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U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION II

PROPOSED RRT REMEDIATION PLAN

S-AREA LANDFILL SITE

NIAGARA FALLS, NY

MAY 1990

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION II

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PROPOSED RRT REMEDIATION PLAN
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INTRODUCTION

This Proposed RRT Remediation Plan (Plan) describes the proposed remedial alternative for the S-Area Landfill Site. This proposed alternative consists of a Site barrier wall containment system, drain tiles and collection wells within the barrier wall, ground water pumping wells beneath the Site to recover aqueous and nonaqueous phase liquid chemicals (APL and NAPL), and associated monitoring programs. The proposed remedial alternative is consistent with the requirements of the 1985 S-Area Judgment entered in the Court of the Western District of New York, and signed by Occidental Chemical Corporation (OCC), the United States Environmental Protection Agency (EPA), the United States Department of Justice (DOJ), the New York State Departments of Environmental Conservation, Health, and Law (State), and the City of Niagara Falls (CNF). The discussions among the parties concerning the proposed remedy for the S-Area Landfill Site are being conducted within the framework of the 1985 S-Area Judgment. The proposed remedial alternative presented in this Plan is the product of on-going negotiations among the parties for the development of a final agreement to ensure its implementation. The following documents were used as a basis for the negotiations: i) OCC's survey assessment reports and associated appendices; ii) EPA/State's responses to OCC's assessment reports; ii) OCC's Requisite Remedial Technology Study (RRT Study); and iv) EPA/State's response to OCC's RRT Study. These documents and other relevant Site information are available at the EPA Public Information Office, which is located in the Carborundum Center, at 345 Third Street, Suite 530, Niagara Falls, New York. Appropriate documentation will also be assembled into the Administrative Record File for the S-Area project, and will be available at the EPA Public Information Office.

This Plan provides background on the S-Area Landfill Site, summarizes alternatives for remediating the Site, presents the proposed remedy, and outlines the public's role in helping EPA and the State reach agreement on a remedy for the Site.

This Plan is being made available to inform the public concerning the remediation of the S-Area Landfill Site.

SITE BACKGROUND

The S-Area Landfill Site, roughly shown in Figure I, includes an approximately eight-acre landfill owned by Occidental Chemical Corporation (OCC) which is located on OCC's Buffalo Avenue Plant, in the southeast corner, adjacent to 53rd Street in Niagara Falls, New York. OCC disposed of approximately 63,000 tons of chemical processing wastes into the S-Area from 1947-1961. The S-Area was also used by OCC for disposal of other wastes and debris, and this practice ended in 1975. Located east of the Site, across 53rd Street, is the City of Niagara Falls Water Treatment Plant (CWTP). The S-Area Landfill lies on top of approximately 30 feet (in depth) of soil, clay, till, and man-made fill (i.e., overburden) on an area reclaimed from the Niagara River. Beneath these materials is fractured bedrock. Two lagoons are located on top of the S-Area Landfill for non-hazardous waste from plant operations and are operated under New York State permits. In 1989, OCC made a decision to discontinue operating these lagoons.

During an inspection of the CWTP in 1969, chemicals were found in the bedrock water intake structures. In 1978, sampling of the structures and of the bedrock water intake tunnel revealed chemical contamination, and subsequently the City of Niagara Falls took action to safeguard its water processing system.

In December 1979, the U.S. Department of Justice filed a civil action against OCC on behalf of EPA. Thereafter, the State joined the lawsuit. The civil action began a series of negotiations among EPA/State, OCC, and the City of Niagara Falls to investigate and assess the extent of chemical migration from the S-Area Landfill Site into the adjacent overburden and bedrock and prescribe remedies for the overburden portion of the S-Area Landfill Site and for the CWTP. These negotiations continued until 1984. A Settlement Agreement was signed on January 10, 1984 and was approved and entered by the District Court of Western New York on April 15, 1985.

Following the effective date of the Judgment, EPA/State and OCC discussed how the remedial investigatory work required by the Judgment would be performed. OCC began the investigation work in December 1986 and completed most of the work by April 1988.

The results of the investigation work indicate the following:

- The ground water flow in the overburden is to the south of the S-Area Landfill Site, toward the Niagara River. The ground water flow in the bedrock is generally in a west/northwesterly direction, away from the S-Area, beneath OCC's Buffalo Avenue Plant, and, ultimately, to the lower Niagara River.

- In the overburden, Nonaqueous Phase Liquid Chemicals (NAPL) have migrated in all directions (i.e., to the north, west, south and east onto the CWTP property). Aqueous Phase Liquid Chemicals (APL) have migrated through the overburden to the west (toward the Power Authority Intakes) and south (to the Niagara River). Additionally, S-Area specific indicator chemicals are present on the CWTP property, to the east of the S-Area Landfill Site.

- Based on the data collected adjacent to the Industrial Intake Pipe Trench (IIPT), it is likely that the IIPT serves as a pathway for APL and NAPL migration.

- NAPL has migrated from the S-Area Landfill Site into the bedrock beneath the Site.

- NAPL has migrated several hundred feet from the S-Area Landfill Site to the north, northeast, west under OCC's Buffalo Avenue Plant, and to the east underneath the CWTP.

- The deepest location at which NAPL was observed was at 164 feet below ground surface.

- NAPL has migrated into the bedrock beneath the Niagara River.

- APL has been determined to be present within the bedrock NAPL plume and beyond it to the north, west and to the east underneath the CWTP.

- Based upon analyses of data collected during the surveys and studies work, OCC identified an area of overburden (Confining Layer) lacking a sufficient clay/till layer to prevent the downward migration of NAPL. This area makes up about one-third of the

southernmost portion of the S-Area Landfill Site.

SUMMARY OF SITE RISKS

OCC conducted an Endangerment Assessment (EA) as described in its RRT Study. EPA/State, likewise, performed an EA as part of their response to OCC's RRT Study. A list of chemicals of concern which move with the ground water and exposure pathways were evaluated by OCC and subsequently by EPA/State. Chemicals which are evaluated are listed in OCC's RRT Study, Chapter 4 and in EPA/State's response to OCC's RRT Study, Appendix D.

In their respective documents, OCC and EPA/State calculated carcinogenic and non-carcinogenic risks for exposure to contaminated ground water via swimming and fishing in the Power Authority of the State of New York (PASNY) Reservoir, and fishing, swimming, and consuming drinking water in and from the lower Niagara River and Lake Ontario. Consumption of drinking water from the CWTP was found not to present health risks. The City conducts daily monitoring of their water system and such monitoring confirms that processed water is free from S-Area chemicals. Nevertheless, the S-Area Landfill Site, due to its proximity to the CWTP, presents a potential public health threat to the consumers of drinking water from the CWTP, if not remediated.

For non-carcinogenic chemicals, a Hazard Index (HI) was calculated by OCC and by EPA/State to determine risk. An estimate of non-carcinogenic risks (i.e., HIs) for each exposure pathway (e.g., swimming, fishing, and drinking water) from all chemicals of concern is obtained by adding the risks from each chemical. The total non-carcinogenic risk is then determined by adding the HIs (risks) for each exposure pathway. If the Hazard Index is calculated to be less than the number one, then no adverse health effects are expected from any exposure to non-carcinogenic chemicals. Non-carcinogenic risks due to S-Area contamination of the lower Niagara River/Lake Ontario and of the PASNY Reservoir were calculated by OCC and EPA/State to be 5.14×10^{-6} and 2.78×10^{-5}, and 1.12×10^{-5} and 2.49×10^{-5}, respectively. Since the risks (HIs) are less than the number one, the data do not support the possibility of adverse health effects from exposure to non-carcinogenic chemicals.

