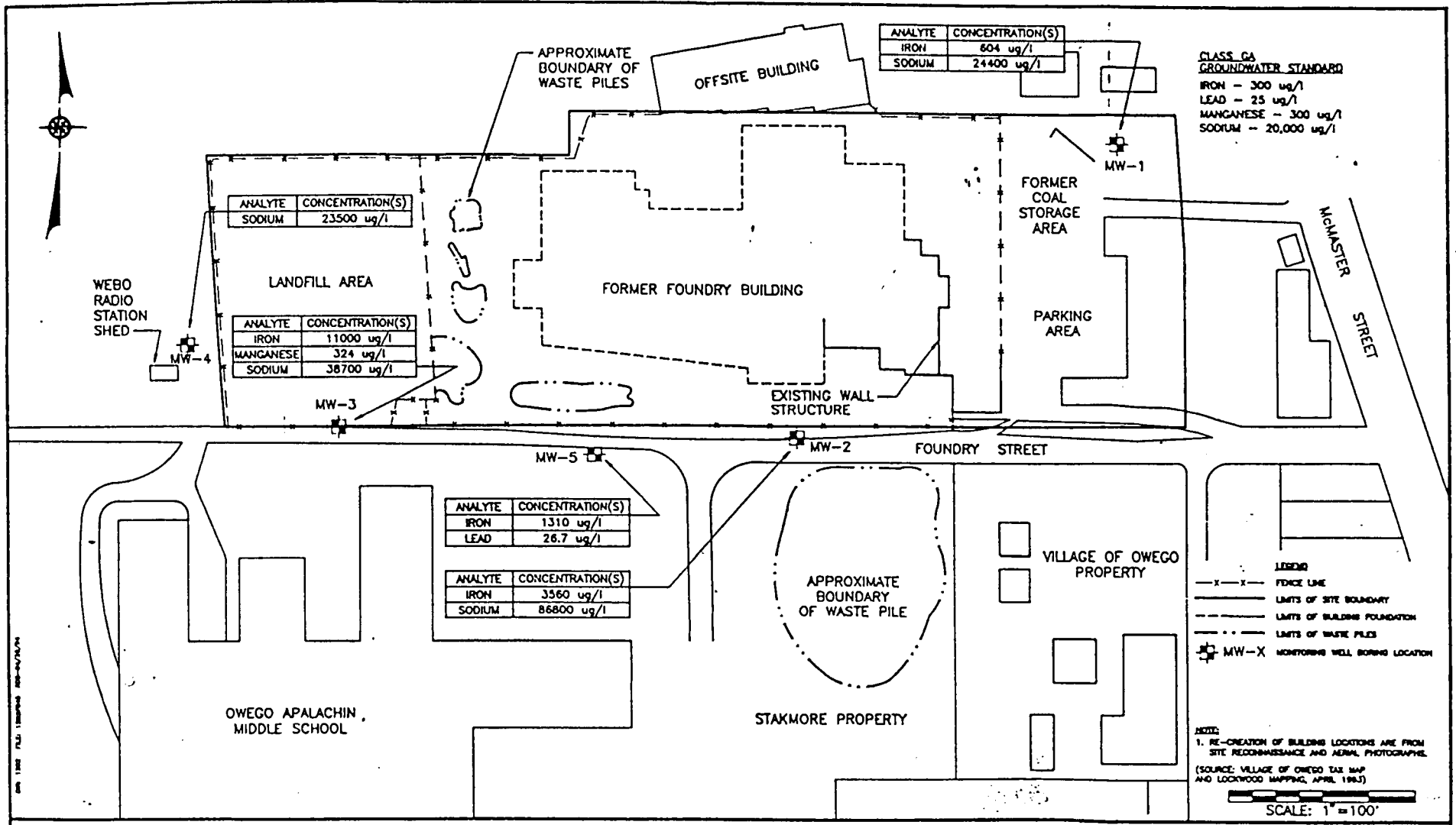
At a minimum, the remedy selected should eliminate or mitigate all significant threats to public health and the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The goals selected for this site are:

- Prevent direct contact exposure (dermal absorption, inhalation and incidental ingestion) with waste piles/soils that have concentrations above the cleanup goals.

- Prevent or reduce the transport of contamination off site via surface runoff from areas where the surface material is contaminated.

- Prevent or greatly reduce the amount of precipitation infiltrating through contaminated soils and adversely impacting the groundwater.



TIOGA CASTINGS SITE
OWEGO, NEW YORK

PHASE I RI

EXCEEDANCE OF NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES

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FIGURE 6

TIOGA CASTINGS SITE
REMEDIAL INVESTIGATION REPORT
PHASE II GROUNDWATER ANALYTICAL RESULTS

SAMPLE ID	TC93-MW1	TC93-MW2	TC93-MW3	TC93-MW4	TC93-MW5	NYSDEC CLASS GA
DATE OF COLLECTION	12/9/93	12/9/93	12/9/93	12/9/93	12/9/93	GROUNDWATER
DILUTION FACTOR	1	1	1	1	1	STANDARDS/GUIDELINES
PARAMETER	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
Cadmium	12.8	14	7	6	5	10
Lead	26.8	20.8	41.8	13.2	39.6	25

: Value exceeds standard/guideline

TABLE 1

The December 1994 Remedial Investigation/ Feasibility Study (RI/FS) presented a cleanup goal of 4 ppm for cadmium in soils based on a qualitative risk assessment. Based on a more detailed evaluation (e.g.. Marathon Battery Site) a cadmium cleanup level of 10 ppm was established. This level was found to be protective based on a very conservative scenario (e.g. for use as a vegetable garden).

The Department's cleanup goal for lead is generally established at a concentration of 400 ppm. However, due to the proximity of this site to the school and the small increase in volumes and costs, the cleanup goal for lead has been set at 250 ppm for surface soils.

The following are contaminant specific cleanup goals:

	SOIL	GROUNDWATER
cadmium	10 ppm	10 ppb
chromium	50 ppm	50 ppb
lead	250 ppm to 12" 500 ppm below 12"	25 ppb

SECTION 7: DESCRIPTION OF REMEDIAL ALTERNATIVES

Potential remedial alternatives for the Tioga Castings site were identified, screened and evaluated in the Feasibility Study. This evaluation is presented in the December 1994 Tioga Castings Feasibility Study Report. A summary of the detailed analysis follows.

The potential remedies are intended to address the contaminated soils and groundwater at the site.

Alternative 1: No Further Action

Present Worth:	$ 120,000
Capital Cost:	$ 0
Annual O&M:	$ 7,700
Time to Construct:	NA

The no further action alternative recognizes the work that has been completed under the previously completed IRMs. It requires continued monitoring only, to evaluate the effectiveness of the remediation completed under the IRMs.

This is an unacceptable alternative as the site would remain in its present condition and the threat presented by contaminated soils/ groundwater would remain.

Alternative 2: Institutional Actions, Consolidation of Contaminated Soil in Existing On-site Landfill, Placement of Permeable Cover over Landfill, Operation and Maintenance (O&M)

Present Worth:	$ 891,000
Capital Cost:	$ 502,000
Annual O&M:	$ 25,700
Time to Construct:	2 - 3 months

Institutional actions would include the maintenance of the security fencing as well as pursuing the placement of deed restrictions on the property. Under this alternative contaminated soils from on-site and off-site areas would be excavated and consolidated into the existing on-site landfill located along the western edge of the property. This material would be placed/graded in preparation for the placement of a permeable cover. The purpose of the cover would be to prevent direct contact as well as the erosion and off site transport of contaminated material.

Alternative 3: Institutional Actions, Consolidation of Contaminated Soils in Existing On-site Landfill, Placement of a Low Permeability Cover, O&M

Present Worth:	$ 1,090,000
Capital Cost:	$ 701,000
Annual O&M:	$ 25,700
Time to Construct:	2 - 3 months

This alternative would be the same as Alternative 2 with the exception of the type of cover placed over the existing landfill. The low permeability cover would consist of a geomembrane placed on a preparatory/ subgrade layer and covered by a protective barrier drainage layer and topsoil.

Alternative 4: Excavation of Contaminated Soil and Off-site Disposal

Present Worth:	$ 3,746,000
Capital Cost:	$ 3,457,000
Annual O&M:	$ 18,700
Time to Construct:	approximately 6 months

This alternative would involve the excavation and off-site disposal of all contaminated materials (including the volume contained within the on site landfill). This material represents a volume of approximately 28,000 cubic yards.

Alternative 5: Institutional Actions, On-site Stabilization of Contaminated Material, Placement of this Material in the On-site Landfill, Permeable Cover on Landfill

Present Worth:	$ 2,641,000
Capital Cost:	$ 2,252,000
Annual O&M:	$ 25,700
Time to Construct:	3 - 12 months

Included in this alternative are the institutional actions discussed in Alternative 2. Stabilization can be performed in-situ or ex-situ. For this site, ex-situ stabilization would be recommended due to the advantage of ensuring proper blending. Treatability studies would be conducted to determine the reagent most effective for the contaminated material present at the Tioga Castings site.

Ex-situ stabilization would involve the excavation and stockpiling of material. The approximate throughput utilizing a pugmill would be 4 - 100 cubic yards/hour (depending on the size of the equipment used). If continuous processing equipment is used, as much as 225 cubic yards/hour could be processed. After the stabilization process is complete, the material would be backfilled at the on-site landfill. A significant increase in volume (approximately 30%) would be expected.

Alternative 6: Institutional Actions, Groundwater Extraction and Treatment

Present Worth:	$ 1,808,000
Capital Cost:	$ 862,000
Annual O&M:	$ 107,000
Time to Construct:	3 - 6 months
Duration of Operation:	10 years (estimate)

Included in this alternative are the institutional actions described in Alternative 2. This alternative would be designed to address groundwater contamination through extraction and treatment. This alternative could be implemented on its own or in combination with one of the other alternatives.

Pre-design pump tests would be required to design the groundwater recovery system. The extraction system would be designed to capture the inorganic plume migrating from the site. The extraction system would consist of five wells located along the southern and eastern perimeter of the site. Four extraction wells would be spaced 300 feet apart along the southern perimeter and one well would be placed at the approximate midpoint of the eastern property boundary. This spacing is based on an estimated 400 foot cone of influence that would be created by each pumping well at a withdrawal rate of 50 gallons/minute with 4 feet of drawdown. This withdrawal rate corresponds to a total of 360,000 gallons/day. An estimate of the length of time to remediate the plume cannot be determined without additional downgradient data. However, for the purpose of developing a cost estimate, an operating period of 10 years has been assumed.

The treatment system would consist of an on-site conventional removal process for metals. It is likely that reverse osmosis would be the most practical removal process for this site, however pre-design treatability studies would be performed prior to the selection of the treatment process. Since there are no sewers or surface water bodies adjacent to the site, discharge from the on site treatment of groundwater would be to a groundwater infiltration system.

SECTION 8: SUMMARY OF COMPARATIVE ANALYSIS OF THE ALTERNATIVES

The criteria used to compare the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6 NYCRR Part 375). For each criterion, a brief description is provided followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is contained in the Feasibility Study.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of the health and environmental impacts to assess whether each alternative is protective.

Alternative 4 would be the most protective of human health and the environment since all significantly contaminated soil would be removed off site with the assumption that there are no potential receptors of contaminated groundwater. Of the remaining alternatives, Alternative 5 would be most protective of human health and the environment since contaminated materials would be stabilized to prevent leaching of contaminants and covered to prevent direct contact. Alternatives 2 and 3 would eliminate surface soil exposure routes. Alternative 3 would provide an impermeable cover over the landfill area and would be more protective of groundwater. Alternative 2 would provide a permeable cover in the area of the landfill. Groundwater treatment would be performed only under Alternative 6. Alternative 1 would not provide any protection of human health or the environment for groundwater or contaminated soils at the site.

Alternatives 4 and 5 would be considered permanent remedies. Post-remediation measures would be taken for the other alternatives to monitor their effectiveness and maintain their integrity.

Alternative 1 would not achieve the remedial action objectives (RAOs) for soil or groundwater. Alternative 2 would achieve the RAOs for soil, but RAOs for groundwater would not be met for an extended period of time. Alternatives 3, 4, and 5 would achieve RAOs for soil. RAOs for groundwater would be achieved in a relatively short period of time (i.e. less than ten years) through source isolation/removal and natural attenuation. Alternative 6 would actively remediate the groundwater, but would not address the RAOs for soil.

Alternatives 2, 3, 4, and 5 would have potential short term risks, however those risks could be easily managed using proper control measures (i.e. dust suppression and erosion controls).

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet applicable environmental laws, regulations, standards, and guidance. The major SCGs for this site include:

- 6 NYCRR Part 360 Solid Waste Management Facilities
- TAGM HWR-92-4046 Determination of Soil Cleanup Objectives
- TAGM HWR-89-4031 Fugitive Dust Suppression and Particulate Monitoring
- 6 NYCRR Part 375 Inactive Hazardous Waste Disposal Site Remedial Program
- TOGS 2.1.2 Underground Injection/ Recirculation at Groundwater Remediation Sites
- 6/93 USEPA Guidance on Solidification/ Stabilization and its Application to Waste Materials
- Air Guide 1

Alternatives 4 and 5 would achieve soil SCGs at the site. All other alternatives that address soils, except no action, involve consolidation of site soils and placement of a cover. Although Alternatives 2 and 3 would take longer to attain SCGs for groundwater protection, they are protective of health and the environment. Alternative 3 has a greater potential for reducing leaching of contaminants to groundwater. As a result, Alternative 3 would attain SCGs for groundwater much sooner than Alternative 2. Alternative 6 would achieve SCGs for groundwater in the shortest period of time. As discussed above, Alternative 6 could be implemented on its own or in combination with one of the other alternatives.

3. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared with the other alternatives.

During construction activities associated with Alternatives 2, 3, 4 and 5, access to the site would be restricted to minimize the potential for exposure to contaminants. Site remediation workers would be protected through use of appropriate respiratory and dermal contact protection as required by the Occupational Safety and Health Administration (OSHA) and the site specific health and safety plan to be developed prior to remediation. The surrounding community would be protected through measures to prevent fugitive emissions, such as dust suppression and temporary cover, and runoff of contaminated excavated material, such as erosion controls. As long as these control measures are used properly, they are effective in minimizing any potential short-term impacts.

Alternative 6 would cause very limited disturbance of site soils and therefore would generate the least short-term impacts. Exclusive of Alternative 6, which is related to remediation of groundwater, Alternatives 2 and 3 would cause the least disturbance of site soils, and therefore, the least short-term impacts. Alternatives 4

and 5 would cause a great deal of disturbance of soils. Since Alternative 1 would require no activity, there would be no short-term impacts due to construction.

With the exception of attaining groundwater RAOs, all alternatives can be implemented in a short time (less than two years). Alternative 6 would directly treat groundwater and has the highest potential for achieving groundwater standards in the shortest time. From fastest to slowest, the other Alternatives would be ranked as follows: 4, 5/3, 2, and 1.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of alternatives after implementation of the response actions. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

By removing contaminants, Alternative 4 is judged to be the most effective in the long-term for the soil/waste contamination at the Tioga Castings Site, requiring limited long-term monitoring/maintenance. On-site containment with a permeable or low permeability cover (Alternatives 2 and 3, respectively), is not considered permanent. Contaminated soil would remain at the site without treatment, requiring groundwater monitoring and maintenance. Alternative 5 would treat the soil and would be considered permanent. Alternatives 3 and 5 are likely to be more effective than other alternatives with regard to leaching contaminants to groundwater. The no further action alternative (Alternative 1) would not be effective in the long-term. Alternative 6, with no contaminated soil/waste remediation, is considered permanent for only groundwater contamination.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternative 4 would decrease the mobility, toxicity and volume of the contaminated soil with respect to the site. Alternative 5 would also decrease the mobility of contaminated site soils, however, it is likely to increase the volume. Alternative 3 would also decrease the mobility of the contaminants from the soil to groundwater. Alternatives 1 and 2 would not reduce the toxicity, mobility or volume of the contaminated soil or groundwater. Alternative 6 would reduce the toxicity, mobility and volume of contaminated groundwater at the site.

6. Implementability. The technical and administrative feasibility of implementing each alternative is evaluated. Technically, this includes the difficulties associated with the construction, the reliability of the technology, and the ability to monitor the effectiveness of the remedy. Administratively, the availability of the necessary personnel and equipment is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

All of the alternatives could be implemented and the required materials/services are readily available. There would be no difficulties associated with coordinating with other divisions/agencies.

Alternative 2 represents the most readily implementable alternative, other than no action, due to the relatively simple constructability of a permeable cover. Alternative 3 would likely be the next easiest alternative to be implemented since a low permeability cap would be placed over the consolidated contaminated material which would likely require additional regrading and site preparation activities. Based on volumes of material to be excavated, Alternatives 4 and 5, respectively, would be more difficult to implement, with Alternative 5 being the most difficult because of the need to stabilized the material and backfill it in the on-site landfill. Alternative 6 is a readily implementable alternative with minimal disturbance of contaminated materials.

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are:

Alt.	Capital Cost	Annual O&M	Total
1	$ 0	$ 7,700	$ 120,000
2	$ 502,000	$ 25,700	$ 891,000
3	$ 701,000	$ 25,700	$ 1,090,000
4	$ 3,457,000	$ 18,700	$ 3,746,000
5	$ 2,252,000	$ 25,700	$ 2,641,000
6	$ 862,000	$ 107,000	$ 1,808,000

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan have been evaluated. A "Responsiveness Summary" has been prepared that describes public comments received and how the Department addresses the concerns raised. The Responsiveness Summary is included as Exhibit A.

SECTION 9: SELECTED REMEDY

Based upon the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC has selected Alternative 3 (institutional actions, consolidation of contaminated soils, placement of a low permeability cover, O&M, and monitoring) as the remedy for this site.

Alternative 1 is not acceptable because it does not address the remedial goals. Alternative 2 would address direct contact and erosion of contaminated material, however it would do nothing to reduce infiltration through contaminated soils. Alternative 4 would address the goals of the program, however there would be substantially greater costs than other alternatives. Alternatives 3 and 5 would not actively remediate groundwater, however by isolating the source of contamination, and by natural attenuation, attainment of groundwater standards would be expected in a relatively short period of time (i.e. less than 10 years). Alternatives 3 and 5 would both be effective, however the cost of Alternative 5 is much greater than Alternative 3.

Alternative 6 (on its own) would actively address groundwater, but would do little to address direct contact and erosion of contaminated material. Alternative 6 has not been proposed with Alternative 3 because 1) the level of contamination in the groundwater is low; 2) available information indicates that residents around the site use municipal water and not groundwater; and 3) groundwater standards are expected to be attained in a relatively short period of time (< 10 years). Also, the characteristics of the aquifer would require the collection of large quantities of groundwater to effectively contain and collect contaminated water. Based on these factors, active groundwater remediation is not proposed.

The estimated present worth cost to carry out the remedy is $ 1,090,000. The cost to construct the remedy is estimated to be $ 701,000 and the estimated average annual operation and maintenance cost for 30 years is $ 25,700.

The elements of the selected remedy are as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Uncertainties identified during the RI/FS will be resolved.

2. Maintaining the fence around the landfill to limit site access as well as pursuing deed restrictions to prevent site development activities in areas where contaminated material is present.

3. Consolidation of the on-site and off-site soils/ waste piles that contain material above the cleanup goals for the site. These materials will be placed on the existing on-site landfill.

4. Placement of a low permeability cover over the on-site landfill; the cap will consist of a geomembrane placed on a preparatory/ subgrade layer and covered by a protective barrier drainage layer and topsoil.

5. Operation and maintenance of the remedy after the remedial construction is complete.

6. Monitoring of groundwater. This will be done to determine if the chosen alternative was successful in reducing the amount of infiltration through contaminated material to an amount which will not have an adverse impact upon groundwater quality.

SECTION 10.0: HIGHLIGHTS OF COMMUNITY PARTICIPATION

Citizen Participation (CP) Activities were implemented to provide concerned citizens and organizations with opportunities to learn about and comment upon the investigations and studies pertaining to the Tioga Castings Site. All major reports were placed in a document repository in the vicinity of the site and made available for public review. A public contact list was developed and used to distribute fact sheets and meeting announcements.

On February 2, 1995 a public meeting was held at the Owego-Apalachin Middle School, Owego, New York to describe the Proposed Remedial Action Plan. Prior to the meeting a public meeting announcement/ fact sheet was mailed to those persons on the contact list. The public comment period extended from January 23, - February 22, 1995. Comments received regarding the Proposed Remedial Action Plan have been addressed and are documented in the Responsiveness Summary (Exhibit A).

EXHIBIT A
RESPONSIVENESS SUMMARY
Tioga Castings Site
Village of Owego, Tioga County
Site ID No. 7-54-012

This document summarizes the comments and questions received by the New York State Department of Environmental Conservation (NYSDEC) regarding the Proposed Remedial Action Plan (PRAP) for the subject site. A public comment period was held between January 23, 1995 and February 22, 1995 to receive comments on the proposal. A public meeting was held on February 2, 1995 at the Owego-Apalachin Middle School to present the results of the investigations performed at the site and to describe the PRAP. The information below summarizes the comments and questions received and the Department's responses to those comments.

DESCRIPTION OF THE SELECTED REMEDY

Based upon the results of the Remedial Investigation/Feasibility Study (RI/FS) for the site and the criteria identified for the evaluation of alternatives, the NYSDEC has selected a remedy to consolidate contaminated material to the existing on site landfill and place a low permeability cover over the landfill area.

