Technology Section RBD File

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

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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.

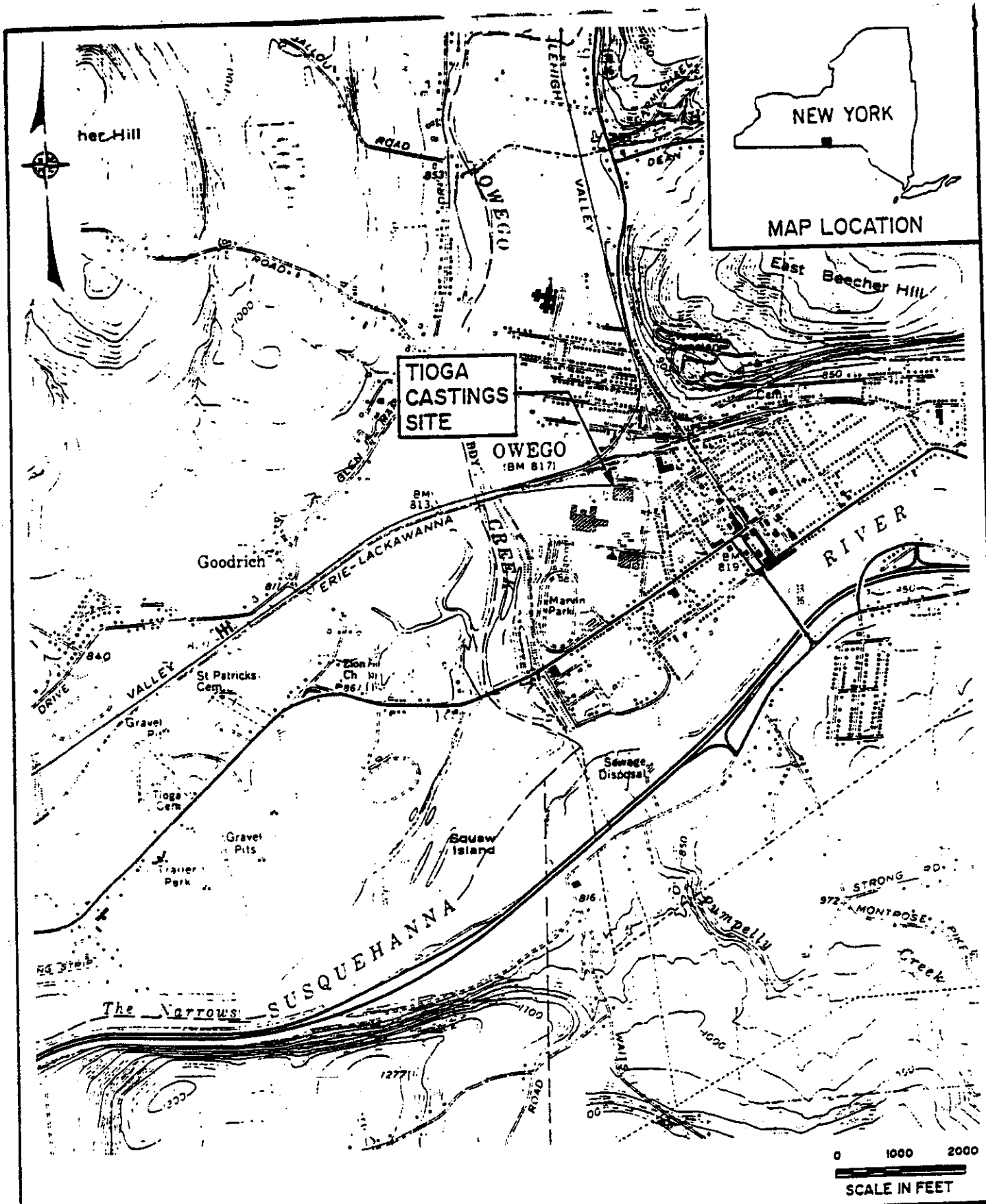
In addition, analytical results from a landfill surface soil sample showed a total lead concentration of 15,000 ppm (as discussed in Section 6, the cleanup goal for lead has been identified as 250 ppm). A temporary cover was placed over the landfill in August 1991 in order to minimize the potential for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