Carcinogenic risks were determined using the same pathways of exposure stated above. OCC and EPA/State calculated carcinogenic risks associated with S-Area contamination of the lower Niagara River/Lake Ontario and of the PASNY Reservoir to be 7.08×10^{-8} and 4.30×10^{-6}, and 1.31×10^{-7} and 2.57×10^{-6}, respectively.

With respect to the presence of NAPL beneath the Niagara River, there is no direct exposure pathway for NAPL. However, chemicals that are present in NAPL dissolve into the ground water to form APL. This APL serves as a basis from which risk is determined. In the report entitled, "NAPL in the Bedrock Beneath the Niagara River, Assessment of Human Endangerment," OCC calculates a cancer risk to be 2.65×10^{-7}. APL, which forms the basis for the risk calculation, migrates from the bedrock under the Niagara River, toward and ultimately west/northwest away from the S-Area Landfill Site. The proposed remedy in the bedrock is intended to address this plume and any endangerment it presents.

The risk numbers generated by OCC and by EPA/State are different because of different assumptions that were made by each party in performing its calculations. However, the overall risks identified by each party are approximately equivalent. The proposed remedy and its response actions will address these risks.

THE REQUISITE REMEDIAL TECHNOLOGY (RRT) PHASE

As a follow-up to conducting the investigation work, OCC submitted its Requisite Remedial Technology (RRT) Study to EPA/State on November 1, 1988. The RRT Study considers the following factors:

> "the nature of the endangerment to human health and the environment which the Remedial Technology is designed to address; the extent to which application of the Remedial Technology would reduce such endangerment to human health or the environment or would otherwise benefit human health or the environment; and the economic costs required to apply the Remedial Technology." (Judgment, Paragraph 4(b), Page 6.)

OCC's RRT Study lists certain technologies and briefly discusses their applicability to the environmental conditions of the S-Area Landfill Site. OCC proposes technologies and describes five alternatives which could be implemented to remediate the S-Area Landfill Site. OCC ultimately proposed one of their alternatives (Number four) as its preferred remedial option. The EPA/State expressed disagreement with certain aspects of that alternative as described in the governments' response of February 24, 1989. Thereafter, EPA/State, the City of Niagara Falls, and OCC entered into negotiations for a remedial program for the S-Area Landfill Site as described in this document.

SUMMARY OF REMEDIAL ALTERNATIVES

The alternatives in this Plan are evaluated based on the following general criteria:

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- Compliance with applicable laws addresses whether or not a remedy would be consistent with all applicable laws.

- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time.

- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies that a remedy may employ.

- Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period.

- Implementability involves the technical and administrative feasibility of a remedy, including the availability of material and services needed to implement the chosen remedy.

- Cost includes estimated capital and operation and maintenance costs, and net present worth costs.

- State acceptance indicates whether, based on its review of all investigatory work and analysis of remedial alternatives, the State concurs with, or opposes the remedy.

- Community acceptance refers to the public's response to the remedy.

REMEDIAL ALTERNATIVES

OCC's RRT Study presents five alternatives for addressing the conditions of the S-Area Landfill Site. Each alternative presented in OCC's RRT Study is a variation of a containment remedy and is illustrated in Figures II to VI. These figures follow page 19. The alternatives in OCC's RRT Study are presented below.

No Action Alternative

For the initial screening of alternatives, OCC briefly discussed the "No Action" alternative. All the parties involved in the project have concluded that Remedial Action is appropriate and necessary to address the conditions of the S-Area Landfill Site.

Alternative 1

Install Site and Northern Containment Systems as shown in Figure II in accord with the 1985 Judgment, including:

a) Barrier Wall;

b) Tile Collection Systems;

c) Operate Site Containment Systems to achieve upward gradient;

d) Cap Site and Northern Area;

e) Construct overburden tile collection system outside north-west Site Barrier Wall;

f) Construct downgradient overburden barrier wall along the Niagara River and install overburden collection system wells;

g) Construct upgradient bedrock barrier wall along the Niagara River and bedrock collection wells south, west and north of S-Area;

h) Construct bedrock barrier wall and horizontal barrier to create "Bathtub" in bedrock. Install injection wells under S-Area;

i) Estimate construction period for the above activities excluding capping to be 51 months; and

j) Capital cost is 53.7 million dollars.

Alternative 2

Install modified Site and Northern Containment Systems as shown in Figure III, including:

a) Barrier Walls;

b) Tile Collection Systems;

c) Grout bedrock areas in lieu of creating upward gradient (grout areas of clay/till $\leq$1 foot);

d) Construct a cap on the S-Area Landfill Site and Northern Area in accord with the 1985 Judgment;

e) Construct overburden tile collection systems outside north-west Site Barrier Wall;

f) Construct downgradient overburden barrier wall along Niagara River and install overburden collection system wells;

g) Grout the bedrock where the clay/till thickness is less than or equal to one foot;

h) Construct upgradient bedrock barrier wall along the Niagara River and bedrock collection wells south, west and north of S-Area;

i) Estimate construction period for the above activities excluding capping to be 28 months; and

j) Capital cost is 17.9 million dollars.

Alternative 3

Install modified Site and Northern Containment Systems as shown in Figure IV, including:

a) Partial Barrier Wall;

b) Tile Collection Systems;

c) Grout bedrock areas in lieu of creating upward gradient (grout areas of clay/till ≤1 foot);

d) Cap Site and Northern Area in accord with the 1985 Judgment;

e) Construct downgradient overburden barrier wall along the Niagara River and install overburden collection system wells;

f) Grout the bedrock where the clay/till thickness is less than one-foot;

g) Construct upgradient bedrock barrier wall along the Niagara River and bedrock collection wells south, west and north of S-Area;

h) Estimate construction period for the above activities excluding capping to be 24 months; and

i) Capital cost is 15.6 million dollars.

Alternative 4

Install modified Site and Northern Containment Systems as shown in Figure V, including:

a) Tile Collection Systems;

b) Grout bedrock areas in lieu of creating upward gradient (grout areas of clay/till ≤ 1 foot);

c) Cap Site and Northern Area in accord with the 1985 Judgment;

d) Construct overburden barrier wall east of NAPL plume;

e) Construct downgradient overburden barrier wall along the Niagara River and install overburden collection system wells;

f) Grout the bedrock where the clay/till thickness is less than or equal to one foot;

g) Construct upgradient bedrock barrier wall along the Niagara River and bedrock collection wells south, west and north of S-Area; and

h) Estimate construction period for the above activities excluding capping to be 21 months; and

i) Capital cost is 14.9 million dollars.

Alternative 5

As shown in Figure VI, including:

a) Construct downgradient overburden barrier wall along the Niagara River;

b) Construct upgradient bedrock barrier wall along the Niagara River and bedrock collection wells south, west and north of S-Area;

c) Cap Site and Northern Area as per the 1985 Judgment;

d) Estimate construction period for the above activities excluding capping to be 12 months; and

e) Capital cost is 9.2 million dollars.

OCC's cost estimates for each alternative are provided in Table I. A list of capital cost expeditures for each of OCC's five alternatives can be found in OCC's RRT Study, dated October 31, 1988.

IDENTIFICATION OF THE PROPOSED REMEDIAL ALTERNATIVE

OCC submitted its RRT Study to EPA/State on November 1, 1988. In the RRT Study, OCC proposed their alternative Number four as its preferred remedial option. The EPA/State expressed disagreement with certain aspects of that alternative as described in the governments' response of February 24, 1989. Thereafter, EPA/State, OCC, and the City of Niagara Falls entered into negotiations for a remedial program for the S-Area Landfill Site.

The proposed remedy described in this document is, to an extent, a combination of the alternatives that were previously described, in that it employs various components of those alternatives in a way to produce an effective remedy. The proposed remedial alternative calls for a containment remedy with provisions for the collection of aqueous phase liquid chemicals (APL) and nonaqueous phase liquid chemicals (NAPL), treatment of APL, incineration of NAPL, monitoring programs to assess the effectiveness of the remedial systems, and response actions to ensure that the proposed remedy is effective. Figures VII, VIII and IX present the conceptual plan. The following is a brief description of the plan.