The major elements of the selected remedy include:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Uncertainties identified during the RI/FS will be resolved.

2. Maintaining the fence around the landfill to limit site access as well as pursuing deed restrictions to prevent site development activities in areas where contaminated material is present.

3. Consolidation of the on-site and off-site soils/ waste piles that contain material above the cleanup goals for the site. These materials will be placed on the existing on-site landfill.

4. Placement of a low permeability cover over the on-site landfill; the cap will consist of a geomembrane placed on a preparatory/ subgrade layer and covered by a protective barrier drainage layer and topsoil.

5. Operation and maintenance of the remedy after the remedial construction is complete.

6. Monitoring of groundwater. This will be done to determine if the chosen alternative was successful in reducing the amount of infiltration through contaminated material to an amount which will not have an adverse impact upon groundwater quality.

I. QUESTIONS/COMMENTS RAISED DURING THE PUBLIC MEETING

1. Issue: What will the cost to property owners be to remove the off-site material and place it on site?

Response: The material present off site above cleanup goals will be brought back on site and consolidated in the landfill area. This material contains elevated levels of metals as a result of historical operation of the Tioga Castings Facility. The consolidation of this material will

be done as a part of the remedial program for this site. Unless Tioga Castings steps forward to implement the remedial program, the work will be performed (and financed) under the State Superfund program. There will be no cost to the off-site property owners. All that will be required of off-site property owners is access to remove the contaminated soil.

2. Issue: Owego-Apalachin Middle School is used year round. Several hundred children are there during the summer. Even if the removal/consolidation of the material is scheduled during the summer, there will be a lot of kids around.

Response: The construction schedule will take into account our goal of minimizing disruptions /distractions to the children. Steps will be taken during remedial activities to safeguard both on-site workers as well as the local community (limiting access to work areas, use of dust suppression, etc.).

3. Issue: In reference to the previous issue, who will be on site to regulate the amount of airborne contamination? Will it be a part of the contract for removing the material? Will an independent third party be responsible for monitoring airborne contamination caused by the contractor during excavation/removal activities?

Response: The Department has guidance documents which clearly state what levels of airborne particulates would require some type of action (i.e., dust suppression, temporarily delaying excavation activities). These levels will be incorporated into the project specifications. In order to insure that the contractor is performing work according to the project specifications, there will be construction oversight provided by the Department. The oversight will be provided by one of the Department's on-site inspectors, or, depending on the availability of staff, by a consultant hired by the Department to oversee the construction.

4. Issue: What is meant by groundwater? I understand that groundwater is very extensive. How can you clean up all of that water?

Response: Groundwater is found below the ground in areas where it fully saturates the soils/overburden present. The soils below this site contain sands and gravel. Relatively speaking, this allows much more free space (pore space) for groundwater to occupy. In other words, the groundwater aquifer immediately below the site would readily produce large amounts of water if a withdrawal well were installed. If it were necessary, withdrawal wells could be installed to remove groundwater and limit its migration away from the site. During the decision making process, the following factors were considered: the exceedances of groundwater standards were marginal; there are no known users of the groundwater in the immediate vicinity of the site; it is anticipated that the remediation of the source of the groundwater contamination will restore groundwater quality to below standards in a relatively short period of time (less than 10 years). Although active remediation of the groundwater is possible, the conditions summarized above do not warrant such action at this site.

5. Issue: How far away from the site has the contamination in the groundwater migrated?

Response: Five monitoring wells were installed around the perimeter of the site during the Remedial Investigation. Samples taken from downgradient locations indicated marginal exceedances of groundwater standards. In such a permeable/productive aquifer, it is anticipated that concentrations in the groundwater drop to levels below groundwater standards within a short

distance downgradient of the site. Since no one is using groundwater immediately downgradient of the site, additional downgradient monitoring wells were not installed.

6. Issue: Other from the landfill area, will the other site fencing be taken down? Will the majority of the site then be available for development?

Response: All material above cleanup goals will be consolidated into the existing on-site landfill and a low permeability cover will be place over the landfill. Certain slopes must be maintained (for drainage) and no subsurface work could be performed at the landfill. However, after remediation, there will be no restrictions placed on the remainder of the property. The final fencing (required as a part of the remedial program) will be just around the landfill.

7. Issue: Off-site samples show slightly elevated lead levels. Would it be better to simply leave the off-site soil where it is rather than removing it and stirring it up and spreading contamination through the air? Is this causing more risk than leaving it alone?

Response: Potential short term impacts are taken into consideration as a part of the evaluation of alternatives in the Feasibility Study (FS). Although there is a potential for dust to become airborne during the excavation of soils, dust suppression techniques will be used, if necessary, to mitigate any impacts. These dust suppression techniques are easily implemented and very reliable (i.e., water mist to control dust).

8. Issue: What happens if the plan does not work? Most people in the neighborhood would prefer that all the material be removed and disposed of off site.

Response: Long term groundwater monitoring will be carried out to evaluate the effectiveness of the remedial action relative to the restoration of groundwater quality. Although the need for it is not anticipated, active groundwater removal and treatment could be implemented in the future to aid in the restoration of groundwater quality. We are confident that the final cover system will be effective in preventing contact with contaminated materials in the landfill.

Although excavation and off-site disposal was evaluated during the FS, the costs associated with this alternative are much greater (almost 4 times greater) than the costs associated with the chosen alternative. Since the proposal is protective of human health and the environment and much more cost effective, it has been selected.

9. Issue: This is a relatively small site. It seems like the proposed solution is just a band-aid. Why not do the job right and remove it all? If everything were removed the entire site could be developed.

Response: As discussed above, the selected remedy is protective of human health and the environment (the major evaluation criterion which must be met in order for an alternative to be selected). Although future land use is a legitimate concern, the Department must take into account the need to remediate several hundred sites across the state to protect other communities. Given the limited resources available to investigate and remediate sites, spending the additional monies to excavate and dispose of the contaminants off site would not be cost effective.

10. Issue: Over the past two years, approximately $300,000 has been spent studying the site. Now the proposal is to spend another $1 million to clean up this site. Will you come back in a few more years to do more clean up?

Response: The remedial process at a site involves many steps, including: identifying that contamination exists; determining the nature and extent of the contamination (RI); evaluating alternatives that could be used to clean-up the site (FS); implementation of the chosen alternative. Currently, the RI/FS has been completed and an alternative has been chosen (in the Record of Decision or ROD). The estimated cost of $1 million is for the implementation of the chosen alternative and the completion of the remedial program at this site. Other than monitoring and maintenance, no further activities are planned.

11. Issue: The main concern seems to be metals. What about the materials associated with the sand molds and binders? Will this material be consolidated as well? The non-hazardous wastes which are on site could be a hindrance to the sale of the property.

Response: The only "hazardous waste" (as defined in 6NYCRR Part 371) present as a result of past operations at this site are those wastes contaminated with high concentrations of metals. State Superfund monies can only be spent for the remediation of "hazardous waste." As a result, the areas where only non-hazardous waste remains cannot be included as a part of the remedial program.

12. Issue: How much time will elapse between the beginning of the excavation of the off-site material and the on-site consolidation and capping of the landfill?

Response: It is estimated that it will take approximately 2-3 months to complete the excavation, consolidation and capping of the landfill.

13. Issue: Has the approach been used elsewhere?

Response: Yes, on-site containment (capping) of existing landfills has been used at many other sites across New York State.

14. Issue: Will this approach become more common as money "dries up"?

Response: Although cost is one of the criteria considered when selecting remedies, it is secondary to protection of human health and the environment. For sites such as this site (where there already is a landfill on-site), on-site containment is often selected.

EXHIBIT B
ADMINISTRATIVE RECORD
Tioga Castings Site
Tioga County
7-54-012

1. Record of Decision; dated March 1995.
2. Proposed Remedial Action Plan; dated January 1995.
3. RI/FS Referral from the Division of Environmental Enforcement, dated August 31, 1992.
4. Remedial Investigation/Feasibility Study (RI/FS) Work Plan, dated March 1993.
5. Citizen Participation Plan, dated March 1993.
6. Fact Sheet, announcing March 31, 1993 Public Meeting.
7. Phase I/Phase II RI Report, dated November 1994.
8. Appendices to Phase I/ Phase II RI Report, dated May 1994.
9. FS Report, dated December 1994.
10. Fact Sheet, announcing February 2, 1995 Public Meeting.
11. Responsiveness Summary, prepared in March 1995 and attached to Record of Decision as Exhibit A.

Appendix B

Sampling Procedures

Tioga Castings
Owego, New York
Site No. 7-54-012

Groundwater Well Sampling Procedures

To collect representative groundwater samples, groundwater wells must be adequately purged prior to sampling. Purging will require the removal of three to five well volumes of water in rapidly recharging wells and at least one volume from wells with slow recharge rates. Sampling will take place as soon as adequate recharge has occurred. Groundwater sampling locations, as well as frequency/schedule of sampling are described in Section 4/Table 1 and shown on Figure 3. Well construction details for the long-term monitoring wells are included at the end of this section.

Well Purging Procedures:

1. The well cover will be unlocked and carefully removed to avoid having any foreign matter enter the well.

2. Using an electronic water level detector, the water level below top of casing will be measured.

    2.1. Clean water level probe and lower portion of cable following standard decontamination procedures and test water level meter to ensure that the batteries are charged.

    2.2. Lower the probe slowly into the monitoring well until audible alarm indicates water.

    2.3. Read depth, to the nearest 100th of a foot from the graduated cable using the highest point on the riser pipe as a reference.

    2.4. Repeat the measurement for confirmation and record the water level.

    2.5 The end of the probe will be soap-and-water washed and deionized-water-rinsed between wells.

3. A suction-lift pump will be used to remove three to five well volumes, measured into a calibrated pail. (A well volume is the volume of water within the casing and sandpack, or borehole.) Dedicated new polyethylene discharge and intake tubing (3/8" low density polyethylene) will be used for each well.

    During this evacuation of the well, the intake opening of the pump tubing will be

positioned just below the surface of the well water. If the water level drops, then the tubing will be lowered as needed to maintain the flow. Pumping will continue until the required volumes are removed. All water removed from the well will be collected and disposed of in the drainage swale around the on-site landfill.

If the well purges to dryness and recharges rapidly (within 15 minutes), water will continue to be removed as it recharges until the required volumes are removed. If the well purges to dryness and is slow to recharge (greater than fifteen minutes), evacuation will be terminated.

4. Alternatively, a disposable bailer may be used to evacuate any well. The line for the bailer will be dedicated new 1/4 inch nylon. It will be discarded after use.

5. Purging will continue until a minimum of three well volumes has been removed. Whenever possible, measurements for pH, turbidity and conductivity will be recorded during purging. Once three well volumes have been removed and these parameters have stabilized, purging is complete.

6. Well purging data are to be recorded in the field notebook and on the Sample Information Record (included at the end of this appendix).

Groundwater Well Sampling Procedures:

1. Sampling should take place after purging as soon as the well has recovered sufficiently to sample. For slowly recovering wells, sampling should take place within 24 hours after evacuation.

2. After well purging is completed and the well has recharged sufficiently for sampling, a sample will be collected into appropriate containers using either a clean teflon or stainless steel bailer, or a dedicated HDPE bailer.

3. All sample bottles will be labeled in the field using a waterproof permanent marker. Labels will include the following information:
   - Site name and number
   - Sample identification code
   - Project number
   - Date/Time
   - Sampler's initials
   - Preservation added (if any)
   - Analysis to be performed

4. Samples will be collected into verifiably clean sample bottles (containing required preservatives, if any) and placed on blue ice in coolers. The sample temperature must be maintained at 4°C until received by lab. Pack carefully to ensure no breakage occurs

during shipping. Complete Chain of Custody form. Ship by overnight delivery to laboratory.

5. Well sampling data are to be recorded in the field notebook and on the Sample Information Record.

6. Replace monitoring well cap and lock protective cap.

SAMPLE INFORMATION RECORD

SITE _____ SAMPLE CREW _____

SAMPLE LOCATION/WELL NO. _____

FIELD SAMPLE I.D. NUMBER _____ DATE _____

TIME _____ WEATHER _____ TEMPERATURE _____

WELL INFORMATION:

DEPTH TO WATER _____ MEASUREMENT METHOD _____

DEPTH OF WELL _____ MEASUREMENT METHOD _____

VOLUME REMOVED _____ REMOVAL METHOD _____

FIELD TEST RESULTS:

COLOR _____ pH _____ ODOR _____

TEMPERATURE (°F) _____ SPECIFIC CONDUCTANCE (umhos/cm) _____

OTHER (OVA, Methane meter, etc.) _____

_____

CONSTITUENTS SAMPLED:

_____ _____ _____ _____

_____ _____ _____ _____

REMARKS: _____

_____

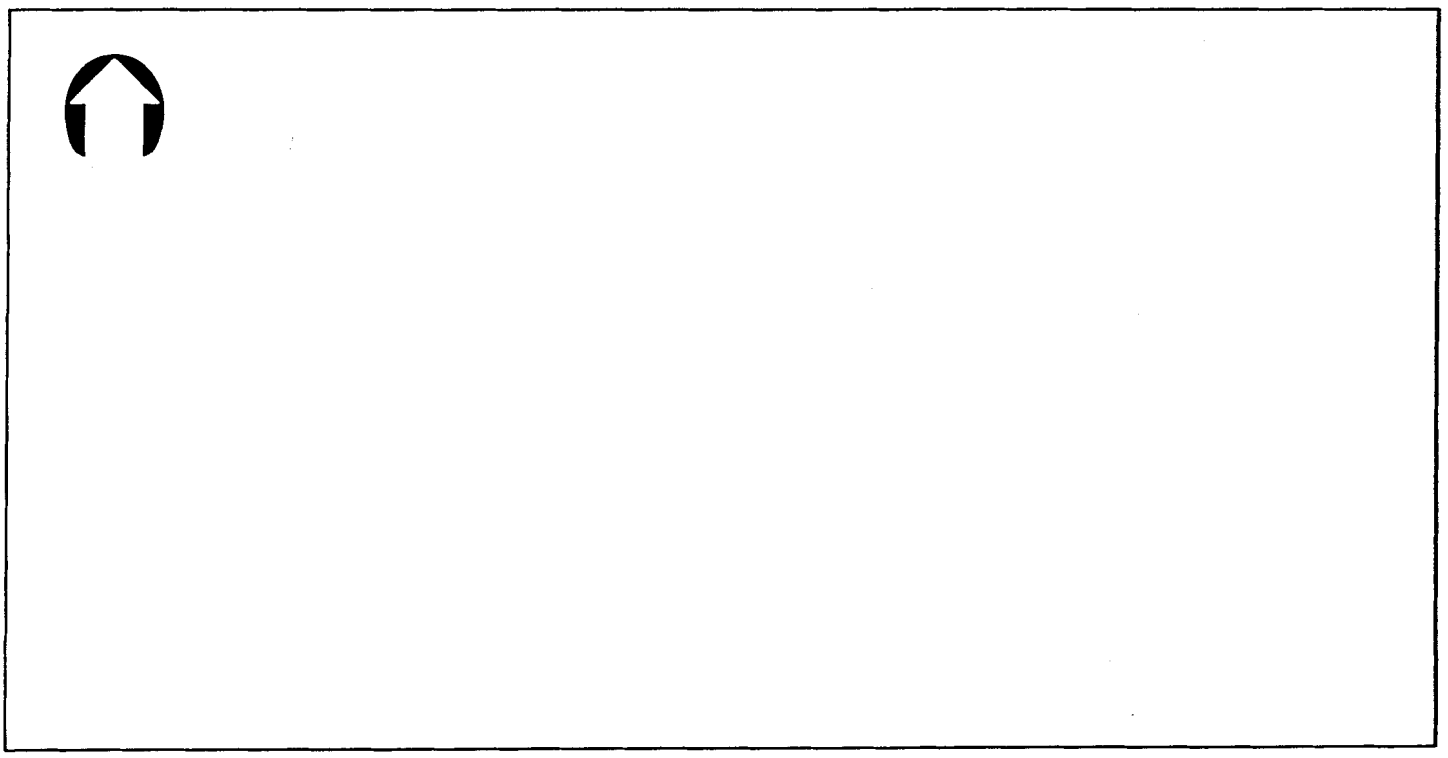
_____

_____

WELL CASING VOLUMES

GAL/FT	1-1/4" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.10	2-1/2" = 0.24	3-1/2" = 0.50	6" = 1.46

Location of monitoring well with reference to permanent reference points



Dvirka and Bartilucci
CONSULTING ENGINEERS

WELL CONSTRUCTION LOG

SITE Tioga Castings Site JOB NO. 1202 WELL NO. MW-1

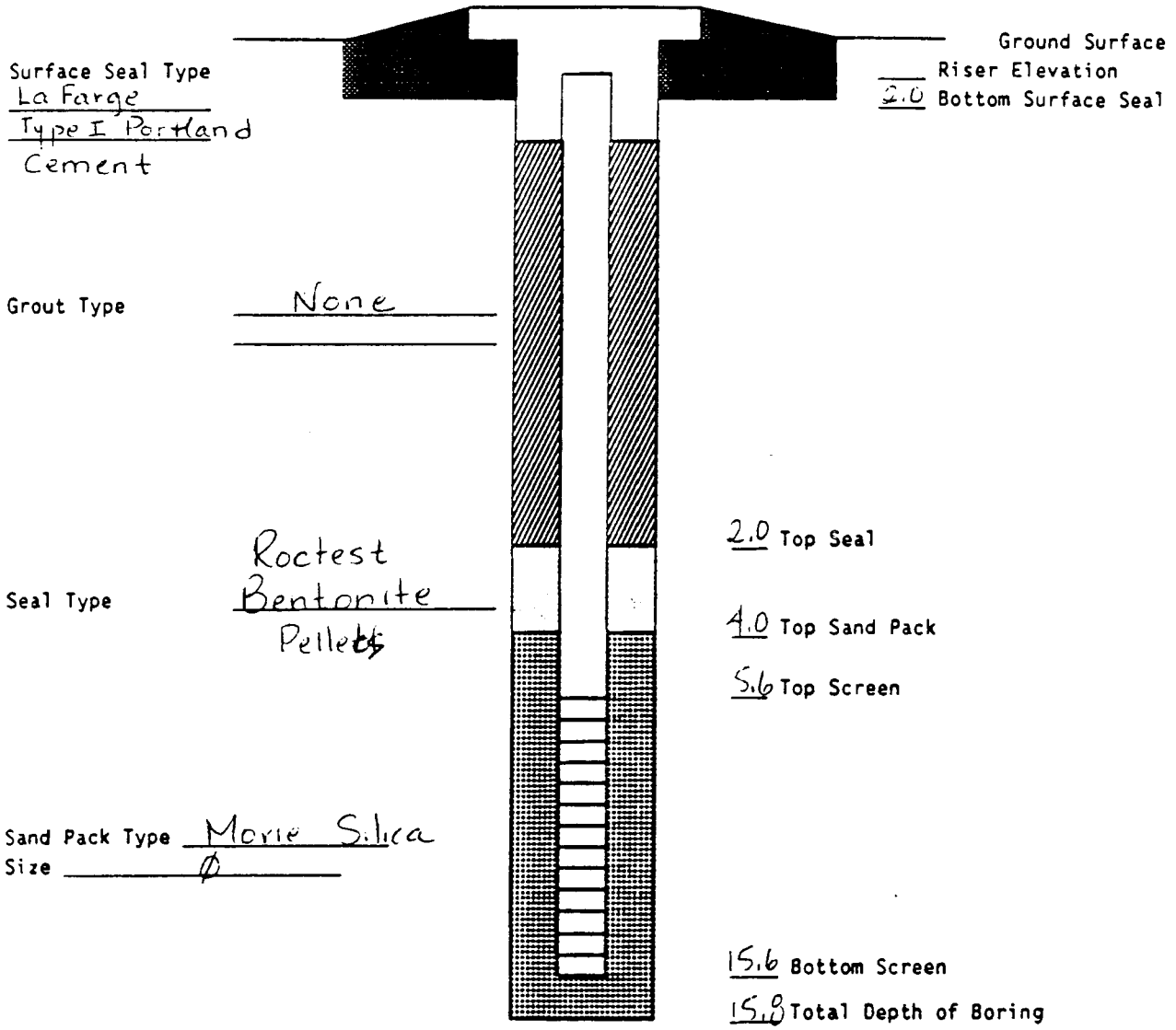
TOTAL DEPTH 15.8' SURFACE ELEV. 810.8 TOP RISER ELEV. 810.49

WATER LEVELS (DEPTH, DATE, TIME) 7.85 T.O.C., 4/15/93, 8:40am DATE INSTALLED 4/6/93

RISER DIA 2" MATERIAL PVC Sch 40 LENGTH 5.6'

SCREEN DIA 2" MATERIAL PVC Sch 40 LENGTH 10.2* SLOT SIZE 0.01"

SCHEMATIC



* with bottom plug

Dvirka and Bartilucci CONSULTING ENGINEERS

WELL CONSTRUCTION LOG

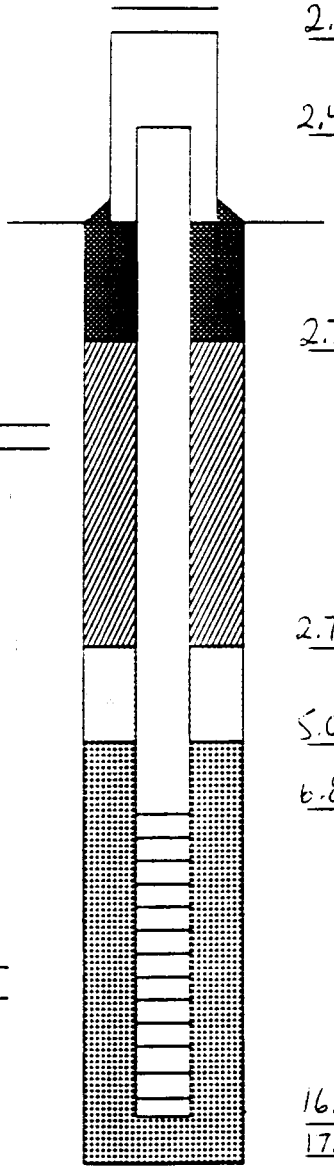
SITE Tioga Castings Site JOB NO. 1202 WELL NO. MW-2