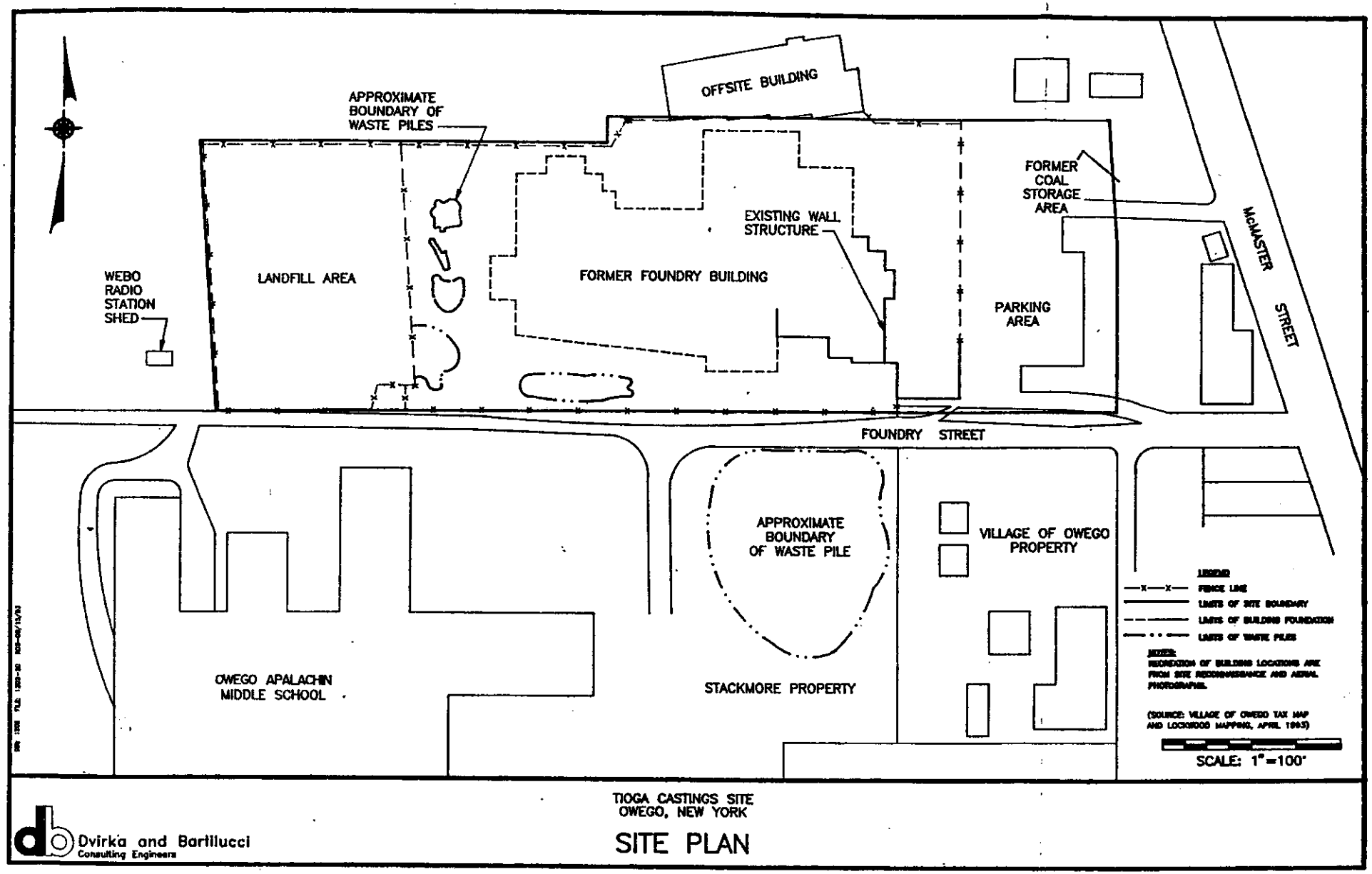
SOURCE: USGS OWEGO, N.Y. QUADRANGLE

TIOGA CASTINGS SITE
OWEGO, NEW YORK

SITE LOCATION MAP

FIGURE 1

Dvirka and Bartlucci
