United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R02-90/140
September 1990

EPA

Superfund Record of Decision:

Hooker Chemical S-Area, NY

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R02-90/140	2.	3. Recipient's Accession No.
4. Title and Subtitle SUPERFUND RECORD OF DECISION Hooker Chemical S-Area, NY First Remedial Action - Final			5. Report Date 09/21/90 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Orgainization Name and Address			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000 14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Hooker Chemical S-Area site is a former landfill area located in Niagara Falls, New York. The site lies adjacent to the Niagara River. Approximately 63,000 tons of chemical processing wastes were disposed of at the landfill. Ground water beneath the site also has been contaminated from aqueous phase and non-aqueous phase liquid chemicals. Chemicals have migrated toward the Niagara Falls Drinking Water Treatment Plant (DWTP) which lies to the east of the site, contaminating the Bedrock intake structures. This Record of Decision (ROD) addresses the landfill, a contaminated ground water plume, bedrock contamination, and the DWTP. The primary contaminants of concern affecting the soil, sediment, and ground water are VOCs including PCE; and other organics including chlorinated organics and pesticides.

The selected remedial action for this site includes abandoning in place, underground utility and service lines; closing and capping onsite lagoons; capping the landfill and surrounding area; constructing a site barrier wall containment system; installing a drain tile collection system; pumping and treatment of ground water and/or leachate from the landfill area, overburden, and bedrock using gravity separation to separate

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Hooker Chemical S-Area, NY
First Remedial Action - Final
Contaminated Media: soil, sediment, gw
Key Contaminants: VOCs (PCE), other organics (chlorinated organics, pesticides)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 337
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

aqueous phase liquids (APLs) from non-aqueous phase liquids (NAPLs); treating APL at an onsite carbon treatment facility with onsite discharge to a permitted outfall; treating NAPL and any associated sediment at an onsite incinerator; monitoring ground water; closing and demolishing part of the adjacent drinking water treatment plant, and constructing a new drinking water treatment facility at another location. The present worth cost for this remedial action is $117,000,000, which includes an annual O&M cost of $2,600,000 for 30 years.

PERFORMANCE STANDARDS OR GOALS: Action levels for bedrock ground water include PCE 5 ug/l and 2,3,7,8-TCDD 0.0005 ug/l. If these levels are exceeded, operational modifications may be implemented.

ROD FACT SHEET

SITE

Name:	Hooker Chemical S-Area
Location/State:	Niagara Falls, New York
EPA Region:	USEPA Region II
HRS Score (date):	51.62; 9/83
NPL Rank:	177

ROD

Date Signed:	RA; 09/21/90
Remedy/ies:	Landfill: Barrier wall containment system, drain tile collection system and recovery wells, clay cap of landfill, carbon adsorption groundwater treatment, incineration of non-aqueous phase chemicals at Occidental Chemical Corporation's Buffalo Avenue Plant Water Treatment Plant: Construction of a new drinking water treatment plant at a new location
Capital Cost:	$ 25 Million (Landfill)
O & M/Year:	$ 2.6 Million annual (Landfill)
Present Worth:	$ 50 Million (Landfill), $ 67 Million (City Drinking Water Treatment Plant)

LEAD

Remedial/Enforcement:	FE
Primary Contact (phone):	Mark D. Purcell, Project Manager, WNYCS-ERRD (212) 264-6282
Secondary Contact (phone):	Kevin Lynch, Section Chief, WNYCS-ERRD (212) 264-6194

WASTE

Type (metals, PCB, &c):	Volatile Organic Compounds, Pesticides
Medium (soil, g.w., &c):	Soil and groundwater
Origin:	Landfill (chemical processing waste)
Est. Quantity cu.yd.:	63,000 tons

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

LETTER OF TRANSMITTAL

TO: Irene Johnson
USEPA - Headquarters
401 M Street, Southwest
Washington, D.C. 20460

DATE: April 10, 1991

FROM: Mark D. Purcell, Project Manager
New York/Caribbean Superfund Branch, Western New York Section II

SUBJECT: Consent Decree entitled "Stipulation on Requisite Remedial Technology (RRT) Program," for the Hooker Chemical S-Area Landfill, Niagara Falls, New York

Description	Date	Copies
1. Stipulation on Requisite Remedial Technology (RRT) Program Volumes I and II	9/12/90	1

VOLUME I

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF NEW YORK

UNITED STATES OF AMERICA, THE STATE OF NEW YORK, Plaintiffs, v. OCCIDENTAL CHEMICAL CORPORATION and THE CITY OF NIAGARA FALLS, NEW YORK, Defendants.	Civil Action No. 79-988 (JTC) (S-Area Landfill)

STIPULATION ON
REQUISITE REMEDIAL TECHNOLOGY (RRT) PROGRAM

STIPULATION

APPENDIX I - S-AREA RRT REMEDIAL PLAN

APPENDIX II - ENVIRONMENTAL HEALTH AND SAFETY

APPENDIX III - CITY DRINKING WATER TREATMENT PLANT REMEDIAL PROGRAM

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF NEW YORK

UNITED STATES OF AMERICA, THE STATE OF NEW YORK, Plaintiffs, v. OCCIDENTAL CHEMICAL CORPORATION and THE CITY OF NIAGARA FALLS, NEW YORK, Defendants.	Civil Action No. 79-988 (JTC) (S-Area Landfill)

STIPULATION ON
REQUISITE REMEDIAL TECHNOLOGY (RRT) PROGRAM

8/16/90
DRAFT FOR SETTLEMENT
AND REVIEW PURPOSES ONLY
SUBJECT TO APPROVAL
BY EACH PARTY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

TO WHOM IT MAY CONCERN

HOOKER S-AREA

The attached "Stipulation of Requisite Remedial Technology Program" (signed Sept. 12, 1990 by the Regional Administrator) is for all technical purposes the equivalent of a Superfund Record of Decision and should be so treated and entered into the RODS System.

The document concerns the Hooker S-Area dump, listed on the National Priorities List, making it a Superfund site. The document contains specific remedies, making it the functional equivalent of a ROD. The document is the result of a negotiated settlement that began before the enactment of CERCLA and was therefore negotiated under RCRA, the Safe Drinking Water Act, and the Clean Water Act. There has been public comment and the settlement also complies with all applicable and relevant and appropriate requirements. There is a proposed remedial action plan (although it is not part of the attached document). This document has been included in the CERCLIS system along with all the other RODs. This document takes the place of a ROD and there will be no separate ROD published later.

Accordingly, the attached document is submitted for inclusion into the RODS system.

12/7/90
Date

Kathleen C. Callahan
for Richard L. Caspe, P.E.
Director
Emergency and Remedial
Response Division

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APPENDIX V - OCC S-AREA PROJECT SCHEDULE

APPENDIX VI - INSURANCE CERTIFICATE FORM

(1) Whereas, the parties to this action are described and set out in Paragraph 1 of the document captioned "Stipulation and Judgment Approving Settlement Agreement" ("Judgment"), except that Hooker Chemicals & Plastics Corp. is now called Occidental Chemical Corporation ("OCC"), and that all named defendants other than OCC and the City were dismissed in consideration of Occidental Petroleum Corporation's agreement, pursuant to the terms and conditions of Paragraph 12 of the Judgment, to execute a guarantee, which was filed with the Court on or about August 13, 1985;

(2) Whereas, the signatory parties to this action -- EPA, the State, the City, and OCC -- agreed and stipulated that the settlement agreement embodied in the Judgment should be entered and, therefore, the signatory parties signed and lodged that document with the Court on January 10, 1984;

(3) Whereas, the Court, after a hearing, concluded that the Judgment provides for appropriate programs to protect against endangerment to human health or the environment in and about the S-Area Landfill Site ("Landfill Site"), and to protect the users of the City of Niagara Falls' drinking water from endangerment, see Judgment, at 1-2; and that the Judgment is fair, adequate, and consistent with public policy, United States v. Hooker Chemical & Plastics Corp., 607 F.Supp. 1052, 1070 (W.D.N.Y. 1985);

(4) Whereas, the Court approved and entered that Judgment on April 15, 1985, and the Second Circuit affirmed the approval and entry, 776 F.2d 410 (2d Cir. 1985);

(5) Whereas, the Judgment approved and entered by the Court provided, among other things, that OCC and the City (where appropriate) must implement containment, monitoring and maintenance programs at and in the vicinity of the Landfill Site, see Judgment ¶ 6, at 8, and Addendum I ¶ A; Addendum II ¶ A, Addendum III ¶ A; that OCC must conduct further surveys and studies concerning the migration of chemicals into the environment at and in the vicinity of the Landfill Site, see Judgment, Addendum I ¶ B(1)(a), at I-1; and that, if chemicals are identified migrating from the Landfill Site in areas not addressed by the containment system, OCC must conduct and submit to the Governmental Parties a study to determine what Requisite Remedial Technology ("RRT"), if any, is required to address such chemicals, see Judgment, ¶ 4, at 6, and Addendum I ¶¶ B(6), B(8), at I-8-9, I-13;

(6) Whereas, on or about November 1, 1988, OCC submitted to the Governmental Parties a document captioned "Requisite Remedial Technology Study of Chemicals in the Overburden and Bedrock, S-Area Landfill, S-Area Remedial Program";

(7) Whereas, on or about February 28, 1989, EPA/State and the City submitted a response to OCC's RRT Study, and OCC subsequently submitted a rejoinder to the governments' response;

(8) Whereas, after lengthy and comprehensive negotiations and technical discussions, the undersigned have determined that OCC and the City will meet their respective obligations under the Judgment by implementing the remedial, monitoring, and remedial waste management programs and other activities described in the addenda and appendices to the Judgment and the RRT Stipulation (as defined below) and that these programs and other activities are necessary and appropriate to protect human health and the environment, and are consistent with the goals of the Judgment;

(9) Whereas, the RRT Stipulation (as defined below) provides that the public have an opportunity to comment on the programs and other activities specified herein during the notice and comment period after this RRT Stipulation's lodging with the Court and before the parties move the Court to approve and enter the RRT Stipulation;

NOW THEREFORE, IT IS STIPULATED, ADJUDGED, ORDERED, AND DECREED as follows:

A.

INCORPORATION OF RRT STIPULATION

1. Upon its effective date, this document captioned "Stipulation on Requisite Remedial Technology (RRT) Program" ("RRT Stipulation") shall be incorporated into, and become enforceable as a part of, the Judgment in accordance with Subparagraph B(9)(c) of Addendum I of the Judgment. As used herein, the term RRT Stipulation shall include this document and the following appendices to this document and any attachments

thereto: S-Area RRT Remedial Plan (Appendix I); the Environmental Health and Safety Plan (Appendix II); the City Drinking Water Treatment Plant Remedial Program, including the attached Plan A and Plan B Schedules and the Drinking Water Treatment Plant Closure/Remedial Plan (Appendix III); the Remedial Waste Management Plan (Appendix IV); the OCC S-Area Project Schedule (Appendix V); and the Insurance Certificate Form (Appendix VI). All documents submitted to the Governmental Parties and which are required to be approved by them pursuant to the Judgment (including without limitation, any attachments, plans, specifications, and protocols) shall also be incorporated into and become enforceable as part of the Judgment upon approval.

2. Unless otherwise specified herein, words and phrases used in this RRT Stipulation shall be defined as they are in the Judgment. To the extent that the provisions of the Judgment are explicitly inconsistent with this RRT Stipulation, the provisions of the RRT Stipulation shall control and the Judgment shall be deemed to be so modified or superseded. Those provisions of the Judgment not so modified or superseded remain in full force and effect.

B.

MODIFICATION

3. (a) Modifications to pages 1-36 of the Judgment, pages 1-49 of this RRT Stipulation or any non-technical sections of future stipulations or modifications that materially alter the

addenda or appendices to those documents shall be accomplished in written form, either by agreement of OCC and the Governmental Parties with the approval of the Court, or by order of the Court upon the petition of any signatory party. When agreement is reached by the appropriate signatory parties, OCC shall promptly file such written consent with the Court.

(b) Non-material modifications to addenda or appendices shall be accomplished by written consent of the Project Coordinators for OCC and the Governmental Parties. Thereafter, OCC shall promptly file such written consent with the Court.

(c) Modifications to any other documents approved by the Governmental Parties, including plans, specifications and protocols, shall be accomplished by written consent of the Project Coordinators for OCC and the Governmental Parties. During field activities such modifications may also be accomplished by oral agreement of the field representatives of OCC and the Governmental Parties, under the following circumstances:

(i) where emergency conditions exist at the Project Site, or

(ii) where unexpected conditions are encountered at the Project Site and time is of the essence.

Such oral modifications shall be confirmed in writing by the OCC Project Coordinator to all other Project Coordinators within three (3) working days. Such confirmations shall be deemed

consented to unless objected to by any Project Coordinator within five (5) working days of receipt. All modifications pursuant to this subparagraph (c) shall be consistent with the objectives and goals of the Judgment and good engineering practice.

(d) No oral modifications of the Judgment shall be effective except as provided in subparagraph (c) above.

(e) All modifications made pursuant to this Section shall be incorporated into and made enforceable as a part of the Judgment.

(f) Nothing in this Section shall be deemed to alter the Court's power to supervise or modify the Judgment.

C.

COMMITMENT TO PERFORM REMEDIAL ACTIVITIES AND TO COMPLY WITH APPLICABLE LAW

4. The Governmental Parties have determined that the activities required under this Judgment are consistent with applicable laws and regulations. OCC and the City shall perform their respective activities required by the Judgment pursuant to the terms and conditions of the Judgment and in accordance with applicable Federal, State and local laws and regulations.

D.

SCHEDULES

5.(a) The OCC S-Area Project Schedule is attached hereto as Appendix V.

(b) The City Drinking Water Treatment Plant Plan A Milestone Schedule ("Plan A Milestone Schedule") (as described in Section E herein), containing milestone dates for the financing, permitting, design, and construction of a proposed new City Drinking Water Treatment Plant ("CWTP") is Attachment A to Appendix III. During the implementation of Plan A, EPA/State may propose that additional Milestone dates be added to the Plan A Milestone Schedule. Such dates will be added either by agreement of the EPA/State and the City or by order of the Court. All documents to be submitted to the State for permits and other authorization for the new CWTP shall also be submitted to EPA for concurrent review and comment. Additionally, documents constituting the Facilities Plan and Detailed Design plans and specifications shall be submitted to EPA for concurrent review, comment and approval as per this subparagraph. EPA's approval of the Facilities Plan and Detailed Design plans and specifications shall be limited to those systems and structures which, if needed, are intended to prevent contamination of the City's drinking water to a level of assurance equal to or greater than the remedial programs for the existing CWTP as set forth in the Judgment. EPA shall, within 60 days of receipt of either the Facilities Plan or the Detailed Design plans and specifications, provide written comments, and/or approval or disapproval to all signatory parties. If the New York State Department of Health has approved the Facilities Plan or the Detailed Design plans and specifications and EPA does not provide its comments, approval or

disapproval for the document in question within such sixty (60) day period, that document shall be deemed approved by EPA. Any disputes among the signatory parties concerning such EPA comments, approval, or disapproval which cannot be promptly resolved informally, will be submitted to the Court for resolution.

(c) No later than 90 days after the lodging of this RRT Stipulation with the Court, the City shall submit, for informational purposes only, to the signatory parties a City Drinking Water Treatment Plant Plan A Project Schedule ("Plan A Project Schedule") detailing implementation dates for Plan A which will be no later than the dates contained in the Plan A Milestone Schedule. Such schedule shall be provided to all signatory parties but will not be subject to EPA/State approval in this proceeding; provided, however, that EPA/State reserve any right they may have to require approvals as part of their usual regulatory functions outside this proceeding.

(d) The City Drinking Water Treatment Plant Plan B Bar Sequencing Schedule ("Plan B Bar Sequencing Schedule") (described in Section E herein), containing the sequencing of, and time frames for, the implementation of Plan B, is Attachment B to Appendix III.

(e) No later than sixty (60) days after a determination either by agreement of the signatory parties or by order of the Court that Plan B shall be implemented, pursuant to Paragraph 15 of Section E, the City and OCC shall jointly prepare and submit a

City Drinking Water Plant Plan B Project Schedule ("Plan B Project Schedule"). The implementation dates set forth in the Plan B Project Schedule shall be consistent with the Plan B Bar Sequencing Schedule, unless it is determined by agreement of the signatory parties or by order of the Court that such consistency would be inappropriate under specific circumstances. Thereafter, the parties shall proceed as provided in Paragraphs 6(c) and (d) of the Judgment. After the Plan B Project Schedule is adopted either by agreement of the signatory parties or by order of the Court, it shall be made an attachment to Appendix III and (if adopted by agreement) filed with the Court.