The proposed alternative includes:

- A Containment System to encompass the NAPL plume in the overburden.

- Drain tile collection system and purge/recovery wells in the overburden to collect APL and NAPL.

- Capping of the site to reduce infiltration and limit the creation of more APL.

- Overburden monitoring programs:

  i) Hydraulic - to measure whether APL and NAPL are being contained within the overburden; and

  ii) NAPL - to evaluate wells for continued pumping of NAPL and to ensure that NAPL is contained.

- A pumping well system in the bedrock to collect APL and recover NAPL.

- Bedrock monitoring programs:

  i) Hydraulic - to measure whether APL is being contained by the bedrock pumping systems;

  ii) Tracer - to evaluate the effectiveness of the Bedrock RRT system at containing NAPL and APL within the existing NAPL plume in the bedrock, and at containing NAPL in the bedrock south of the site;

  iii) NAPL - to evaluate the effectiveness of the remedial systems at containing NAPL;

  iv) Chemical - to evaluate the effectiveness of the bedrock RRT Systems; and

  v) Environmental - to evaluate the effectiveness of the Bedrock RRT System at protecting human health and the environment from endangerment by migration of chemicals from the S-Area Landfill Site.

EPA's estimated costs for the proposed remedy for the present worth, capital cost, and annual operation and maintainence are $ 50,000,000, $ 25,000,000, and $ 2,600,000, respectively.

ANALYSIS OF THE PROPOSED REMEDIAL ALTERNATIVE

1. Overall Protection of Human Health and the Environment

The proposed remedial alternative for the S-Area Landfill Site will be designed and operated to be fully protective of human health and the environment. Potential short-term risks due to construction activities will be addressed by the implementation of a comprehensive environmental health and safety program. The risk posed by the site will be reduced by containing and/or collecting, and subsequently treating APL and NAPL. There will be a reduction in the mobility of APL and NAPL and a reduction in the source of ground water contamination (i.e., NAPL) will also be achieved. An environmental monitoring program will be conducted to ensure that chemical loadings from the S-Area Landfill Site do not continue to escape the influence of the remedial systems. Other monitoring programs previously described will be implemented to evaluate the effectiveness of the remedy. Where necessary, the remedial systems will be modified to ensure that the remedies are effective.

The City of Niagara Falls and OCC have reached a conceptual agreement for OCC to purchase the existing CWTP property and help the City finance the construction of a new CWTP. With this

development, the S-Area Landfill Site will not pose a potential risk to the users of the City's drinking water. Monitoring and response action measures will be employed prior to the start-up of the new CWTP to ensure that the current CWTP continues to be protected during implementation of the proposed remedy.

2. Compliance With Applicable Laws

An objective of the proposed alternative is to contain and/or collect chemicals. The collected chemicals will be incinerated and/or treated, and other remedial activities that will be conducted will be consistent with all applicable local, State, and Federal laws.

3. Long-term Effectiveness

As previously stated, there are various monitoring programs that will evaluate the effectiveness of the remedy. Modifications to the remedial systems will be implemented if monitoring program response actions are triggered. The barrier walls are expected to present an impermeable, physical barrier to chemical migration. This is so because the material to be used for the barrier walls will be tested for chemical compatibility with S-Area chemicals. The operation of the tile collection system and collection wells in the overburden and collection wells in the bedrock are expected to be effective in collecting contaminated ground water because such technology is reliable. NAPL collection will be effective to the extent that it is within the radius of well influence of a collection well. The overburden is a porous media and as such will facilitate easier collection of NAPL than in the bedrock. NAPL will be recovered in the bedrock easier where the geology is substantially fractured (i.e., in the top 30 feet of bedrock). Capping of the site will be effective at reducing the amount of precipitation entering the S-Area Landfill Site (and thus reducing the contamination leaving the Site) because it is a reliable technology. With an appropriate operation and maintenance program for the proposed remedy, it is expected that the proposed remedy will remain effective during the course of the project.

4. Reduction of Toxicity, Mobility, or Volume

An objective of the remedy is to contain and/or collect and treat APL and NAPL. This will be accomplished by barrier walls and collection wells. The proposed remedy will provide for the reduction of mobility of APL and NAPL by a physical barrier in the overburden and by creating a hydrualic barrier in the overburden and in the bedrock through pumping wells, thus reducing the amount of contaminated ground water flow that would continue to migrate under non-pumping conditions.

Since APL is produced when water moves across a NAPL plume, the volume of APL would be reduced if a reduction in NAPL presence were achieved. The volume of APL will be reduced because NAPL will be removed from the S-Area Landfill Site. In collecting NAPL, its volume will also be reduced. APL will be removed from the S-Area Landfill Site and treated, and NAPL will be recovered and permanently destroyed by incineration. Therefore, the proposed remedy will reduce the toxicity, mobility and volume of S-Area chemicals.

5. Short-term Effectiveness

There is a limited potential for individuals working and living in close proximity to the S-Area Landfill Site to be exposed to contaminants during construction activities. Excavation of Site soils for the installation of the barrier walls and foundations for storage structures will result in the greatest potential of exposure to particulate and vapor emissions. However, a comprehensive environmental health and safety program will be in place to protect site workers and persons in close proximity to the S-Area Landfill Site. The proposed remedy will provide for short-term effectiveness because the barrier walls that will be installed during the early phase of remediation will provide an effective barrier to NAPL migration upon installation.

There could also be a temporary impact on traffic moving along the Robert Moses Parkway (RMP). This may occur when OCC installs grout plugs in two locations across the RMP. If the RMP is required to be closed for this activity, a redirection of traffic will be necessary. Depending on OCC's construction procedures, the RMP may not be required to be closed. While a redirection of traffic in the area will inconvenience motorists, this construction phase is not expected to be lengthy.

6. Implementability

The proposed remedial alternative is technically feasible and includes technologies which are proven, reliable, and commonly used at other sites. The proposed remedy is expected to be fully implementable.

7. Cost

The estimated costs for the proposed remedial alternative appear on page 12 and are listed in Table I.

8. State Acceptance

The State of New York concurs with the remedy. However, the concurrence of both EPA and the State of New York is contingent upon the lodging of a complete Stipulation with the court and

public review and comment on that Stipulation.

9. Community Acceptance

This criterion will be evaluated during the formal comment period to be held following the lodging of the RRT Stipulation. All written public comments received by the end of the public comment period will be considered in the remedy selection process.

COMMUNITY ROLE IN THE SELECTION PROCESS

This document is being issued to provide information to the public concerning the proposed remedial alternative for the S-Area Landfill Site. After the negotiations among the parties are complete, the RRT Stipulation will be lodged with the United States District Court for the Western District of New York. Following that lodging, a public comment period will begin during which interested persons can submit written comments to EPA/State regarding the proposed remedial alternative. Public meetings and availability sessions will also be scheduled following lodging of the RRT Stipulation.