CONSULTING ENGINEERS



TIOGA CASTINGS SITE
OWEGO, NEW YORK

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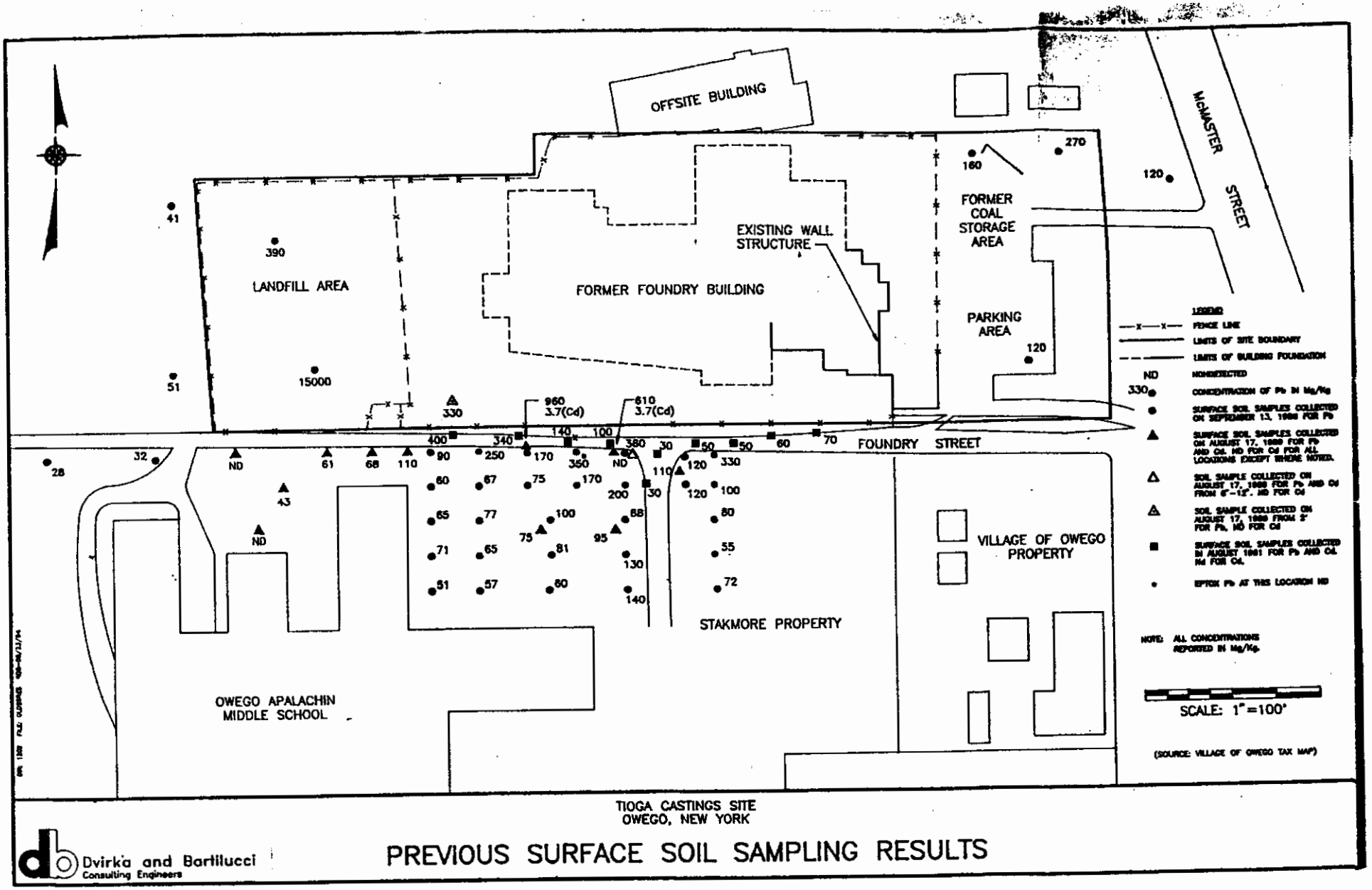
SITE PLAN