(f) The Remedial Waste Treatment Milestone Schedule ("RWTMS") is Attachment A to Appendix IV. If OCC and EPA/State cannot resolve any dispute concerning OCC submissions or EPA/State responses under the RWTMS within thirty (30) days, any signatory party may seek Court resolution of any such disputes which relate to compliance with the provisions of subparagraph 5(g). If the Court decides that delay in meeting the RWTMS is attributable to EPA/State's non-compliance with subparagraph 5(g), then OCC's time for compliance with the RWTMS may be extended in the Court's discretion, as appropriate. If the Court decides that delay in meeting the RWTMS is attributable to OCC's non-compliance with subparagraph 5(g), then OCC may be subject to any appropriate penalty or action under this Judgment, in the Court's discretion, as appropriate, including the possibility of providing additional storage capacity per

subparagraph 20(d) to meet the starting date provided by the OCC S-Area Project Schedule for operation of Phase II remedial systems. For purposes other than this Judgment, nothing herein shall be construed to limit the authority or alter any legal standard or time period of review regarding EPA/DEC processing of OCC's incinerator permit applications, including but not limited to the ability to require additional information or revised submissions, and shall not limit or alter OCC's rights applicable thereto.

(g) With respect to all the above schedules, OCC and the City will use their best efforts to supply, in an expeditious manner, complete permit applications and other submissions required by this Judgment, including all information required by EPA/State to process such permit applications and submissions. In accordance with Paragraph 8(d) of the Judgment, EPA and the State shall use their best efforts, consistent with their legal authority, to expeditiously review and make timely final determinations on permit applications and other submissions of the City and OCC required by the OCC S-Area Project Schedule, the Plan B Project Schedule, the Plan A Milestone Schedule and the Remedial Waste Treatment Milestone Schedule. The signatory parties will take all actions, consistent with their legal authority, to assure compliance with the aforementioned schedules. To the extent that applicable statutory and regulatory requirements and this Judgment provide the signatory parties with discretion to act in a timely manner, such actions

shall be undertaken in a manner which is consistent with the aforementioned schedules; provided, however, that nothing herein shall be construed to require any party hereto to act in a manner which is arbitrary and capricious or otherwise unlawful. If any signatory party completes an activity required under the Judgment on a date earlier than scheduled or otherwise required, the parties shall use best efforts to correspondingly move up subsequent activities under the Judgment dependent on such completed activity, to the extent practicable, consistent with the other activities on that schedule. To the extent that the Uniform Procedures Act, New York Environmental Conservation Law, Article 70, is applicable to State permits required under this Judgment, nothing herein shall alter the obligations of the New York State Department of Environmental Conservation to meet the requirements of that Act.

6.(a) Whenever OCC believes that revisions to the OCC S-Area Project Schedule or its portion of the Plan B Project Schedule should be made, OCC shall submit proposed revisions in writing to the Governmental Parties for their respective review and approval, as appropriate. In proposing revisions to those Project Schedules due to any delays, including failure to obtain timely governmental authorizations and/or approvals, OCC shall propose only an additional amount of time necessary to perform the activities in a professional manner and pursuant to the terms of the Judgment. OCC's submission of proposed revisions shall be accompanied by a report which fully explains why such revisions

are necessary. If OCC or any signatory party has already fully advised EPA/State or the Court of a particular period of delay pursuant to the terms of Paragraph 8(a) or 8(c), as appropriate, of the Judgment, then OCC may cross-reference that submission. Proposed schedule revisions pursuant to this subparagraph shall be reviewed by the Governmental Parties pursuant to Paragraphs 6(c) and (d) of the Judgment. Upon agreement of the Governmental Parties and OCC or order of the Court, OCC shall promptly file with the Court all revisions to the OCC S-Area or Plan B Project Schedule, together with a complete explanation of the revisions. Revisions to the RWTMS shall be addressed pursuant to subparagraph 5(f) of this Section.

(b) Whenever the City believes that revisions to its portion of the Plan B Project Schedule should be made, the City shall submit proposed revisions in writing to the EPA/State for their review and approval. At such time, the City shall also provide copies of such proposed revisions to OCC. In proposing revisions to those schedules due to any delays, including failure to obtain timely governmental authorizations and/or approvals, the City shall propose only an additional amount of time necessary to perform the activities in a professional manner and pursuant to the terms of the Judgment. The City's submission of proposed revisions shall be accompanied by a report which fully explains why such revisions are necessary. If the City or any signatory party has already fully advised EPA/State or the Court of a particular period of delay pursuant to the terms of

Paragraph 8(a) or 8(c), as appropriate, of the Judgment, then the City may cross reference that submission. Proposed schedule revisions pursuant to this subparagraph shall be reviewed by EPA/State pursuant to Paragraphs 6(c) and (d) of the Judgment and Section E herein. Upon agreement of the Governmental Parties and OCC or order of the Court, the City shall promptly file with the Court all revisions to its Plan B schedule, together with a complete explanation of the revisions. Proposed changes to milestone dates in the Plan A Milestone Schedule shall be addressed pursuant to Section E.

(c) Nothing in the Plan A or Plan B Schedules shall affect the scheduling and implementation of any activities required pursuant to the OCC S-Area Project Schedule; provided, however, that advancing the scheduled date for the installation of portions of the eastern Barrier Wall that cross service lines to the CWTP shall be evaluated, if after installation of all other portions of the Barrier Wall and the collection systems adjacent to 53rd Street, response actions are triggered by the monitoring criteria for NAPL presence and inward hydraulic gradient set forth in subsection 2.3, Appendix I of the RRT Stipulation.

7.(a) No later than March 15, 1991, and no later than March 15 of each succeeding year, OCC will submit to all other signatory parties and the Court a complete report describing the progress of its activities during the previous twelve (12) months under the Judgment and this RRT Stipulation.

(b) On such dates, the City shall also submit to all other signatory parties and the Court a complete report describing the progress of its activities during the previous twelve (12) months under the Judgment and this RRT Stipulation, including, without limitation, its progress under the Plan A Milestone Schedule.

(c) Any signatory party may submit to the Court its own progress report at such times as it deems appropriate, and any signatory party may submit a response to a progress report submitted pursuant to this Section.

E.

CITY DRINKING WATER TREATMENT PLANT

8. OCC and the City will implement activities relating to the City Drinking Water Treatment Plant (CWTP), as described in this Section and in Appendix III. As described below and in Appendix III, this Program consists of the Interim CWTP Monitoring and Response Action Plan and a plan for either (a) construction of a new water treatment plant and closure of the existing CWTP ("Plan A"), (b) re-lining of the raw water intake system and other remedial actions at the existing CWTP ("Plan B"), or (c) an alternative drinking water supply plan and closure of the existing CWTP ("Plan C").

9. Plan A will be implemented to completion and no portion of either Plan B or C will be implemented, unless and until a determination is made pursuant to Paragraph 15 of this Section that either Plan B or Plan C will be implemented.

10. The obligations and responsibilities of the signatory parties with respect to Plan A shall be as follows:

(a) The City shall construct and operate a new City Drinking Water Treatment Plant ("new CWTP") on property located east of the existing CWTP.

(b) The City shall use its best efforts to initiate construction and "full-scale operation" of the new CWTP consistent with the requirements of the Plan A Milestone Schedule. As used herein, "full-scale operation" is defined as the date upon which the new CWTP has received its Completed Works Approval from the New York State Department of Health.

(c) The City shall use its best efforts to make timely submission of applications and submissions, which it believes in good faith to be complete, relating to permits and other required governmental authorizations and approvals, consistent with the Plan A Milestone Schedule.

(d) The City shall obtain and/or provide financing to build the new CWTP.

(e) OCC shall make payments to the City to help pay for construction of the new CWTP, in accordance with the provisions of a contemporaneous separate agreement between OCC and the City.

(f) Upon initiation of full-scale operation of the new CWTP or Plan C, as appropriate, OCC and the City will implement the Drinking Water Treatment Plant Closure/Remedial Plan, Appendix III, Attachment C. Any modification, reassessment, reduction, or termination of the plan's remedial systems or monitoring programs shall be made as provided in Sections 5.2 through 5.5 of Appendix I.

11. Based on the fact that the Court is ordering Plan A to be implemented pursuant to this RRT Stipulation, no environmental impact statement and no other processing under the State Environmental Quality Review Act, or any State or local

regulations or enactments pursuant thereto, shall be required regarding permits and authorizations or any other governmental approval or action required for implementation of Plan A, or regarding selection of the site for a new CWTP or associated property transfers.

12. As used herein, "Plan B" will consist of the implementation by OCC and the City of the remedial systems and associated activities described in the following provisions of the Judgment, as modified by Section 2.0 of Appendix III: Paragraph E of Addendum I; Paragraphs C through I of Addendum II; and Paragraphs C, D(1) and E of Addendum III.

13. The signatory parties have determined that the implementation of either Plan A or Plan B, as set forth in the Judgment, would be consistent with the goal of the Judgment to protect the users of CWTP drinking water from endangerment.

14.(a) During the implementation of Plan A, the City shall, or another signatory party may, promptly notify the other signatory parties in writing in the event one of the following circumstances occurs prior to the City's issuance of the notice to proceed for the first major construction contract for the new CWTP:

> (i) A milestone date set forth in the Plan A Milestone Schedule is not met or facts exist which demonstrate a milestone date will not be met;
>
> (ii) Facts exist which demonstrate that full scale operation of the new CWTP will be delayed for at least two years beyond the date for such operation set forth in the Plan A Milestone Schedule, Attachment A of Appendix III,

as a result of "force majeure" or other circumstances beyond the City's control;

(iii) Despite the best efforts of the signatory parties, the City is not able to obtain real property rights, permits, or other authorizations required to construct and operate the new CWTP;

(iv) Facts exist which demonstrate that it is technically infeasible to construct or initiate operation of the new CWTP substantially as designed; or

(v) The estimated cost for completing the project will be "unreasonably high" and, based on this cost estimate, the City has decided not to implement Plan A. As used herein, such costs may be deemed "unreasonably high" only if the product of (i) the estimated project costs for the new CWTP (in millions of dollars) and (ii) the estimated true interest cost (in percent) on fixed rate debt obligations to finance the project exceeds the following:

651 if contract award is to occur in 1992,

678 if contract award is to occur in 1993, or

705 if contract award is to occur in 1994 or thereafter.

In estimating the project cost and the true interest cost for the purpose of this subparagraph, the same methodology shall be used as was utilized by the City in calculating the June, 1990 estimates, Attachment D, Appendix III. In that attachment the City estimated that the project cost is $67.8 million and the true interest cost is 8.0 percent; and the product of these parameters is 542 (67.8 x 8.0).

(b) Following the City's issuance of the notice to proceed for the first major construction contract for the new CWTP, the City will finance and implement the remaining portions of Plan A to completion according to the Plan A Milestone Schedule and the provisions of Paragraphs 14(a) and 15 shall be inapplicable; except however, the events described in subparagraphs 14(a)(iii)

and 14(a)(iv) shall continue to trigger notifications and actions pursuant to Paragraphs 14 and 15 until full scale operation of the new CWTP.

15. Within 30 days following notification that any one of the circumstances set forth in Paragraph 14(a) has occurred, the party providing the notice shall submit to the other signatory parties a complete written description of the particular circumstances and the basis upon which the notification was given. If the signatory parties determine by agreement that a subparagraph 14(a) circumstance has occurred, but nonetheless Plan A should continue to be implemented, the signatory parties shall confirm said agreement in writing and make any appropriate revisions to the Plan A Milestone Schedule, RRT Stipulation, and any other documents necessary to reflect such agreement. Thereafter, the City shall promptly file such revisions with the Court. If the signatory parties determine by agreement that a subparagraph 14(a) circumstance has occurred and that Plan A should not continue to be implemented, the signatory parties shall confirm said agreement in writing and the City shall promptly file said agreement with the Court. Thereafter, Plan A shall be terminated and Plan B shall be implemented pursuant to Paragraph 5(e) of this Stipulation, unless a Plan C is implemented pursuant to the requirements of Paragraph 15(d). If no such determination by agreement among the signatory parties can be reached, any signatory party may, within 30 days following submission of the aforementioned written description of the

subparagraph 14(a) event, petition the Court for a determination that Plan A should be terminated and that Plan B or Plan C should be implemented. If the petitioning party demonstrates to the Court that any of the circumstances described in subparagraph 14(a) has occurred, the Court shall order that Plan A shall be terminated and Plan B shall be implemented unless a signatory party demonstrates to the Court that:

(a) with respect to an occurrence described in subparagraph 14(a)(i) that:

(i) Despite failure to meet one of the milestone dates, the City will be able to meet the milestone date for initiation of full-scale operation of the new CWTP;

(ii) The City's failure to meet its milestone date was primarily the result of the failure of the EPA/State to use best efforts, consistent with subparagraph 5(g), to make timely determinations on permits, authorizations and/or approvals;

(iii) The City's failure, despite its best efforts to meet its milestone date, was primarily the result of the failure to obtain approvals or authorizations from any party other than EPA/State and any resultant delay will be less than two years; or

(iv) There is good cause to extend the milestone dates for construction and initiation of full-scale operation for a period not to exceed two years; or

(b) Notwithstanding any occurrence described in subparagraphs 14(a)(ii);(iii) or (iv), there is good cause to proceed with the implementation of Plan A and such implementation shall not cause an unreasonably high project cost as defined in subparagraph 14(a)(v), unless the City agrees to proceed despite such cost; or

(c) Notwithstanding the occurrence described in subparagraph 14(a)(v), there is good cause

to proceed with the implementation of Plan A and the City so agrees; or

(d) The City demonstrates, that subject to achievement of an agreement with OCC pursuant to paragraph 16, it is willing and able to promptly implement a Plan C to obtain its drinking water supplies from a source other than from the existing CWTP or the new CWTP described in Plan A and that Plan C is:

(i) Technically and financially feasible;

(ii) Capable of being implemented and meeting all the then-existing CWTP supply requirements within substantially the same time frame as that remaining for completion of Plan A pursuant to the Plan A Milestone Schedule; and

(iii) Consistent with the goal of the Judgment to protect users of the CWTP drinking water from endangerment.

In the event the City makes such a demonstration pursuant to this subparagraph (d) and reaches an agreement with OCC, pursuant to paragraph 16, within thirty (30) days, OCC and the City shall not be required to implement Plan B, unless Plan C is not implemented as per paragraph 17, below. If no such City/OCC agreement is reached within thirty (30) days, Plan B shall be implemented pursuant to Appendix III, unless the City demonstrates to the Court that despite not having reached an agreement with OCC, Plan C will be implemented as per the time requirements of subparagraph 15(d)(ii).

16. OCC shall have no obligation with respect to Plan C, other than its obligations under the CWTP Closure/Remedial Plan, unless it enters into a separate agreement with the City, which sets forth specific obligations with regard to Plan C. Any disputes arising regarding the achievement, interpretation or implementation of such agreement which OCC and the City cannot promptly resolve informally will be submitted to the Court for

resolution. Any such agreement shall not affect the obligations of the City and OCC, as appropriate, under this Judgment. EPA/State shall have no financial obligations with regard to Plan C; provided, however, that this provision will not be construed to affect the City's eligibility for any otherwise-available State or federal assistance.

17. If the Court determines pursuant to Paragraph 15(d) that Plan C shall be implemented and if an agreement pursuant to Paragraph 16 between OCC and the City has been achieved, the City shall promptly implement such plan in accordance with the Court's order.

18. The Interim CWTP Monitoring and Response Plan set forth in Appendix III, Section 3.0 will be undertaken until either (a) the initiation of full-scale operation described in Plan A; (b) the installation and initial operation of remedial systems described in Plan B; or (c) the provision of a satisfactory drinking water supply pursuant to Plan C, whichever first occurs.

F.

REMEDIAL WASTE MANAGEMENT PLAN

19. (a) All solid, semi-solid, and liquid waste generated as a result of programs and activities described in the Judgment shall be managed as described therein, as modified by the RRT Stipulation and Appendix IV and in accordance with the Remedial Waste Treatment Milestone Schedule attached thereto.

(b) Except as provided herein below and in Paragraph 20, OCC shall initiate operation of remedial systems as provided in the OCC S-Area Project Schedule. However, nothing in the Judgment shall be construed to require OCC to:

(i) install or operate remedial systems which generate solid or semi-solid wastes until a waste cell(s) at the Landfill Site, as described in Appendix IV, has been constructed by OCC and approved by EPA/State to accept such wastes;

(ii) conduct Phase I remedial activities described in Section 4.3 of Appendix I until the APL/NAPL Storage Facility described in Appendix IV has been constructed and has received written governmental authorization to accept liquid wastes;

(iii) operate remedial systems which generate liquid wastes until (a) the APL/NAPL Storage Facility has been constructed and has received written governmental authorization to accept such wastes, and (b) the APL Carbon Treatment Facility has been constructed by OCC per approvals by EPA/State and authorized by the appropriate parties, at that time, to discharge effluent from the facility. (Nothing herein modifies any EPA

authority to regulate such discharge to the City waste water treatment plant under U.S. v. City of Niagara Falls, Civ. No. 81-363(C)).