TABLES

TABLE I

REMEDIAL ALTERNATIVES

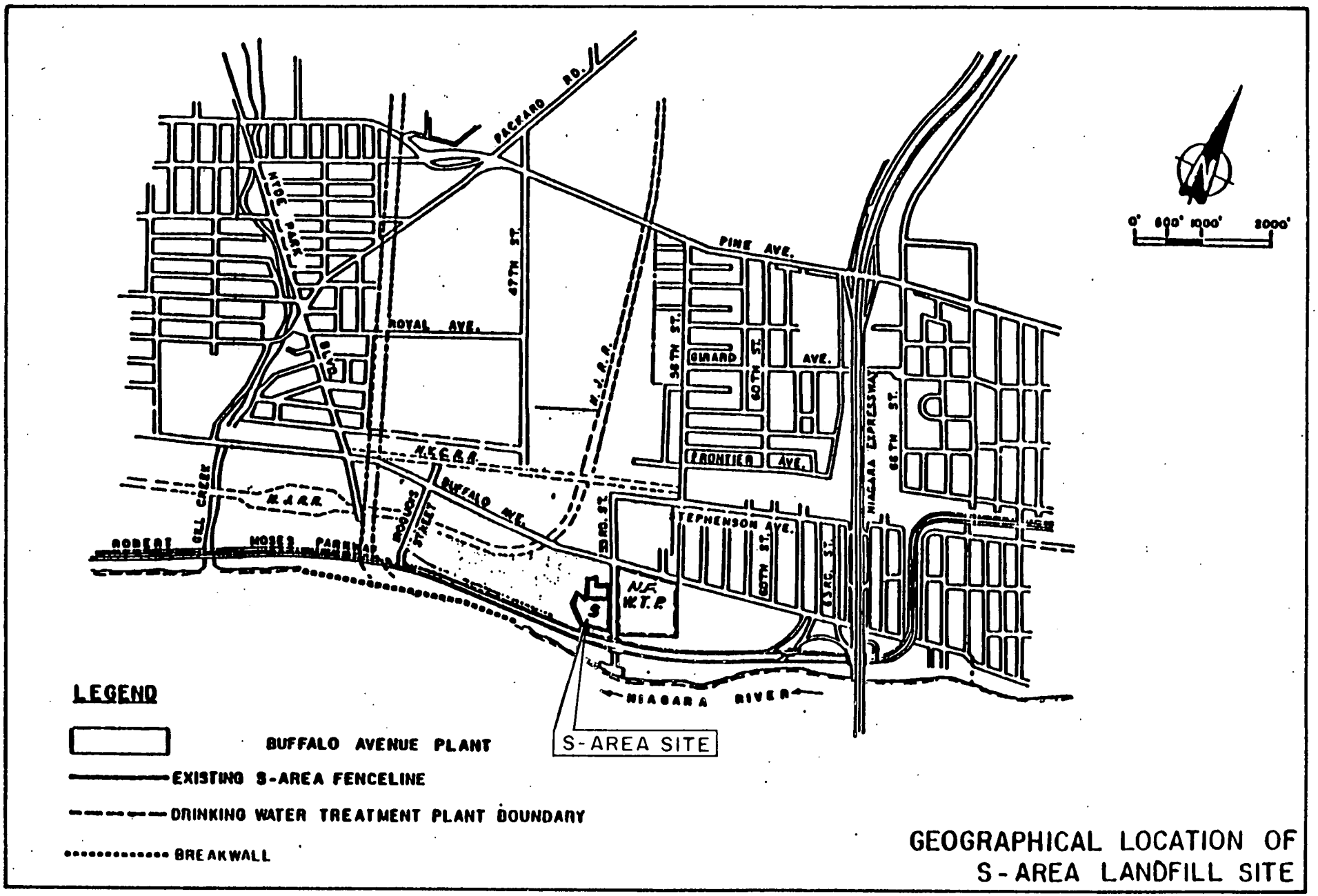
ESTIMATED COSTS

ALTERNATIVE	CAPITAL COST	YEAR 1 O & M COST
Alternative 1	57.3 million	2.6 million
Alternative 2	17.9 million	2.6 million
Alternative 3	15.6 million	2.6 million
Alternative 4	14.9 million	2.6 million
Alternative 5	9.2 million	2.4 million
Proposed Remedial Alternative	25.0 million	2.6 million

FIGURES

The following figures are not presented as evidence, but as negotiation and illustration tools.