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

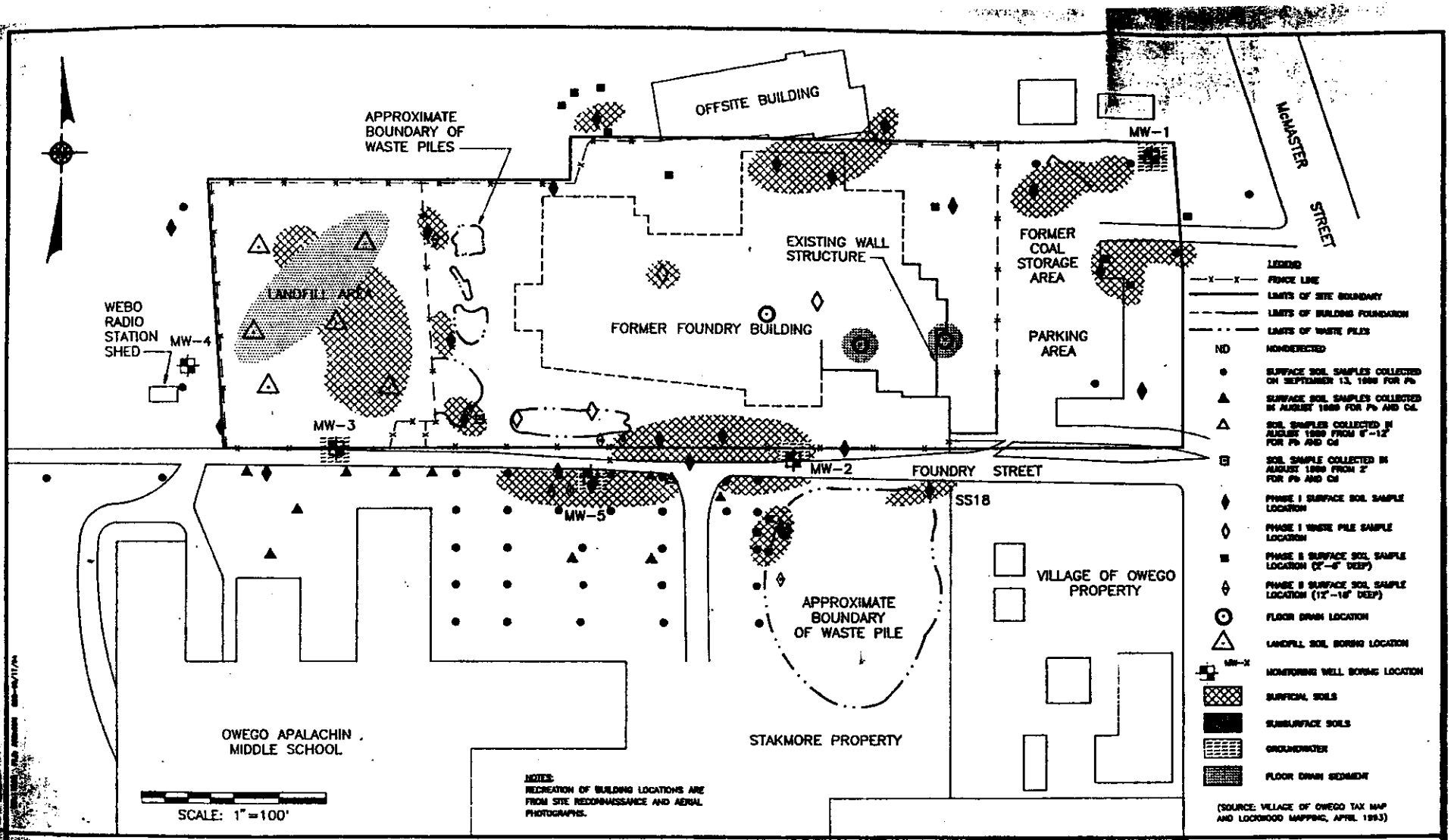
Elevated levels of certain metals have been found in soils on site as well as adjacent to the site. The metals found at elevated concentrations include cadmium, lead, and chromium. Generally, lead and cadmium are