20. The starting operation date for the remedial systems which generate NAPL (other than Phase I activities described in Section 4.3, Appendix I) shall be governed by the OCC S-Area Project Schedule and by the determinations, activities, and conditions relating to the storage and treatment of NAPL as set forth in this Paragraph.

(a) OCC's existing incinerator at its Niagara Plant ("OCC Liquids Incinerator") is currently permitted to incinerate certain process and remedial hazardous liquid wastes. OCC has also applied for governmental authorizations to construct and operate a thermal destruction unit at its Niagara Plant ("OCC Solids Incinerator") to incinerate hazardous solid wastes generated at OCC-associated remedial sites in Western New York. OCC shall submit revised applications for permit modifications to allow incineration of liquid remedial wastes, including S-Area NAPL, at the OCC Solids Incinerator in accordance with RWTMS Schedule C. If these incinerators are determined, separately or in combination, to have sufficient capacity and be capable of incinerating NAPL generated by activities under the Judgment in accordance with all applicable permitting requirements designed to protect human health and the environment, EPA and the State have agreed with OCC that these incinerators will be the

preferred facilities for the incineration of NAPL generated by activities under this Judgment; provided, however, as follows:

(i) The foregoing preference shall not be construed to limit or delay OCC's obligations described in subparagraphs (b) or (c) below or to preclude utilization of available capacity at permitted facilities described in subparagraph (c) for the incineration of NAPL generated by activities under the Judgment, if, separately or in combination, the OCC Liquids Incinerator and/or the OCC Solids Incinerator are unavailable to accept NAPL from the remedial system as provided in the OCC S-Area Project Schedule;

(ii) The foregoing preference shall be terminated if, following either the assessment described in subparagraph (b) below or the EPA/DEC determination on OCC's application for approval to incinerate S-Area NAPL (Item A5 of the RWTMS) it is determined that, separately or in combination, the OCC Liquids Incinerator and/or the OCC Solids Incinerator do not have technical capability or sufficient capacity to incinerate NAPL in accordance with applicable permitting requirements;

(iii) Termination of the preference described in subparagraph (ii) shall not be construed to limit or delay the obligations of any party under Paragraph 5(g).

(b) Within 90 days following completion of the Phase I pump tests as provided by the OCC S-Area Project Schedule, OCC shall submit to EPA/State an assessment report described in this subparagraph. The purpose of this assessment is to evaluate whether there will be sufficient incineration capacity authorized by permit and, if such capacity is not available by the date for initiation of operation of Phase II remedial systems provided by the OCC S-Area Project Schedule, when and by what means OCC will obtain sufficient capacity to treat NAPL to be generated by activities under the Judgment. Such assessment shall also consider, among other things, the characterization and the projected volumes of NAPL to be generated by remedial systems installed under the Judgment and by other sources of liquid remedial waste which OCC plans to incinerate; and the permitted projected capacity of the OCC Liquids Incinerator, the OCC Solids Incinerator and permitted storage facilities to treat or store NAPL to be generated by activities under the Judgment. If this assessment indicates that, separately or in combination, OCC's Liquids Incinerator and/or OCC's Solids Incinerator will not be available or will not have sufficient capacity for treating S-Area NAPL generated by activities under the Judgment by the scheduled start of operation of remedial systems that will

generate NAPL, OCC shall, by the scheduled start date, have available 316,000 gallons of NAPL storage (inclusive of NAPL storage provided pursuant to Section 4.4.6(a) of Appendix IV) to allow for start-up of the Phase II remedial system.

(c) If it is determined (either under the subparagraph (b) assessment or under Item A5 of the RWTMS) by agreement of OCC and EPA/State or by order of the Court that there will not be sufficient permitted incineration capacity to accommodate NAPL generated by activities under the Judgment within six months after scheduled initial remedial system operation start-up, or within the period of time for which there will be available NAPL storage capacity, whichever is longer, OCC shall proceed as described in this subparagraph (c). OCC will conduct an assessment which evaluates obtaining NAPL treatment capacity from among the following alternatives:

(i) a commercial incinerator permitted by EPA and the State;

(ii) an on-site mobile incinerator able to be permitted or authorized by EPA and the State; or

(iii) on-site pre-treatment and subsequent incineration at an incinerator permitted or authorized by the State.

As part of that assessment, OCC shall also include evaluation of the following:

(i) Subject to subparagraph (d) below, installation of additional storage capacity.

(ii) Deferral of scheduled start-up of remedial system operations or start-up of remedial system operations under modified conditions (including modified performance monitoring criteria).

(iii) Some combination of the five alternatives set forth above.

The assessment report shall be submitted to EPA/State within 90 days after the aforementioned determination. The report shall include proposed milestone dates for obtaining sufficient NAPL treatment capacity from the alternative(s) recommended in the assessment. Upon EPA/State approval of the assessment report, the RWTMS Schedule D shall be amended to include milestone dates to implement such alternative(s). Once the RWTMS is amended pursuant to this subparagraph, OCC shall proceed with best efforts to expeditiously obtain sufficient treatment capacity, pursuing those alternatives set forth in subparagraphs (a) and (c) on parallel paths according to the schedules for those alternatives under the RWTMS unless otherwise agreed to by EPA/State or ordered by the Court.

(d) If it is determined by agreement of EPA/State and OCC or by order of the Court that NAPL storage capacity beyond 316,000 gallons installed pursuant to subparagraph (b) is reasonable and necessary to satisfy the goals of the Judgment, the total combined APL/NAPL storage capacity will be increased to a maximum of 948,000 gallons. In installing APL/NAPL storage up to 948,000 gallons, OCC shall also reevaluate the APL Treatment

Facility operational needs and the APL storage installed pursuant to Section 4.4.6(a) of Appendix IV. Based on that evaluation, the amount of APL storage may be reduced or increased, as appropriate. Additional APL/NAPL storage capacity, beyond 948,000 gallons, may be ordered by the Court, in its discretion, only if it determines that delays in the RWTMS were the result of OCC's unjustified non-compliance with its obligations under Paragraph 5(g) and the RWTMS. Likewise, if the Court determines that NAPL treatment capacity is unavailable and that unavailability is the result of EPA/State's unjustified non-compliance with its obligations under paragraph 5(g) and the RWTMS, the scheduled date for initial remedial system operations may be extended by such time period as the Court deems appropriate, in its discretion.

(e) If, following submission of the assessment reports described in subparagraphs (b) and (c) and the resolution of all issues relating thereto, it is determined, by agreement of OCC and EPA/State or by order of the Court, that none of the alternatives set forth in subparagraphs (a) and (c) can or will be implemented by December 31, 1995, OCC shall submit to EPA/State an assessment described in this subparagraph. This assessment will include an evaluation of the availability of permitted incineration, its performance equivalent, and treatment facilities other than those described in subparagraph (c) and the installation of additional storage capacity notwithstanding the limitation described in subparagraph (d). OCC's assessment

report shall be submitted within 90 days following the aforementioned determination. The appropriate action to be taken thereafter will be determined by agreement of EPA/State and OCC or order of the Court and shall be consistent with the goals of the Judgment.

G.

ENVIRONMENTAL HEALTH AND SAFETY PLAN

21. The Environmental Health and Safety Plan set forth in Addendum V of the Judgment shall be applicable to activities (other than Plan A; Plan C; and activities on the Eastern Portion of the Treatment Plant, as defined in Appendix III, Section 4.0) undertaken pursuant to the Judgment, except as modified pursuant to Appendix II of this RRT Stipulation.

H.

ENGINEERING AND CONSTRUCTION OVERSIGHT

22. All the design and construction work to be performed by OCC under the Judgment shall be under the direction and supervision of a qualified professional engineer licensed and currently registered to practice in the State of New York. Within 30 days of the lodging of this RRT Stipulation, OCC shall notify the Governmental Parties in writing of the name, title, and qualifications of the engineer who will be responsible for directing or supervising such work. EPA/State, by written notice to OCC, may disapprove any such engineer based upon professional qualifications and other reasonable and appropriate criteria.

EPA/State's approval shall not be unreasonably withheld. Nothing in this Section shall preclude OCC from hiring a field manager, who does not meet the above engineering requirements, provided that the field manager is otherwise qualified and is under the direction and supervision of a qualified engineer who meets the licensing and registration requirements of this Paragraph. At least 30 days prior to the commencement of remedial system construction activity, OCC shall provide the name and qualifications of OCC's selected field manager.

23. At least 30 days prior to the commencement of each construction activity identified on the OCC S-Area Project Schedule, OCC shall notify the Governmental Parties, in writing, of the name and qualifications of any civil, mechanical or well drilling contractor who has been retained to perform or participate in any portion of such work. EPA/State, by written notice to OCC, may disapprove any such contractor(s) based upon professional qualifications and other reasonable and appropriate criteria. EPA/State's approval shall not be unreasonably withheld.

24. Except if previously set forth in the OCC S-Area Project Schedule, OCC shall give the Governmental Parties at least 14 days advance notice of all field activities (including, without limitation, sampling activities, but not including routine operational and maintenance activities) to be performed pursuant to the Judgment. If it is not possible for OCC to give at least 14 days advance notice, OCC shall provide written

notice to the Governmental Parties on the earliest working day possible.

25. OCC shall, following the installation of each remedial system described in the Judgment, provide the Governmental Parties with a certification from a licensed professional engineer currently registered to practice in the State of New York that the system was installed in conformance with the plans and specifications and any approved revisions for that work.

I.

ASSESSMENT REPORTS

26. Whenever the Judgment requires OCC to assess a situation or condition (other than a study conducted pursuant to Paragraph B(8), Addendum I of the Judgment) or conduct a focused feasibility study, OCC shall submit an assessment report pursuant to the provisions of Paragraphs 27 through 32 of this RRT Stipulation unless otherwise specified in Appendix I or Appendix III.

27. Each assessment report shall be prepared in accordance with appropriate professional standards and shall include, without limitation, the following:

(a) a title sheet and a table of contents;

(b) a complete statement of why the assessment report is required, including a clear statement of the problem addressed;

(c) a complete discussion of how the assessment was performed, including assumptions made and the technical and computational methods and procedures used for all assessments;

(d) all data used in the assessment and an explanation of how the data was collected; or, in the alternative, reference to the data if that data was previously provided;

(e) a description and evaluation of all action(s) analyzed;

(f) all conclusions drawn by the assessment;

(g) a recommendation for actions, if any, to be taken;

(h) a complete discussion of the basis for OCC's recommendation;

(i) estimated implementation costs of any action(s) (including no-action alternatives) recommended in the assessment report; and

(j) an implementation schedule for all recommended actions.

(k) an assessment report for a focused feasibility study shall evaluate all applicable alternatives utilizing the same criteria used to evaluate the recommended alternative and shall report such evaluation in a fashion that allows for a full comparison between alternatives.

28. Unless submission of an assessment report is otherwise scheduled, or unless notification is first provided by the Governmental Parties, OCC shall notify the Governmental Parties in writing within 7 days after determining that an assessment report is required by the Judgment. OCC shall complete and submit an assessment report to the Governmental Parties within 30 days after such notification, unless otherwise specified.

29. The Governmental Parties shall review each submitted assessment report and, within 30 days, notify OCC in writing of its agreement or disagreement with the assessment or the assessment report. In the case of disagreement, the Governmental Parties will provide the basis for that disagreement -- including a complete statement of the disagreement, assumptions made, data used, analyses performed, and conclusions drawn -- and, in the discretion of the Governmental Parties, may provide a recommendation for action by OCC.

30. If the Governmental Parties notify OCC either that the assessment or the assessment report is incomplete or otherwise fails to comply with this Section, or that the Governmental Parties disagree with the report's conclusions, OCC shall revise the assessment report to address the Governmental Parties' concerns and recommendations and shall resubmit the report, within 21 days of receipt of the Governmental Parties' response. In the alternative, OCC may, by the required resubmittal date, petition the Court to resolve the dispute.

31. Upon receiving OCC's revised assessment report, the Governmental Parties shall within 30 days of receipt of OCC's revised assessment report, notify OCC in writing of their position regarding the revised report. If the Governmental Parties do not approve the revised assessment report the Governmental Parties will provide a recommendation for what is required to address their concerns and a complete discussion of the basis for their recommendations. If the Governmental Parties do not approve the revised report (or portions of the revised report), OCC shall promptly implement the Governmental Parties' recommendation unless, within 14 days following receipt of the Governmental Parties' response to the resubmitted report, OCC petitions the Court to resolve the dispute.

32. Prior to the submittal of any assessment report or during any review period any signatory party may request that informal meetings or negotiations be held within the specified time frames. Furthermore, the time frames for submittals, review and approval specified in this Section may be extended by agreement of OCC and the Governmental Parties or order of the Court, for good cause shown.

J.

CWTP IMPACTS

33. Whenever the Judgment requires OCC to:

(a) conduct an assessment or focused feasibility study of Operational Modifications, System Modifications and supplements, Monitoring Program Reassessments and Modifications, System Operation Reductions, or Terminations; or

(b) conduct an RRT Study or focused RRT Study;

the impact of any alternative actions analyzed upon the existing CWTP remedial systems, structures, underground pipelines or utilities shall be included in the assessment. If the existing CWTP remedial systems, structures, underground pipelines or utilities may be adversely affected by the proposed actions pursuant to such assessment study, OCC shall include in its assessment an evaluation of measures designed to eliminate or to mitigate, as appropriate, such impacts. The Governmental Parties shall consider these impacts and any proposed measures in their review and approval process for any proposed actions.

K.

RETENTION OF RECORDS

34. (a) Except as provided in subparagraphs (b) or (c) below, following the lodging of this RRT Stipulation, each signatory party shall keep, as "Retained Records," all data, records, documents and information of any kind which are in, or

which may come into, its possession or control and which provide information on or relate to:

(i) the disposal or presence of chemicals in, or the migration of chemicals at or from, the Landfill Site;

(ii) any analysis or evaluation of actual or potential health or environmental impacts due to the disposal, presence, or migration of chemicals at or from the Landfill Site;

(iii) geology, hydrogeology, remediation, or regulation of the Landfill Site, and

(iv) any activity in the Area of Concern (AOC) required under the Judgment,

regardless of any document retention policy to the contrary. As used herein, Retained Records shall include, without limitation, originals, and duplicate copies with informational marks or notations or microfiche or microfilm of originals, whether privileged or non-privileged. A party shall, upon written request of any other signatory party, make available for inspection and copying any non-privileged Retained Records and identify privileged Retained Records, as per subparagraph (d) of this Section, within fourteen (14) days of such request, except where the party with Retained Records is otherwise specifically required to provide such material under other provisions of the Judgment.

(b) A party may at any time destroy Retained Records which have been photocopied, microfilmed, microfiched or duplicated using equivalent techniques provided that ninety (90) days prior notice is given to all other signatory parties and that upon request such parties are afforded the opportunity to take custody of any non-privileged Retained Records proposed for such destruction, and all privileged Retained Records proposed for destruction have been identified as per subparagraph (d) of this Section.

(c) A party may, after May 1, 2000, destroy Retained Records which are at least ten (10) years old provided that at least ninety (90) days prior notice is given to all signatory parties and that upon request such parties are afforded the opportunity to take custody of such non-privileged Retained Records; and all privileged Retained Records proposed for destruction have been identified as per subparagraph (d) of this Section. If such Retained Records consist of OCC's "as-built" drawings of remedial systems described in the Judgment, OCC shall submit such drawings to EPA without a request having been made.

(d) Any signatory party shall have the right to contest the validity of any other party's assertion that certain Retained Records are privileged. The party claiming a privilege shall produce, upon request of another signatory party, a list of such Retained Records with sufficient information about those records to permit an evaluation of the validity of the assertion of privilege.

L.

RESERVATION OF RIGHTS

35. The signatory parties hereto acknowledge that OCC is undertaking certain surveys and investigations regarding chemical migration from areas of its Niagara Falls Buffalo Avenue Plant, (separate from the surveys and investigation undertaken for the Landfill Site) pursuant to the requirements contained in permits issued by EPA and the State and pursuant to a stipulation approved by this Court in the State of New York and Henry G. Williams, Commissioner of Environmental Conservation of the State of New York v. Occidental Chemical Corporation, et al., Civil Action No. 83-1393. OCC is also required to take appropriate remedial action in response to such chemical migration. EPA/State reserve all rights in the aforementioned proceedings to require that any identified plumes from the Landfill Site not addressed by remedial systems under this Judgment which commingle with Buffalo Avenue Plant Site plumes be addressed in conjunction with those Plant Site plumes under the Buffalo Avenue Plant Site remedial programs, as appropriate. Furthermore, EPA/State reserve all rights in the aforementioned proceedings to require that Buffalo Avenue Plant Site remedial programs, otherwise installed pursuant to those proceedings, be operated in a manner which address chemicals migrating in an identified plume from the Landfill Site where such action is Requisite, as defined in Paragraph 4 of the Judgment, or where such migration triggers

response actions developed to address Buffalo Avenue Plant Site plumes.