TOTAL DEPTH 17.05'GS SURFACE ELEV. 805.3 TOP RISER ELEV. 807.68

WATER LEVELS (DEPTH, DATE, TIME) 4.97 T.O.C, 4/15/93, 8:56am DATE INSTALLED 4/7/93

RISER	DIA 2"	MATERIAL Sch 40 PVC	LENGTH 9.26			
SCREEN	DIA 2"	MATERIAL Sch 40 PVC	LENGTH 10.2*	SLOT SIZE 0.010"		
PROT CSG	DIA 4"	MATERIAL Steel	LENGTH 6'			

SCHEMATIC



2.6 Prot. Csg Stickup

2.41 Riser Stickup

Ground Surface

Surface Seal Type La Farge Type I Portland Cement

2.75 Bottom Surface Seal

Grout Type X

Seal Type Roctest Peltonite

2.75 Top Seal

5.0 Top Sand Pack

6.85 Top Screen

Sand Pack Type Morie

Size #0

16.85 Bottom Screen

17.05 Total Depth of Boring

* with bottom plug

Dvirka and Bartlucci
CONSULTING ENGINEERS

WELL CONSTRUCTION LOG

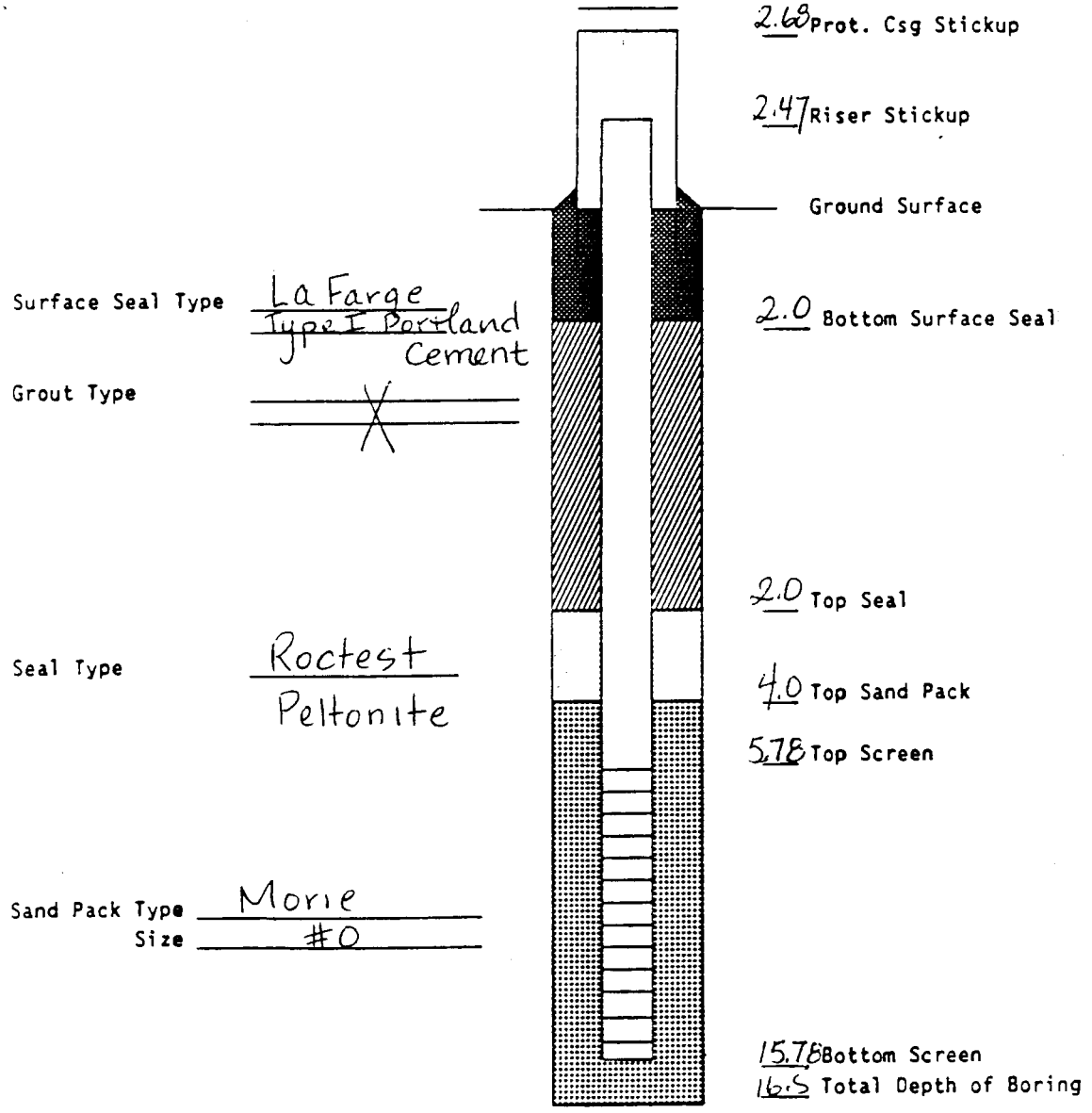
SITE Tioga Castings Site JOB NO. 1202 WELL NO. MW-3

TOTAL DEPTH 16.5' SURFACE ELEV. 810.2 TOP RISER ELEV. 812.61

WATER LEVELS (DEPTH, DATE, TIME) 9.41 T.O.C, 4/15/93, 9:17am DATE INSTALLED 4/7/93

RISER	DIA 2"	MATERIAL PVC	LENGTH 8.25'			
SCREEN	DIA 2"	MATERIAL PVC	LENGTH 10.2*	SLOT SIZE .010"		
PROT CSG	DIA 4"	MATERIAL Steel	LENGTH 6'			

SCHEMATIC



* with bottom plug

Dvirka and Bartilucci CONSULTING ENGINEERS

WELL CONSTRUCTION LOG

SITE Tioga Castings Site JOB NO. 1202 WELL NO. MW-4

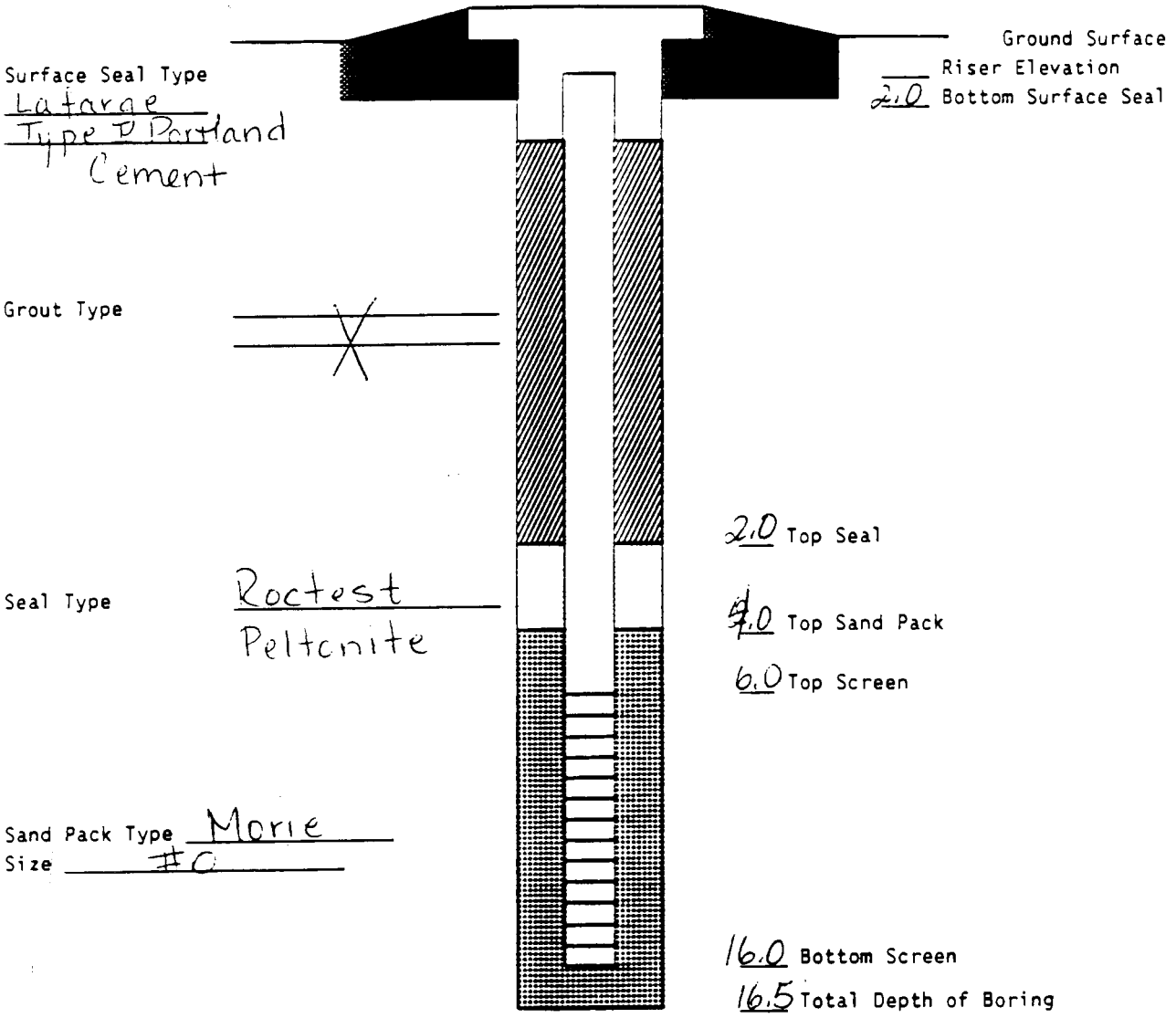
TOTAL DEPTH 16.2' SURFACE ELEV. 806.6 TOP RISER ELEV. 806.33

WATER LEVELS (DEPTH, DATE, TIME) 3.1 T.O.C, 4/15/93 9:25am. DATE INSTALLED 4-8-93

RISER DIA 2" MATERIAL PVC LENGTH 5.7'

SCREEN DIA 2" MATERIAL PVC LENGTH 10' SLOT SIZE .010"

SCHEMATIC



Dvirka and Bartilucci
CONSULTING ENGINEERS

WELL CONSTRUCTION LOG

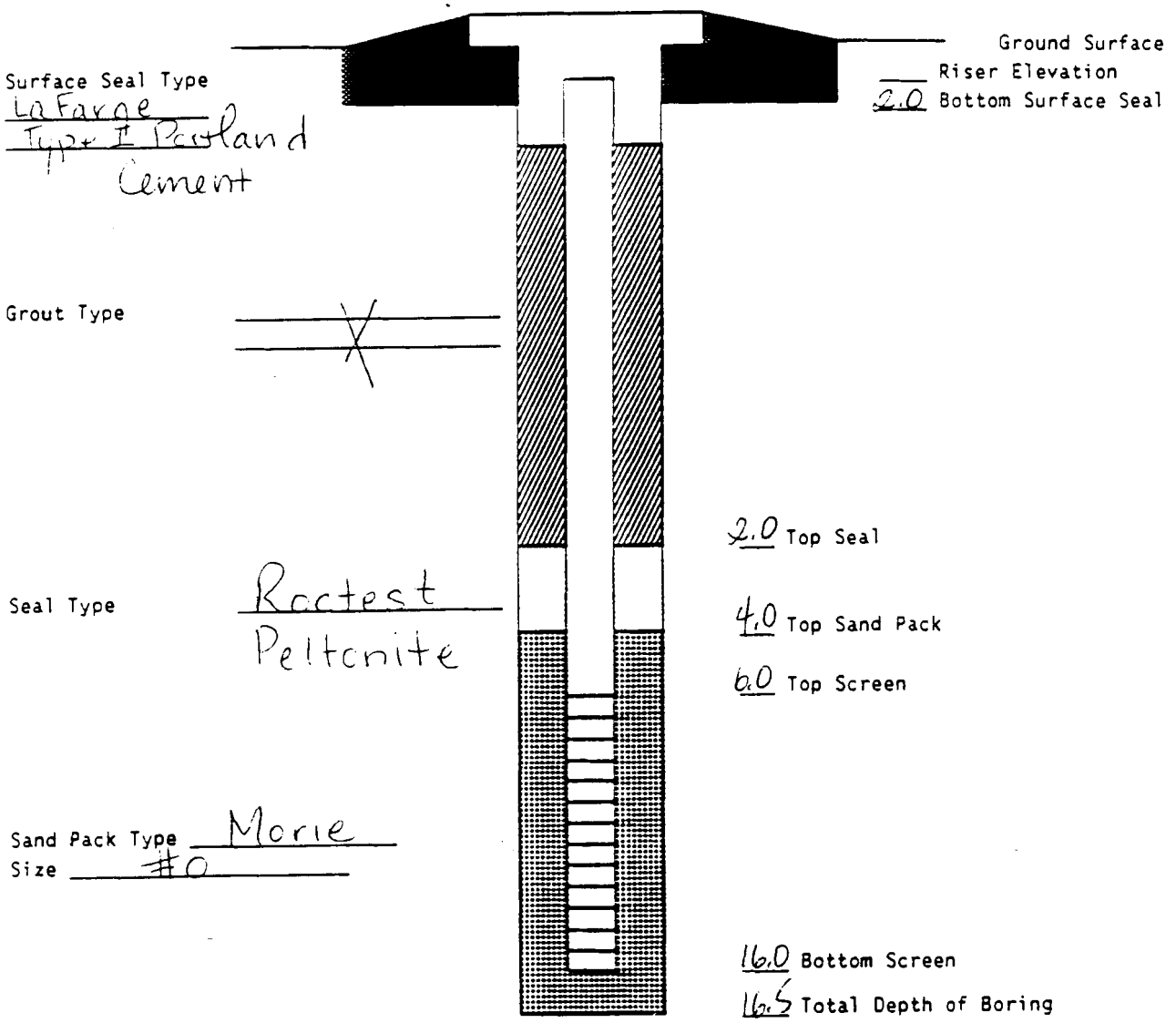
SITE Tioga Castings Site JOB NO. 1202 WELL NO. MW-5

TOTAL DEPTH 16.2' SURFACE ELEV. 804.1 TOP RISER ELEV. 803.89

WATER LEVELS (DEPTH, DATE, TIME) 0.84, 4/15/93, 9:07am DATE INSTALLED 4/8/93

RISER DIA 2" MATERIAL PVC LENGTH 5.76'
SCREEN DIA 2" MATERIAL PVC LENGTH 10' SLOT SIZE .010"

SCHEMATIC



Appendix C

Site Inspection Form

Tioga Castings
Owego, New York
Site No. 7-54-012

SITE INSPECTION FORM

Name of Inspector: _____

Title: _____

Date of Inspection: _____

1. Vegetative cover: ☐ Good ☐ Fair ☐ Poor

   If poor, describe: _____

   _____

2. Woody plants present on cap: ☐ Yes ☐ No

3. Condition of perimeter fence: ☐ Good, no maintenance required ☐ Damaged, maintenance reqired

   If damaged, describe:

   _____

   _____

4. Erosion of cap: ☐ None ☐ Minor ☐ Needs Repair

   Describe repair needed:

   _____

   _____

5. Evidence of ponded water on cap: ☐ None ☐ Suspected ☐ Observed

   Indicate location on map and describe: _____

   _____

6. Evidence of animal borrows on cap: ☐ No ☐ Yes
If yes, backfill as required. Date backfilled: _____

7. Debris present on or around landfill: ☐ No ☐ Yes
If yes, describe and indicate location(s) on site map: _____

_____

[Remove at time of inspection if possible]

8. Condition of perimeter drainage swale:
☐ No maintenance required
☐ Maintenance required
☐ Debris needs to be removed

If yes, describe and indicate location(s) on site map: _____

_____

[Remove debris at time of inspection if possible]

9. Condition of monitoring wells. *Inspect each well and check boxes below as completed. All wells should be secured and locked. If damaged, identify well number and describe damage*:

_____

_____

☐ MW-1
☐ MW-2
☐ MW-3
☐ MW-4
☐ MW-5

Additional Comments:

_____

_____

_____

_____

_____

Send copies of completed form to:

Mr. Gerald Rider
NYSDEC Div. of Env. Rem.
O&M Section
50 Wolf Road
Albany, NY 12233-7010

Mr. Charles Branagh
NYSDEC Div. of Env. Rem.
Region 7 Office
615 Erie Boulevard West
Syracuse, NY 13204-2400

APPENDIX C

Tioga Casting Facilities #7-54-012

GROUNDWATER SAMPLING LOG SHEET

PAGE _____ OF _____

DATE

SAMPLE LOCATION ID

LOCATION ACTIVITY START END

FIELD QC DATA: ☐ FIELD DUPLICATE COLLECTED DUP ID _____

WATER LEVEL / WELL DATA

WELL DEPTH FT ☐ MEASURED ☐ HISTORICAL ☐ TOP OF WELL ☐ TOP OF CASING ☐ _____

PROTECTIVE CASING STICK-UP (FROM GROUND) FT

PROTECTIVE CASING/WELL DIFF. FT

WELL DIA. ☐ 2 INCH ☐ 4 INCH ☐ 6 INCH ☐ _____

WELL INTEGRITY:	YES	NO	N/A
PROT. CASING SECURE	☐	☐	☐
CONCRETE COLLAR INTACT	☐	☐	☐
WELL LOCKED	☐	☐	☐
OTHER: _____	☐	☐	☐

DEPTH TO WATER FT

HISTORICAL WELL DEPTH FT

WELL MATERIAL: ☐ PVC ☐ SS ☐ _____

HEIGHT OF WATER COLUMN FT X ☐ .16 GAL/FT (2 IN) ☐ .65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) ☐ ___ GAL/FT (__IN) =

GAL/VOL

TOTAL GAL PURGED

AMBIEMT AIR VOA PPM

WELL MOUTH PPM

PURGE DATA

PURGE VOLUME	@ ____ GAL	@ ____ GAL	@ ____ GAL	@ ____ GAL	@ ____ GAL
TEMP, DEG C					
pH, UNITS					
SPECIFIC CONDUCTIVITY umhos/cm					
_____					

SAMPLE OBSERVATIONS
- ☐ CLEAR
- ☐ COLORED _____
- ☐ CLOUDY _____
- ☐ TURBID _____
- ☐ ODOR _____
- ☐ OTHER (SEE NOTES)

EQUIPMENT DOCUMENTATION

PURGING	SAMPLING	
☐	☐	PERISTALTIC PUMP
☐	☐	SUBMERSIBLE PUMP
☐	☐	BAILER
☐	☐	PVC/SILICON TUBING
☐	☐	TEFLON/SILICON TUBING
☐	☐	AIR LIFT
☐	☐	WATERRA
	☐	IN-LINE FILTER
	☐	PRESS/VAC FILTER
☐	☐	_____

EQUIPMENT ID
ISCO # _____
KECK # _____
☐ 2" ☐ 1" # ___
☐ QED
_____

DECON FLUIDS USED
- ☐ LIQUI-NOX
- ☐ DEIONIZED WATER
- ☐ HNO3/D.I. WATER
- ☐ POTABLE WATER
- ☐ TSP SOLUTION
- ☐ NONE
- ☐ _____

WATER LEVEL EQUIP. USED
- ☐ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE
- ☐ OTHER

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	

NOTES

SIGNATURE: _____

APPENDIX C

Tioga Casting Facilities #7-54-012

GROUNDWATER SAMPLING LOG SHEET

PAGE _____ OF _____

DATE

SAMPLE LOCATION ID

LOCATION ACTIVITY START END

FIELD QC DATA: ☐ FIELD DUPLICATE COLLECTED DUP ID _____

WATER LEVEL / WELL DATA

WELL DEPTH FT ☐ MEASURED ☐ HISTORICAL ☐ TOP OF WELL ☐ TOP OF CASING ☐ _____

PROTECTIVE CASING STICK-UP (FROM GROUND) FT

PROTECTIVE CASING/WELL DIFF. FT

DEPTH TO WATER FT

HISTORICAL WELL DEPTH FT

WELL DIA. ☐ 2 INCH ☐ 4 INCH ☐ 6 INCH ☐ _____

WELL MATERIAL: ☐ PVC ☐ SS ☐ _____

WELL INTEGRITY:	YES	NO	N/A
PROT. CASING SECURE	☐	☐	☐
CONCRETE COLLAR INTACT	☐	☐	☐
WELL LOCKED	☐	☐	☐
OTHER: _____	☐	☐	☐

HEIGHT OF WATER COLUMN FT X ☐ .16 GAL/FT (2 IN) ☐ .65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) ☐ ___ GAL/FT (__IN) = GAL/VOL

TOTAL GAL PURGED

AMBIEMT AIR VOA PPM

WELL MOUTH PPM

PURGE DATA

PURGE VOLUME	@ ____ GAL	@ ____ GAL	@ ____ GAL	@ ____ GAL	@ ____ GAL
TEMP, DEG C					
pH, UNITS					
SPECIFIC CONDUCTIVITY umhos/cm					
_____					