FIGURE I



GEOGRAPHICAL LOCATION OF
S-AREA LANDFILL SITE

FIGURE II

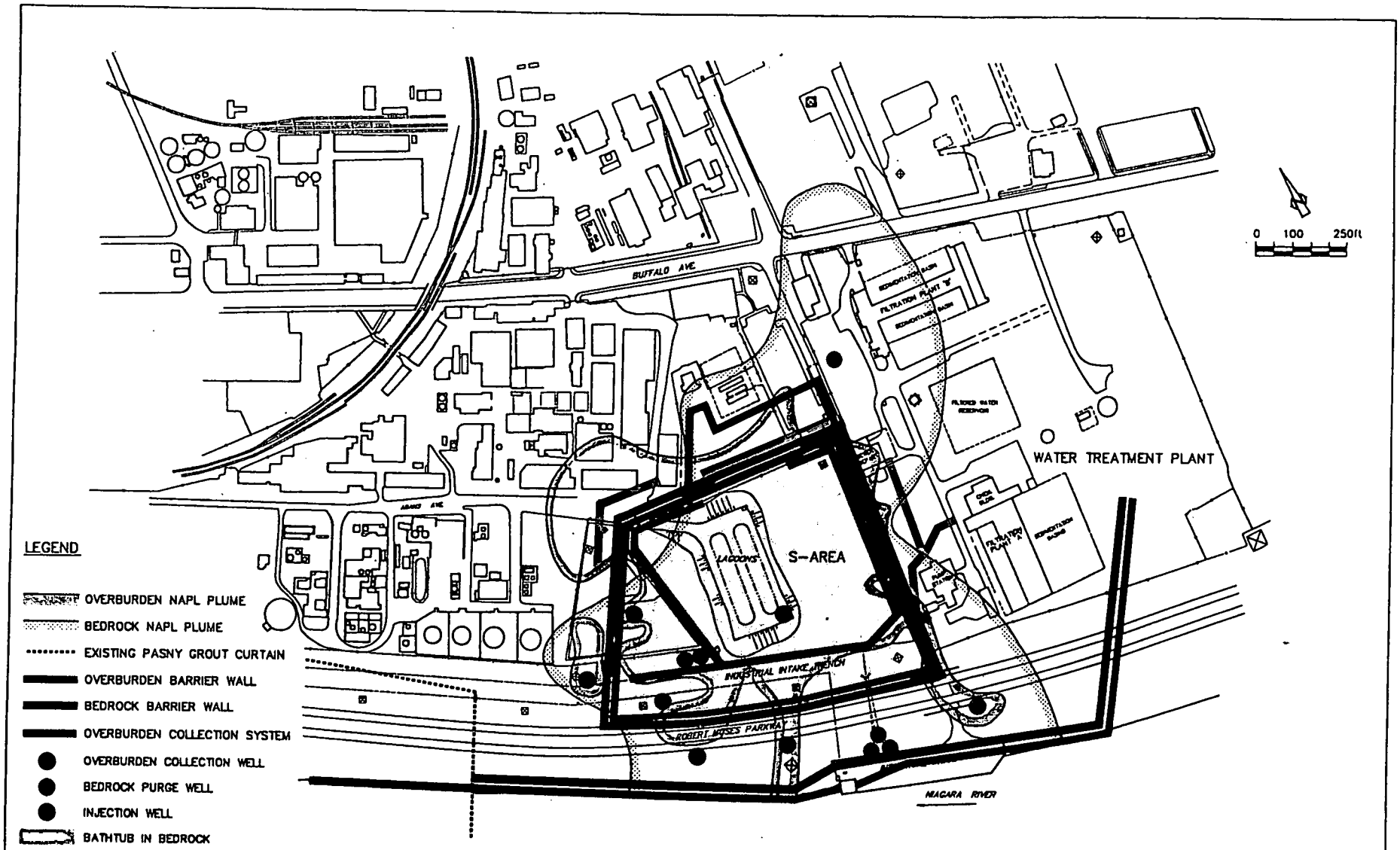


figure 5.1

ALTERNATIVE I

CRA

1769-20/10/88-43-D-1

FIGURE III

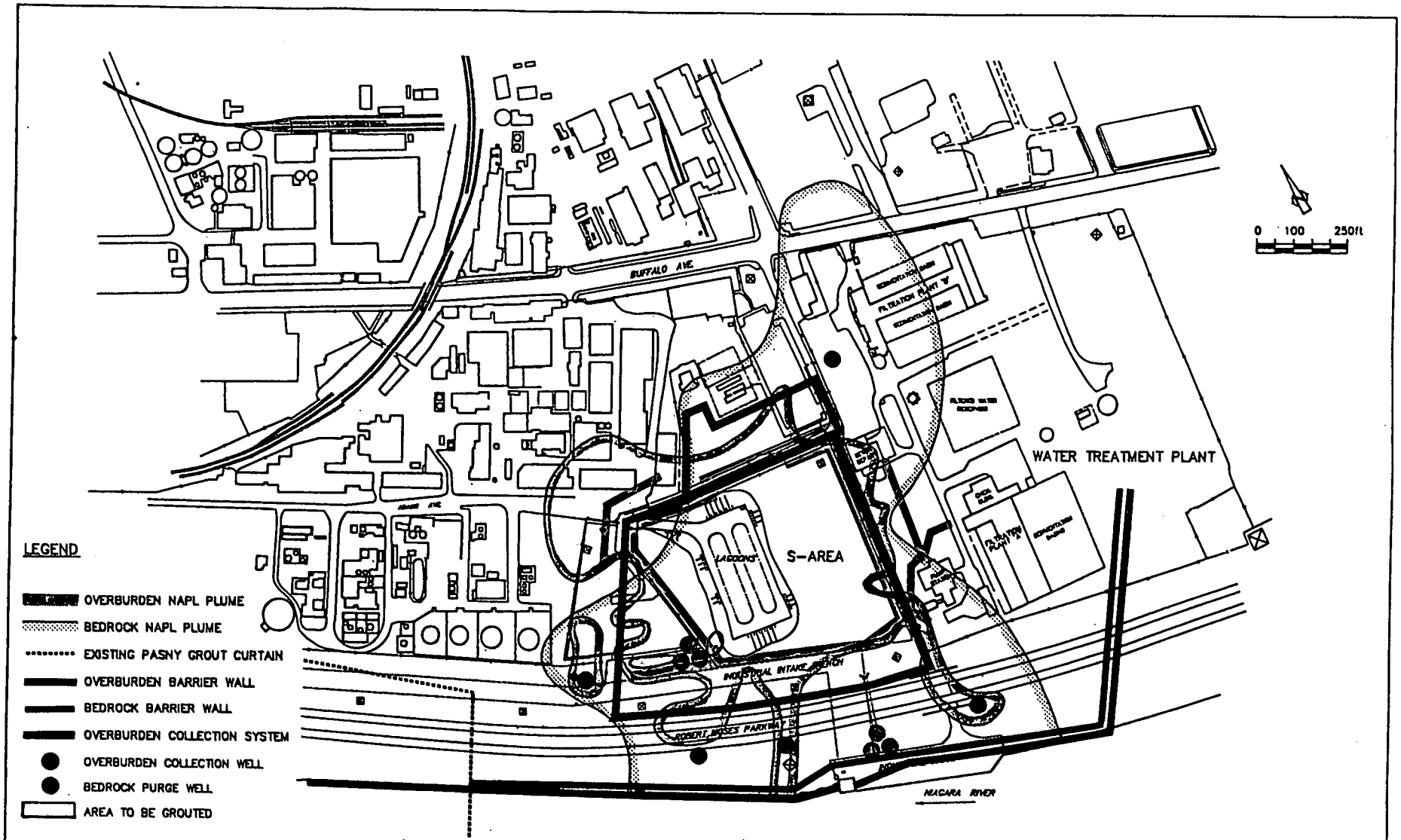


figure 5.2

ALTERNATIVE 2

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1769-20/10/88-43-D-1

FIGURE IV

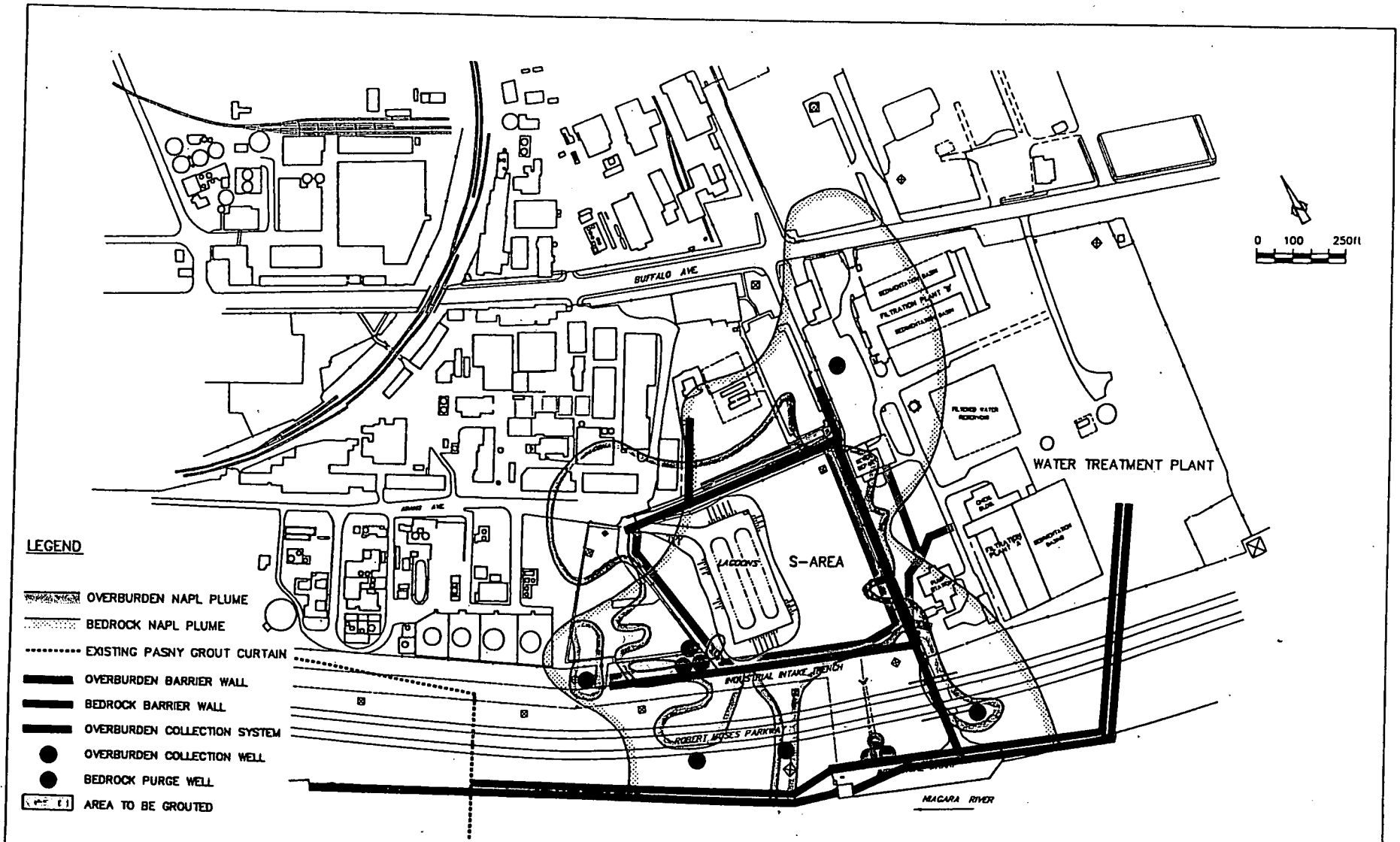