36. Similarly, nothing herein is intended to preclude the signatory parties from assessing the effectiveness of remedies implemented under the Buffalo Avenue Plant Site remedial programs in meeting the goals of the Judgment and the objectives of the remedial systems implemented at the Landfill Site pursuant to this RRT Stipulation, or from petitioning this Court to modify the Judgment, in accordance with applicable law, based on the results of any such assessment. If OCC proposes such a modification to the Court, it shall first prepare an assessment report for the Governmental Parties pursuant to Section I of this RRT Stipulation. OCC may not move to modify the Judgment pursuant to this Section until:

(i) the Site Containment System and RRT Overburden Containment System as set forth in Appendix I, Section 2.0 have been installed and are operating, and

(ii) the Bedrock System (including the Prototype and/or Bedrock RRT System) described in the Judgment has been installed and operating for at least ten (10) years after initial operation of the Prototype System.

37.(a) EPA/State have determined that any presently known or reasonably anticipated conditions which are associated with chemicals that have migrated from the Landfill Site into the

Bedrock beneath the Niagara River will be addressed by the remedial programs, associated response actions, monitoring programs, assessments and studies described in the Judgment. If new data or information reveal conditions associated with these chemicals which have migrated into the Bedrock beneath the Niagara River which are not presently known or could reasonably be anticipated by EPA/State, and if those conditions are not adequately addressed pursuant to the Judgment, EPA/State reserves its rights under Paragraph 11(c)(i) of the Judgment to seek appropriate relief, including requiring OCC to study and/or remediate such conditions.

(b) This subparagraph (b) is subject to the provisions of subparagraph (a), including specifically, but not limited to, the EPA/State reservation of rights under Paragraph 11(c)(i) of the Judgment. Implementation of all the requirements and activities of the Judgment and the RRT Stipulation shall satisfy OCC's obligations under Paragraphs B(6)(a) and (b) of Addendum I of the Judgment. Except as provided in subparagraphs E(9)-(14), Addendum I of the Judgment and in the Drinking Water Treatment Plant Remedial/Closure Plan (see RRT Stipulation, Appendix III, Attachment C), OCC shall not be required pursuant to this Judgment (including the RRT Stipulation) to install wells, take samples, or conduct surveys in the Bedrock beneath the Niagara River. Any RRT study, associated actions, or operational or system modifications which may be required pursuant to the plans and programs described in the Judgment shall not include

technologies which require installation in or beneath the Niagara River, or which address the issues described in subparagraph (7)(a) of Addendum I of the Judgment.

38. All signatory parties reserve their rights to assert any rights or make any arguments that otherwise may be available to them prior to the date on which this RRT Stipulation is signed by the parties; provided, however, nothing herein shall modify any explicit waiver, discharge, or release set forth in the Judgment approved by the Court in 1985, including but not limited to, those set forth in Paragraphs 3(b) and 11 of that Judgment.

39. To the extent that any signatory party reserves rights pursuant to this Section, all other signatory parties reserve all rights and defenses relating thereto.

M.

INDEMNIFICATION AND INSURANCE

40. OCC agrees to defend, indemnify and hold harmless the United States and the State (including their officers, agents, employees, contractors and subcontractors or representatives) for any and all claims and causes of action asserted against the United States or the State, arising from or on account of tortious acts or omissions of OCC, its officers, directors, employees, contractors, subcontractors or any persons acting on its behalf or under its control in carrying out activities pursuant to the Judgment. OCC shall not hold out the United States or the State as a party to any contract entered into by or

on behalf of OCC in carrying out obligations pursuant to this Judgment. OCC shall not be considered an agent of the United States or the State for any purpose under the Judgment.

41. OCC waives, and agrees to defend, indemnify and hold harmless the United States and the State, in respect to any claims for damages or reimbursement from the United States or the State (or for set-off of any payments made or to be made to the United States or the State) arising from any agreement or arrangement between OCC and another party arising out of OCC's obligations under the Judgment, including but not limited to claims arising out of construction delays.

42. Within 20 days after the effective date of this RRT Stipulation and thereafter so long as activities under the Judgment require, OCC shall name the United States and the State as additional insureds on OCC policies for comprehensive general liability and automobile insurance which are applicable to OCC activities in Western New York. Such policies shall contain liability limits no less than those specified on the Insurance Certificate Form (Appendix VI). Within 30 days after the effective date of this RRT Stipulation, OCC shall submit to EPA/State a certificate of such insurance. OCC shall resubmit to EPA/State such a certificate if the previously submitted certificate becomes inoperative. In addition, for so long as activities under the Judgment require, OCC shall require that its contractors and subcontractors satisfy all applicable laws regarding provision of workers compensation insurance for all

persons performing activities on behalf of OCC in furtherance of this Judgment.

N.

NOTICES

43. Written notices, reports or other documents referenced in the Judgment shall be sent to the following individuals at the addresses specified below (unless those individuals or their designated successors give written notice of a change of identities or addresses to the other signatory parties) where such documents (a) are required to be submitted to the Court or to the signatory parties pursuant to the Judgment; (b) relate to modifications or proposed modifications to the Judgment described in Paragraph 3(a) and written confirmations pursuant to 3(c) supra; (c) provide notice of delays in the performance of work required under the Judgment; or (d) relate to disputes under the Judgment which are under discussion by counsel for the parties or under consideration by the Court. All other written notices, reports, and other documents referenced in the Judgment may be forwarded only to the Project Coordinators at the addresses set forth below, and, in those instances, the Project Coordinators will take responsibility for assuring that all such documents are appropriately disseminated.

a. <u>As to the United States:</u>

1 copy: Chief, New York/Caribbean Superfund Branch
Office of Regional Counsel
U.S. Environmental Protection Agency, Region II
26 Federal Plaza, Room 437
New York, N.Y. 10278
Attention: S-Area Attorney

5 copies: Chief, New York/Caribbean Compliance Branch
Emergency and Remedial Response Division
U.S. Environmental Protection Agency, Region II
26 Federal Plaza, Room 747
New York, New York 10278
Attention S-Area Site Project Coordinator

1 copy: Chief, Special Litigation Branch
Office of Enforcement-Superfund (LE-134S)
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460
Attention: S-Area Attorney

b. <u>As to the State</u>:

4 copies: Director
Bureau of Western Remedial Action
Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233
Attention: S-Area Site Project Coordinator

2 copies: Director
Bureau of Environmental Exposure Investigation
New York State Department of Health
2 University Place
Albany, New York 12203

1 copy: New York State Department of Law
Environmental Protection Bureau
120 Broadway
New York, New York 10271
Attention: S-Area Attorney

c. As to OCC:

5 copies: Mr. John Nichter
S-Area Project Coordinator
Special Environmental Programs
Occidental Chemical Center
360 Rainbow Boulevard South
P.O. Box 728
Niagara Falls, New York 14302

1 copy: J. Alan Mack, Esquire
Associate General Counsel
Occidental Chemical Corporation
5005 LBJ Freeway
Dallas, Texas 75244

d. As to the City:

3 copies: Mr. John R. Westendorf
S-Area Project Coordinator
City of Niagara Falls Water Treatment Plant
53rd Street & Buffalo Ave.
P.O. Box 69
Niagara Falls, New York 14302

1 copy: Michael B. Gerrard, Esquire
Berle, Kass & Case
45 Rockefeller Plaza
New York, New York 10111

O.

PUBLIC PARTICIPATION

44. Court approval and entry of this RRT Stipulation are subject to the public participation requirements set forth in this Section. The consent of EPA and the State to this RRT Stipulation is on the condition that an opportunity be afforded persons (natural or corporate) who are not signatories hereto to comment on the RRT Stipulation. Promptly after the filing of the RRT Stipulation by the parties, notice of the filing will be

provided in the Federal Register and copies of the RRT Stipulation will be made available to the public at the EPA Public Information Office, Carborundum Center, Suite 530, 345 Third Street, Niagara Falls, New York 14303, and at the Department of Environmental Conservation, Region 9 Office, Buffalo, New York. EPA and the State may withdraw or withhold consent to this RRT Stipulation, or propose modifications to the RRT Stipulation, if comments received disclose facts or considerations that indicate that the RRT Stipulation is inappropriate, improper, or inadequate. EPA/State will receive public comments for sixty (60) days after the date the RRT Stipulation is filed with the Court. Within sixty (60) days thereafter, EPA/State will respond in writing to public comments received during the comment period and submit any public comments received and responses to those comments to the Court. Within ten (10) days of that submission, EPA/State will advise the Court by letter or motion whether they wish to withdraw from, to withhold consent to, to propose modifications or to move to have the RRT Stipulation entered and incorporated into the Judgment.

45. In the event that EPA/State withdraws or withholds its consent to the entry of this RRT Stipulation, or proposes modifications to the RRT Stipulation, the signatory parties shall promptly initiate discussions relating to the comments received or to any proposed modifications to the agreement embodied in the lodged RRT Stipulation and shall notify the Court and the public of these discussions. In the event that the signatory parties

are able to agree to the proposed modifications within 30 days of the date of notification of the Court pursuant to this paragraph, they shall lodge the RRT stipulation, as modified, with the Court. In the event that the signatory parties are unable to agree to any proposed modification within said 30 days the RRT Stipulation lodged with the Court shall be deemed withdrawn, null and void, and shall be inadmissible in this or any other action; however, nothing herein shall preclude agreement between OCC and the Governmental Parties that certain portions of the RRT Stipulation shall become effective. In the event that the RRT Stipulation is deemed withdrawn, in whole or in part, the Judgment which was approved and entered in 1985, together with any stipulations filed with the Court pursuant to that Judgment, shall continue to have full force and effect, and any disputes shall be resolved by the Court.

46. The 60-day public comment period may be extended by EPA/State for an additional 30 days, in their discretion, and if prior to the granting of such extension, EPA/State notifies the Court of its intent to grant the extension. The 30-day period for discussing any proposed modifications may be extended by agreement of the signatory parties, with prior notification to the Court, or by order of the Court.

47. OCC and the City consent to the entry of this RRT Stipulation, unless the withdrawal or modifications provisions of Paragraphs 44 and 45 become applicable, without further notice.

P.

EFFECTIVE DATE

48. The effective date of this RRT Stipulation shall be the date on which it is entered by the United States District Court for the Western District of New York. The activities set forth in any applicable schedule or in any revised schedule to be filed pursuant to Section D shall not be affected by the effective date of this RRT Stipulation or by the pendency of any appeal from such entry, unless the Court orders otherwise.

Q.

EXECUTION OF RRT STIPULATION

49. This RRT Stipulation may be executed in two or more identical counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. The parties represent to the Court that counsel of record have authority to signify the parties' consent and approval of this RRT Stipulation, subject to the provisions of Section O, above, by signing below.

UNITED STATES OF AMERICA
UNITED STATES DEPARTMENT OF JUSTICE

By:_____
RICHARD STEWART
Assistant Attorney General
Land and Natural Resources Division

By: _____
DENNIS C. VACCO
United States Attorney
Western District of New York

By: _____
MICHELE GIULIANI
Trial Attorney - Environmental
Enforcement Section

U.S. ENVIRONMENTAL PROTECTION AGENCY

By: _____
Constantine Sidamon-Eristoff
Regional Administrator
Region II

By: _____
JAMES M. STROCK
Assistant Administrator for Enforcement

By: _____
STEVEN M. SPIEGEL
Attorney-Advisor
Office of Enforcement - Superfund

By: _____
GREGORY C. SNYDER
Attorney-Advisor
Office of Regional Counsel
Region II

STATE OF NEW YORK

By: _____
ROBERT L. OSAR
Assistant Attorney General
NEW YORK STATE DEPARTMENT OF LAW

By: _____
EDWARD O. SULLIVAN
Deputy Commissioner
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

By: _____
DR. DAVID AXELROD
Commissioner
NEW YORK STATE DEPARTMENT OF HEALTH

CITY OF NIAGARA FALLS

By: _____
MICHAEL O'LAUGHLIN
Mayor

By: _____
CARL E. MOORADIAN
Deputy Corporation Counsel

By: _____
MICHAEL B. GERRARD
BERLE, KASS & CASE

OCCIDENTAL CHEMICAL CORPORATION

By: _____
THOMAS H. TRUITT
KEITH S. WATSON
PIPER & MARBURY

By: _____
LOUIS NIZER
MARTIN B. WASSER
PHILLIPS, NIZER, BENJAMIN,
KRIM & BALLON

By: _____
DAVID K. FLOYD
PHILLIPS, LYTLE, HITCHCOCK,
BLAINE & HUBER

Dated: September 12, 1990

ENTER:

Stipulation is hereby approved in accordance with the foregoing.

_____
UNITED STATES DISTRICT JUDGE

APPENDIX I

S-AREA RRT REMEDIAL PLAN

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S-AREA - RRT REMEDIAL PLAN

1.0 INTRODUCTION

A. To attain the goals of the Judgment and the RRT Stipulation, OCC shall design, install, operate, maintain and monitor the RRT remedial systems to remediate chemicals within the Landfill Site and chemicals which have migrated beyond the Landfill Site and beyond areas addressed by other remedial systems described in the Judgment, as described in this Remedial Plan.

B. The RRT remedial systems described in this Remedial Plan consist of the following:

- Site Containment System
- Overburden RRT System
- Bedrock RRT System

C. The design objectives of the Site Containment System are: (1) to contain APL and NAPL; (2) to maximize the collection of NAPL within the Site Barrier Wall (as defined below) at the Landfill Site; and (3) to minimize the migration of chemicals toward the City's Drinking Water Treatment Plant (hereinafter "CWTP"). Subject to Section 1.0.F. below, the Site Containment System will be operated to attain these design objectives.

D. The design and remedial objectives of the Overburden RRT System are: (1) to contain APL and NAPL within

the existing S-Area Overburden NAPL plume; and (2) to collect NAPL outside the Site Barrier Wall to the maximum extent practicable. Subject to Section 1.0.F. below, the Overburden RRT System will be operated to attain these objectives.

E. The design and remedial objectives of the Bedrock RRT System are: (1) to contain APL and NAPL within the existing S-Area Bedrock NAPL plume; (2) to prevent further NAPL migration in the bedrock under the Niagara River; and (3) to collect NAPL within this plume to the maximum extent practicable. The Bedrock RRT System will be operated to attain these objectives.

F. The Bedrock RRT System will be operated to attain its objectives even if doing so prevents maintaining the specified upward hydraulic gradients into the Site Containment and Overburden RRT Systems.

G. The design and operating objectives of the City Drinking Water Treatment Plant Remedial Program as set forth in Appendix III of this RRT Stipulation are to prevent chemicals which have migrated from the Landfill Site from entering the CWTP water supply structures and service lines in order to protect the users of the City of Niagara Falls' drinking water from endangerment and to minimize structural impacts on CWTP pipelines, utilities, buildings, or other CWTP structures due to remedial activities.

2.0 OVERBURDEN REMEDIAL SYSTEMS:

2.1 SITE CONTAINMENT SYSTEM

2.1.1 OBJECTIVES

The design objectives of the Site Containment System are: (1) to contain APL and NAPL; (2) to maximize the collection of NAPL within the Site Barrier Wall (as defined below) at the Landfill Site; and (3) to minimize the migration of chemicals toward the CWTP. Subject to Section 1.0.F., the Site Containment System will be operated to attain these design objectives.

2.1.2 REMEDIAL SYSTEM

A. Installation:

A1. The Overburden area at the Landfill Site will be addressed by a remedial system (Site Containment System), consisting of barrier walls (Site Barrier Wall), a drain tile system (Tile Collection System), seven Overburden (Site Containment) purge wells installed in Confining Layer Discontinuities and a cap. The Site Barrier Wall shall consist of a slurry wall on the west, north, and east. These components, except the cap, are shown on Figure 1. The Site Barrier Wall refers to those portions of the Overburden Barrier Walls (as defined in Section 2.2.2.B1) located north of the Industrial Intake Pipe Trench (IIPT).