SAMPLE OBSERVATIONS
- ☐ CLEAR
- ☐ COLORED _____
- ☐ CLOUDY _____
- ☐ TURBID _____
- ☐ ODOR _____
- ☐ OTHER (SEE NOTES)

EQUIPMENT DOCUMENTATION

PURGING	SAMPLING	
☐	☐	PERISTALTIC PUMP
☐	☐	SUBMERSIBLE PUMP
☐	☐	BAILER
☐	☐	PVC/SILICON TUBING
☐	☐	TEFLON/SILICON TUBING
☐	☐	AIR LIFT
☐	☐	WATERRA
	☐	IN-LINE FILTER
	☐	PRESS/VAC FILTER
☐	☐	_____

EQUIPMENT ID
- ISCO # _____
- KECK # _____
- ☐ 2" ☐ 1" # ___
- ☐ QED

DECON FLUIDS USED
- ☐ LIQUI-NOX
- ☐ DEIONIZED WATER
- ☐ HNO3/D.I. WATER
- ☐ POTABLE WATER
- ☐ TSP SOLUTION
- ☐ NONE
- ☐ _____

WATER LEVEL EQUIP. USED
- ☐ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE
- ☐ OTHER

NUMBER OF FILTERS USED _____

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	
☐					☐	

NOTES

SIGNATURE: _____

Appendix D

Annual Report Distribution

Tioga Castings
Owego, New York
Site No. 7-54-012

Annual Report Distribution

Mr. Gerald Rider
NYSDEC Div.of Env. Rem.
Operations, Maintenance and Support
50 Wolf Road
Albany, New York 12233-7010

Mr. Charles Branagh
NYSDEC Div. Env. Rem.
Region 7 Office
615 Erie Boulevard West
Syracuse, NY 13204-2400

Mr.Gary Robinson
NYSDOH
217 South Salina Street
Syracuse, NY 13202-3592

Mr. Gary Rice
Tioga County Health Department
231 Main Street
Owego, NY 13827

Tioga Castings Document Repository
c/o Owego Village Clerk
90 Temple Street
Owego, NY 13827

Appendix E
Landfill Cap Repair Protocol

COVER SYSTEM MAINTENANCE ITEMS
TIOGA CASTINGS
NYSDEC SITE NO. 7-54-012

Inspection Area	Item Noted	Action
Subsidence/ponding	a. Formation of small depressions in cover ground surface.	✧ Fill area with clean common fill to surrounding grade. ✧ Re-establish vegetation layer.
	b. Formation of large depressions in cover ground surface.	✧ Fill area with clean common fill to surrounding grade. ✧ Re-establish vegetation layer. ✧ Conduct subsurface investigation if problem persists.
Erosion	a. Formation of erosion gullies.	✧ Grade gully with clean common fill to smooth v-shaped cross sections and reestablish vegetation cover.
	b. Erosion, cover failure, slippage, slope.	✧ Smooth gully sides and install geotextile filter fabric or erosion control matting. Backfill gully to original grade with NYSDOT fine stone fill (NYSDOT Specification Section 620.02).
Slope Stability	a. Erosion, cover failure, slippage, slope	✧ All slopes are to remain at the approximate slopes that were completed during remedial construction, as follows: Center of landfill (COF) to north-top swale ..... 4% COF to east-top swale ..... 4% COF to south-top swale ..... 6% COF to west-top of swale ..... 6% Swale side-slope ..... transition from 25% to 33% ✧ Reconstruct slope to those indicated above. ✧ If problem persists, develop a detailed plan to reconstruct slope/increase stability

COVER SYSTEM MAINTENANCE ITEMS
TIOGA CASTINGS
NYSDEC SITE NO. 7-54-012

Vegetation	a. Lack of vegetation.	✧ Prepare area for vegetation establishment by fertilizing and placement of topsoil. ✧ Apply seed either by hydro seeding or manual application. ✧ Cover seed with mulch to allow establishment of roots and to minimize seed loss. ✧ Reseeding should preferably occur in late August through October or April through June.
Vegetation	b. Excessive vegetation.	✧ Mowing - preferably in June after the spring growth and in September before autumn.
	c. Chronically weak and vulnerable vegetation.	✧ Perform soil analyses to identify nutrient deficiencies, pH. ✧ Evaluation of soil water-holding properties and drainage. ✧ Application of required nutrients.
	d. Undesirable species or scrubs on cover	✧ Physical removal of vegetation and root system. ✧ Repair topsoil after root system removal. ✧ Fertilization of soil and reseed.
Vectors	a. Large population of burrowing animals	✧ Backfill burrows with clean soil Reseed affected area(s). ✧ Capture animals in traps if problem becomes chronic. Remove animals to distant location for release.

Appendix F

Health and Safety Plan

TIOGA CASTINGS

HEALTH AND SAFETY PLAN

(taken from Remedial Investigation Work Plans prepared by Dvirka & Bartilucci)

FILE COPY

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

March 26, 1993

Thomas C. Jorling
Commissioner

Mr. Edward D. Santoro
Dvirka and Bartilucci
6800 Jericho Turnpike
Syosset, New York 11791

Dear Mr. Santoro:

RE: **Tioga Castings, Tioga County,**
Site No. 7-54-012

The March 1993 revised Work Plans for the above-referenced site have been received. Although a formal modification to the Work Plans is not required, I would like this letter attached to them in order to clarify the following points:

- The TLVs for asbestos, listed in Table 7-3, should be consistent with the numbers listed on the Hazardous Substance Fact Sheet for asbestos (Section 7 of Work Plan). Amosite has been identified at the site and has a TLV of .5 fibers/cubic cm.

- The wording on page 7-12 was not changed. As stated in your March 15 response, "if excessive radiation levels above background are encountered ... all personnel will immediately vacate the site."

- On page 7-23 the reference to St. James Mercy Hospital is incorrect. It should be the Robert Parker Hospital.

As I discussed above, you should attach this letter to the March 1993 Work Plans. Additional modification and printing of the Work Plan is not necessary. If you have any questions, please contact me at (518) 457-0315.

Sincerely,

James A. Moras

James A. Moras, P.E.
Environmental Engineer
Bureau of Western Remedial Action
Division of Hazardous Waste Remediation

JAM/bs

bcc: E. Belmore
A. English
S. Gupta
J. Moras

Section 7

7.0 HEALTH AND SAFETY PLAN

7.1 General Information

7.1.1 Introduction and Objectives

This plan establishes Dvirka and Bartilucci (D&B) Consulting Engineers' occupational health and safety requirements, responsibilities and procedures to protect workers during the remedial investigation and feasibility study (RI/FS) for the Tioga Castings Site located in the Village of Owego, Tioga County, New York.

The purpose of the Tioga Castings Site RI/FS is to determine the nature and extent of the contamination at the site and adjacent areas, identify and confirm the source(s) of contamination, and evaluate the need for appropriate, long-term, environmentally sound remedial action. This plan was developed to assure the protection of the health and safety of the employees of Dvirka and Bartilucci Consulting Engineers at this hazardous waste site. The Health and Safety Plan is designed to be protective of on-site workers and to mitigate the potential of off-site releases. As part of this plan, access to the investigation site will be controlled, and ambient air monitoring will be performed at the location of soil disturbances, downwind and at the site perimeter to minimize the potential for possible on-site and off-site exposure.

7.1.2 Requirements

The requirements for worker health and safety are based on the following:

- The Standard Operating Safety Guides, U.S. Environmental Protection Agency (EPA), Office of Emergency and Remedial Response.
- The Occupational Safety and Health Administration (OSHA) Regulations, 29 CFR Parts 1910.120 and 1926.
- NYSDEC Division of Hazardous Waste Remediation's Technical and Administrative Memorandums 4016 and 4031.
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH, OSHA, USCG, and EPA.
- Health and Safety Procedures for Hazardous Waste Sites, Dvirka and Bartilucci Consulting Engineers.
- Superfund Amendments Reauthorization Act (SARA), Title I, Section 126.

7.1.3 Applicability

The protection of D&B Consulting Engineers workers' health and safety and the environment are major concerns during the RI/FS at the Tioga Castings Site. Personnel must be protected from the risk of incurring illness or injury during the field investigation at the site. Since each and every safety hazard associated with the site cannot be anticipated, precautions will be taken to prevent illness or injury to workers during the project. Based on these considerations, this health and safety plan will be applicable for each phase of the RI/FS at this site as described in this work plan. The implementation of this plan will be based on the judgment of the Project Manager, as described in this work plan, site Health and Safety Officer and the Field Operations Manager who are responsible for the health and safety of the site personnel.

7.2 Site Description, History and Evaluation

7.2.1 Site Description

The Tioga Castings Site is a 5-acre industrial plant located on Foundry Street in the Village of Owego, New York. From 1945 to 1988, the facility operated a cupola type foundry for the production of gray iron castings. This process involved smelting of scrap iron and the use of phenol-formaldehyde-treated sand to cast the iron. This process produced solid waste sand molds, bentonite, fly ash, cast iron grindings and fine baghouse ash/cupola dust containing high concentrations of lead and cadmium. These wastes were disposed of in an off-site landfill until March 1979. The facility then operated an on-site landfill for the disposal of its foundry wastes.

The facility ceased operation in 1988, leaving waste material, including various drums, and a number of one-ton plastic lined bags of the cupola dust. On July 11, 1989, the facility had a fire which left the building structurally unsafe.

During a sampling event in the late summer of 1989, a surface soil sample, taken from the landfill area just west of of the foundry building, indicated the presence of lead at a concentration of 15,000 ppm. The potentially responsible party (PRP) placed a temporary cover over the landfill in August 1991. The cover consisted of a 10-mil thick plastic sheet with six inches of cover material. The purpose of the cover is to prevent erosion (wind and surface water) which would cause off-site migration of the contaminants.

From the summer of 1991 to the summer of 1992, most of the on-site building has been demolished/dismantled. Prior to the dismantling of the building, samples were taken from the material "blanketing" the floor. There were three areas inside the building where material on the floor indicated elevated lead levels. This material was placed in drums prior to taking the building down.

7.2.2 General Hazard Characterization

The general hazard potential of the Tioga Castings Site is characterized in Table 7-1. The primary concern at this site is to protect the workers from potential exposure to contaminated waste materials, surface and subsurface soil, sediment and groundwater on the site. Although limited characterization has been performed in most areas of the site, the principal organic compounds found at the site have been identified as phenols, formaldehyde and PCBs. Phenols and formaldehyde are related to treated sand used to cast the iron and PCBs from hydraulic oils. They may have been stored/spilled at the site. Inorganic contaminants prevalent at the site include high concentrations of lead and cadmium present in dusts from the cupola. Groundwater sampling conducted at the site during previous sampling has not indicated the presence of any significant levels of contamination.

The primary health and safety hazards to workers from contaminants are from the inhalation of volatile organic compounds or soils laden with metals during activities which may disturb soils or dusts such as drilling and sampling operations throughout the site. Based on the concentrations of chemicals constituents shown in Table 7-2, OSHA Permissible Exposure Limits (PEL) and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) are not likely to be exceeded except during soil disturbance operations which may generate dust or liberate vapors. These operations include primarily soil boring construction and sampling operations where the very fine and dry particulates may be capable of being easily suspended and dust may be able to migrate into breathing zones. Both soil borings and soil sampling will be closely monitored and evaluated to determine potential for exceedance of standards.

7.2.3 Site Evaluation

7.2.3.1 - On-site Activities

Activities of concern at the Tioga Castings Site will be divided into two phases as follows:

Table 7-1

SUMMARY OF GENERAL SITE CHARACTERISTICS AND HAZARDS
TIOGA CASTINGS SITE
TIOGA COUNTY, NEW YORK

Type of Site	Gray Iron Castings Foundry
Classification	Inactive Industrial Site
Apparent Hazard	Medium
Potential Source	Residual Wastes and Debris, Sediment Soil and Groundwater
Status of Discharge	Nonactive
Type of Discharge	Organic Compounds and Metals
Contamination Characteristics	Toxic
Form of Hazards	Dusts, Liquids, Vapors
Routes of Exposure	Inhalation, Ingestion, Skin, Eyes

Table 7-2

CHEMICALS FOUND IN SOIL SAMPLES
AT THE TIOGA CASTINGS SITE

Chemical	Concentration Range
Formaldehyde	Suspected in high concentrations in casting sand
Phenols	Suspected in high concentrations in casting sand
PCBs	Suspected in hydraulic oils
Lead	30-25,000 mg/kg
Cadmium	<5-50 mg/kg
Asbestos	ND-25%

Note: Units of mg/kg indicate parameter present in soil; percent indicates presence in asbestos containing building materials.

I. Site Characterization (Phase I RI) - Collection of analytical data from various sampling locations and environmental media on and surrounding the site for evaluation of contamination source(s) and locations. Field activities include construction of soil borings and monitoring wells, monitoring well development, and sampling of groundwater, sediment, surface and subsurface soil, waste pile and air monitoring.

II. Post-Screening Field Investigation (Phase II RI) - Determination and confirmation of nature and extent of soil contamination. Field activities are presently undefined, but will most likely be similar to (but more limited than) the Phase I RI program.

Potential safety risks will vary with the specific activity and equipment used and with the sampling sites themselves. When any new data is collected, potential health and safety hazards will be evaluated and related to the current and planned activities at the site. All sampling work in which the potential hazards have not been identified may require additional precautions to assure protection against potential hazards. Any modification of the work plan will require evaluation to determine if the existing Health and Safety Plan is adequate in protecting on-site investigators.

With the implementation of construction of drilling activities during the Phase I field program, some safety risks inherent with these activities may be expected. All underground utilities must be located in areas where subsurface investigation is to be performed. Utility companies shall be contacted to provide "mark-outs" on and off site at all investigative locations prior to initiation of subsurface activities. The direct handling of contaminated drums, containers or concentrated pure chemicals is not expected during the investigation. In the event that such materials are encountered during the field program, the operation will cease, uncovered drums which have been damaged during excavation activities will be recovered with site material. In the event of a drum puncture and release of material, absorbent materials (i.e., spedi dry) will be placed to absorb the released liquids prior to being covered. The condition will be recorded and the field team will be instructed to secure the area until health and safety risks are properly assessed.

7.2.3.2 - Hazard Identification

The source of contamination from the Tioga Castings Site has been inactive for several years. A list of the chemicals that have been identified as being present at the site is found in Table 7-2. Elevated concentrations of the toxic metals, in addition to being found in surface and subsurface soil, may be present in waste residuals along with organic compounds. In addition, concentrations in dust and soil, if disturbed and allowed to become airborne, may be present at levels approaching the ACGIH threshold limit values (TLVs) given in Table 7-3. The primary

hazard of concern to workers is potential inhalation while disturbing soil during construction of soil borings and from sampling soil. Although several of the chemicals detected on-site are a potential health concern, measures can be taken to decrease generation of dusts which reduces concentrations and duration of exposure to the contaminants of concern. Volatile organic compounds and particulate dusts will be closely monitored utilizing portable instruments to ensure that exposures remain below permissible exposure limits.

7.2.3.3 - Potential Exposures

Potential exposure to the chemicals listed in Table 7-2 from exposure to residual wastes, soil, water and sediment can be mitigated through proper investigation and health and safety procedures. Potentially contaminated media/samples include waste, soil, groundwater, drainage water and sediment.

Most of the chemicals currently found in soil samples would only pose a potential health hazard primarily as a result of continuous long-term exposure to levels found in the soils of the site. Significant concentrations of volatile organic chemicals are not expected. Long-term exposure during this study will not occur since potential exposures can be mitigated through appropriate investigation procedures and will be short and intermittent over a period of several weeks. The expected risk of exposure to these chemicals would be from inhalation, ingestion, skin or eye contact with contaminated materials. The primary known location with possible elevated levels of contaminants is in the area of the landfill and debris throughout the site. All personnel related to the investigation should keep upwind of all soil disturbances and sampling activities at all times when possible.

7.2.3.4 - Routes of Exposure

Potential worker exposure is possible from inhalation, ingestion, dermal contact or eye contact with contaminants of concern taken from areas of contamination on-site. If VOC or dust levels should approach the TLV, then inhalation would be the primary route of exposure. Table 7-3 lists inhalation exposure limits of chemicals that have been found at the Tioga Castings Site. Skin and eye irritation are possible from contact with waste and contaminated soil and sediment.

Table 7-3

THRESHOLD LIMIT VALUES (TLVs) AND PRIMARY HEALTH HAZARDS FOR CONTAMINANTS OF CONCERN FOUND IN SOIL AND GROUNDWATER SAMPLES AT THE TIOGA CASTINGS SITE

Chemical	TLV	Primary Health Hazards
Formaldehyde	1 ppm	Respiratory System, Eyes and Skin
Phenols	5 ppm	Liver, Kidneys and Skin
PCBs	0.001 mg/kg 1 mg/kg (skin)	Skin, Eyes and Liver
Lead	0.15 mg/m^3	Cumulative Blood Effects, Cumulative Neurologic Effects, Reproductive Hazards
Cadmium	0.05 mg/m^3	Cumulative Kidney and Lung Damage, Suspected Carcinogen
Asbestos	2 fibers/cubic cm (Chrysotile) amosite → .5 fibers/cm^3 (see Appendix C of ACGIH pocket guide)	Respiratory System

7.2.3.5 - Physical and Biological Hazards

Potential physical hazards from routine sampling operations at the site are low, but still require consideration due to their ability to cause hazards. Due to the presence of an unsound structure caused by a fire on-site, workers may encounter sharp objects, dangerous building structures, hazardous construction residuals, or unsecured footing. Improper or careless use of sampling and drilling equipment increases the risks of accidents from underground utilities, collapse of building structures, open boreholes and operation of the equipment. Workers may also be exposed to poison ivy, stinging and biting insects, ticks and vermin. Open excavations or other confined spaces, including dry wells, also represent hazards and under no circumstances should be entered.

7.2.3.6 - Radiological Hazards

Humans receive a continuous exposure to ionizing radiation that results from natural sources such as cosmic radiation from outer space and from radioactive materials in the earth and materials both around and within the body. This "background radiation" is part of the normal environment and man evolved under its effect. The degree of injury inflicted on an individual by radiation exposure depends on such factors as the total dose, the rate at which the dose is received, the kind of radiation and the body parts receiving it.

Extensive work has been performed in an attempt to relate radiation dose to resulting damage. Based upon all the studies performed "maximum permissible levels of exposure have been established which denote the radiation dose that can be tolerated with little chance of later development of adverse effects. There is no identified use of radiological materials which would be consistent with manufacturing performed at the site that would indicate the presence of above background levels of radioactive materials on-site. A Geiger counter will be utilized as a screening tool to ensure that no source other than natural materials are present on-site. Readings indicative of levels above normal background will require that the site workers leave the area. The site Health and Safety Officer shall be consulted immediately if investigative activities result in elevated Geiger counter readings.

7.3 Site Personnel

This project will require the interaction of government agencies, contractors, site facility operators and technical specialists, both on-site and off-site. The project team will be composed of representatives of the New York State Department of Environmental Conservation (NYSDEC), Dvirka and Bartilucci Consulting Engineers and various subcontractors.

The D&B Project Director will have overall responsibility for implementation of the corporate and site-specific Health and Safety Plan. Because of the low hazard potential of the site and the proposed activities, a site Health and Safety Officer (Certified Industrial Hygienist) will not be present on site during all operations. However, the Health and Safety Officer may make periodic visits to the site as needed and review procedures and activities, especially during the initiation of the field program and sampling program. The Health and Safety Officer will also be on call should significant chemical and physical hazards warrant consultation.

Any decisions requiring use or selection of personal protective equipment or monitoring devices other than those proposed in this work plan will be approved by the Health and Safety Officer. The D&B Project Manager will assure that all elements of this site-specific Health and Safety Plan are implemented where applicable and that all project staff are protected and working in a safe manner. The Field Operations Manager will be responsible for implementing safety precautions and procedures during all field activities/sampling phases. The following personnel will be responsible for implementation of this Health and Safety Plan:

Responsibility	Name
~~Project Director (D&B Consulting Engineers)~~	~~Thomas Maher~~
~~Project Manager (D&B Consulting Engineers)~~	~~Edward Santoro, M.S.~~
~~Health and Safety Officer (D&B Consulting Engineers)~~	~~Brian Heneveld, C.I.H.~~
~~Field Operations Manager (D&B Consulting Engineers)~~	~~Caroline Yates~~
Project Director (NYSDEC)	Gerald J. Rider, Jr. ~~To Be Named~~
Project Manager (NYSDEC)	John Strang ~~James Moras~~
On-Site Supervisor (NYSDEC)	To Be Named

7.4 General Procedures

7.4.1 General Work Practices

The following general health and safety requirements will apply to all persons working at the site:

1. All persons working on the investigation team shall read, sign and become familiar with this Health and Safety Plan. (A copy of the Acknowledgment Form is provided in this section.) If any information is unclear, the reader shall contact the Health and Safety Officer for clarification prior to any field work. A copy of the plan will be available for review through the Project Manager, the Field Operations Manager or his designee.

2. No employee will be allowed in active investigation areas without the prior knowledge and approval of the Health and Safety Officer, Project Manager or Field Operations Manager. All active areas shall be fenced or designated with warning tape to prevent access by other site personnel

3. Sufficient backup personnel will be available for all site activities. At a minimum, two persons shall be present at any location during investigation activities.

4. All personnel involved in the investigation at the site will notify the Health and Safety Officer, Project Manager or Field Operations Manager of any unsafe conditions or activities.