figure 5.3

ALTERNATIVE 3

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1769-20/10/88-43-D-1

FIGURE V

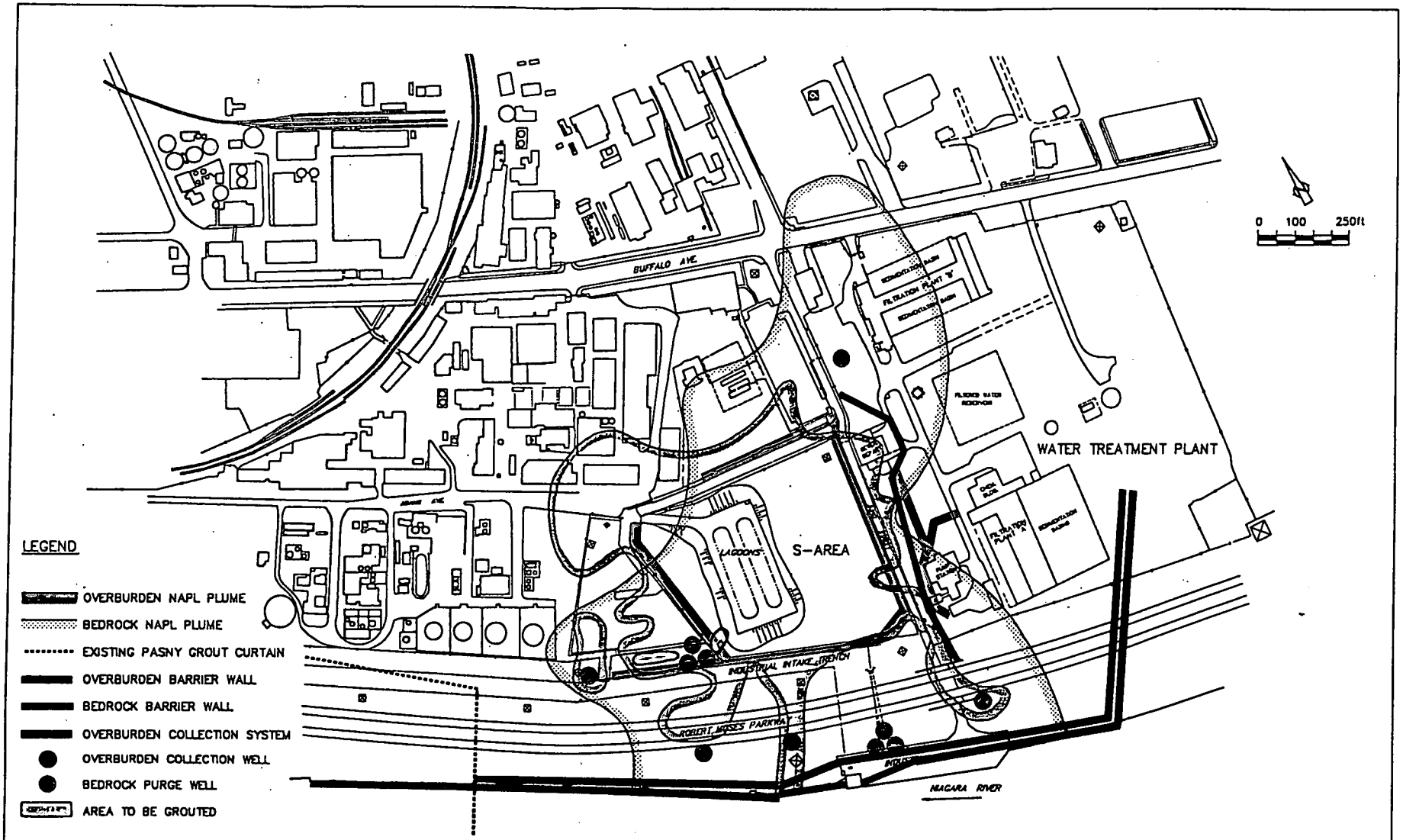

figure 5.4

ALTERNATIVE 4

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1769-20/10/88-43-D-1

FIGURE VI

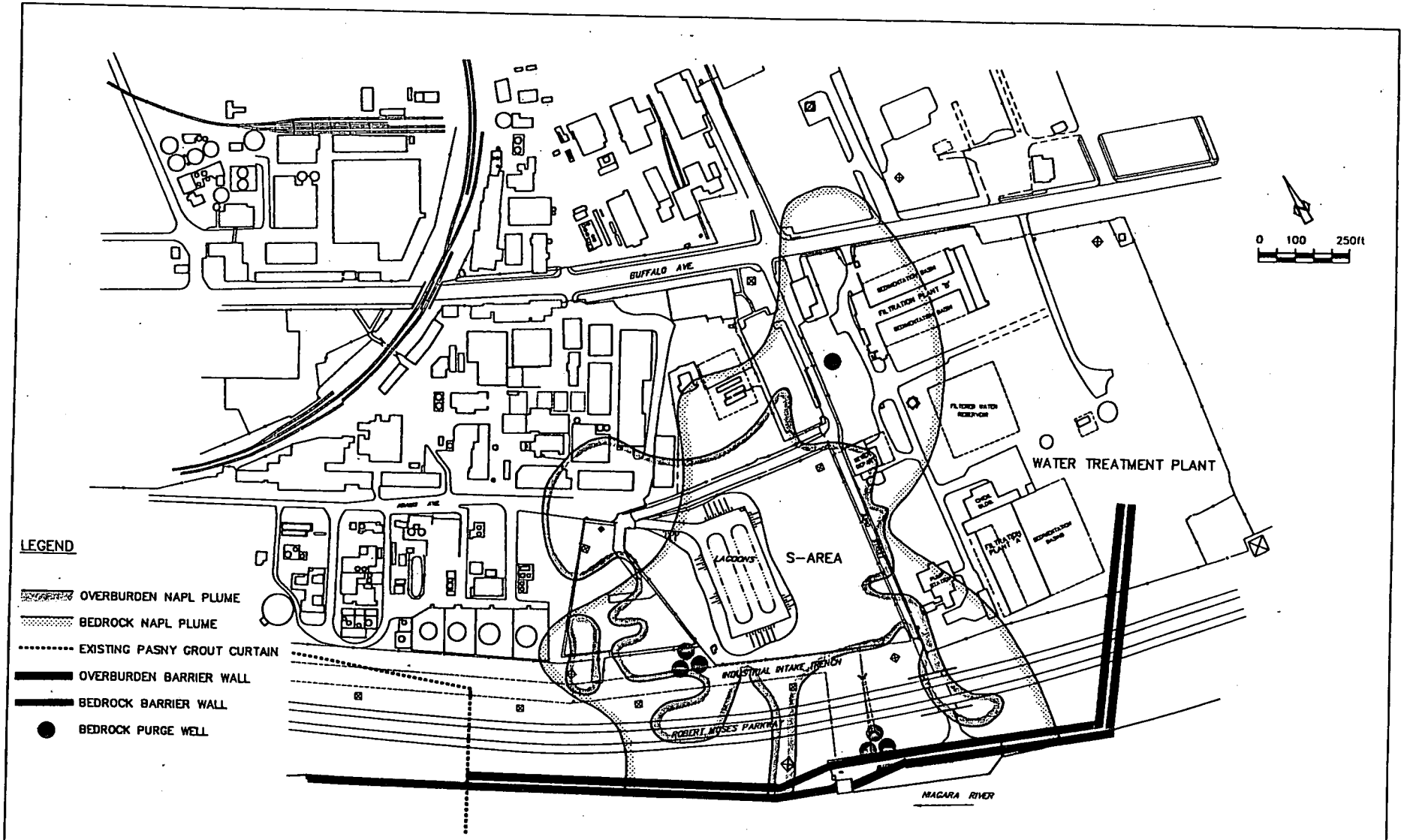

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figure 5.5