A2. Site Barrier Wall:

(a) The Site Barrier Wall shall be installed at least one foot below the top of the Confining Layer; provided, however, that in the event any routes of chemical migration are identified which are expected to pass under the Site Barrier Wall in the Overburden after Hydraulic Stabilization (as described in Sec. 4.4.1.A3), the depth of the Site Barrier Wall shall be lowered so as to intercept any such routes in the Overburden. If the Site Barrier Wall traverses a Confining Layer Discontinuity, it shall be installed to a depth and in a manner which will assure the integrity and intended function of the Site Barrier Wall.

(b) The Site Barrier Wall shall consist of material or materials at least two feet wide having a maximum permeability of 1×10^{-6} cm/sec, or its performance equivalent. Prior to submission of plans and specifications concerning the Site Barrier Wall, OCC shall conduct an accelerated test of any material it intends to use to demonstrate to what extent, if any, the permeability of the material will be affected by chemicals in the adjacent Overburden. The results of such testing and all underlying data related thereto shall accompany OCC's submission of plans and specifications concerning the Site Barrier Wall.

A3. Tile Collection System:

(a) The Tile Collection System shall be located and installed in a manner which will maximize the containment

of APL and NAPL located within the Site Barrier Wall. The Tile Collection System drain which is adjacent to the Industrial Intake Pipe Trench (IIPT) shall be hydraulically connected to the bedding of the IIPT in such a manner as to allow collection of APL and NAPL from the IIPT bedding.

(b) The Tile Collection System shall be installed at least to the top of the Confining Layer; provided, however, that it shall be installed to a depth which will maximize the collection of NAPL located within the Site Barrier Wall. If the Tile Collection System traverses a Confining Layer Discontinuity, it shall be installed to one foot above the top of Bedrock. The drain tile shall be sloped toward Wet Well A at a minimum grade of 0.5%.

(c) OCC shall promptly submit to the Governmental Parties plans, specifications and protocols for the accelerated compatability testing of all permanent materials, (e.g., pipe, filter fabric) associated with Tile Collection System installation that OCC intends to use to demonstrate to what extent, if any, the material will be affected by chemicals in the adjacent overburden. Implementation of the testing program shall commence immediately following the Governmental Parties approval of the plans, specifications and protocols. The results of such testing and all underlying data related thereto shall accompany

OCC's submission of plans, and specifications concerning the Tile Collection System.

A4. Site Containment Purge Wells:

The Site Containment Purge Wells shall be located approximately as shown on Figure 1. The wells shall be installed in such a manner and to such depths as to meet the objectives set forth in Section 1.0.

A5. Cap:

The Landfill Site shall be capped in accordance with the provisions of the Waste Management Plan and Section 3.0 herein.

A6. Underground Utilities:

Underground utility and service lines located within the perimeter of the Site Barrier Wall shall be abandoned in place. Whenever a utility or service line previously abandoned or to be abandoned pursuant to this subparagraph crosses the Site Barrier Wall, OCC shall remove that portion of such line crossing the Wall, seal the ends of each line remaining in place by plugging with appropriate grouting material, or its performance equivalent, and backfill the trench from which such portion was removed. If appropriate, utility and service lines abandoned pursuant to this subparagraph shall be replaced by installations above ground or outside the Site Barrier Wall. The 003 storm sewer outfall shall be relocated to the alignment shown on Figure 1.

A7. Lagoons:

OCC shall terminate the operation and use of the existing lagoons, and the area encompassed by the existing lagoons shall be capped and closed in accordance with Section 3.0 and the Waste Management Plan.

B. Operation:

B1. The Tile Collection System and seven Site Containment purge wells will be operated to achieve an inward gradient across the Site Barrier Wall, except in those areas where the installation or operation of the CWTP or RRT systems make the achievement of such inward gradients impracticable. In those areas where an inward gradient is not achieved, any migration of S-Area APL and NAPL will be addressed by other installed remedial system(s).

B2. The Tile Collection System will be operated to maximize an upward gradient across the Confining Layer within the area encompassed by the Site Barrier Wall such that the wet well water level is maintained at the lowest drain tile invert elevation at the wet well.

B3. The static water table elevation of each Site Containment Purge/Recovery Well measured after Hydraulic Stabilization as defined in Subsection 4.4.1.A3, will be used to determine the need for Site Containment Purge/Recovery Well operation. If the static water table elevation at a Site

Containment Purge/Recovery Well is greater than one foot above the top of the Clay/Till Layer, or Bedrock where no Clay/Till Layer exists, and a nine foot upward head differential does not exist at that well, then that Site Containment Purge/Recovery Well will be operated to maintain the pumping water level in the well at one foot or less above the Clay/Till Layer or top of Bedrock where no Clay/Till Layer exists.

C. NAPL Recovery-Testing and Operation:

C1. Identification of Wells for Testing: Thirty days after the installation of the 7 Site Containment System purge/recovery wells, each well that encounters NAPL during installation will be tested to evaluate NAPL recovery potential.

C2. Recovery Testing Procedure: When testing purge/recovery wells, the objective will be to evaluate the capability of the well to produce NAPL and to define operational requirements needed to maximize NAPL recovery. Initially, each purge/recovery well that encounters NAPL upon installation will be pumped for APL and NAPL at the maximum rate achievable (to a maximum of 5 gal/min) for a duration of five days. The test will be conducted to quantify the ratio of NAPL to APL produced as a function of time. The radius of well influence on NAPL will also be evaluated for the overburden wells that are tested. No additional new wells will be installed solely for the purpose of evaluating the radius of

well influence. Test results will be evaluated during each well test, and upon approval by the Governmental Parties, the pump rates and duration will be varied to enhance the effectiveness of the test.

C3. Operation of NAPL Recovery Wells: Based on the results of the NAPL recovery testing, any well shown to be capable of producing reasonable amounts of NAPL will be operated in such a manner as to recover NAPL to the maximum extent practicable. In evaluating whether the amount of NAPL which can be recovered by a well is reasonable, the following factors will be considered:

- Ratio of NAPL to APL collected
- Depth of NAPL in a well
- Volume of water pumped to recover NAPL
- Radius of well influence
- Production decline
- Use of non-continuous pumping, i.e., periodic pumping of NAPL.

Any well which is shown not to be capable of producing reasonable amounts of NAPL and which is not being pumped pursuant to Subsection 2.1.2.B. or 2.2.2.C. will be monitored as described in Section 2.3.1.

Based on the results of the NAPL recovery testing, OCC will, within 30 days of test completion, identify, subject to the Governmental Parties approval, which wells will be operated as NAPL recovery wells and how and when those wells will be operated to maximize NAPL recovery.

2.2 OVERBURDEN RRT SYSTEM

The Overburden area outside the Site Containment System will be addressed by the RRT system (Overburden RRT System) described below.

2.2.1 OBJECTIVES

The design and remedial objectives of the Overburden RRT System are: (1) to contain APL and NAPL within the existing S-Area Overburden NAPL plume; and (2) to collect NAPL outside the Site Barrier Wall to the maximum extent practicable. Subject to Section 1.0.F., the Overburden RRT System will be operated to attain these objectives.

2.2.2 REMEDIAL SYSTEM

A. Introduction:

This Section addresses the installation, operation and testing of the components of the Overburden RRT System.

B. Installation:

B1. The Overburden RRT System shall consist of barrier walls south of the Site Barrier Wall and the Robert Moses Parkway (RRT Barrier Wall), drain tiles, Grout Plugs installed across the Industrial Intake Pipe Trench (IIPT) and Robert Moses Parkway (RMP), Overburden RRT Purge/Recovery Wells, and a cap. These components, except the cap, are shown on Figure 1. The Site Barrier Wall and RRT Barrier Wall are

referred to collectively in this Plan as the Overburden Barrier Walls.

B2. RRT Barrier Wall:

(a) The RRT Barrier Wall refers to that portion of the Overburden Barrier Wall located south of the Site Barrier Wall. The approximate location of the RRT Barrier Wall is shown on Figure 1.

(b) All design and installation requirements specified for the Site Barrier Wall under Subsection 2.1.2 shall apply to the design, installation and performance of the slurry wall portion of the RRT Barrier Wall.

B3. Drain Tiles:

Drain tiles shall be designed and installed in accordance with the criteria specified for the Tile Collection System drain tiles under Subsection 2.1.2. The location of the drain tiles shall be approximately as shown on Figure 1.

B4. Grout Plugs:

(a) Grout Plugs shall be installed across the IIPT and RMP at the location where these facilities are intersected by the centerline of the RRT Barrier Wall, as shown on Figure 1.

(b) The depth to which the Grout Plugs are installed shall be in accordance with the criteria specified for Site Barrier Wall installation under Subsection 2.1.2.

(c) The Grout Plugs shall be installed by a prescriptive grouting program designed and implemented to allow for maintenance of the hydraulic gradients specified under Subsection 2.2.2.c. Once the Governmental Parties-approved prescriptive grouting program has been implemented the installation of Grout Plugs shall be deemed complete.

(d) OCC shall promptly submit to the Governmental Parties plans, specifications and protocols for the accelerated testing of grout material associated with Grout Plug installation that OCC intends to use. The objective of the accelerated testing is to demonstrate to what extent, if any, the permeability of the grout material will be affected by chemicals in the adjacent overburden. Implementation of the testing program shall commence immediately following the Governmental Parties approval of the plans, specifications and protocols. In lieu of such testing, OCC may promptly submit technical documentation that adequately demonstrates, subject to the Governmental Parties approval, the appropriateness of grout material for use in the prescriptive grouting program defined in this Section 2.2.2.B4. The results of such testing and all underlying data related thereto shall accompany OCC's submission of plans and specifications concerning the Grout Plugs.

B5. <u>Overburden RRT Purge/Recovery Well Systems:</u>

(a) Two Overburden purge/recovery well systems

will be installed as shown on Figure 1. These systems will consist of:

(i) a well system consisting of six wells located immediately south of the IIPT and north of the RMP; and

(ii) a well system consisting of ten wells, including nine wells located south of the RMP and one well located north of the RMP and east of the IIPT.

(b) The Overburden RRT Purge/Recovery Wells shall be installed in such a manner and to such depths as to meet the objectives set forth in Section 1.1.

B6. Cap:

The Overburden RRT System area shall be capped in accordance with the provisions of Section 3.0 herein.

C. Operation:

C1. The Overburden RRT purge/recovery well system will be operated to achieve:

(a) an inward gradient, across the RRT Barrier Wall and grout plugs on the west, south and east; and

(b) an upward gradient within these walls and grout plugs, as described in Section C2. below.

C2. Each RRT purge/recovery well will be operated to maintain an inward gradient and/or to increase the upward gradient cited in Subsection C1. above, if, after Hydraulic Stabilization (as defined in Subsection 4.4.1.A3.), but no later than 12 months after start of operation of both the Tile

Collection System and the Prototype Bedrock System, any of the following conditions exist:

(a) an inward gradient does not exist across the RRT Barrier Wall or the grout plugs shown on Figure 1;

(b) static water levels in any of the six wells adjacent to the IIPT are higher than one foot above the Clay/Till Layer, or the Bedrock where no Clay/Till Layer exists, and there is less than a nine foot upward head differential from the Bedrock;

(c) static water levels in any of the ten remaining wells which are installed in the defined areas with less than three feet of Confining Layer are higher than one foot above the Clay/Till Layer and there is less than a nine foot upward head differential from the Bedrock; or

(d) static water levels in any of the ten remaining wells which are installed in the defined areas of greater than three feet of Confining Layer are higher than one foot above the Clay/Till Layer and indicate no net upward gradient from the Bedrock.

D. <u>NAPL Recovery Testing in the Overburden RRT Purge/Recovery Wells</u>:

D1. Identification of Test Wells: Thirty days after the 16 RRT purge/recovery wells are installed, each well that encounters NAPL during installation will be tested by pumping to evaluate NAPL recovery potential.

D2. Recovery Testing Procedure: When testing purge/recovery wells, the objective will be to evaluate the capability of the well to produce NAPL and to define operational requirements needed to maximize NAPL recovery. The testing for NAPL recovery by Overburden RRT purge/recovery wells will be as described in Section 2.1.2.C2, infra.

D3. Operation of NAPL Purge/Recovery Wells: Based on the results of the NAPL recovery testing, any well shown to be capable of producing reasonable amounts of NAPL will be operated as described in Section 2.1.2.C3, infra.

2.3 OVERBURDEN MONITORING PROGRAM

2.3.1 NAPL MONITORING

A. Monitoring Objective:

The objective of the Overburden NAPL Monitoring Program (ONP) is:

- to evaluate the NAPL recovery by the Site Containment and Overburden RRT Systems and to facilitate the selection and/or addition of Overburden wells to be pumped for NAPL recovery pursuant to Section 2.3.1.C.
- to assess whether the S-Area Overburden NAPL plume is contained within the Overburden Barrier Walls.

B. Program Implementation:

B1. Each purge/recovery well within the Overburden Barrier Walls will be evaluated for NAPL recovery as follows:

- Monitoring will be initiated at the same time as Overburden Hydraulic Monitoring (see Subsection 2.3.2.B1. below).

- Quarterly frequency.

- Each well pumped solely for the purpose of NAPL recovery will be monitored for the following:

  - NAPL and APL production rates (measured);

  - NAPL/APL ratio (calculated);

  - NAPL production decline (calculated);

  - Volume of water pumped to recover NAPL (measured); and

  - radius of well influence calculated and/or measured.

- Wells not being pumped will be monitored for depth of NAPL.

B2. The cumulative volume of NAPL recovered by the Overburden RRT purge/recovery well system will be monitored and calculated monthly.

B3. Piezometers outside the Overburden Barrier Walls will be monitored for NAPL presence as follows:

- Monitoring will begin one year after completion of the Overburden Barrier Walls.

- Annual frequency.

- Each of the nine Overburden piezometers outside the Overburden Barrier Walls will be visually inspected for NAPL using hand bailing to the bottom of the piezometer (or a performance equivalent).

C. Response Actions:

C1. During the ONP, an Overburden NAPL recovery test, as per Subsection 2.1.2.C2., will be conducted on any Overburden purge/recovery well where:

- ONP monitoring indicates NAPL in any previously non-NAPL bearing, non-pumping well.
- The level of NAPL in a NAPL-bearing well which is not being pumped increases to pumpable levels between ONP monitoring observations.

If any well is shown by the pump test to be capable of recovering reasonable amounts of NAPL (as defined in Section 2.1.2.C3.), it will be operated as described in Section 2.1.2.C3.

C2. Any Overburden purge/recovery well which is being operated solely for the purpose of NAPL recovery will be shut off if it is no longer recovering reasonable amounts of NAPL based upon the considerations stated in Subsection 2.1.2.C3. However, that well will continue to be subject to monthly ONP monitoring, and, if the NAPL level increases to pumpable levels between monitoring observations, the NAPL will be pumped out. If the well is determined to be capable of producing a reasonable amount of NAPL, operation of the well will be reinitiated as described in Subsection 2.1.2.C3.

C3. One year after initiation of ONP monitoring, the selection of Overburden Wells which are being pumped for NAPL

recovery will be assessed. OCC shall submit this assessment to the Governmental Parties within 30 days.

C4. As a result of the assessment, additional Overburden wells for NAPL recovery will be installed if data indicate that such wells would collect reasonable amounts of NAPL (as described in Subsection 2.1.2.C3).

C5. If ONP monitoring indicates NAPL presence in any piezometer immediately outside the Overburden Barrier Walls, OCC will proceed pursuant to Section 5.1.1 to determine what Operational Modifications (as defined in Section 5.1.1) to the Overburden RRT System and/or the Site Containment System are required to contain NAPL.

C6. If further ONP monitoring indicates that the action taken pursuant to Subsection C5. above is not effective in containing NAPL within the existing Overburden NAPL plume, OCC will proceed pursuant to Section 5.1.2.

2.3.2 OVERBURDEN HYDRAULIC MONITORING

A. Monitoring Objective:

The objective of the Overburden Hydraulic Monitoring Program (OHP) is to evaluate the effectiveness of the Site Containment System and the Overburden RRT System in maintaining inward gradients across the Overburden Barrier Walls and upward gradients into the Site Containment System and Overburden RRT System from the Bedrock.

B. Program Implementation:

B1. OHP monitoring frequency will be as follows:

- Water level monitoring will begin no more than 90 days after the start of operations of the Site Containment and Overburden RRT Systems;

- Monthly frequency, except that one Overburden well, one Bedrock well, and water level in the Niagara River will be monitored continuously. The wells to be continuously monitored may be changed from time to time.

B2. Water levels to calculate inward gradients will be monitored using the following wells and piezometers:

- four piezometers inside and six piezometers outside the eastern, northern and western portion of the Overburden Barrier Walls, as shown on Figure 4.

- a piezometer placed on each side of the three grout plugs near the middle of each of the plugs.