5. Standard hygiene practices will be implemented such as no smoking, eating or drinking during site investigation work activities, and requiring a thorough washing of hands and face prior to smoking, eating or drinking. These activities will only occur inside the site trailer while on-site. At all times, personnel should perform investigative activities from upwind directions.

6. Workers will avoid unnecessary contamination such as walking through, sitting on, leaning on or kneeling in areas that are known or suspected to be hazardous.

7. All site personnel shall observe their partners for any signs of adverse effects associated with the work activity and will inform their partner or supervisor of any unusual signs or symptoms that they are experiencing themselves.

7.4.2 Orientation and Training

Each member of the field investigation team has completed the 40-hour training course required by the Occupational Safety and Health Administration for personnel working at hazardous waste sites. Each field team member is trained and experienced in the standard field sampling techniques and procedures to be utilized in this project. An overview of the sampling procedures to be utilized on this project are presented in Section 6.0 - Quality Assurance/Quality Control Plan.

Each person who may be required to use respiratory protection has been medically approved, trained and fit tested within the last year with a NIOSH approved respirator appropriate for the conditions likely to be encountered. In addition, each field team member participates in an orientation session prior to commencing of work at the site. The orientation training will include the following:

- o Project goals and objectives.
- o Overview of the Health and Safety Plan.
- o Health and safety requirements and procedures.
- o Chemicals contaminating the site and their properties.
- o Potential health and safety hazards.
- o Safe sampling procedures.
- o First aid and emergency procedures.
- o Use of respiratory protection and respirator fit testing.
- o Use of protective clothing.
- o Decontamination procedures.
- o Waste disposal procedures.

7.4.3 Special Contingencies

The field team will be prepared for unexpected changes in hazardous conditions. No contingencies are foreseen that would impact the public in the surrounding areas of the Tioga Castings Site. Any contingency action will be documented and reported to the Health and Safety Officer, Project Manager and NYSDEC. The following guidelines will be implemented:

- o Should monitoring data for total VOC vapors exceed 5 ppm, the digital dust indicator read 0.15 mg/m^3, or the Geiger counter exceeds two times the background concentration in the ambient air at the site as detected during the air screening/radiation survey, work at that location will be stopped until the need for additional respiratory protection is evaluated by the Project Manager, Health and Safety Officer, or Field Operations Manager. Downwind monitoring at the area of test pit excavation, drilling or sampling will be performed to determine whether off-site contaminant migration is occurring.

- o Upon detection of 100 ppm VOC vapors or the Geiger counter reading exceeds 10 times the background concentration workers will leave the work area. A review of work procedures, air monitoring needs and use of self-contained breathing apparatus

Did not change

(SCBA) respiratory protection will be performed. In addition, downwind monitoring at the site perimeter will be performed to determine whether off-site contaminant migration is occurring. Work will proceed only after review and approval by the Health and Safety Officer (Certified Industrial Hygienist) and the appropriate corrective action is taken or protection level implemented.

- o Continued work will consider protection of general public health and safety.
- o Should perimeter monitoring indicate that off-site contaminant migration is occurring, the emergency procedures as delineated under Section 7.10 of this plan will be implemented.

Dust is expected to be generated during field investigation activities (e.g., drilling and sampling activities). It may also be generated by activities not related to the investigation such as vehicle traffic or other site activities. Dust suppression techniques including the wetting of surface areas or the use of cover material will be implemented should the dust monitor indicate action is required or visible emissions can be avoided. Vehicle speeds in unpaved areas of the site will be restricted to 5 mph.

Any dust generated during drilling operations will be monitored continuously for the presence of respirable particles (<10 um) in order to preclude potential hazards. Background and work area dust particulate levels will be determined each day prior to and continuously during all field activities that may generate dust. If respirable dust particulate levels exceed 2.5 times background or 150 ug/m^3, then corrective action will be required. If the above action levels are exceeded, all operations will stop as required by NYSDEC. A report on the incident will be made to the NYSDEC Project Manager within seven days, stating the particulate (or organic vapor) levels, wind direction and the corrective actions taken.

The same procedures and protocols practiced by on-site workers will aid in preventing any potential adverse conditions with respect to areas adjacent to the site. That is, these procedures are designed to assist in eliminating or minimizing the potential for extensive off-site migration. In the unlikely event that such migration occurs, this plan incorporates notification procedures requiring timely communication with all appropriate parties and organizations. The pertinent procedures are listed below:

- o Notification of local police, fire and rescue personnel advising them of the remedial investigation activities and the schedule of events on-site.
- o Immediate notification of NYSDEC, Tioga County Health Department (TCHD), New York State Department of Health (NYSDOH) and local officials in the event of a threatening hazardous condition that may effect the health and safety of on-site workers and/or the surrounding community.

- o Decontamination procedures for equipment to prevent off-site migration of contaminants.

- o Use of a flame or photoionization detector to monitor volatile organic vapors and potential off-site migration of contaminants.

- o Use of a digital dust indicator to monitor dust particulate levels and potential off-site airborne migration of contaminants.

- o Use of a Geiger counter to monitor radiation levels and potential off-site airborne migration of contaminants.

- o Wetting down the ground surface or using clean cover material or calcium chloride to suppress particulate dust in the event that permissible dust levels in the air of the work-area are exceeded.

7.4.4 Monitoring and Surveillance Equipment

The principal forms of chemical contamination at the site are believed to be known and are of generally low hazard levels if appropriate precautionary measures are used. Since the potential hazards are not restricted to specific work sites where field activities are occurring, routine monitoring for health and safety will be performed during all on-site activities. A daily Air Monitoring Form will be used to record ambient VOC and dust indicator readings. Other readings will be obtained as appropriate by utilizing the monitoring equipment described below.

All monitoring and surveillance equipment will be operated, maintained and calibrated each working day in accordance with the manufacturer's instructions and D&B's quality assurance procedures. Organic vapor monitoring will be conducted by trained field staff prior to, during and following well development and sampling, and disturbance of soils or sediments at a sampling site. Should contaminant levels indicate high hazard potential, the Health and Safety Officer will review monitoring procedures and results. The following monitoring equipment will be used for this purpose:

- o Century OVA-128 portable flame ionization device for detection of volatile organic vapors (with and without a methane filter).

- o PhotoVac MicroTip portable photoionization device for the detection of organic vapors.

- o Geiger counter for the detection of elevated levels of ionizing radiation.

- o Portable combustible gas/oxygen/hydrogen sulfide detector will be available for determining lower explosive limits, oxygen and hydrogen sulfide levels in any identified confined spaces. Under no circumstances shall confined spaces be entered unless discussed with the Health and Safety Officer and this plan is revised to incorporate additional safety requirements.

- o Draeger gas detector for detecting specific hydrocarbons (e.g., formaldehyde and total phenols) should OVA/TIP readings exceed 5 ppm.

- o Digital dust indicator for monitoring of respirable particulate emissions.

Instruction and calibration manuals for the proper use of these, as well as other field instrumentation, are provided in Appendix A - Field Equipment Manuals.

Note that monitoring and surveillance equipment is impacted by wet or cold weather (less than 50°F), communication transmissions and possibly high voltage electrical transmission wires and other interferences. Any unusual meter responses should be noted on the Air Monitoring Form and a diagnosis of potential influencing factors made to determine and eliminate the cause.

7.4.5 Injuries and Emergencies

Any injured or overexposed person will be removed from the area immediately. Where applicable, first aid will be used and/or an emergency rescue team called. All injuries and emergencies will be reported immediately to the Health and Safety Officer, Project Manager and Field Operations Manager who, in turn, will prepare an Accident/Injury Report (see Section 7.12). Depending on the nature of the emergency, appropriate notifications listed in Section 7.10 - Emergency Information will be made, and if necessary, a hazardous waste incident report will be completed.

7.5 Levels of Protection

The Project Manager, Health and Safety Officer and Field Operations Manager are responsible for assuring that the level of protection, which is determined to be appropriate for each activity and phase of the project as identified in this Health and Safety Plan, is utilized. Four protection levels (A, B, C and D) will be used as bench marks for selection of personal protective equipment.

Level A requires the highest degree of protection including a fully encapsulating, chemical resistant suit with full facepiece, SCBA or supplied air respirator. No situations are anticipated in this investigation that will require this level of protection.

Level B protection requires full chemical resistant clothing with a full facepiece SCBA or supplied air respirator. No levels of VOCs or toxic chemicals are expected at this site that would require this level of protection. However, provision will be made to have this equipment available should its use be determined to be required. Investigative activities which may result in this level of protection being required will not be implemented until the equipment has been transported to the site. The Health and Safety Officer shall be notified should air monitoring indicate this level of protection is required. Implementation of Level B protection shall only be performed when sufficient trained personnel (minimum of two) are available on-site.

Level C protection requires a full facepiece, air purifying cartridge-equipped respirator (or half facepiece, air purifying cartridge-equipped respirator if specifically approved), and protective coveralls (tyvek or full chemical resistant clothing or other protective clothing if specifically approved). Level of contaminants in the study area may require this level of protection. Activities which significantly disturb the soil or generate dust will be closely monitored to determine if additional upgrading or downgrading from this level of protection is appropriate. Sampling and handling of highly contaminated wastes or soils on-site could result in potential exposures where this level of protection is warranted. The decision to require this level of protection will be made on a case-by-case basis as described in Section 7.4 above. Unknown hazard conditions suspected of containing risks which have not been identified as part of this plan shall be investigated utilizing Level C protection, but only after approval of the Health and Safety Officer.

Level D protection requires standard work clothes such as protective coveralls, work boots, safety glasses/goggles and hard hat. This protection level applies to situations in which there is minimal risk of dust generation with subsequent inhalation and dermal risk to hazardous chemicals. It is currently anticipated that this level of protection will be applicable to all on-site investigative activities which do not disturb soils or wastes and all activities off-site.

Should ambient air monitoring during the study indicate a need for higher protection levels than those currently in use, immediate implementation of the appropriate level or cessation of all activities, which are generating the excessive level shall be performed. The Health and Safety Officer should be consulted before preceding with the investigation using upgraded levels of protection.

In addition, protection and first aid will be provided for common health hazards associated with outdoor work such as poison ivy, insect bites and stings, and ticks. Since ticks are known disease vectors, affected persons are instructed to report tick bites to a physician. Poison ivy contact should be treated immediately. A medical kit for first aid will be available in the field. Any signs of rashes, inflammation, irritation or burning sensations will be reported immediately.

7.6 Personal Protective Equipment

All employees at the site will be required to use appropriate protective equipment for protection against potential hazards at the site. The following requirements will be applied and enforced.

7.6.1 Protective Clothing and Accessories

Protective clothing must be worn by all personnel while working in the study area according to the level of protection described in Section 7.5. All personnel which are to access the site shall be equipped with the following:

- Disposable Clothing (Tyvek)
- Coveralls
- Safety shoes
- Rubber boots
- Work gloves
- Vinyl gloves
- Hard hat
- Safety glasses
- Respirator

Additional equipment accessories shall be available in the field trailer:

- Chemical Protective Clothing
- Flashlight

- o Knife
- o Ear protection

Specific chemical protective clothing will not likely be required due to the low concentrations and exposures to VOCs and other chemicals that are likely to be encountered. Tyvek suits will be adequately protective for contaminated dust at the site. However, sampling results such as elevated VOC levels or very high (9-14) or very low (1-5) pH ranges shall be cause to increase chemical protective clothing to prevent skin absorption or burns.

The Project Manager, Health and Safety Officer and Field Operations Manager will also consider the potential hazards of wearing cumbersome protective clothing since it hastens the onset of fatigue, increases heat stress and increases the time that personnel must spend performing investigative tasks.

Employees must compensate for the increased heat stress caused by wearing protective clothing in hot weather in order to prevent the onset of heat induced illness. Employees must maintain water and salt balances by drinking water or other liquids. Employees must also compensate for cold stress by wearing sufficient clothing to prevent body heat loss and occurrence of frost-bite. An appropriate work-rest regimen will be maintained by observing an eight-hour work day including a 45 minute lunch break and mid-morning and mid-afternoon breaks. If the work day is longer, or excessive heat or humidity conditions exist, there will be additional rest periods.

7.6.2 Skin and Eye Protection

The expected level of chemicals in the soil, water and sediment samples may pose a minor skin hazard or skin absorption problem. Standard work gloves and disposable coveralls will provide sufficient protection. When collecting and handling samples, vinyl outer gloves with latex inner gloves are recommended for added protection and shall be used when very high or low pH conditions are present during sampling activities.

Safety glasses shall be worn during sampling activities to provide appropriate eye protection when work activities may create a potential for eye injury. Face shields will be used during activities where chemical liquids may be handled including samples which may have high or low pH values.

7.6.3 Respiratory Protection

A respirator shall be used by all site personnel who work in areas where a potential for inhalation exposure at greater than Threshold Limit Values to volatile organic chemicals or dust is present. Respiratory protection procedures will include the following:

- Properly cleaned, maintained, NIOSH approved air purifying respirators with HEPA combined cartridges for asbestos, if necessary, and organic vapor and dust cartridges.
- At a minimum, air-purifying cartridges will be replaced at the end of each shift when they are used under Level C conditions.
- Only employees who have had qualitative respirator fit tests within the previous year for the respirator for which they will be using will be allowed to work in atmospheres where respirators are required or may be required if conditions change.
- Employees who wear respirators may leave work areas to wash their face and respirator facepiece as needed to prevent potential skin irritation associated with respirator use.
- Facial hair that might interfere with achieving a good facepiece seal is prohibited.
- Self-contained breathing apparatus (SCBA) must be worn on-site when:
  - Containers of unknown or known materials are being opened that may be a potential acute inhalation hazard.
  - When in confined spaces where hazardous materials are present, such as enclosed areas which have received spilled chemicals (under no circumstances shall a confined space be entered without prior knowledge of the Health and Safety Officer and modification of this plan).
  - When unknown total volatile organic vapors reach 100 ppm during drilling and sampling.
  - When Geiger counter readings indicate 10 times the background concentration is present in the work area.
  - When the concentration of oxygen in a work space falls below 19.5%.
  - When dealing with greater than 5 ppm of chemicals with poor warning properties.
- Full (or half-face, if specifically approved) cartridge respirators must be worn on-site when:
  - Initiating investigative activities where disturbances are likely to generate contaminant concentrations within the protection factor range of the respirator to provide exposure levels less than threshold limit values.

- Volatile organic chemicals in the air are greater than 5 ppm and less than 100 ppm, providing the chemicals are known and have good warning properties.

- Geiger counter readings indicate two times background level is present in the work area.

- Low levels (<5 ppm) of unknown toxic substances (vapors or dusts) are generated in air due to sampling, handling, decontamination or other operations.

o Respirators with chemical cartridges should not be used for extended periods that would result in the capacity of the cartridge to be exceeded and respirators with particulate filter cartridges should be replaced when difficulties with breathing attributable to clogging of the filters is encountered. Difficulties in breathing shall be cause for immediate cessation of investigative activities and movement to a "clean" area.

7.7 Site Control and Security

7.7.1 Work Zones

Since the potential for adverse health effects to workers from the chemical contamination of the site is low, no requirements for Exclusion Zone restrictions are anticipated. Work zone requirements will be comparable to those required in a Contamination Reduction Zone. During drilling activities, the work zone will be fenced with wire, tape or temporary or high visibility fencing to restrict access. Sampling will include the site and adjacent areas. Concentrations of VOCs, dusts and radioactivity shall be monitored to insure concentrations of contaminants are below permissible exposure limits. When visible dust emissions are encountered, close scrutiny of particulate monitors and means for avoiding continued generation of dust shall be evaluated.

7.7.2 Security

A secure site promotes worker safety and limits access to visitors and the public who might otherwise become exposed to hazardous conditions. The following security procedures will be maintained:

o Controlling access to the investigation site by logging persons in and out at the site trailer.

o Permitting only authorized personnel with 40 hour health and safety training and applicable refresher courses, medical monitoring, proper health and safety equipment and a signed acknowledgment form to enter investigation work areas.

o Securing all equipment, supplies and facilities.

- o Requiring all persons entering investigation work areas to be subject to the health and safety requirements set forth by this plan.
- o Providing site surveillance.
- o Enlisting public enforcement agencies, where applicable and available.

7.7.3 Communication

Communication systems established for this project include the following:

- o Visual signals
- o Compressed air horns
- o Telephones

The areas which contain, or are suspected of containing hazardous materials, will be clearly delineated/maintained and posted. The Project Manager and Health and Safety Officer will establish applicable work zones for areas of different levels of potential personnel hazard. Only persons authorized by either the Project Manager, Health and Safety Officer or Field Operations Manager may enter potentially hazardous work areas.

7.8 Disposal of Protective Clothing

Noncontaminated disposable items such as coveralls, gloves and general trash will be packed in plastic bags and deposited in a designated container and disposed of as nonhazardous waste. Disposable clothing or trash suspected to be contaminated with hazardous waste shall be placed in plastic bags and packed in a 55-gallon ring top drum and properly disposed in accordance with federal and state regulations. Containers with suspected contaminated materials will be staged in the fenced equipment storage area at the site.

7.9 Personnel Decontamination

Personnel decontamination procedures will include good work practices, use of disposable clothing, proper personal hygiene and a field decontamination station. Standard personnel procedures include the following:

- o Removal of outer work gloves (if applicable) and placement in a 55-gallon drum.

- o Removal of disposable coveralls and boot covers (if applicable) and placement in a 55-gallon drum.
- o Removal of vinyl and/or latex gloves (if applicable) and placement in a 55-gallon drum.
- o Thorough washing of hands, face or exposed areas.

Note: Some equipment such as rubber pullover boots may be dedicated for use through the duration of the project. At project completion these supplies will be disposed of in a 55-gallon drum.

The decontamination station, which will be located at the site, will consist of:

- o Long handled scrub brushes
- o Metal wash basins
- o Plastic sheeting
- o Plastic tubs for hand and face washing (or site sanitary facilities)
- o First aid kit
- o Portable eye wash
- o Hand soap solution
- o Five gallon water containers
- o Drums/trash containers

7.10 Emergency Information

7.10.1 Emergency Procedures

The Project Manager or Field Operations Manager will be responsible for implementing the procedures to protect personnel in case of emergencies at the site. The emergency procedures include:

- o Immediately contact the appropriate emergency service personnel,
- o Administering first aid as appropriate,
- o Assuring that appropriate personal protective equipment is utilized, and
- o Implementing evacuation procedures.

No significant fire or explosion hazards are anticipated at the site. Any fire protection requirements will be met by the local fire department. The fire department will be notified of any potential or real emergency, fire or explosion. Field investigation supervisors will carry compressed air horns. In the event of fire, spill, inadvertent vapor release or other hazardous incident, three short blasts shall signal all personnel to evacuate the site.

7.10.2 Emergency Personnel and First Aid

Response to emergency situations will include immediate notification of an off-site trained rescue team. The trained rescue team nearest the site will be notified of all work schedules at the site. The local fire department rescue squads will be suitable for any foreseeable emergencies.

7.10.3 Emergency Services and Notifications

The emergency procedures will include notifying emergency and other affected personnel, and keeping their locations and emergency telephone numbers in a convenient and readily accessible area at the project site such as the field office. All emergency services will be notified prior to initiation of field work to explain the effort involved, site location and work schedule. A copy of these notifications is contained in this section. In addition, a map showing the route from the project site to the nearest emergency medical facility will be provided at the project site in the field office and in each project vehicle. The route to St. James Mercy Hospital is shown in Figure 7-1.