ALTERNATIVE 5

1769-20/10/88-43-D-1

FIGURE VII

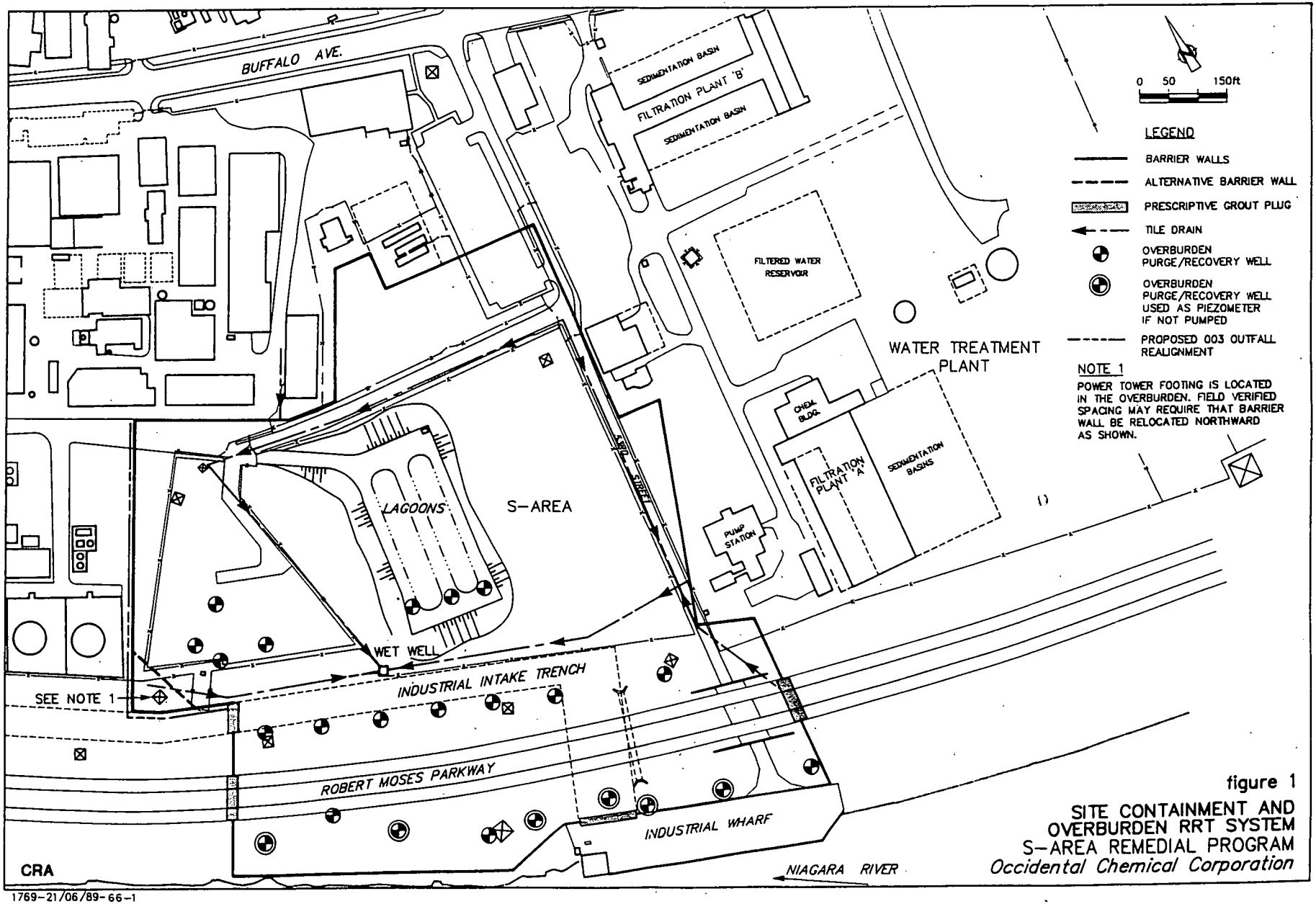

figure 1

SITE CONTAINMENT AND OVERBURDEN RRT SYSTEM
S-AREA REMEDIAL PROGRAM
Occidental Chemical Corporation

1769-21/06/89-66-1

FIGURE VIII

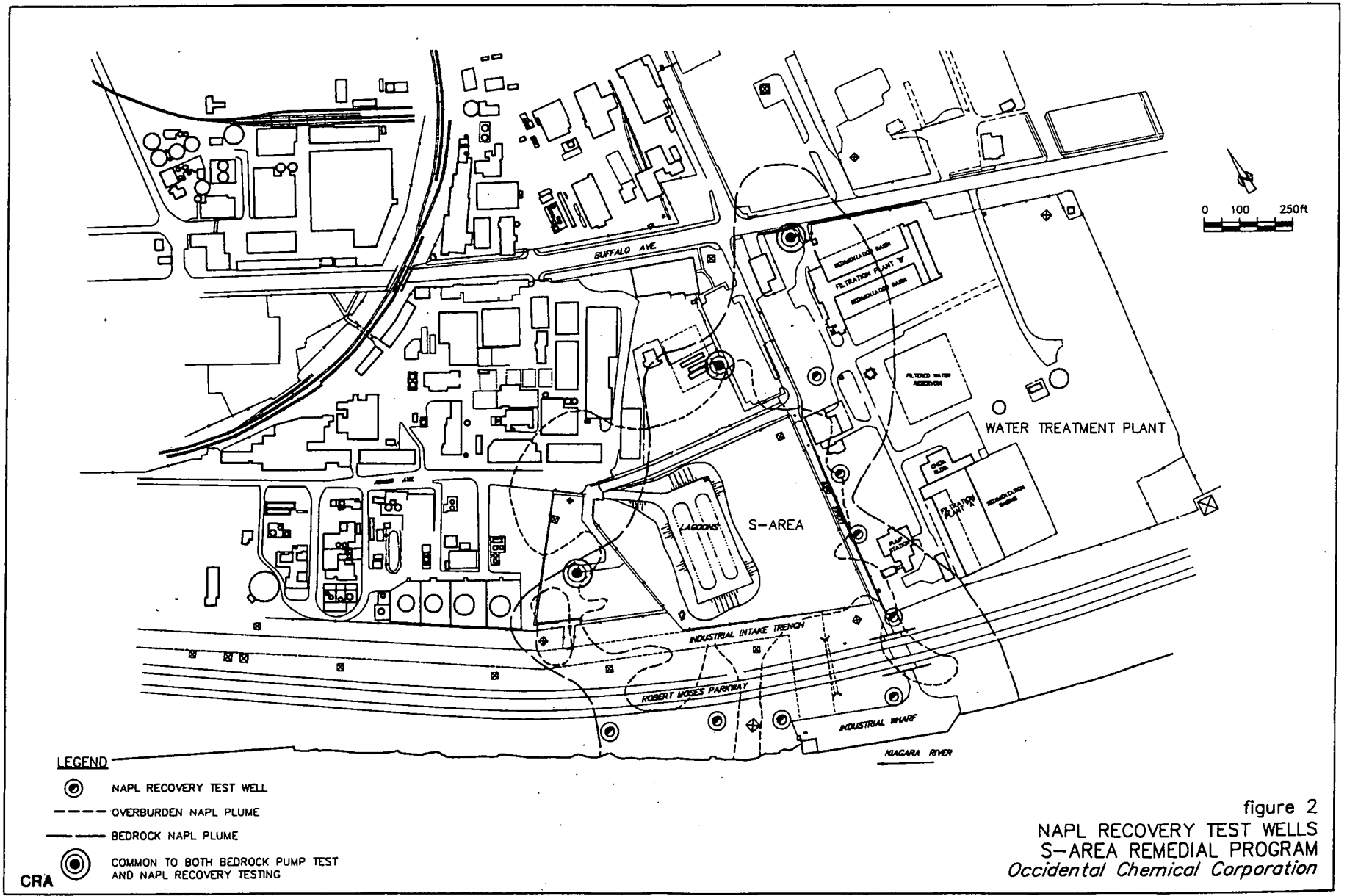

figure 2
NAPL RECOVERY TEST WELLS
S-AREA REMEDIAL PROGRAM
Occidental Chemical Corporation