- Niagara River (stilling well)

- Any of the purge/recovery wells installed immediately north of the Niagara River which are not operated for NAPL recovery or water level reduction.

B3. Water levels to calculate upward gradient will be monitored using the following wells, shown conceptually on Figure 4:

- 12 maintenance piezometers;

- 23 purge/recovery wells in the Overburden, and

- 21 Shallow Bedrock wells selected from those wells that presently exist.

Where existing wells become unusable, new wells will be installed.

B4. An assessment of OHP monitoring procedures and well locations will be initiated one year after the start of operation of the Site Containment and Overburden RRT Systems and submitted to the Governmental Parties within 60 days after initiation of the assessment.

C. Response Actions:

C1. If OHP monitoring indicates that an inward hydraulic gradient is not being achieved across the Overburden Barrier Walls in an area not influenced by any other installed overburden remedial system(s), OCC will proceed pursuant to Section 5.1.1 to determine what Operational Modifications (as defined in Section 5.1.1) are required either to achieve the specified gradients or otherwise contain NAPL and APL in the affected area. Such measures may include increased pumping and, if necessary, installation of additional wells and/or drain tiles to draw down the overburden water table as required to maintain specified inward gradients across the Overburden Barrier Walls.

C2. If further OHP monitoring indicates that the action(s) taken pursuant to C1., above, are not effective in

maintaining inward gradients across the Overburden Barrier Walls, OCC will proceed pursuant to Section 5.1.2.

C3. If OHP monitoring indicates that upward gradients specified in Subsection 2.2.2.C between the Bedrock and Overburden are not being achieved, OCC will proceed pursuant to Section 5.1.1 to determine what Operational Modifications (as defined in Section 5.1.1), are required to achieve the specified gradients. For the Site Containment System, such Operational Modifications may include increasing the pumping rates or other operational changes to existing wells, but shall not include installation of new wells. For the Overburden RRT System, such Operational Modifications may include, among others, increased pumping rates or other Operational Modifications (as defined in Section 5.1.1) to drawdown the overburden water table within the RRT Barrier Walls.

3.0 CAPPING

3.1 The areas at and around the Landfill Site will be capped as follows:

(a) The area within the Site Barrier Wall west of the existing 003 Outfall alignment will be capped with clay or asphalt and may be used in the future as a storage or parking area.

(b) The area within the Site Barrier Walls east of 53rd Street shall be asphalted and may be used in the future as a storage or parking area.

(c) The area south of the northern (westbound) lanes of the RMP may be capped to reduce infiltration.

(d) The area within the Site Barrier Wall north of Adams Avenue shall be capped with asphalt or concrete and may be used in the future as an area for storage of APL and NAPL generated by remedial activities required by the Judgment or the Stipulation.

(e) All other areas within the Overburden Barrier Walls will be capped as described in Section 3.2.

3.2 Except as provided in Section 3.1, all other areas within the Overburden Barrier Wall will be capped as follows:

(a) The cap shall consist of clay and have a maximum permeability of 1×10^{-7} cm/sec. The clay cap shall consist of a minimum of three feet of clay, an 18-inch layer of

silty soil or loam, and a six-inch layer of topsoil seeded with native vegetative growth. All areas capped with clay shall be crowned by the construction of one or more apexes, each of which slopes at a minimum of 5% grade toward a surface drainage system having a minimum of 0.5% grade.

(b) The following actions shall be taken concerning the cap to verify compliance with design specifications:

(i) before installation, the clay to be used for the cap shall be tested; permeabilities at various soil compaction densities shall be determined; and the density required to attain a maximum permeability of 1×10^{-7}cm/sec. shall be identified;

(ii) during installation, the clay used for the cap shall be evaluated before it is placed to insure the material meets specifications; and the compacted density in each six-inch layer shall be tested to insure it meets requirements to attain the specified permeability; and

(iii) after installation, six undisturbed samples (Shelby Tubes) shall be collected at representative locations and density tested; the thickness of the clay cap and topsoil also shall be verified at these six locations; and the holes created in accordance with this subparagraph shall be appropriately plugged and the cap restored.

4.0 BEDROCK RRT SYSTEM

NAPL and APL in the Bedrock at and around the Landfill Site will be addressed by the RRT System (Bedrock RRT System) described below.

4.1 OBJECTIVES

The design and remedial objectives of the Bedrock RRT System are: (1) to contain APL and NAPL within the existing S-Area Bedrock NAPL plume; (2) to prevent further NAPL migration in the Bedrock under the Niagara River; and (3) to collect NAPL within this plume to the maximum extent practicable. The Bedrock RRT System will be operated to attain these objectives. The Bedrock RRT System will be operated to attain its objectives even if doing so prevents maintaining the specified upward hydraulic gradients into the Site Containment and Overburden RRT Systems.

4.2 PHASED APPROACH

The design, installation, operation and monitoring of the Bedrock RRT System will proceed in a three-phased approach:

Phase I	-	Initial Testing of Shallow Bedrock Zone.
Phase II	-	Design, Installation, Operation and Monitoring of Prototype Bedrock System in the Shallow, Intermediate and Deep Bedrock Zones.

Phase III -	Design, Installation, Operation and Monitoring of Bedrock RRT System in the Shallow, Intermediate and Deep Bedrock Zones.

Three zones within the Bedrock are defined for the RRT System:

Shallow Zone:	Top 30 feet of Bedrock
Intermediate Zone	From the bottom of the Shallow Zone to 30 feet above the top of the Gasport Formation
Deep Zone:	From 30 feet above the Gasport Formation down to the top of the Rochester Formation

4.3 PHASE I - INITIAL TESTING OF SHALLOW BEDROCK (Top 30 Feet)

4.3.1 NAPL RECOVERY TESTING

A. A network of eleven recovery wells which are designed to maximize NAPL collection will be installed into the top 30 feet of the Bedrock (Shallow Bedrock) as shown on Figure 2 and subsequently tested. Testing will be designed to evaluate the capability of wells to recover NAPL and to define operational requirements. Initially, each well will be pumped for APL and NAPL at the maximum rate achievable (to a maximum of 5 gal/min) for a duration of five days. The test will be designed to quantify the ratio of NAPL to APL collected as a function of time.

B. Test results will be evaluated during each well test and the pump rates and duration may be varied to enhance the effectiveness of the test and to determine the most

effective operation to maximize the collection of NAPL. Modifications to the initial test procedure may be made, subject to approval by the Governmental Parties. After completion of the recovery testing, all data generated by the testing will be evaluated and used to design the NAPL recovery component of the Prototype Bedrock System.

4.3.2 HYDRAULIC TESTING - APL/NAPL CONTAINMENT

A. A second network of eight Shallow Bedrock purge wells, which are intended to effectively characterize the hydraulic properties of the Bedrock, will be installed at the locations shown on Figure 3. Each well will be sized for a pumping rate up to 150 gallons per minute. Water level measurements will be taken: i) from each pumped well; ii) from a maximum of ten observation wells for each test, two of which will be instrumented with continuous recorders; and iii) from the Niagara River via a continuous recorder. Existing wells may be used if their location and construction are appropriate for the test; no new wells will be installed solely for the purpose of this test. However, new wells required for other programs under this RRT Remedial Plan shall be installed ahead of schedule if needed for this test. Water levels will be measured every four hours for a period of one day prior to each test start. Due to the effects of the Niagara River fluctuations,

the maximum time permitted between water level measurements in any well during the test period will be two hours.

B. Initially, each of the first two wells will be pumped for APL at the maximum rate achievable (to a maximum of 75 gal/min) for a duration of 24 hours. After these two wells are tested, the results will be evaluated and the test protocols reviewed. If higher pump rates are required for the remaining tests, the pump rates will be adjusted up to 150 gal/min. After the completion of the hydraulic testing, all data generated by the testing will be evaluated and used to design the hydraulic containment component of the Prototype Bedrock System.

4.4 PHASE II - PROTOTYPE BEDROCK SYSTEM

Based on the data obtained during the Phase I testing, a Prototype Bedrock System, which consists of NAPL recovery wells and APL/NAPL containment purge wells, will be designed and installed as described below.

4.4.1 PROTOTYPE BEDROCK SYSTEM (Shallow Bedrock)

A. Remedial System:

A1. System Design and Installation: The Prototype Bedrock System will be designed and installed in the Shallow Bedrock based on the data obtained from the Phase I testing. The Prototype Bedrock System shall be designed and installed, as the second phase of a three-phase program, to attain the design

and remedial objectives of the Bedrock RRT System described in Section 4.1 and to collect data for the final design of the Bedrock RRT System. The prototype design will include the number of wells, well locations and the well, pump, and operation specifications.

A2. System Evaluation: The Prototype Bedrock System will be operated and monitoring data will be collected until implementation of the Bedrock RRT System pursuant to Section 4.5.1. The monitoring data will be used to evaluate the effectiveness of the Prototype Bedrock System in recovering NAPL and containing APL and NAPL. Based upon evaluation of generated data and subject to the Governmental Parties approval, the system will be adjusted during the first 12 months of operation of the Prototype Bedrock System by varying pumping rates and, if necessary, by the addition or deletion of NAPL recovery wells and APL/NAPL containment purge wells. Evaluation for the above adjustment will be made by OCC 6 months and 12 months following startup of the Prototype Bedrock System. OCC will conduct one additional evaluation doing this 12-month period if so requested by the Governmental Parties.

After the initial 12-month period, pumping rates in the Prototype Bedrock System's wells may be adjusted at three month intervals to evaluate the effect on inward hydraulic gradients and NAPL recovery rate. Data collected during operation of the Prototype Bedrock System will be used to: (i)

evaluate Bedrock conditions; and (ii) design the Bedrock RRT System and monitoring programs per Section 4.5.

A3. Hydraulic Stabilization: Hydraulic Stabilization in the Bedrock is defined to have occurred when the head measurement of the inside Bedrock piezometer of a piezometer pair no longer declines more than 0.2 feet per quarter, taking appropriate account of barometric pressure, water level fluctuations in the Niagara River, and seasonal effects. When a modification of the Prototype Bedrock System is implemented, only the area affected by that modification will be evaluated to determine if Hydraulic Stabilization is re-established. Hydraulic monitoring will continue for those areas not affected by the modification. If the head measurement of the inside piezometer does not achieve a decline rate of 0.2 feet or less per quarter, then Hydraulic Stabilization is assumed to have occurred one year after implementation or modification of the Prototype Bedrock System.

B. Monitoring Program:

B1. Shallow Bedrock NAPL Monitoring:

(a) Monitoring Objective: The objective of the Shallow Bedrock NAPL Monitoring Program (SBNP) is to evaluate the effectiveness of the Prototype Bedrock System in attaining the objective set forth in Subsection 4.4.1.A1.

(b) Program Implementation:

1. The following SBNP monitoring to assess NAPL recovery by the Prototype Bedrock System will be conducted in purge/recovery wells within the existing Bedrock NAPL plume along the River:

- A monitoring program for NAPL recovery by the Prototype Bedrock System will be developed after completion of the Initial Testing Program (described in Section 4.3) and from data resulting from the NAPL Tracer monitoring program (see Section 4.4.1.B3 below).

- Elements of SBNP monitoring for the Prototype Bedrock System will include quarterly evaluation of cumulative total NAPL/APL recovery data for the Prototype Bedrock System and annual assessment of the following:

  - NAPL/APL ratios on individual purge/recovery wells;

  - NAPL/APL ratios on five monitoring wells located south of the Robert Moses Parkway;

  - evaluation of NAPL collection decline curves and the radius of well influence, on an individual well basis.

2. The following SBNP for the Prototype Bedrock System will be conducted in purge/recovery wells within the existing Bedrock NAPL plume not along the River to monitor NAPL recovery:

- Monitoring will begin upon installation of the Prototype Bedrock System and will continue until implementation of a SBNP for the Bedrock RRT System.

- Quarterly monitoring of NAPL/APL ratios in NAPL wells currently being pumped.
- Annual monitoring of NAPL/APL ratios in NAPL recovery wells which have been shut off.
- Quarterly evaluation of cumulative NAPL/APL recovery data for Prototype Bedrock System.
- Annual evaluation of NAPL collection decline curves and radius of well influence, on an individual well basis.
- Quarterly measurement of NAPL levels in all inner piezometers of the piezometer pairs.

3. The following monitoring for the presence of NAPL beyond the existing Bedrock NAPL plume will be conducted:

- Monitoring will begin when piezometer pairs and Prototype Bedrock System are installed.
- Quarterly frequency.
- Method: hand bailing bottom of well/piezometer or performance equivalent.
- Monitor each outside piezometer of the piezometer pairs.
- Monitor each Shallow Bedrock well within 200 feet of the outside boundary of the Bedrock NAPL plume.

(c) <u>Response Actions</u>:

If, at any time during the operation of the Prototype Bedrock System, SBNP monitoring in any Shallow Bedrock well or piezometer indicates the presence of NAPL outside the previously-defined Bedrock NAPL plume, OCC will:

- Within 30 days thereafter, modify the operation of the Prototype Bedrock System and/or install additional wells, if necessary, subject to the Governmental Parties approval, to contain NAPL, unless the source of the NAPL is demonstrated not to be from the S-Area NAPL plume. However, following OCC's submission of the final design for the Bedrock RRT System per Section 4.5.1., and until implementation of the Bedrock RRT System, the response actions triggered by the SBNP under this Subsection 4.4.1.B1 shall be limited to Operational Modifications (as defined in Subsection 5.1.1).

- Following implementation of the above action(s), adjust the monitoring program, as appropriate, to assess the effectiveness of the modified remedial system.

- Utilize data collected from the adjusted monitoring program in designing of Phase III - Bedrock RRT System per Section 4.5.1.

B2. Shallow Bedrock Hydraulic Monitoring Program:

(a) Monitoring Objective: The objective of the Shallow Bedrock Hydraulic Monitoring Program (SBHP) is to evaluate the effectiveness of the Prototype Bedrock System in maintaining an inward gradient across the areal boundary of the S-Area Shallow Bedrock NAPL plume.

(b) Program Implementation:

1. SBHP monitoring will utilize the following wells:

- 12 Shallow Bedrock piezometer pairs to be installed around the areal boundary of the Shallow Bedrock NAPL Plume:

- each pair spaced no more than 400 feet apart;
- inner well of each pair within and no more than 100 feet from the areal boundary of the Shallow Bedrock NAPL plume.

° Selected S-Area and Niagara Plant Shallow Bedrock wells available for SBHP monitoring will be utilized for SBHP monitoring, as appropriate.

2. Following the Prototype Bedrock System installation and until Hydraulic Stabilization (as defined in Section 4.4.1.A3.), the following monitoring of the Prototype Bedrock System will be conducted:

° Water levels will be measured weekly in all Bedrock Piezometer pairs and selected existing Shallow Bedrock wells.

° Continuous water level measurements will be taken on two well pairs (locations to be changed from time to time).

° Hydraulic data and pumping rates from Bedrock purge wells will be evaluated quarterly, and pumping rates will be modified, as appropriate, at that time.

3. After Hydraulic Stabilization following installation of the Prototype Bedrock System, or after Hydraulic Stabilization following any modification to the System or its operation, the following SBHP monitoring will be conducted, and will continue until implementation of the SBHP for the Bedrock RRT System:

° Water levels in all paired piezometers will be measured at least weekly for 12 months after the initial Hydraulic Stabilization and then the monitoring frequency will be assessed.

- Only piezometer pairs will be monitored, unless response action criteria from any monitoring program (tracer, chemical, or hydraulic) are triggered, in which case other wells in the affected area also will be monitored.

(c) Response Actions:

1. If, after Hydraulic Stabilization, the monthly average of the water level elevation difference between any piezometer pair is less than 0.1 foot (inward gradient), OCC will within 30 days modify the operation of the Prototype Bedrock System and/or install additional wells, if necessary, subject to the Governmental Parties approval, to achieve the specified inward gradient. Nothing in this Subsection 4.4.1.B2 shall require the installation of additional wells after the first 12 months of operation of the Prototype Bedrock System.

2. After implementation of the above action(s), only the area affected by the modification will be evaluated to determine when Hydraulic Stabilization occurs, although monitoring will continue in all areas.

B3. Tracer Monitoring:

(a) APL Tracer Dispersion Testing Program:

1. Objective:

The objective of the Tracer Dispersion Test is to collect information (including groundwater velocity, tracer concentration profiles at receiving wells and Bedrock porosity)

for use in assessing the feasibility of an APL Tracer Monitoring Program and, if feasible, for designing a Tracer Monitoring Program for the Bedrock RRT System.

2. Program Implementation:

(i) The Tracer Dispersion Test will be conducted as follows:

- Perform promptly following the installation of the Bedrock purge well selected for the test.