the most predominant contaminants which will drive the remediation at this site. Figure 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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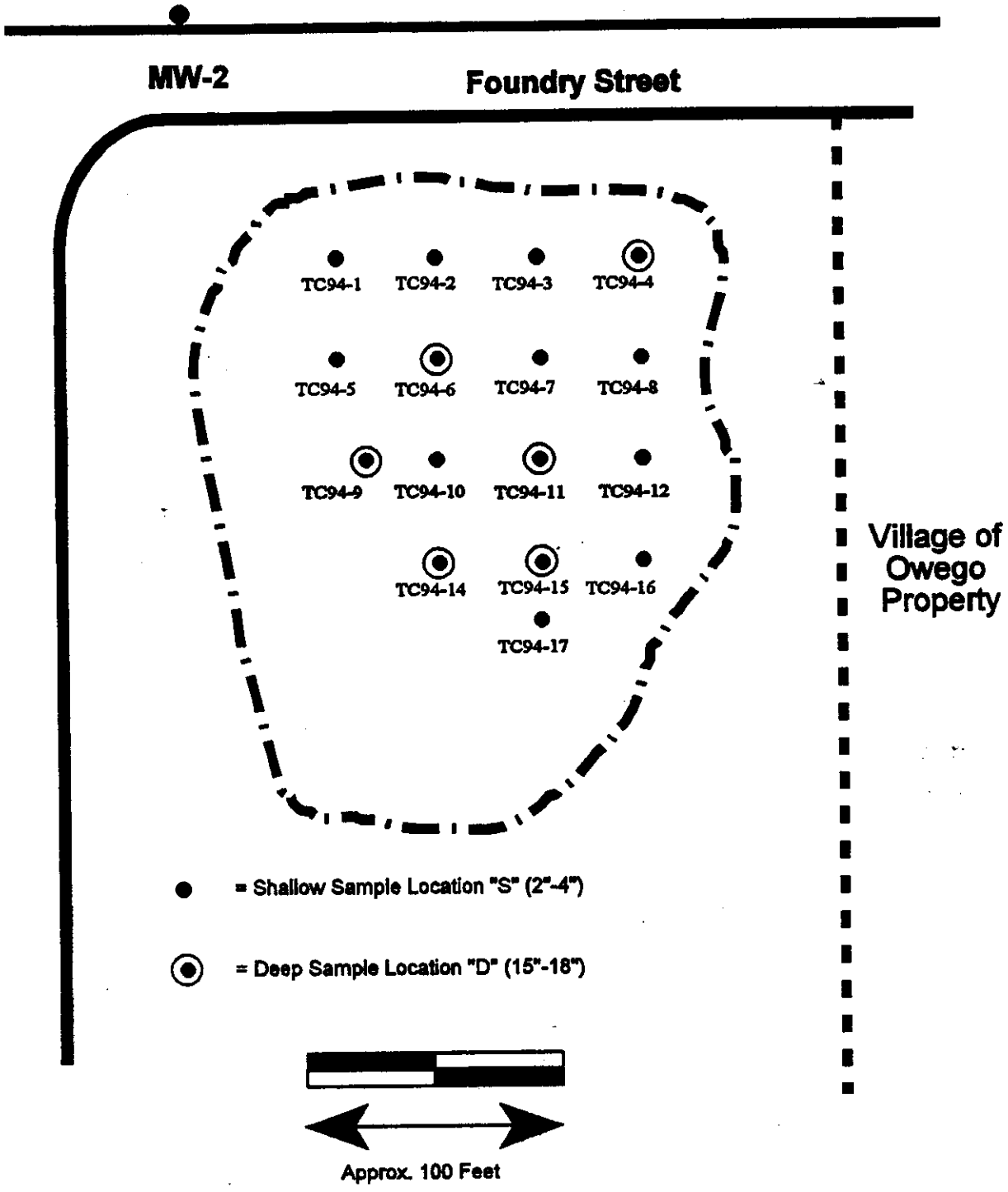
AREAS OF CONCERN

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).