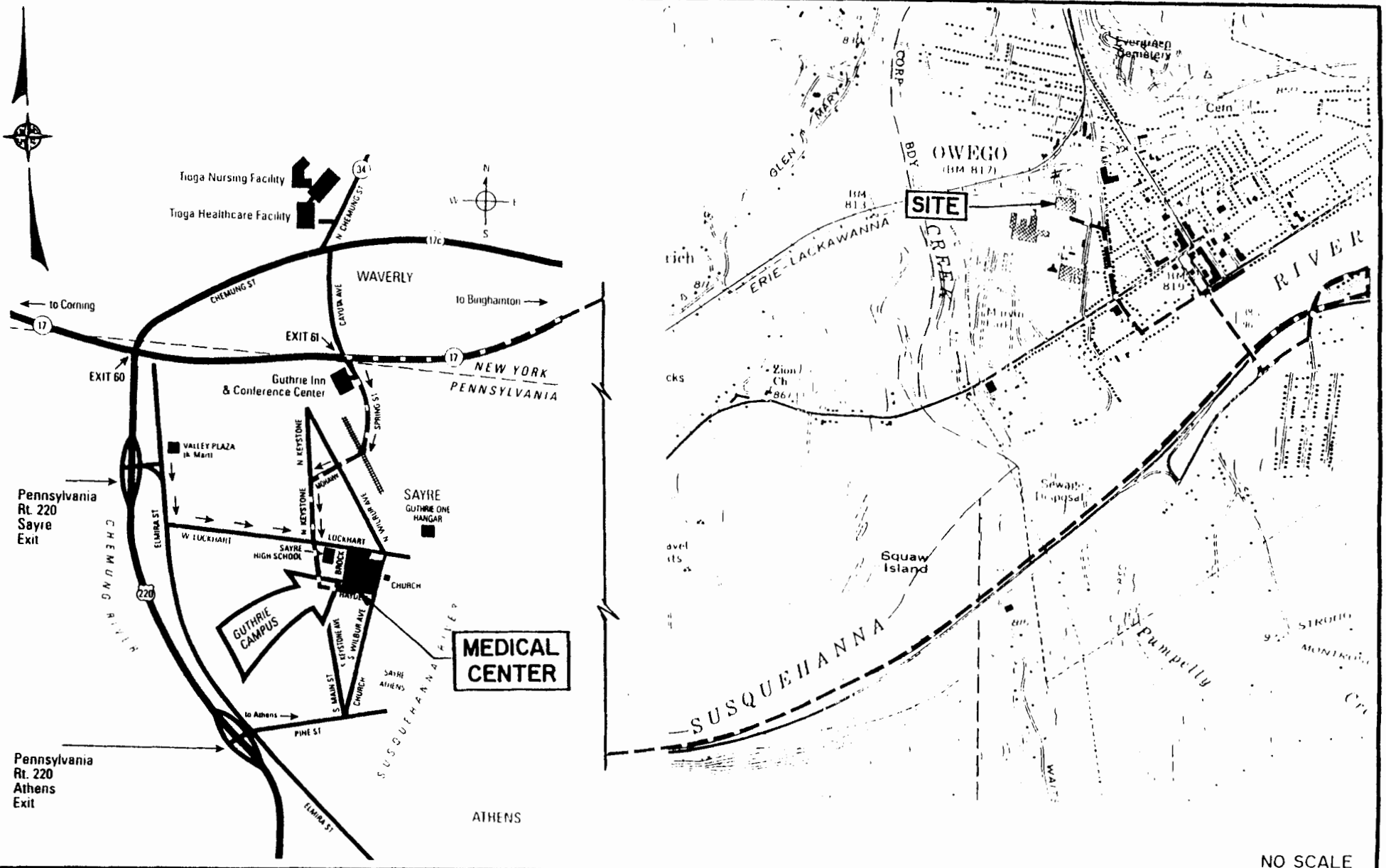
Emergency services for the Tioga Castings Site include:

- **Nearest Emergency Medical Facility**

  Russell Knight, President
  Robert Packer Hospital
  Gutherie Square
  Sayre, PA 18840
  (717) 888-6666 (General)
  (717) 882-4225 (Emergency Room)

- **Fire Department and Rescue Service**

  Owego Fire Department
  90 Temple Street
  Owego, NY 13827
  Att: Chief Jim Morris
  (607) 687-1313



TIOGA CASTINGS SITE
OWEGO, NEW YORK

MEDICAL CENTER EMERGENCY ROUTE

Dvirka and Bartilucci CONSULTING ENGINEERS

FIGURE 7 - 1

- **Police Department**

  Owego Police Department
  90 Temple Street
  Owego, NY 13827
  Att: Chief Robert Williams
  (607) 687-2233

- **Poison Control Center**

  Russell Knight, President
  Robert Packer Hospital
  Gutherie Square
  Sayre, PA 18840
  (717) 888-6666 (General)
  (717) 882-4225 (Emergency Room)

Note: Emergency 991 is not effective in this region until October 1993.

- **Designated On-Call Physician**

  Ronald Rosen, MD
  Center for Occupational and Preventive Health Care
  269-11 76th Avenue - CCC Building
  Third Floor - Room 313
  New Hyde Park, NY 11042
  (718) 470-4435

7.10.4 Evacuation Procedures

There is no anticipated hazard potential that would require evacuation of nearby residential or commercial areas. However, the police and rescue services will be notified of the planned work at this site. Should an unexpected emergency occur, all site workers will be signaled using an airhorn or other signals to evacuate. Local emergency response teams will be immediately contacted for needed fire, rescue and emergency service. Any potential evacuation would involve workers in a local work area. Any potential evacuation of nearby residential or commercial areas will be the responsibility of the police and rescue services. Evacuation would be in an upwind direction. Escape routes will be explained to all site workers.

7.10.5 Emergency Contacts

In case of an emergency, the following individuals should be notified.

Name	Title	Organization	Telephone
T. Maher	Project Director	D&B	(516) 364-9892
E. Santoro	Project Manager	D&B	(908) 668-4747
B. Heneveld	Health and Safety Officer	D&B	(516) 364-9892
J. Moras	Project Manager	NYSDEC-Albany	(518) 457-0315
To Be Named	On-Site Supervisor	NYSDEC-Albany	(518) 457-0315

In addition, the following agencies must be notified:

Tioga County Health Department	(607) 687-4535
New York State Department of Health	(518) 458-6310

During field activities, the Field Operations Manager and Health and Safety Officer should be notified immediately in case of an emergency. However, in case of personal injury or illness, no delay should occur in calling for the required emergency services.

7.10.6 Emergency Treatment

Provision is made for a physician on call on a 24-hour basis for consultation purposes. Should site personnel suffer an injury or illness, the resources cited above under emergency procedures will be utilized, as appropriate. If an injury or illness is the result of a chemical exposure, the Health and Safety Officer and Field Operations Manager shall promptly initiate the steps necessary to identify the chemical(s). Such information shall be made available to the on-call physician and the local medical facility providing treatment.

Any injury or illness will require the completion of the Occupational Illness/Injury Investigation Report and Hazardous Waste Incident Report. These forms are contained in this section.

Any injury/illness not limited to first aid will require that the Field Operations Manager immediately notify the Project Manager. This will allow the coordination of internal resources to assist the treating physician in rendering appropriate care. A copy of Chemical Fact Sheets for typical volatile, semivolatile and inorganic compounds which could be encountered at the site are provided in this section.

7.11 Medical Surveillance

Due to the low chemical hazard potential for workers at the site, a detailed medical surveillance of each site worker is not anticipated. However, as a precautionary measure, all personnel on site have successfully completed a recent physical examination/medical screen. This examination is to assure maximum worker health, to establish a baseline health record, and to seek conditions which would predispose the employee to illness from exposure to hazardous materials or from the physical demands of using personal protective equipment. The examination includes the following:

- Occupational history
- Medical history
- Comprehensive physical
- Pulmonary function test
- Blood profile
- Vision exam
- Complete blood count
- Audiometric test
- Hemoglobin
- Otoscoptic (auditory) exam
- Routine urinalysis
- Serum cholinesterase
- Liver function
- General neurological test

Medical surveillance of the workers at the site is performed by a licensed physician with certification in occupational medicine. Depending upon the specific exposure conditions, periodic medical examination will be required. Medical surveillance and records of each worker will conform to OSHA requirements as detailed in Dvirka and Bartilucci Consulting Engineers' Health and Safety Procedures for Hazardous Waste Sites.

The physician responsible for undertaking the medical monitoring program and maintaining the medical files for each employee involved in hazardous waste investigations for D&B Consulting Engineers is Dr. Ronald E. Rosen, MD. Dr. Rosen may be contacted at the following address:

Ronald E. Rosen, MD
269-11 76th Avenue - CCC Building
Third Floor - Room 313
New Hyde Park, NY 11042
(718) 470-4435

If any chemical exposures occur, the following information will be included in the employee's medical record:

- Name of hazardous materials to which the employee was exposed.
- Information on the probability, frequency and extent of exposures.
- Any available environmental measurements relating to hazardous materials.

At the end of final work activities at the site, all personnel who were potentially exposed to hazardous levels of chemicals will have a medical examination as described above for the preassignment examination. The scope of this examination may vary depending on the time since the employee's last physical examination, exposure to hazards and/or signs or symptoms of exposure.

7.12 Reporting Requirements

The Project Manager will assure that the following records are kept:

- Acknowledgment Form
- Daily Field Activity Report (see Section 6.22 of the Quality Assurance and Quality Control Plan)
- Accident/Injury Report and Hazardous Waste Incident Report
- Air Monitoring Report
- Notification of Local Emergency Services

The following forms are to be used in implementing this Health and Safety Plan:

- o Acknowledgment Form
- o Air Monitoring Report
- o Occupational Illness/Injury Investigation Report
- o Hazardous Waste Incident Report

HEALTH AND SAFETY PLAN
ACKNOWLEDGMENT FORM

SITE-SPECIFIC
HEALTH AND SAFETY PLAN

ACKNOWLEDGMENT FORM
TIOGA CASTINGS SITE

I have read the attached site-specific plan and attachments concerning the health and safety requirements for conducting the Remedial Investigation and Feasibility Study at the Tioga Castings Site, the Village of Owego, Tioga County, New York. I have discussed any questions which I have regarding these materials with my supervisor or the health and safety officer, and I understand the requirements.

Signed: _____ Date: _____

Title: _____ Affiliation: _____

AIR MONITORING FORM

DVIRKA
AND
BARTILUCCI

AIR MONITORING FORM

PROJECT NAME: _____ DATE: _____

PROJECT NUMBER: _____ INSTRUMENT: _____

RECORDED BY: _____ CALIBRATION DATE: _____

WEATHER CONDITIONS: _____

TIME	LOCATION	WIND SPEED AND DIRECTION	READING	OBSERVATIONS

RECORDING PROCEDURES/REMARKS: _____

AMF

ACCIDENT/INJURY REPORT AND HAZARDOUS WASTE INCIDENT REPORT

DVIRKA AND BARTILUCCI

Accident Report

Refer to Safety and Loss Prevention Bulletin No. 22 for the preparation of this report

Department	No. of Bldg.	Date of Accident	Time of Accident ☐ a.m. ☐ p.m.

Who was injured or what was damaged

Nature of injury or accident

Describe this accident

Cause - describe unsafe act and/or unsafe condition

Corrective action taken

Supervisor	Date
Reviewed by (Dept. Head)	Date

Comments

Reviewed by	Date

Comments

AR

DVIRKA
AND
BARTILUCCI

Hazardous Waste Incident Report

GENERAL INFORMATION

Facility Name: EPA Permit Number:

Facility Address:

Facility Contact: Title: Phone:

Date of Report: Completed by: Title:

INCIDENT DESCRIPTION

Date of Incident: Time: Location: Type:

Identity of Materials Involved	Quantity

Cause of Incident if Known (use additional sheet if necessary):

Action Taken to Prevent Reoccurrence (use additional sheet if necessary):

PERSONAL INJURIES

No. Individuals Injured: No. Individuals Hospitalized: Fatalities:

Types of Injuries Sustained:

WASTE RECOVERY

Waste Identity	Quantity	Recovery Method	Disposal Method

DVIRKA
AND
BARTILUCCI

Occupational Illness/Injury Investigation Report

Employee Name: _____ Date of Injury: _____

Fill Out All Applicable Information

1. Activity in progress at time of accident

2. Events - Begin with initiating event and end with nature and extent of injury/damage

3. Accident causes
   A. Conditions

   B. Actions

   C. Factors influencing A or B

EQUIPMENT/HARDWARE/VEHICLE INVOLVED (AS APPLICABLE)

4. Did equipment design and cefect contribute to accident severity ☐ No ☐ Yes

5. #1 Equipment _____ _____
   Generic or brand name and model — Identification No.

   #2 Equipment _____ _____
   Generic or brand name and model — Identification No.

6. Corrective actions (If risk is acceptable, corrective action may not be necessary)
   A. Initial actions taken

   B. Additional actions recommended

   C. Items in B to be completed by: _____
   Implementation Date

7. Did employee lose time: ☐ Yes ☐ No

8. Work days lost: _____

9. Work days restricted: _____

10. Death: ☐ Yes ☐ No. If yes, enter date: _____
    Month Day Year

11. Permanent transfer to different job because of accident ☐ Yes ☐ No

    Terminated because of accident ☐ Yes ☐ No

12. Has employee returned to work with no further anticipated work days lost or restricted? ☐ Yes ☐ No

13. Was supervisor aware that the lost time was a result of work incurred injury/illness? ☐ Yes ☐ No

14. Was clinic notified of the lost time? ☐ Yes ☐ No

15. If injury is a back case incident, how did the injury occur?

A. With Load	Lifting	☐ Yes	☐ No	Pulling	☐ Yes	☐ No
	Carrying	☐ Yes	☐ No	Jerking	☐ Yes	☐ No
	Pushing	☐ Yes	☐ No	Twisting	☐ Yes	☐ No

   B. Body movement only without load ☐ Yes ☐ No

   C. Previous back injury ☐ Yes ☐ No

16. Analysis (Circle at least one item in each column)

Accident Description	Type of Injury	Cause
1. Slips/Falls	1. Strain/Sprain	1. Unsafe Conditions
2. Caught in/on or between	2. Inhalation/Ingestion	2. Unsafe Act
3. Struck against Object	3. Eye Injury	3. Change in Equipment
4. Struck by Object	4. Bruise, cut or fracture	4. Change in Process
5. Electrical Contact	5. Burn	5. Indeterminable
6. Not Otherwise Classified	6. Radiation Exposure	
	7. Back Injury (see No. 15 above)	
	8. Not Otherwise Classified	

17. Investigator/Representative _____ Date: _____

18. Safety Coordinator _____ Date: _____

19. Reviewing Official _____ Date: _____

CHEMICAL FACT SHEETS

New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **FORMALDEHYDE**

CAS Number: 50-00-0
DOT Number: UN 2209

RTK Substance number: 0946
Date: February 1989 Revision: First

HAZARD SUMMARY

* **Formaldehyde** can affect you when breathed and by passing through skin.
* **Formaldehyde** is a CARCINOGEN--HANDLE WITH EXTREME CAUTION.
* Exposure irritates the eyes, nose, and throat and can cause skin and lung allergy. Higher levels can cause throat spasm and a build-up of fluid in the lungs, a medical emergency.
* Contact can cause severe eye and skin burns, leading to permanent damage. These may appear hours after exposure, even if no pain is felt.
* **Formaldehyde** is a HIGHLY FLAMMABLE LIQUID/GAS and a DANGEROUS FIRE HAZARD.

IDENTIFICATION

Formaldehyde is a colorless gas with a strong odor, mixed in solutions with water or methanol. It is used as a germicide, an embalming fluid and in home insulation and pressed-wood products.

REASON FOR CITATION

* **Formaldehyde** is on the Hazardous Substance List because it is regulated by OSHA and cited by NIOSH, ACGIH, IARC, DOT, NTP, CAG, NFPA and EPA.
* This chemical is also on the Special Health Hazard Substance List because it is a **CARCINOGEN**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from you employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD = 0.83 ppm.**
* The odor threshold only serves as a warning of exposure. Not smelling it does not mean you are not being exposed.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **3 ppm** averaged over an 8-hour workshift; **5 ppm**, which shall not be exceeded at any time, and **10 ppm** which shall not be exceeded in any 30 minute period.

NIOSH: NIOSH recommends the lowest feasible limit for this cancer-causing substance.

ACGIH: The recommended airborne exposure limit is **1 ppm** averaged over an 8-hour workshift and **2 ppm** as a STEL (short term exposure limit).

* **Formaldehyde** is a PROBABLE CANCER-CAUSING AGENT in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
* The above exposure limits are for air levels only. Skin contact may also cause overexposure.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* A regulated, marked area should be established where **Formaldehyde** is handled, used, or stored.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Formaldehyde** and at the end of the workshift.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposures. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Formaldehyde**:

* Liquid **Formaldehyde** may irritate the skin, causing a rash or burning feeling on contact. It can also cause severe burns, leading to permanent damage. The burns may be delayed for hours after contact, even is no burn is felt at first.
* Contact can cause severe eye burns. These also may be delayed for hours
* Exposure irritates the nose, mouth and throat. Higher concentrations can cause a build-up of fluid in the lungs (pulmonary edema) or spasm of the windpipe. This can cause death.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Formaldehyde** and can last for months or years:

Cancer Hazard

* **Formaldehyde** is a PROBABLE CANCER-CAUSING AGENT in humans. It has been shown to cause cancer of the nasal passages in animals.
* Many scientists believe that there is no safe level of exposure to a cancer-causing agent. Such substances may also have the potential for causing reproductive damage in humans.

Reproductive Hazard

* There is not enough information to determine the ability of **Formaldehyde** to affect reproduction adversely.

Other Long-Term Effects

* **Formaldehyde** may cause a skin allergy. If an allergy develops, very low future exposures can cause itching and a skin rash.
* It may also cause an asthma-like allergy. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness.
* Repeated exposures may cause bronchitis, with symptoms of cough and shortness of breath.
* Although **Formaldehyde** is a food product, breathing it (powder or mist) could cause effects different from eating it. For example, many plant products when breathed in can cause lung allergy, with cough, wheezing and/or tightness in the chest. It is not known whether **Formaldehyde** also has this effect. If allergy occurs, even low future exposures can cause symptoms.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater) the following are recommended before beginning work and at regular times after that:

* Lung function tests.
* Interview for brain effects, including recent memory, mood (irritability, withdrawal), concentration, headaches, malaise and altered sleep patterns. Consider cerebellar, autonomic and peripheral nervous system evaluation. Positive and borderline individuals should be referred for neuropsychological testing.

If symptoms develop or overexposure is suspected, the following may be useful:

* Evaluation by a qualified allergist, including careful exposure history and special testing, may help diagnose skin allergy
* Consider chest x-ray after acute overexposure.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

* Vapors of **Formaldehyde** can react with *Hydrogen Chloride* exposure is also present, to form a potent human CANCER-CAUSING agent (*Bis-Chloromethyl Ether*).
* Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Formaldehyde** from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: Occupational Exposure to *Formaldehyde #77-126*.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Formaldehyde** should change into clean clothing promptly.
* Do not take contaminated work clothes home. Family members could be exposed.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Formaldehyde**.
* Eye wash fountains in the immediate work area should be provided for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Formaldehyde**, immediately wash or shower to remove the chemical.
* Wash any areas of the body that may have contacted **Formaldehyde** at the end of each work day, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Formaldehyde** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Formaldehyde**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

* Eye protection is included in the recommended respiratory protection.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Engineering controls must be effective to ensure that exposure to **Formaldehyde** does not occur.
* At <u>any</u> exposure level, use an MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive-pressure mode or with a full facepiece, hood, or helmet operated in the continuous-flow mode. An MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive-pressure mode is also recommended.

HANDLING AND STORAGE

* Prior to working with **Formaldehyde** you should be trained on its proper handling and storage.
* A regulated, marked area should be established where **Formaldehyde** is handled, used, or stored.
* **Formaldehyde** must be stored to avoid contact with OXIDIZERS (such as PERMANGANATES, NITRATES, PEROXIDES, CHLORATES and PERCHLORATES) ALKALINE MATERIALS, since violent reactions occur.
* Store in tightly closed containers in a cool well-ventilated area away from HEAT, SPARKS or FLAMES.
* Sources of ignition such as smoking and open flames are prohibited where **Formaldehyde** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
* Use only non-sparking tools and equipment, especially when opening and closing containers of **Formaldehyde**.
* Wherever **Formaldehyde** is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include <u>dust releasing operations</u> (grinding, mixing, blasting, dumping, etc.), <u>other physical and mechanical processes</u> (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and <u>"confined space" exposures</u> (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<

Common Name: **FORMALDEHYDE**
DOT Number: **UN 2209**
DOT Emergency Guide code: 29
CAS Number: **50-00-0**

Hazard rating	NJ DOH	NFPA
FLAMMABILITY	-	4
REACTIVITY	-	0
POISONOUS GASES ARE PRODUCED IN FIRE		
CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Formaldehyde** is a FLAMMABLE GAS or a COMBUSTIBLE LIQUID.
* Vapors may travel to a source of ignition and flash back.
* Use dry chemical, CO_2, water spray or foam extinguishers. Water can be used to keep fire-exposed containers cool.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* The vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Formaldehyde** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until cleanup is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Keep **Formaldehyde** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **Formaldehyde** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:
CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water. Continue without stopping for at least 30 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash area with large amounts of water. Seek medical attention immediately.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.
* Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.

PHYSICAL DATA

Vapor Pressure: 16 mm Hg at 77°F (25°C)
Flash Point: 122°F to 185°F (50° to 85°C) for 37% liquid solutions
Water Solubility: Miscible

OTHER COMMONLY USED NAMES

Chemical Name:
Formaldehyde
Other Names and Formulations:
Formalin; HCHO; Methanal

NEW JERSEY DEPARTMENT OF HEALTH
Right to Know Program
CN 368, Trenton, NJ 08625-0368
(609) 984-2202

New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **PHENOL**

CAS Number: 108-95-2
DOT Number: UN 1671/UN 2821

RTK Substance number: 1487
Date: January 1986

HAZARD SUMMARY

* Phenol can affect you when breathed in and by passing through your skin.
* Exposure to Phenol could cause immediate collapse and death.
* Because this is a **MUTAGEN**, handle it as a possible cancer-causing substance--with extreme caution.
* It may severely burn the skin and eyes with permanent damage of the eyes.
* Long-term exposure may damage the liver and kidneys.
* High exposure may cause poisoning with vomiting, difficulty swallowing, diarrhea, lack of appetite, headache, dizziness and fainting.

IDENTIFICATION

Phenol is a colorless to pink solid or thick liquid with a characteristic sweet tar-like odor. It is used in making plywood, pharmaceuticals, plastics and rubber.

REASON FOR CITATION

* Phenol is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, NIOSH and EPA.
* This chemical is also on the Special Health Hazard Substance List because it is a **MUTAGEN**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from you employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD** = 0.15 mg/m^3.
* The odor threshold only serves as a warning of exposure. Not smelling it does not mean you are not being exposed.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 19 mg/m^3 averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is 20 mg/m^3 averaged over a 10-hour workshift and 60 mg/m^3, not to be exceeded during any 15 minute work period.

ACGIH: The recommended airborne exposure limit is 19 mg/m^3 averaged over an 8-hour workshift.