- Inject a water soluble tracer (Tracer I) into a Shallow Bedrock well to be installed in the northern portion of the existing Bedrock NAPL plume, 100 feet southeast of the Bedrock purge well to be used for the test.

- Select Tracer I which satisfies the following criteria: a chemical which is highly soluble in water, unlikely to have significant chemical or physical interaction with the Bedrock, and is readily capable of interference-free detection using generally accepted analytical methods.

- Take and analyze APL samples for Tracer I from six Shallow Bedrock wells (OW-225, OW-230, OW-231, OW-232, OW-233, and Bedrock RRT purge well used for test).

- Base the initial sampling frequency for each well on estimated travel time from the injection point to the well.

- Continue sampling until the first of the following three conditions occurs:

  - the concentration of Tracer I in each of the target wells has fallen to 50% of the peak concentration measured in that well; or

- the start of the pumping test described in (ii) below; or

- one year after injection, if Tracer I is detected in any target well within three months of injection or before the start of the pumping test (see (ii) below).

(ii) The pumping test will be conducted as follows:

- Perform if Tracer I is not detected in any target well within three months of injection.

- Perform after injection of the addition of Tracer I or injection of a second tracer (Tracer IA) if use of Tracer IA is demonstrated by OCC or the Governmental Parties to be practicable.

- The duration of well pumping will be five times the estimated travel time from the injection point to the Bedrock purge well under pumping conditions.

- APL samples from the Bedrock purge well used for the test will be taken and analyzed for Tracer I or Tracer IA at a frequency to be determined prior to the start of well pumping.

(iii) The following performance criteria for the Tracer Dispersion Test will be utilized:

- Performance "Successful" if Tracer I is detected in a target well before the start of the Pumping test.

- Performance "Unsuccessful" if Tracer I or IA is not detected in any target well before or during the pumping test.

- If Tracer I or IA is detected during, but not before the pumping test, OCC will submit a report to the Governmental Parties assessing whether

APL tracer monitoring is appropriate for the Bedrock RRT System.

(b) NAPL Tracer Monitoring Program:

1. Monitoring Objective: The objectives of the NAPL Tracer Monitoring Program (NTP) are as follows:

- During the first stage of the program, to collect information on the volume and velocity of southward NAPL plume migration across the line of NAPL recovery wells immediately north of the Niagara River, as shown on Figure 2, prior to the installation and operation of the Prototype Bedrock System, and;

- During the second stage of the program, to collect information to assist in evaluating the effectiveness of the Prototype Bedrock System in containing southward* NAPL plume migration across the line of NAPL recovery wells immediately north of the Niagara River, as shown on Figure 2.

2. Program Implementation:

(i) During the first stage of the program, NTP monitoring will be conducted as follows:

- Monitoring will be initiated as soon as possible

- OCC will select a hydrophobic tracer (Tracer II), mix it with S-Area NAPL, and inject this mixture into wells OW-244 and OW-245.

- APL and NAPL from four NAPL recovery wells and from five Shallow Bedrock monitoring wells along the Niagara River will be sampled and analyzed semi-annually for two years after injection, and annually thereafter, until Hydraulic Stabilization following installation of the Prototype Bedrock System.

(ii) During the second stage of the program, NTP monitoring will be conducted as follows:

- Program will be initiated promptly after Hydraulic Stabilization following the Prototype Bedrock System installation.

- An appropriate second tracer (Tracer IIA) will be injected into wells OW-244 and OW-245.

- NAPL will be sampled and analyzed for Tracer IIA from appropriate Bedrock purge/recovery wells and Bedrock monitoring wells semi-annually for two years after injection and annually thereafter.

- Tracer IIA will be replenished by additional injections over time, as appropriate.

- Monitoring for Tracer II in APL and NAPL from wells along the River will continue after Hydraulic Stabilization, in parallel with the monitoring for Tracer IIA in NAPL from these and other appropriate wells.

- The results of the monitoring will be submitted annually to the Governmental Parties.

(c) Response Actions: If NAPL sampling and analysis indicate the presence of Tracer II and/or Tracer IIA in non-pumping wells adjacent to the River, OCC will within 30 days submit to the Governmental Parties a report assessing what modifications to the operation of the Prototype Bedrock System and/or installation of additional wells are necessary to contain southward NAPL plume migration across the line of NAPL recovery wells immediately north of the Niagara River, as

shown on Figure 2. Nothing in this Subsection 4.4.1.B3(b) shall require installation of additional wells after the first 24 months of operation of the Prototype Bedrock System.

Following implementation of the above action(s), OCC will adjust the monitoring program, as appropriate, to assess the effectiveness of the modified remedial system.

B4. Baseline Chemical Monitoring:

(a) Monitoring Objective: The objective of the Baseline Chemical Monitoring is to collect information for use in designing the Shallow Bedrock Chemical Monitoring Program (SBCP) for the Bedrock RRT System.

(b) Program Implementation:

1. Baseline Chemical Monitoring and SBCP monitoring will be conducted on wells within the upper 30 feet of the Bedrock selected from three concentric "rings," including:

- an outer ring considerably beyond the S-Area Bedrock NAPL Plume and inside the EMP wells (outside the influence of Bedrock RRT System and, if technically practicable, outside any chemical plumes);
- a middle ring beyond the Bedrock NAPL plume areal boundary (i.e., within the S-Area APL plume but outside the NAPL plume), with approximately equal numbers of wells immediately adjacent to and somewhat removed from the areal boundary of the NAPL plume;

- an inner ring within the S-Area Bedrock NAPL Plume;

Existing wells and wells installed for other monitoring programs will be used wherever feasible; however, installation of up to eight new Shallow Bedrock monitoring wells may be necessary.

2. SBCP baseline monitoring will be conducted as follows:

- Monitoring will begin in accordance with the RRT Schedule.
- APL samples from four inner ring, eight middle ring, and four outer ring wells will be collected quarterly for two years, and semi-annually thereafter until the start of SBCP monitoring following Hydraulic Stabilization of the Bedrock RRT System.
- Samples will be analyzed for TOX and baseline parameters.

4.4.2 PROTOTYPE BEDROCK SYSTEM (Intermediate and Deep Bedrock Zones)

A. Remedial System:

A1. Refinement of NAPL Plume Boundary: In order to design the Prototype Bedrock System for the Bedrock zones beneath the Shallow Bedrock, the extent of the NAPL plume on the eastern portion of the Site will be defined by installing a supplemental boring about 250 feet west of the CWTP pump station. The supplemental boring will be installed to the top of the Gasport Formation using the same protocols specified for

conducting prior survey activities (Judgment, Addendum I, Paragraph B).

Following installation, the supplemental boring will be grouted if OCC concludes and the Governmental Parties agree that it is inappropriate to use this boring in conjunction with the Monitoring Programs described in Section 4.5.2.

A2. System Design and Installation: Based on data generated by the refinement of the NAPL plume boundary and other available data, the Prototype Bedrock System for the Intermediate and Deep Zones will be installed as follows

- Four purge/recovery wells will be installed, two in each of the Intermediate and Deep Zones (maximum depth to top of Gasport Formation).
- If NAPL has been found in the supplemental boring installed in the Intermediate/Deep Zones, a third purge/recovery well will be installed in each zone where NAPL was so detected.

A3. System Evaluation: The following actions will be taken to evaluate the capability of the Prototype Bedrock System in attaining the objectives set forth in Subsection 4.1.

- Six monitoring wells/piezometers will be installed in each of the Intermediate and Deep Zones (12 wells) outside any existing NAPL plume. The wells in the Deep Zones shall be installed to the top of the Rochester Formation.
- Each purge well in the Prototype Bedrock System will be pumped at the maximum rate achievable (to a maximum

of 20 gal/min.) for a duration of 48 hours. Pumping rates and water elevations in the pump test wells and monitoring wells/piezometers will be recorded and evaluated.

- Based on the data generated by the individual pump testing, the entire system, including the individual purge wells, will be assessed to determine if it is capable of creating an inward gradient across the areal boundary of the Bedrock NAPL Plume.

B. Intermediate/Deep Hydraulic Evaluation Program:

B1. Objective: The objective of the Intermediate/ Deep Zones Hydraulic Evaluation Program (IDHP) is to collect hydraulic data for use in designing the Intermediate/Deep components of the Bedrock RRT System and designing the hydraulic monitoring program for that System.

B2. Program Implementation:

(a) Based on pump test results, pumping rates will be set to maximize NAPL/APL containment and NAPL recovery. Pumping rates will be measured and water elevations will be taken in purge/recovery wells. Inward gradient monitoring will be performed.

(b) OCC will also measure water elevations in six observation wells in the Intermediate Zone and in six observation wells in the Deep Zone and in selected, then-existing wells located in these Zones within 1000 feet of the Landfill Site. These wells will be installed during Phase

II and monitored immediately following installation. This monitoring shall include:

- monthly frequency;
- two continuous digital recorders installed, one in the Intermediate Zone and one in the Deep Zone;
- reassessment after two years.

B3. Program Evaluation: Five years after program initiation, OCC will submit to the Governmental Parties a report assessing the pump test results and all the hydraulic data collected to date pursuant to the Hydraulic Evaluation Program. This assessment will be used to design a final hydraulic monitoring program for the Intermediate/Deep Bedrock Zones pursuant to Section 4.5.2.B, infra.

4.5 PHASE III - BEDROCK RRT SYSTEM (Shallow Bedrock, Intermediate/Deep Zones)

4.5.1 REMEDIAL SYSTEM

A. The Bedrock RRT System will be designed and installed in the Shallow Bedrock and Intermediate/Deep Zones based on the data generated from the Phase I initial Testing Program and Phase II Prototype Bedrock System. Evaluation of that data base to determine whether there are sufficient data to complete final Bedrock System design will occur one year after start-up of the Prototype Bedrock System. OCC will submit a report to the Governmental Parties assessing whether

the data are sufficient for this purpose. If OCC and the Governmental Parties agree that the data are sufficient for the final design, OCC will submit a final Bedrock RRT System design within 90 days thereafter. If OCC and the Governmental Parties agree that the data are not sufficient, the additional data to be collected will be identified by OCC and the Governmental Parties and will be collected by OCC. A re-evaluation of the data base will be made every six months. Twenty-four months following startup of the Prototype Bedrock System, sufficient data will be deemed to have been collected and a final design will be submitted by OCC to the Governmental Parties within 90 days thereafter. Following approval of final design by the Governmental Parties, OCC will install, operate, monitor and maintain the Bedrock RRT System to attain system design and remedial objectives.

B. The design of the Bedrock RRT System may modify among other things, the number of wells, pumping rates and well locations used in the Prototype Bedrock System. The design may also consider installation of a Bedrock grout curtain along the edge of the River. The design for the Bedrock RRT System shall include a monitoring program as per Section 4.5.2. However, under the Bedrock RRT System design, OCC will not be required to install purge/recovery wells in the Deep Zone below the top of the Gasport Formation unless data is collected showing NAPL below the Gasport Formation.

4.5.2 MONITORING PROGRAMS

A. NAPL Monitoring:

A1. Shallow Bedrock NAPL Monitoring:

(a) Monitoring Objective: The Objective of Shallow Bedrock NAPL Monitoring Program (SBNP) is to evaluate the effectiveness of the Bedrock RRT System in attaining its objectives as set forth in Section 1.0.

(b) Program Implementation:

1. The SBNP to monitor NAPL recovery by the Bedrock RRT System will be designed after two years of SBNP monitoring of the Prototype Bedrock System.

2. The following monitoring for the presence of NAPL beyond the existing Bedrock NAPL plume will be conducted:

- Monitoring will begin when the Bedrock RRT System is installed.
- Quarterly frequency.
- Method: hand bailing bottom of well/piezometer or performance equivalent.
- Monitor each outside piezometer.
- Monitor each Shallow Bedrock well within 200 feet of the outside boundary of the Bedrock NAPL plume.

(c) Response Actions:

1. Response actions will be determined for the SBNP monitoring of NAPL recovery by the Bedrock RRT System based upon the data generated from the Phase I Initial Testing Program, the Phase II Prototype Bedrock System and the

associated SBNP monitoring. Response actions relating to NAPL recovery will consist of monitoring of then-existing non-pumping wells to determine if they are capable of producing reasonable amounts of NAPL (and thus become NAPL recovery wells) and, if necessary, implementation of Operational Modifications (as defined in Section 5.1.1), such as the installation of new NAPL recovery wells.

2. If SBNP monitoring in any Shallow Bedrock well or piezometer indicates the presence of NAPL outside the previously-defined Bedrock NAPL plume, OCC will:

- Proceed pursuant to Section 5.1.1 to determine what Operational Modifications (as defined in Section 5.1.1) to the Bedrock RRT System are required to contain NAPL, unless the source of the NAPL is demonstrated not to be from the S-Area NAPL plume.
- Following implementation of the Operational Modifications described above, adjust monitoring program, as appropriate, to assess the effectiveness of the modified remedial system.
- If further SBNP monitoring indicates that action described above is not effective in containing NAPL within the newly-defined Bedrock NAPL plume, OCC shall proceed pursuant to Section 5.1.2.

A2. Intermediate/Deep NAPL Monitoring:

(a) Monitoring Objective: The objective of the Intermediate/Deep NAPL Monitoring Program (IDNP) is to monitor the effectiveness of the Bedrock RRT System at containing NAPL

in the Intermediate and Deep Zones within the vertical projection of the existing Bedrock NAPL plume.

(b) Program Implementation: IDNP monitoring will be conducted as follows:

- Begin monitoring immediately following the installation of the Intermediate/Deep Zones Hydraulic Evaluation Program observation wells;
- Hand bail from selected wells/piezometers within 400 feet of the Bedrock NAPL plume in Deep and Intermediate Zones;
- Annual monitoring frequency.

(c) Response Actions: If IDNP monitoring indicates the presence of NAPL in any well outside of the previously-defined NAPL plume in the Intermediate or Deep Bedrock Zones, OCC will take response actions as described in Section 4.5.2 A1.(c)(2).

B. Hydraulic Monitoring:

B1. Shallow Bedrock Hydraulic Monitoring: The objective of the Shallow Bedrock Hydraulic Monitoring Program (SBHP) is to evaluate the effectiveness of the Bedrock RRT System in maintaining an inward gradient across the areal boundary of the S-Area Shallow Bedrock NAPL plume.

A hydraulic monitoring program for the Bedrock RRT System will be developed following the completion of the Prototype Bedrock program. Final monitoring criteria and

response actions for the Bedrock RRT System will be developed as part of the finalization of the Bedrock RRT System design.

B2. Intermediate/Deep Zones Hydraulic Monitoring: A hydraulic monitoring program for the Intermediate and Deep Bedrock Zones will be assessed after completion of the IDHP pursuant to Section 4.4.2.B, infra. Based on the results of this assessment, OCC will design a hydraulic monitoring program, including final monitoring criteria and response actions, as part of the Bedrock RRT System design.

C. Chemical Monitoring:

C1. Shallow Bedrock Chemical Monitoring:

(a) Monitoring Objective: The objective of the Shallow Bedrock Chemical Monitoring Program (SBCP) is to evaluate, in conjunction with other applicable monitoring programs, the effectiveness of the Bedrock RRT System.

(b) Program Implementation: SBCP monitoring for indicator chemicals will be conducted as follows:

- Upon Hydraulic Stabilization following installation of the Bedrock RRT System, indicator chemicals characteristic of the S-Area Landfill will be selected based on detection frequency of baseline parameters analyzed during Baseline Chemical Monitoring.

- The need to include additional indicator chemicals which are characteristic of N-Area or other Plant Site chemicals will be assessed at this time.

- Monitoring will begin within 60 days after Hydraulic Stabilization of the Bedrock RRT System (Shallow Zone) and selection of indicator chemicals. Baseline Chemical Monitoring will continue until indicator chemicals have been selected by OCC and approved by the Governmental Parties.

- APL samples from six inner ring, 16 middle ring, and six outer ring wells will be collected and analyzed semi-annually for indicator chemicals.

- Monitoring of some or all of the six inner ring wells may be discontinued based on the Baseline Chemical Monitoring results.

(c) Response Actions:

1. OCC will proceed pursuant to Section 5.1.1 to determine the need for Operational Modifications (as defined in Section 5.1.1) to the System if:

- A statistically significant increase in SBCP indicator chemical concentrations in any one or more middle ring well(s) occurs. "Significance" is defined as an increase, over an appropriate number of sampling rounds, in the concentrations of at least one-half of the SBCP indicator parameters which are detected in each sampling round, with a confidence level greater that 95%.

2. If further SBCP monitoring indicates a statistically significant increase in SBCP indicator chemical concentrations following implementation of Operational Modifications, OCC shall proceed pursuant to Section 5.1.2.