1769-21/06/89-66-0

FIGURE IX

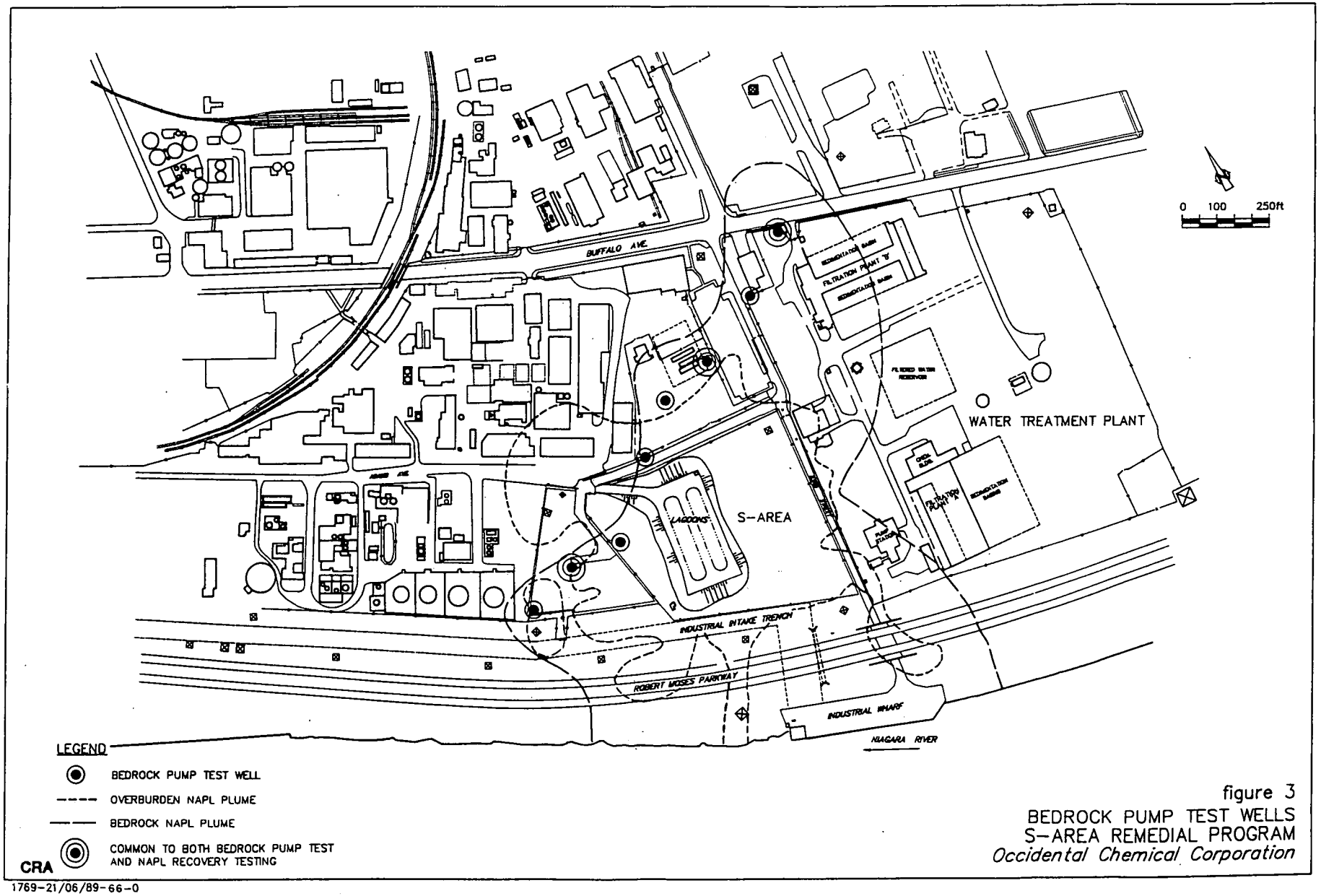

figure 3
BEDROCK PUMP TEST WELLS
S-AREA REMEDIAL PROGRAM
Occidental Chemical Corporation

1769-21/06/89-66-0

GLOSSARY

GLOSSARY

1) **APL** - Aqueous Phase Liquid.

2) **Assessments** - as outlined and specified in the S-Area Judgment, Subparagraph B(5)(a) and (b) and Subparagraph B(6)(c).

3) **Bedrock** - A formation of rock that is beneath unconsolidated overburden materials.

4) **Carcinogen** - A substance that increases the risk of cancer.

5) **Confining Layer** - As defined in the S-Area Judgment, a Confining Layer is a "stratum which (i) has a maximum permeability of 1 X 10^{-7} cm/sec, (ii) has a continuous thickness of at least three feet, and (iii) does not contain nonaqueous liquid or solid phase chemicals."

6) **Endangerment Assessment (EA)** - Assessment of human health and environmental endangerment using the RRT Study(s) Chemical Monitoring Program chemicals, as listed in the RRT Study(s) Chemical Monitoring Program document dated November 9, 1987.

7) **Exposure** - To be accessible to the influence of a substance.

8) **EPA** - United States Environmental Protection Agency.

9) **IIPT** - The Industrial Intake Pipe Trench, which contains pipelines that provide water to local industry and is located primarily to the north of the Robert Moses Parkway in the vicinity of 53rd Street.

10) **Judgment** - In the United States District Court for the United States District Court for the Western District if New York, United States of America, The State of New York, Plaintiffs, v. Hooker Chemicals & Plastics Corp.; Hooker Chemical Corporation; Occidental Petroleum Investment Co.; Occidental Petroleum Corporation; and the City of Niagara Falls, New York, (S-Area Landfill) Defendants,

    Civil Action No. 79-986
    Stipulation and Judgement
    Settlement Agreement signed by
    all parties in January 10, 1984
    Entered by the Court April 15, 1985

11) **NAPL** - Nonaqueous Phase Liquid.

12) **Niagara Falls Water Treatment Plant** - The City of Niagara Falls Drinking Water Treatment Plant (CWTP), located at Buffalo Avenue and 53rd Street.

13) **Northern Area** - The area that is circumscribed by containment walls to the nort of Adams Avenue, as shown on Figure VII.

14) **OCC** - Occidental Chemical Corporation.

15) **Overburden** - Unconsolidated materials (e.g., soils, man-made fill, etc.) that overly a bedrock formation.

16) **RRT - Requisite Remedial Technology**

a) "Remedial Technology" - Refers to engineering and construction practices used or accepted for use in landfill containment projects or other industrial projects which are applicable to the materials and hydrogeologic conditions found at the S-Area/Treatment Plant area.

b) "Requisite" - In determining whether a Remedial Technology is "Requisite," consideration is required of the following factors:

(i) the nature of endangerment to human health and the environment which the Remedial Technology is designed to address;

(ii) the extent to which application of the Remedial Technology would reduce such endangerment to human health or the environment or would otherwise benefit human health or the environment; and

(iii) the economic costs required to apply the Remedial Technology.

Judgment, Paragraph 4(b), at 6.

17) **RRT Study** - as required and specified in Subparagraph B(6)(a), page I-8 of the S-Area Judgment.

18) **Risk** - The probability of incurring adverse health effects.

19) **State** - New York State Departments of Environmental Conservation, Health, and Law.

20) **Surveys and Studies** - as outlined and specified in Addendum I Paragraphs B and C of the 1985 S-Area Judgment.