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.
* Phenol is a **MUTAGEN** and may have a cancer risk. Contact should be reduced to the lowest possible level.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to Phenol and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Phenol to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Phenol:

* Significant skin contact or breathing of Phenol can lead to death within minutes.
* Breathing the vapor can irritate the mouth, nose, and throat.
* Contact can cause severe burns of the eyes, leading to permanent damage and severe skin burns.
* Skin contact is not immediately painful, but deep damage to skin and even local gangrene can result.
* High exposure may cause Phenol poisoning with vomiting, difficulty in swallowing, diarrhea, lack of appetite, headache, dizziness, and fainting.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Phenol and can last for months or years:

Cancer Hazard

* Phenol causes MUTATIONS (genetic changes). Such chemicals may have a cancer risk
* Many scientists believe there is no safe level of exposure to a cancer-causing agent. Such substances may also have the potential for causing reproductive damage in humans.

Reproductive Hazard

* According to the information presently available to the New Jersey Department of Health, Phenol has not been tested for its ability to adversely affect reproduction.

Other Long-Term Effects

* High or repeated exposure may damage the liver, kidneys, pancreas and heart muscle.
* Very irritating substances may affect the lungs. It is not known whether Phenol causes lung damage.
* This chemical has not been adequately evaluated to determine whether brain or other nerve damage could occur with repeated exposure. However, many solvents and other petroleum-based chemicals have been shown to cause such damage. Effects may include reduced memory and concentration, personality changes (withdrawal, irritability), fatigue, sleep disturbances, reduced coordination, and/or effects on nerves supplying internal organs (autonomic nerves) and/or nerves to the arms and legs (weakness, "pins and needles").

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater, or significant skin contact) the following are recommended before beginning work and at regular times after that:

* Interview for brain effects, including recent memory, mood (irritability, withdrawal), concentration, headaches, malaise and altered sleep patterns. Consider cerebellar, autonomic and peripheral nervous system evaluation. Positive and borderline individuals should be referred for neuropsychological testing.

* Liver and kidney function tests.
* Urinary Phenol.

These tests should be repeated if overexposure is suspected.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid Phenol from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: *Occupational Exposure to Phenol #76-196*.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by Phenol should change into clean clothing promptly.
* Do not take contaminated work clothes home. Family members could be exposed.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Phenol.
* Eye wash fountains in the immediate work area should be provided for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with Phenol, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted Phenol, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where Phenol is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with Phenol. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* ACGIH recommends *Neoprene* or *Butyl Rubber* as good to excellent protective materials.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid or dust-proof and face shield goggles when working with powders or dusts, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Engineering controls must be effective to ensure that exposure to Phenol does not occur.
* Where the potential exists for exposures near or over 19 mg/m^3 use a MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge/canister and dust/mist prefilter. Increased protection is obtained from full facepiece powered-air purifying respirators.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect Phenol, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Where the potential for higher exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters, to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Exposure to 385 mg/m^3 is immediately dangerous to life and health. If the possibility of exposures above 385 mg/m^3 exists use an MSHA/NIOSH approved self contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with Phenol you should be trained on its proper handling and storage.
* Phenol must be stored to avoid contact with CALCIUM HYPOCHLORITE and other STRONG OXIDIZERS such as CHLORINE and BROMINE, since violent reactions occur.
* Store in tightly closed containers in a cool well-ventilated area away from HEAT.
* Sources of ignition such as smoking and open flames are prohibited where Phenol is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include <u>dust releasing operations</u> (grinding, mixing, blasting, dumping, etc.), <u>other physical and mechanical processes</u> (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and <u>"confined space" exposures</u> (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Don't all chemicals cause cancer?

A: No. Most chemicals tested by scientists are not cancer-causing.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<

Common Name: **PHENOL**
DOT Number: **UN 1671/UN 2821**
DOT Emergency Guide code: 55
CAS Number: **108-95-2**

Hazard rating	NJ DOH	NFPA
FLAMMABILITY	-	2
REACTIVITY	-	0

FLAMMABLE VAPORS PRODUCED WHEN HEATED
POISONOUS GASES ARE PRODUCED IN FIRE
CONTAINERS MAY EXPLODE IN FIRE

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Phenol** is a COMBUSTIBLE LIQUID.
* Flammable vapors are produced when **Phenol** is heated.
* CONTAINERS MAY EXPLODE IN FIRE.
* POISONOUS GASES ARE PRODUCED IN FIRE
* Use water spray, dry chemical, CO_2, or alcohol foam extinguishers.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Phenol** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Ventilate the area of spill or leak.
* Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* It may be necessary to contain and dispose of **Phenol** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 4)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water. Continue without stopping for at least 30 minutes, occasionally lifting upper and lower lids. Seek medical attention.

Skin Contact

* If concentrated **Phenol** gets on a large area of skin, immediately rush under shower, and with shower on full blast, remove all contaminated clothing. Begin scrubbing the contaminated area with soap for 10 minutes (water alone may be harmful.) Transport to emergency room. If *Polyethyleneglycol-300* is available, continue to swab exposed area in cotton soaked in it.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.
* Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.

PHYSICAL DATA

Vapor Pressure: 0.36 mm Hg at 68°F (20°C)
Flash Point: 174°F (78.9°C)
Water Solubility: Soluble

OTHER COMMONLY USED NAMES

Chemical Name:
Phenol
Other Names and Formulations:
Carbolic Acid; Hydroxybenzene; Phenic Acid

NEW JERSEY DEPARTMENT OF HEALTH
Right to Know Program
CN 368, Trenton, NJ 08625-0368
(609) 984-2202

New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

COMMON NAME: POLYCHLORINATED BIPHENYLS

CAS NUMBER: 1336-36-3 **DOT NUMBER:** UN 2315

HAZARD SUMMARY

* **Polychlorinated Biphenyls** can affect you when breathed in and by passing through your skin.
* **Polychlorinated Biphenyls** are CARCINOGENS--HANDLE WITH EXTREME CAUTION.
* They may be teratogens and may damage the adult reproductive system.
* Exposure can cause an acne-like skin rash (called "chloracne").
* They can damage the liver.
* High exposure can damage the nervous system, causing numbness, weakness and tingling ("pins and needles") in the arms and legs.

IDENTIFICATION

Polychlorinated Biphenyls are a mixture of chemicals that are clear to yellow oily liquids or solids. They are used in closed electrical systems of capacitors, transformers and insulating fluids.

REASON FOR CITATION

Polychlorinated Biphenyls are on the Workplace Hazardous Substance List because they are regulated by OSHA and cited by NIOSH, DOT, IARC and NTP.

* These chemicals are on the Special Health Hazard Substance List because they are CANCER-CAUSING AGENTS and TERATOGENS.
* Definitions are provided on page 5.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 1 mg/m^3 (42% *Chlorine*) and 0.5 mg/m^3 (54% *Chlorine*) averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is 0.001 mg/m^3 averaged over a 10-hour workshift.

* The above exposure limits are for <u>air levels only</u>. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.
* **Polychlorinated Biphenyls** are PROBABLE CANCER-CAUSING AGENTS in humans. There may be <u>no</u> safe level of exposure to carcinogens, so all contact should be reduced to the lowest possible level.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WAYS OF REDUCING EXPOSURE

* A regulated, marked area should be established where **Polychlorinated Biphenyls** are handled, used, or stored as recommended by NIOSH.
* Wear full body protective work clothing.
* Wash thoroughly <u>immediately</u> after exposure to **Polychlorinated Biphenyls** and on exit from the work area.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Polychlorinated Biphenyls** to potentially exposed workers.

This Fact Sheet is a summary source of information for workers, employers, and community residents. Health professionals may also find it useful. If this substance is part of a mixture, this Fact Sheet should be used along with the manufacturer-supplied Material Safety Data Sheet (MSDS).

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Polychlorinated Biphenyls**:

* Exposure to the vapor can irritate the eyes, nose and throat.
* High exposures can damage the liver.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Polychlorinated Biphenyls** and can last for months or years:

Cancer Hazard

* **Polychlorinated Biphenyls** are PROBABLE CANCER-CAUSING AGENTS in humans. There is some limited evidence that they cause skin cancer in humans and they have been shown to cause liver cancer in animals.
* Many scientists believe there is no safe level of exposure to a cancer-causing agent. Such substances may also have the potential for causing reproductive damage in humans.

Reproductive Hazard

* **Polychlorinated Biphenyls** may be TERATOGENS in humans since they have been shown to be teratogens in animals.
* They may be passed to a child through mother's milk.
* **Polychlorinated Biphenyls** can affect the reproductive system of adults.

Other Long-Term Effects

* Repeated exposures can cause liver damage.
* **Polychlorinated Biphenyls** can cause a severe acne-like rash (chloracne). This may persist for years.
* High exposures can damage the nervous system, causing numbness, weakness, and tingling ("pins and needles") in the arms and legs.

MEDICAL

Medical Testing

Before beginning employment and at regular times after that, the following are recommended:

* Liver function tests.
* Serum triglycerides level.
* Exam of the skin.

If symptoms develop or overexposure is suspected, the following may be useful:

* Blood PCB levels.
* Nerve conduction studies should be considered.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are <u>not</u> a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

Because more than light alcohol consumption can cause liver damage, drinking alcohol can increase the liver damage caused by **Polychlorinated Biphenyls**.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace, and (3) whether harmful skin or eye contact could occur. Special controls should be

in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically transfer **Polychlorinated Biphenyls** from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document on Occupational Exposure to *Polychlorinated Biphenyls #77-225*.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Polychlorinated Biphenyls** should change into clean clothing promptly.
* Do not take contaminated work clothes home. Family members could be exposed.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Polychlorinated Biphenyls**.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Polychlorinated Biphenyls**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Polychlorinated Biphenyls**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Polychlorinated Biphenyls** are handled, processed, or stored, since the chemicals can be swallowed. Wash hands carefully before eating or smoking.
* If solid, when vacuuming, a high efficiency particulate absolute (HEPA) filter should be used, <u>not</u> a standard shop vacuum.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Polychlorinated Biphenyls**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* *VITON* is recommended as a good protective material.

Eye Protection

* Eye protection is included in the recommended respiratory protection.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in OSHA 1910.134.

* At <u>any</u> exposure level, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chem-

ical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Don't all chemicals cause cancer?
A: No. Most chemicals tested by scientists are not cancer-causing.

Q: Should I be concerned if a chemical causes cancer in animals?
A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.

Q: But don't they test animals using much higher levels of a chemical than people usually are exposed to?
A: Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone don't cause cancer unless it's a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?
A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of child-bearing age are at high risk.

Q: Should I be concerned if a chemical is a teratogen in animals?
A: Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that similar damage can occur in humans.

The New Jersey State Department of Health, Occupational Disease Prevention and Information Program offers multiple services in occupational health. These include: Right to Know Information Resources, Public Presentations, General References, Industrial Hygiene Information, Surveys and Investigations, and Medical Evaluation. Consult another Fact Sheet for a more detailed description of these services or call (609) 984-1863.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

EMERGENCY INFORMATION

Common Name: **POLYCHLORINATED BIPHENYLS**

DOT Number: UN 2315
NFPA Flammability: No Citation
NFPA Reactivity: No Citation

WARNING

CANCER CAUSING AGENT
POISONOUS GASES ARE PRODUCED IN FIRE
Health hazards on front page

FIRE HAZARDS

* **Polychlorinated Biphenyls** may burn, but does not readily ignite.
* Use dry chemical, CO_2, water spray, or foam extinguishers.
* POISONOUS GASES ARE PRODUCED IN FIRE, including *Dioxin* and *Chlorinated Dibenzofurans*.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Polychlorinated Biphenyls** are spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Ventilate the area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
* It may be necessary to contain and dispose of **Polychlorinated Biphenyls** as a HAZARDOUS WASTE. Contact the NJ Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your local fire department. You can also request emergency information from the following:

DEP HOTLINE: (609) 292-7172
CHEMTREC: (800) 424-9300

HANDLING AND STORAGE

* Prior to working with Polychlorinated **Biphenyls** you should be trained on its proper handling and storage.
* Store in tightly closed containers in a cool well-ventilated area away from STRONG OXIDIZERS (such as CHLORINE, BROMINE, and FLUORINE).
* **Polychlorinated Biphenyls** should be handled only in an established, controlled, regulated area.

FIRST AID

NJ POISON INFORMATION 1-800-962-1253

Eye Contact
* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact
* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

PHYSICAL DATA

Flash Point: 383°F
Water Solubility: Slightly soluble

OTHER COMMONLY USED NAMES

This Fact Sheet also covers the following substances:

PCB-1242 (Chlorodiphenyl-42% Chlorine)
CAS # 53469-21-9;
PCB-1254 (Chlorodiphenyl-54% Chlorine)
CAS # 11097-69-1.

New Jersey Department of Health
CN 368 Trenton, NJ 08625
(609) 984-2202

Date prepared: March 1986
Revision:
OES-16
AUG 84

New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

COMMON NAME: LEAD

CAS NUMBER: 7439-92-1 **DOT NUMBER:** None

HAZARD SUMMARY

* **Lead** can affect you when breathed in and if swallowed from food, drinks, or cigarettes.
* **Lead** is a TERATOGEN--HANDLE WITH EXTREME CAUTION.
* Repeated exposure causes **Lead** build-up in the body. Low levels may cause tiredness, mood changes, headaches, stomach problems and trouble sleeping.
* Higher levels may cause aching, weakness, and concentration or memory problems.
* **Lead** can also cause serious permanent kidney or brain damage at high levels.
* **Lead** exposure increases risk of high blood pressure.

IDENTIFICATION

Lead is a heavy, soft gray metal. It has wide industrial use due to its properties of high density, softness, low melting point, resistance to corrosion and ability to stop gamma and x-rays.

REASON FOR CITATION

* **Lead** is on the Workplace Hazardous Substance List because it is regulated by OSHA and cited by ACGIH and NIOSH.
* This chemical is on the Special Health Hazard Substance List because it is a TERATOGEN.
* Definitions are provided on page 5.

WORKPLACE EXPOSURE LIMITS

* These exposure limits are recommended for *inorganic Lead dusts* and *fumes* measured as *Lead*.

OSHA: The legal airborne permissible exposure limit (PEL) is 0.05 mg/m^3 averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is less than 0.10 mg/m^3 averaged over an 10-hour workshift.

ACGIH: The recommended airborne exposure limit is 0.15 mg/m^3 averaged over an 8-hour workshift.

* **Lead** is a TERATOGEN. All contact with this chemical should be reduced to the lowest possible level.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.

* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Lead to potentially exposed workers.

This Fact Sheet is a summary source of information for workers, employers, and community residents. Health professionals also find it useful. If this substance is part of a mixture, this Fact Sheet should be used along with the manufacturer-supplied Material Safety Data Sheet (MSDS).

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Lead:

* Extremely high exposures could cause seizures, but usually symptoms from Lead occur after weeks to months of exposure.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Lead and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health, Lead has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* Lead is a PROBABLE TERATOGEN in humans.
* Lead may decrease fertility in males and females.

Other Long-Term Effects

* Repeated exposure to Lead causes Lead to build up in the body. The earliest symptoms may be tiredness, trouble sleeping, stomach problems, constipation, headaches and moodiness (mostly irritability and depression).
* Higher levels may cause aching and weakness in your arms and legs, trouble concentrating and remembering things, and may cause a low blood count (anemia).
* Lead can cause serious, permanent kidney and brain damage at high enough levels.
* Lead exposure increases risk of high blood pressure.

MEDICAL

Medical Testing

Before first exposure and every six months thereafter, OSHA (1910.1025) requires your employer to provide:

* Blood Lead test.
* ZPP test (a special test for the effect of Lead on blood cells).

Before first exposure, and yearly for exposed person with blood Lead over 40 micrograms per 100 g of whole blood, OSHA also requires a complete medical history and exam with the above tests, and:

* Complete blood count.
* Kidney function tests.

OSHA defines "exposure" for these tests as air levels averages 30 micrograms of Lead or more in a cubic meter of air. OSHA requires your employer to send the doctor a copy of the Lead standard and provide one for you.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are <u>not</u> a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

Body exposures to Lead from hobbies using Lead solder or pigments; target practice; and drinking moonshine made in *Leaded* containers will increase Lead levels. Repeated breathing or handling *Leaded* gasoline may also add somewhat to body Lead levels.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is

less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace, and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Avoid heating above 900°F.
* Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA standard *1910.1025* available from OSHA or your employer.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* When vacuuming, a high efficiency particulate absolute (HEPA) filter should be used, not a standard shop vacuum.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Lead**.
* Work clothing should be HEPA vacuumed before removal.
* Do not take contaminated work clothes home. Family members could be exposed.
* Wash any areas of the body that may have contacted Lead at the end of each workday, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where Lead is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.
* Use a HEPA vacuum or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Lead** dust and fume. Wear protective gloves, full body and hat clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* Work clothing should be HEPA vacuumed before removal.

Eye Protection

* Wear dust-proof goggles when working with powders or dust, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures not higher than 0.5 mg/m^3, use a half-mask, air purifying respirator equipped with high efficiency filters.
* Where the potential exists for exposures not higher than 2.5 mg/m^3, use a full facepiece, air purifying respirator with high efficiency filters.
* OSHA requires the employer to provide a powered-air purifying respirator, instead of one of the above, whenever the employee asks to use this type of respirator.
* OSHA prohibits the employer from requiring an employee to wear one of the above negative pressure respirators longer than 4.4 hours per day in battery manufacturing and primary and secondary **Lead** production.
* Where the potential exists for exposures not higher than 50 mg/m^3, use any

powered-air purifying respirator with [illegible]h efficiency filters or half-mask [illegible]pplied-air respirator operated in positive pressure mode.

* If while wearing a filter, cartridge or canister respirator, you can smell, taste or otherwise detect Lead, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential exists, for exposures not higher than 100 mg/m^3, use supplied-air respirators with full facepiece, hood, helmet or suit, operated in positive pressure mode.
* [illegible]re the potential exists for exposures greater than 100 mg/m^3, use full facepiece, self-contained breathing apparatus operated in positive pressure mode.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the [illegible]unt of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes which release mist, vapor or fume (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?
A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

The New Jersey State Department of Health, Occupational Disease Prevention and Information Program offers multiple services in occupational health. These include: Right to Know Information Resources, Public Presentations, General References, Industrial Hygiene Information, Surveys and Investigations, and Medical Evaluation. Consult another Fact Sheet for a more detailed description of these services or call (609) 984-1863.

DEFINITIONS

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A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

EMERGENCY INFORMATION

Common Name: LEAD

DOT Number: None
NFPA Flammability: No Citation
NFPA Reactivity: No Citation

WARNING

DO NOT USE WATER
POISONOUS GAS IS PRODUCED IN FIRE
Health hazards on front page

FIRE HAZARDS

* Lead Powder is FLAMMABLE when exposed to heat or flame.
* POISONOUS GAS IS PRODUCED IN FIRE.
* Use dry chemicals appropriate for extinguishing metal fires. DO NOT USE WATER.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If Lead is spilled, take the following steps:

* Restrict persons not wearing protective equipment from area of spill until clean-up is complete.
* Ventilate the area of spill.
* Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
* It may be necessary to contain and dispose of Lead as a HAZARDOUS WASTE. Contact the NJ Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your local fire department. You can also request emergency information from the following:

DEP HOTLINE: (609) 292-7172
CHEMTREC: (800) 424-9300

HANDLING AND STORAGE

* Prior to working with Lead you should be trained on its proper handling and storage.
* Lead must be stored to avoid contact with OXIDIZERS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES and NITRATES) and CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC) since violent reactions occur.
* Lead is regulated by an OSHA Standard 1910.1025. All requirements of the standard must be followed.

FIRST AID

NJ POISON INFORMATION 1-800-962-1253

Eye Contact
* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact
* Remove contaminated clothing. Wash contaminated skin with soap and water.

Antidotes and Special Procedures
* Persons with significant *Lead poisoning* are sometimes treated with EDTA while hospitalized. Since this drug causes a rush of Lead from body organs into the blood and kidneys and thus has its own hazards, it must be done only by experienced medical persons under careful observation. It or other "chelating" drugs should never be used to prevent poisoning while exposures continues or without strict exposure control as severe kidney damage can result.

PHYSICAL DATA

Vapor Pressure: -1.77 mm Hg at 1832°F
Water Solubility: Slightly soluble

CHEMICAL NAME

Lead

New Jersey Department of Health
CN 368 Trenton, NJ 08625
(609) 984-2202

Date prepared: May 1986
Revision:
OES-16
AUG 84

New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

COMMON NAME: CADMIUM

CAS NUMBER: 7440-43-9 **DOT NUMBER:** UN 2570

HAZARD SUMMARY

* Cadmium can affect you when breathed in.
* Cadmium is a CARCINOGEN, a TERATOGEN, and causes REPRODUCTIVE DAMAGE. HANDLE WITH EXTREME CAUTION.
* High exposures can cause severe lung damage and death. This can be delayed for several hours.
* Repeated lower exposures can cause permanent kidney damage, emphysema, anemia, and/or loss of smell.
* High exposure to Cadmium may cause nausea, salivation, vomiting, cramps, and diarrhea.

IDENTIFICATION

Cadmium is a bluish metal or grayish powder. It is used in electroplating other metals, batteries, pigments, stabilizers for plastics, nuclear reactor rods, and as a catalyst.

REASON FOR CITATION

* Cadmium is on the Workplace Hazardous Substance List because it is regulated by OSHA.
* This chemical is also on the Special Health Hazard Substance List because it is a CANCER-CAUSING AGENT.
* Definitions are provided on page 5.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 0.2 mg/m^3 averaged over an 8-hour workshift and 0.6 mg/m^3, not to be exceeded during any (15 minute) work period.