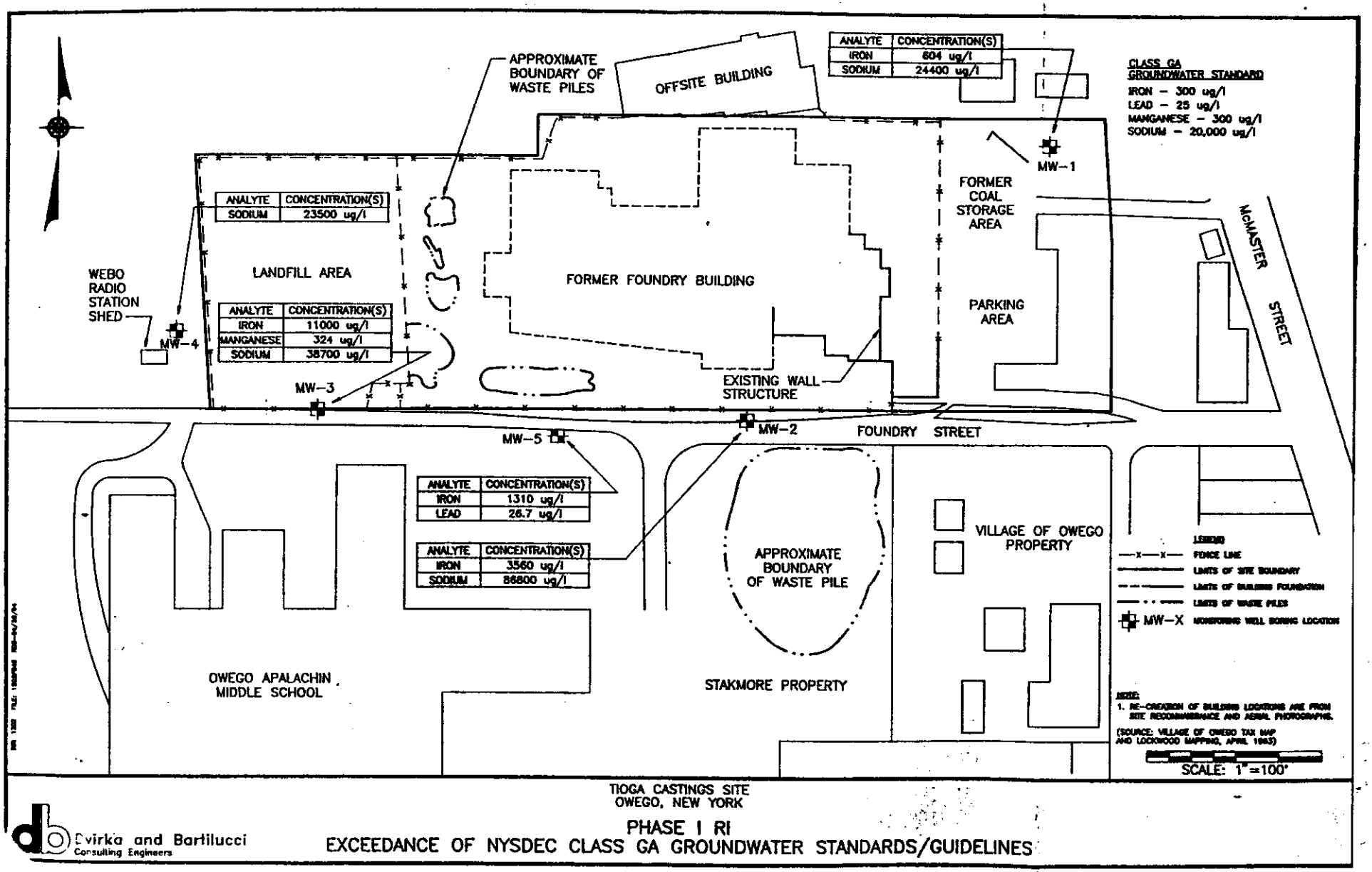
At a minimum, the remedy selected should eliminate or mitigate all significant threats to public health and the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

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	26.6	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.