NIOSH: It is recommended that exposure to Cadmium be at *the lowest feasible level.*

ACGIH: The recommended airborne exposure limit is 0.05 mg/m^3 averaged over an 8-hour workshift.

* These exposure limits are recommended for *Cadmium Dust.*
* Cadmium is a PROBABLE CANCER-CAUSING AGENT in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WAYS OF REDUCING EXPOSURE

* A regulated, marked area should be established where Cadmium is handled, used, or stored.
* Wear protective work clothing.
* Wash thoroughly at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of ah ongoing education and training effort, communicate all information on the health and safety hazards of Cadmium to potentially exposed workers.

This Fact Sheet is a summary source of information for workers, employers, and community residents. Health professionals may also find it useful. If this substance is part of a mixture, this Fact Sheet should be used along with the manufacturer-supplied Material Safety Data Sheet (MSDS).

Metal, metal compounds and alloys are often used in "hot" operations in the workplace. These may include, but are not limited to, welding, brazing, soldering, plating, cutting, and metallizing. At the high temperatures reached in these operations, metals often form metal fumes which have different health effects and exposure standards than the original metal or metal compound and require specialized controls. Your workplace can be evaluated for the presence of particular fumes which may be generated. These results can be used to determine the appropriate NJ Hazardous Substance Fact Sheet that should be available.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Cadmium**:

* During heating or grinding operations, **Cadmium** can cause a flu-like illness with chills, headache, aching and/or fever. This can go on to more serious illness.
* High exposures can cause rapid and severe lung damage, with shortness of breath, chest pain, cough, and even a buildup of fluid in the lungs. In severe cases death or permanent lung damage occurs. Illness can be delayed for 4 to 8 hours, allowing overexposure WITHOUT WARNING. If overexposure is suspected, leave the area; do not wait for signs of illness. Risk is greatest during HEATING and GRINDING operations.
* High exposure to **Cadmium** may cause nausea, salivation, vomiting, cramps, and diarrhea.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Cadmium** and can last for months or years:

Cancer Hazard

* **Cadmium** (especially *Cadmium Oxide*) is a PROBABLE CANCER-CAUSING AGENT in humans. There is some evidence that it causes prostate and kidney cancer in humans and it has been shown to cause lung and testes cancer in animals.
* Many scientists believe there is no safe level of exposure to a cancer-causing agent.

Reproductive Hazard

* It is a PROBABLE TERATOGEN in humans.
* **Cadmium** may damage the testes (male reproductive glands) and may affect the female reproductive cycle.

Other Long-Term Effects

* Repeated low exposures can cause permanent kidney damage which can go unnoticed without testing until severe. The kidney damage can lead to kidney stones and other serious health problems.
* Emphysema and/or lung scarring can occur from a single high exposure or repeated lower exposures.
* Long term exposure can cause anemia, loss of sense of smell, fatigue and/or yellow staining of teeth.

MEDICAL

Medical Testing

Before beginning employment and at regular times after that, the following are recommended:

* Urine test for **Cadmium** (levels should be less than 10 micrograms per liter of urine).
* Urine test for "low molecular weight proteins" to detect kidney damage
* Urinalysis (UA).
* Lung function tests.

For persons exposed to levels equal to or greater than half the TLV, the following is also recommended:

* Complete blood count (CBC).

These should be repeated after suspected overexposure.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure. Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

* Cigarette smoke contains some **Cadmium**. Because it is hard for the body to eliminate **Cadmium**, it tends to build up in the body. Any workplace exposure adds to these levels.
* Smoking or carrying cigarettes near **Cadmium** increases release of toxic fumes. Also, because both smoking and **Cadmium** can cause emphysema, lung effects may be greater in smokers.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace, and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* If **Cadmium** is used in a "hot" process such as smelting, steel fabricating, or melting **Cadmium** ingots, *Cadmium Fume* may be released. This is more acutely toxic than *Cadmium Dust* and proper controls and protective equipment are necessary.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: Occupational Exposure to *Cadmium #76-192.*

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Cadmium** should change into clean clothing promptly.
* Do not take contaminated work clothes home. Family members could be exposed.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Cadmium**.
* Wash any areas of the body that may have contacted **Cadmium** at the end of each workday, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Cadmium** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.
* Use a vacuum or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.
* When vacuuming, a high efficiency particulate absolute (HEPA) filter should be used, not a standard shop vacuum.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Cadmium**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Protection
Eye protection is included with the recommended respiratory protection.

Respiratory Protection
IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in OSHA 1910.134.

* At any exposure level, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Don't all chemicals cause cancer?
A: No. Most chemicals tested by scientists are not cancer-causing.

Q: Should I be concerned if a chemical causes cancer in animals?
A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.

Q: But don't they test animals using much higher levels of a chemical than people usually are exposed to?
A: Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone don't cause cancer unless it's a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?
A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of child-bearing age are at high risk.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

EMERGENCY INFORMATION

Common Name: **CADMIUM**

DOT Number: **UN 2570**
NFPA Flammability: **No Citation**
NFPA Reactivity: **No Citation**

WARNING

DO NOT USE WATER
FLAMMABLE POWDER
TOXIC FUMES PRODUCED IN FIRE
Health hazards on front page

FIRE HAZARDS

* **Cadmium** is a FLAMMABLE POWDER.
* Toxic Fumes are produced in a fire.
* Use dry chemicals appropriate for extinguishing metal fires. DO NOT USE WATER.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Cadmium** is spilled, take the following steps:

* Restrict persons not wearing protective equipment from area of spill until clean-up is complete.
* Remove all ignition sources.
* It may be necessary to contain and dispose of **Cadmium** as a HAZARDOUS WASTE. Contact the NJ Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your local fire department. You can also request emergency information from the following:

DEP HOTLINE: (609) 292-7172
CHEMTREC: (800) 424-9300

HANDLING AND STORAGE

* Prior to working with **Cadmium** you should be trained on its proper handling and storage.
* A regulated, marked area should be established where **Cadmium** is handled, used, or stored.
* **Cadmium** must be stored to avoid contact with SULFUR, SELENIUM, TELLURIUM, AMMONIUM NITRATE, and HYDRAZOIC ACID since violent reactions occur.
* Store in tightly closed containers in a cool well-ventilated area away from OXIDIZERS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, and NITRATES).
* Sources of ignition such as smoking and open flames are prohibited where **Cadmium** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

FIRST AID

NJ POISON INFORMATION 1-800-962-1253

Skin Contact
* Remove contaminated clothing. Wash contaminated skin with soap and water.

Eye Contact
* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention.

Breathing
* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.
* Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.

PHYSICAL DATA

Water Solubility: Insoluble

OTHER COMMONLY USED NAMES

Chemical Name: Cadmium
Other Name: C.I. 77180

New Jersey Department of Health
CN 368 Trenton, NJ 08625
(609) 984-2202

Date prepared: April 1986
Revision:

OES-16
AUG 84

New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **ASBESTOS**

CAS Number: See last page
DOT Number: UN 2212/UN 2590

Substance number: 0164
Date: 2/25/87 Revision: 1-87

HAZARD SUMMARY

* **Asbestos** can affect you when breathed in.
* **Asbestos** is a CARCINOGEN--HANDLE WITH EXTREME CAUTION.
* Repeated exposure can cause a disease called *Asbestosis* to develop, usually 20 or more years after exposure begins. *Asbestosis is a scarring* of the lungs that causes changes on chest x-ray, and shortness of breath with exertion. Progression of *Asbestosis* can lead to disability and death. The earlier exposure is stopped, the better the chance of stopping serious disease later.

IDENTIFICATION

Asbestos is the common name for a group of mineral fibers that range in color from white, green, brown, or blue. It is used as a fireproofing and insulating agent and in brake linings.

REASON FOR CITATION

* **Asbestos** is on the Workplace Hazardous Substance List because it is regulated by OSHA and cited by NIOSH, ACGIH, IARC, NTP and CAG.
* This chemical is also on the Special Health Hazard Substance List because it is a **CARCINOGEN**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

These exposure limits are for fibers longer than 5 micrometers.

OSHA: The legal airborne permissible exposure limit (PEL) is 0.2 fibers/cc averaged over an 8-hour workshift.

PEOSH: The NJ PEOSH legal airborne exposure limit is 0.1 fibers/cc averaged over an 8-hour workshift, and 0.5 fibers/cc, not to be exceeded during any work period.

NIOSH: The recommended airborne exposure limit is 0.1 fibers/cc averaged over an 8-hour workshift.

ACGIH: The recommended airborne exposure limits are for:
Amosite 0.5 fibers/cc
Chrysotile 2.0 fibers/cc
Crocidolite 0.2 fibers/cc
Other forms 2.0 fibers/cc
averaged over an 8-hour workshift.

* **Asbestos** is a CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of **Asbestos** chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* A regulated, marked area should be established where **Asbestos** is handled, used, or stored.
* Wear protective work clothing.
* Wash thoroughly at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Asbestos** to potentially exposed workers.

This Fact Sheet is a summary source of information for workers, employers, and community residents. Health professionals may also find it useful. If this substance is part of a mixture, this Fact Sheet should be used along with the manufacturer-supplied Material Safety Data Sheet (MSDS).

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Asbestos**:

* There are no known acute effects. People who develop serious and fatal disease later in life may feel fine at the time of exposure.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Asbestos** and can take months or years to develop:

Cancer Hazard

* **Asbestos** is a CARCINOGEN in humans. It has been shown to cause lung cancers (including *Mesothelioma*) as well as stomach, colon, rectal, vocal cord and kidney cancers.
* Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

* According to the information presently available to the New Jersey Department of Health, **Asbestos** has been tested and has not been shown to adversely affect reproduction.

Other Long-Term Effects

* Repeated exposure to **Asbestos** can cause the disease *Asbestosis*, a scarring of the lungs. The higher the exposure, and the longer the time of exposure, the more chance there is of serious illness.
* *Asbestosis* develops some years (from seven to thirty) after the period of exposure. It can progress to disability and death.

Symptoms of *Asbestosis* include shortness of breath on exertion and changes on the chest x-ray.

MEDICAL

Medical Testing

Before beginning employment and at regular times after that, the following are recommended:

* Lung function tests (annually).
* New Jersey Public Employee Occupational Safety and Health Act requires that employees with significant historical direct exposure receive a chest x-ray every 5 years for the first 15 years, then every 2 years until 20 years after first exposure, and yearly thereafter. Private sector employees have a slightly different schedule; refer to the new OSHA Standard 1910.1001.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are <u>not</u> a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by **Asbestos** exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems. The risk of lung cancer may be as much as <u>92 times higher</u> for people with **Asbestos** exposure who smoke than for those without both exposures.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Specific engineering controls are required for this by OSHA. Refer to the OSHA Standard for General Industry : 1910.1001 and the OSHA Standard for Construction: 1926.58, which applies to the *Asbestos Abatement Industry* (Federal Register Vol. 51, No. 119 June 20, 1986 Rules and Regulations.) Also refer to the NIOSH criteria document: Occupational Exposure to *Asbestos #77-169*.
* New Jersey PEOSHA, NJAC 12:100-12.6 requires the use of an enclosed, two hand glove system for brake and clutch repair and substitution with non-**Asbestos** brakes.
* Substitute the less toxic *mineral wool* and *fiberglass* for **Asbestos** where possible. There are substitutes for almost every use of **Asbestos**.
* There are extensive recommended and required engineering and procedural regulations for construction and repair projects involving **Asbestos** material. Before disturbing any **Asbestos** containing materials . Contact the NJ DOH for more information. Under OSHA and NJ PEOSHA all workers must receive special training by law.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Asbestos** must change into clean clothing.
* Do not take contaminated work clothes home. Family members could be exposed.
* Wash any areas of the body that may have contacted **Asbestos**.
* Do not eat, smoke, or drink where **Asbestos** is handled, processed, or stored, since **Asbestos** can be swallowed. Wash hands carefully before eating or smoking.
* Ongoing Asbestos abatement projects in sealed areas become very hot and humid. There is a risk of heat stress. You should be trained by your employer to recognize the warning signs and the proper action to take to avoid seriously dangerous working conditions.
* Do not dry sweep for clean-up. Use a vacuum or a wet method to reduce dust during clean-up.
* When vacuuming, a high efficiency particulate absolute (HEPA) filtered vacuum should be used, <u>not</u> a standard shop vacuum.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Asbestos**. Wear protective gloves and clothing. Protective gloves and clothing should be impenetrable to **Asbestos**.
* Contaminated, disposable work clothes should be disposed of with **Asbestos** waste.
* Non-disposable clothing should be placed in plastic bags for laundering or decontamination by the employer.

Eye Protection

* Eye protection is included in the recommended respiratory protection.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

At any exposure level, use a MSHA/NIOSH approved combination respirator which includes a Type-C supplied-air respirator with a full facepiece operated in the pressure-demand mode and with either emergency HEPA backup filter or auxiliary self-contained breathing apparatus operated in the pressure-demand mode. [Caution: This type of respirator is not to be confused with demand or continuous flow Type-C supplied air respirators, which are not recommended.] Alternatively, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in the pressure-demand mode.

* However, during asbestos abatement projects when it is impossible to use supplied air or self-contained breathing apparatus, use a full facepiece powered air purifying respirator with high efficiency particulate filters.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Don't all chemicals cause cancer?

A: No. Most chemicals tested by scientists are not cancer-causing.

HANDLING AND STORAGE

* Prior to working with Asbestos you must be, by law trained on its proper handling and storage.
* A regulated, marked area should be established where Asbestos is handled, used, or stored.
* Airborne Asbestos dust is very difficult to remove. It is therefore essential that any area where Asbestos is handled be enclosed and isolated. The material should be kept wet with special surfactants and water.
* Enclose operations and use local exhaust ventilation with negative pressure air filtration and high efficiency particulate filters in areas of Asbestos removal. If enclosure with containment "glove" bags is not used for minor repairs, respirators must be worn and proper procedures must be followed.
* All Asbestos materials must be removed and disposed of according to regulations. The area must be monitored to ensure airborne Asbestos levels are below limits prior to reoccupation of the area where Asbestos was disturbed.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: **ASBESTOS**
DOT Number: **UN 2212/UN 2590**
DOT Emergency guide code: **31**

NJ DOH Hazard rating	
FLAMMABILITY	0
REACTIVITY	0
CARCINOGEN	

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* Extinguish fire using an agent suitable for type of surrounding fire. Asbestos itself does not burn.
* Care should be taken to contain **Asbestos** materials disturbed in a fire.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Asbestos** is spilled or damaged take the following steps:

* Restrict persons not wearing protective equipment from area of spill until clean-up is complete.
* Proper procedures for repair or removal of the material must be followed by trained personnel.
* Spills and damaged **Asbestos** material MUST be cleaned using wet methods. DO NOT DRY SWEEP or SHOVEL.
* It may be necessary to contain and dispose of **Asbestos** as a HAZARDOUS WASTE. Contact your State Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your local fire department. You can also request emergency information from the following:

DEP HOTLINE: (609) 292-7172
CHEMTREC: (800) 424-9300

HANDLING AND STORAGE (See page 4)

FIRST AID

NJ POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

OTHER COMMONLY USED NAMES

Asbestos may be a common name for any combination of the following:

Asbestos, Crocidolite
CAS # 12001-28-4
Asbestos, Anthrophyllite
CAS # 77536-67-5
Asbestos, Amosite
CAS # 12172-73-5
Asbestos, Chrysotile
CAS # 12001-29-5
Asbestos, Tremolite
CAS # 14567-73-8
Asbestos (no specification)
CAS # 1332-21-4

NEW JERSEY DEPARTMENT OF HEALTH
Right to Know Project
CN 368, Trenton, NJ 08625-0368
(609) 984-2202

New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

COMMON NAME: METHYL ALCOHOL

CAS NUMBER: 67-56-1 **DOT NUMBER:** UN 1230

HAZARD SUMMARY

* Methyl Alcohol can affect you when breathed in and by passing through your skin.
* Exposure can cause blindness.
* It may damage the liver.
* Exposure to high concentrations can cause headaches, nausea, vomiting and dizziness. It can cause death.
* Repeated or prolonged contact can cause dryness and cracking of the skin.
* Methyl Alcohol is a FLAMMABLE LIQUID and a FIRE HAZARD.

IDENTIFICATION

Methyl Alcohol is a colorless liquid with a strong odor. It is used as a solvent and cleaner.

REASON FOR CITATION

* Methyl Alcohol is on the Workplace Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH and NFPA.
* This chemical is on the Special Health Hazard Substance List because it is FLAMMABLE.
* Definitions are provided on page 5.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 200 ppm averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is 200 ppm averaged over an 10-hour workshift and 800 ppm, not to be exceeded during any 15 minute work period.

ACGIH: The recommended airborne exposure limit is 200 ppm averaged over an 8-hour workshift and 250 ppm as a STEL (short term exposure limit).

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* ODOR THRESHOLD = 100 ppm.
* The odor threshold only serves as a warning of exposure. Not smelling it does not mean you are not being exposed.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to Methyl Alcohol and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Methyl Alcohol to potentially exposed workers.

This Fact Sheet is a summary source of information for workers, employers, and community residents. Health professionals may also find it useful. If this substance is part of a mixture, this Fact Sheet should be used along with the manufacturer-supplied Material Safety Data Sheet (MSDS).

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Methyl Alcohol:

* Contact may irritate the eyes, and exposure to high concentrations can irri-tate the eyes, nose, mouth, and throat.
* Breathing the vapor or absorbing the liquid through the skin can cause permanent blindness.
* Exposure to high concentrations can cause headaches, nausea, vomiting and dizziness. It can cause death.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Methyl Alcohol and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health, Methyl Alcohol has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* According to the information presently available to the New Jersey Department of Health, Methyl Alcohol has not been tested for its ability to adversely affect reproduction.

Other Long-Term Effects

* It may damage the liver.
* Repeated or prolonged contact can cause dryness and cracking of the skin.

MEDICAL TESTING

If symptoms develop or overexposure is suspected, the following are recommended:

* Liver function tests.
* Exam of the eyes and vision.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are <u>not</u> a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace, and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid Methyl Alcohol from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document on *Methyl Alcohol # 76-148*.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Methyl Alcohol** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Methyl Alcohol**.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* Wash any areas of the body that may have contacted **Methyl Alcohol** at the end of each work day, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Methyl Alcohol** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Methyl Alcohol**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/ clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* ACGIH recommends *Nitrile Rubber* or *VITON* as good to excellent protective materials.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over 200 ppm, use an MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use an MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
* Exposure to 25,000 ppm is immediately dangerous to life and health. If the possibility of exposures above 25,000 ppm exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **Methyl Alcohol** you should be trained on its proper handling and storage.
* **Methyl Alcohol** must be stored to avoid contact with STRONG OXIDIZERS (such as CHLORINE, BROMINE, and FLUORINE).
* Store in tightly closed containers in a cool well-ventilated area away from HEAT.
* Sources of ignition such as smoking and open flames are prohibited where **Methyl Alcohol** is handled, used, or stored.
* Metal containers involving the transfer of 5 gallons or more should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
* Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Alcohol**.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey State Department of Health
Occupational Disease Prevention and Information Program
CN 360
Trenton, NJ 08625
(609) 984-1863

Right to Know Information Resources

The Right to Know Hotline (609) 984-2202 can answer questions about the identity of chemicals, the preparation of the workplace surveys, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-5627.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions or trade associations, and other groups.

General References

A list of educational materials in occupational health and references used to prepare the Fact Sheets are available upon request.

Industrial Hygiene Information and Surveys

Industrial hygienists are available to answer your questions regarding the health effects of chemical substances present in your workplace. In response to requests, a field investigation, including a walk-through, air monitoring, measurements of temperature and humidity, and evaluation of existing engineering controls, can be provided.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you can call to make an appointment at the Occupational Health Clinic to be examined by our physicians. The only fees are for laboratory tests. The clinic is located at the Helene Fuld Medical Center in Trenton but we can refer you to another center if you cannot travel. In addition, if a large number of individuals need to be screened, a mobile screening van can be brought to your workplace for the examinations and testing.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

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EMERGENCY INFORMATION

Common Name: METHYL ALCOHOL

DOT Number: UN 1230
NFPA Flammability: 3
NFPA Reactivity: 0

WARNING

FLAMMABLE LIQUID
POISONOUS GASES ARE PRODUCED IN FIRE
Health hazards on front page

FIRE HAZARDS

* Methyl Alcohol is a FLAMMABLE LIQUID.
* Use dry chemical, CO_2, or alcohol foam extinguishers and water to keep fire exposed containers cool.
* POISONOUS GASES ARE PRODUCED IN FIRE, including *Formaldehyde*.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If Methyl Alcohol is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Keep Methyl Alcohol out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of Methyl Alcohol as a HAZARDOUS WASTE. Contact the NJ Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your local fire department. You can also request emergency information from the following:

DEP HOTLINE: (609) 292-7172
CHEMTREC: (800) 424-9300

HANDLING AND STORAGE (See page 3)

FIRST AID

NJ POISON INFORMATION 1-800-962-1253

Eye Contact
* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

Skin Contact
* Quickly remove contaminated clothing. Immediately wash area with large amounts of water. Seek medical attention.

Breathing
* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 97 mm Hg at 68°F
Flash Point: 52°F
Water Solubility: Miscible

OTHER COMMONLY USED NAMES

Chemical Name: Methanol
Other Names: Wood Alcohol; Carbinol; Methylol

New Jersey Department of Health
CN 368 Trenton, NJ 08625
(609) 984-2202

Date prepared: April 1986
Revision: #1

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