3. The SBCP, including sampling frequency, number of wells sampled, and indicator chemicals analyzed, will be reviewed and the need for SBCP modifications assessed if:

- over an appropriate number of sampling rounds, the concentrations of between one-quarter and one-half of the SBCP parameters which are detected in each sampling round increase with a confidence level greater than 95%; or

- the level of TOX in any well increases with a confidence level greater than 95% on two consecutive or three of five consecutive sampling events.

C2. Intermediate/Deep Zones Chemical Monitoring Program:

(a) Monitoring Objective: The objective of the Intermediate/Deep Zones Chemical Monitoring Program (IDCP) is to collect chemical data in the Intermediate and Deep Zones and to utilize the data in developing a final chemical monitoring program for those zones.

(b) Program Implementation: IDCP monitoring will be conducted as follows:

- Following installation, sample and analyze each well once for SBCP baseline parameters.

- Begin monitoring upon the start of Phase III (Start of Operation of Bedrock RRT System).

- Sample six wells (new or existing) in each of the Intermediate and Deep Zones.

- Sample and analyze semi-annually.

- Analyze samples for SBCP indicator chemicals selected as discussed above.

(c) Response Actions:

Five years after initiation of IDCP, OCC will submit a report to the Governmental Parties assessing whether a

Chemical Monitoring Program (CMP) in the Intermediate and Deep Zones is useful in evaluating system performance. Based on the results of that assessment, OCC will, if appropriate, design a CMP, including final monitoring criteria, and develop response actions, subject to the Governmental Parties approval.

D. Tracer Monitoring:

D1. APL Tracer Monitoring Program:

(a) Monitoring Objective: The objective of the APL Tracer Monitoring Program is to evaluate, in conjunction with other applicable monitoring programs, the performance of the Bedrock RRT System.

(b) Program Implementation: APL Tracer Monitoring will be conducted as follows: if the Tracer Dispersion Test is deemed successful or if APL Tracer monitoring is deemed appropriate pursuant to Section 4.4.1.B3.(a):

- APL Tracer Monitoring will be initiated after all piezometer pairs have satisfied the hydraulic monitoring criteria (i.e., at least 0.1 ft. inward head differential between the outer and inner piezometer of each pair).
- Tracer I or Tracer IA will be injected in the inner piezometer of the pair which displays the smallest inward gradient.
- APL samples will be taken from the outer piezometer of that pair and at

other appropriate Bedrock RRT purge wells at a frequency based on the results of the dispersion test.

- Tracer I or Tracer IA will be replenished by injecting additional tracer, as appropriate.

- Two years after initial injection of tracer for APL Monitoring, OCC will initiate an assessment whether ATP monitoring is useful in evaluating system performance and submit a report containing the assessment to the Governmental Parties within 60 days after initiation. Such assessment will consider continuation, modification, and termination of ATP monitoring.

(c) Response Actions: If ATP monitoring indicates the presence of Tracer I or Tracer IA in an outer piezometer, OCC will proceed pursuant to Section 5.1.1. to determine what Operational Modifications (as defined in Section 5.1.1.) are required to contain APL within the existing Bedrock NAPL plume. Following implementation of Operational Modifications described above, OCC will adjust the monitoring program, as appropriate, to assess the effectiveness of the modified remedial system.

- Following Operational Modifications described above, if ATP monitoring again indicates the presence of Tracer I or Tracer IA and at least two years have elapsed since initial Tracer I or Tracer IA injection, OCC shall proceed as per Section 5.1.2

D2. NAPL Tracer Monitoring Program:

(a) Monitoring Objective: The objective of the NAPL Tracer Monitoring Program (NTP) is:

- To collect information to evaluate the effectiveness of the Bedrock RRT System in containing southward NAPL plume migration across the line of NAPL recovery wells immediately north of the Niagara River, as shown on Figure 2.

(b) Program Implementation: NTP monitoring will be conducted as follows:

- The program described in Section 4.4.1.B3.b(2) will be continued following installation of the Bedrock RRT System.

- The results of the monitoring will be submitted annually to the Governmental Parties. Five years after the Tracer IIA injection, OCC will submit a report to the Governmental Parties assessing whether NTP monitoring is useful in evaluating system performance and whether the program should be continued, modified or terminated.

(c) Response Actions: If NAPL sampling and analysis indicate the presence of Tracer II or Tracer IIA in non-pumping wells adjacent to the River, OCC will proceed pursuant to Section 5.1.1.

Following implementation of the Operational Modifications described above, OCC will adjust the monitoring program, as appropriate, to assess the effectiveness of the modified remedial system. If further NTP monitoring indicates that the Operational Modifications described above are not

effective in containing southward NAPL plume migration across the line of wells immediately north of the Niagara River, as shown on Figure 2, OCC will proceed pursuant to Section 5.1.2.

E. Environmental Monitoring Program

E1. Monitoring Objective: The objective of the Environmental Monitoring Program (EMP) is to evaluate the effectiveness of the Bedrock RRT System in protecting human health and the environment from endangerment by chemical migration from the Landfill Site.

E2. Program Implementation:

(a) Plans and specifications for the installation of the EMP wells will be submitted to the Governmental Parties in conjunction with the Bedrock RRT System design.

(b) Eight EMP wells will be installed in the Shallow Bedrock Zone in an area extending from west to northeast of the Landfill Site and located beyond the groundwater capture zone of the Bedrock RRT System. (See Figure 5.)

(c) Following Hydraulic Stabilization of the Bedrock RRT System, samples will be collected quarterly from the EMP wells and analyzed.

(d) Groundwater flow will be calculated based on quarterly elevation data gathered from the EMP wells. As

necessary, piezometers or other wells will be used to supplement the EMP wells for the purpose of calculating groundwater flow hydraulic data.

(e) The collected data will be used to calculate the average groundwater concentration in the monitored aquifer for each EMP Parameter on a quarterly basis, as follows:

- The samples collected from the eight EMP wells will be analyzed for the EMP Parameters listed in subparagraph (f). EMP Parameters not detected will be assigned a value of one-half the detection level for that sampling period if during such sampling the parameter is detected in a sample from any of the eight wells; otherwise, it will be assigned a value of zero.

- The groundwater flow weighted average aquifer concentration (AAC) of each EMP Parameter identified in the monitored aquifer will then be calculated.

(f) For the purposes of the EMP, the following action levels will be applicable:

EMP Parameter	EMP Action Level (PPB)
1,1 Dichloroethylene	5
Endosulfan	10
Hexachlorocyclohexane (each isomer)	7
2,3,7,8 TCDD equivalents	0.0005
Hexachlorobenzene	7
Mirex (C_{10} Cl_{12})	7
Tetrachloroethylene	5

E3. Response Actions:

(a) If the AAC level calculated per subparagraph E2(e) exceeds the EMP Action Level for the same EMP Parameter for two consecutive quarters, OCC will, within 30 days thereafter, submit a report to the Governmental Parties assessing what Operational Modifications (as defined in Section 5.1.1), if any, are required to reduce the AAC levels for those parameters.

(b) If further EMP monitoring indicates that the Operational Modifications undertaken pursuant to (a) were ineffective in reducing the AAC level(s) below the indicated EMP Action Level(s), OCC will proceed pursuant to Section 5.1.2.

(c) With respect to Hexachlorocyclohexane and Tetrachloroethylene, response actions under this subparagraph E3 need not be undertaken unless the total chemical flux of all EMP Parameters exceeds a calculated response action flux level. This response action flux level will be calculated as the sum of the EMP Action Levels times the total monitored aquifer flow. The total chemical flux will be calculated as the product of the AAC, calculated pursuant to subparagraph E2(e), and the total monitored aquifer flow.

(d)The EMP will continue unless or un l it is superseded by applicable Niagara Plant monitoring progr s.

5.0 REMEDIAL SYSTEM - RESPONSE ACTIONS, REASSESSMENTS, ETC.

5.1 Procedures Regarding Response Actions

Sections 2.0, 3.0, and 4.0 above set forth the remedial systems selected to address the environmental conditions identified at the Landfill Site. The monitoring programs selected for these remedial systems, as described in Sections 2.0 and 4.0, are intended to determine whether the objectives of these remedial systems are being met and whether response actions are required.

The following is the process which the parties have agreed to follow if a response action is triggered by the monitoring programs.

5.1.1 Operational Modifications

A. "Operational Modifications" are defined to consist of upgrading existing equipment, changes in operating pumping rates of existing wells, and installation of new wells or other equipment in order to attain the objectives of the remedial system being monitored. Operational Modifications shall be consistent with good engineering practice. Operational Modifications do not include: (i) actions which exceed the "maximum" modifications pursuant to Section 5.1.1.B, or (ii) if such maximums have not been established, actions which significantly alter the basic features of the initially

installed remedial system or associated treatment or storage facilities with respect to scope or cost.

B. OCC shall propose, as part of the design of the Site Containment System, the Overburden RRT System, and the Bedrock RRT System, specified maximum modifications to that system (e.g., maximum number of additional wells or maximum increase in pumping rates) which constitute Operational Modifications. OCC and EPA/State shall, prior to approval of the design for a final remedial system, use their best efforts to agree to specified maximum modifications to the system. If OCC and EPA/State cannot agree to such maximums at the time of design approval, OCC will implement the approved design without such maximums and either OCC or EPA/State may pursue the resolution of maximums through dispute resolution.

C. If, during operation of any of the remedial systems described in Paragraph B, the monitoring program applicable to the specific remedial system(s) triggers Operational Modifications, OCC will implement Operational Modifications to those systems as provided below:

C1. OCC shall submit an assessment report to EPA/State proposing what Operational Modifications OCC will implement. However, such report shall not be required for Operational Modification(s) involving only increase rates of operation.

C2. For those Operational Modifications not requiring an assessment report, OCC shall implement the response action, as soon as practicable, and shall notify the EPA/State within fourteen (14) days of the initial response action trigger date. Such notification shall be in writing and shall describe the Operational Modification(s) taken or to be taken, the reason for taking such modification(s), and the justification for the selected level of response.

C3. For Operational Modifications requiring an assessment report, OCC will submit such report within twenty-one (21) days of the initial response action trigger date. The report shall include: a description of the problem, including data and analyses; Operational Modification(s) that OCC has considered; an evaluation of the proposed Operational Modification(s), including assumptions and analyses used and justifications for the proposal; and the total time estimate to implement each alternative. As soon as practicable but not later than thirty (30) days after EPA/State approval of the Operational Modification(s), OCC shall submit an implementation schedule and plans and specifications (to the extent not already approved for such use) for the approved Operational Modification(s). OCC shall implement Operational Modifications, following EPA/State approval, in accordance with the approved schedule.

5.1.2 System Modifications and Supplements

A1. As used herein, "System Modifications" are defined to consist of physical alterations to an RRT remedial system that:

- are above and beyond Operational Modifications;
- are compatible with the installed RRT remedial systems;
- are designed to meet the same goals and objectives as the installed RRT remedial systems. (System Modifications may be accompanied, as necessary, by revisions to specific monitoring program requirements.)

A System Modification, in general, is a physical alteration that will augment or otherwise enhance the performance of the installed RRT remedial system without significantly altering the installed system in either technology, scope, or function. System Modifications are intended to include only alterations using 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 and will not include unproven new technologies or source control efforts such as full or partial excavation, vitrification, etc. Examples of System Modifications include, among others, additional or relocated hydraulic collection or containment installations (e.g., well installations, slurry or grout walls). System

Modifications shall be designed and installed to be consistent with good engineering practice and cost-effective in compliance with Paragraph C.

A2. As used herein, "System Supplements" are defined as remedies using Remedial Technology (as defined in Paragraph 4(a) of the Judgment) which are different than those used in the installed RRT remedial systems and which are designed to supplement an RRT system by specifically addressing the conditions triggering the response action. System Supplements shall be designed to be consistent with good engineering practice and cost-effective in compliance with Paragraph C.

B. If, after OCC has implemented all required Operational Modifications pursuant to Section 5.1.1, and one or more response action triggers described in Sections 2.0 or 4.0 require OCC to take further action pursuant to Section 5.1.2, OCC will proceed as follows:

B1. <u>NAPL and Certain Hydraulic Monitoring:</u> The procedures of this subparagraph B.1 will be applicable if a response action for System Modifications is triggered by the monitoring described in Section 2.3.1.C6 (Overburden NAPL Monitoring), Section 2.3.2.C2 (Inward Gradient Overburden Hydraulic Monitoring), Sections 4.5.2.A1.c.2 and 4.5.2.A2.c (Bedrock NAPL Presence Monitoring), or Section 4.5.2.B1

(Shallow Bedrock Hydraulic Monitoring). OCC will submit to EPA/State, within 90 days of the response action trigger date, a focused feasibility study which evaluates alternative System Modifications to the remedial system which would enable the system to prevent further response action triggers and meet the system objectives of Section 1.0. OCC's focused feasibility study will address at least the following factors:

- The nature and extent of the condition triggering the response action;
- The degree to which each modification alternative will enable the remedial system to prevent further response action triggers and meet system design objectives of Section 1.0; and
- The cost and schedule for implementing such modification alternative.

After submission of the focused feasibility study to EPA/State, the parties will proceed as described in Paragraph C of this Section.

B2. Other Monitoring: For those monitoring programs not identified in subparagraph B1, the procedures of this subparagraph B2 will be applicable if a response action is triggered by any monitoring program described in Sections 2.0 or 4.0 which requires response under Section 5.1.2. OCC will prepare the same type of focused feasibility study of System Modifications set forth in subparagraph B1. The feasibility study shall also identify and evaluate System Supplements. In addition, if OCC chooses, the feasibility study may also evaluate whether System Modifications or System Supplements are

"Requisite" (as defined in Paragraph 4(a) of the Judgment) and whether the Environmental, Chemical or Tracer Monitoring Programs accurately evaluate the Remedial System's performance in meeting the remedial objectives in Section 1.0.

OCC will submit this focused feasibility study to EPA/State within 90 days after the response action trigger date. After submission of the focused feasibility study to EPA/State, the parties will proceed as described in Paragraph C of this Section.

C. Within 120 days following receipt of an OCC submission described in Paragraph B, EPA/State will respond in writing to the submission. EPA/State will either approve the recommendations in OCC's feasibility study or propose (either from OCC's feasibility study or any similarly prepared study of its own) cost-effective System Modifications or System Supplements, as appropriate, which enable the system to meet the objectives of Section 1.0 and effectively prevent further response action triggers. OCC will be required to implement the System Modifications or System Supplements proposed by EPA/State in accordance with the terms and conditions of this Section 5.0 unless, upon the evidence, the Court determines:

C1. That the EPA/State proposal does not satisfy the definition of System Modifications or System Supplements, as appropriate, set forth in subsection 5.1.2.A; or

C2. That considering the factors set forth in B1(a)-(c) and all relevant monitoring date it would be arbitrary and capricious to require OCC to implement the proposed System Modifications or System Supplements; or

C3. That, in the case of System Modifications triggered by the monitoring programs referenced in subsection B.2 or System Supplements:

> (i) the proposed System Modifications or System Supplements are not "Requisite" (as defined in Paragraph 4(b) of the Judgment; or
>
> (ii) those monitoring triggers are not accurate measurements of meeting the applicable objectives.

5.1.3 RRT Study

If, after OCC implements all required System Modifications or System Supplements to the remedial system, pursuant to Section 5.1.2, a response action described in Section 2.0 or Section 4.0 is still being triggered by a monitoring program requiring response and if OCC and EPA/State agree or the Court determines that no further modification(s) will enable the system to meet the system objectives of Section 1.0, OCC shall undertake an RRT Study. The RRT Study shall include an evaluation of whether the implementation of any other Remedial Technology (including source control) would be more effective in achieving the goals of the Judgment than the installed remedial systems. That evaluation will be based on

will be based on the Requisite Remedial Technology criteria of Paragraph 4 of the Judgment. OCC will implement any remedy selected pursuant to Paragraph 4 of the Judgment in accordance with a schedule approved by EPA/State.

5.2 Monitoring Program Reassessment and Modification

5.2.1 Reassessment

Every five years after the beginning of the operation of the Bedrock RRT System, OCC will submit to EPA/State a reassessment of such monitoring programs (including associated response action triggers) then in effect. EPA/State may require OCC to conduct a monitoring program reassessment sooner or at more frequent intervals, if at any time, it is determined either by agreement of EPA/State and OCC or by order of the Court, that there is an endangerment to human health, the environment, or the users of the City of Niagara Falls drinking water resulting from chemical migration from the Landfill Site which is not triggering response actions then in effect under Sections 2.0 and 4.0. In addition, EPA/State, the City (when conditions at the CWTP are specifically affected) or OCC at its option, may conduct and, for good cause, submit to the other parties a reassessment of such monitoring programs, provided that it is conducted after the first five year assessment has been conducted and reviewed.

5.2.2 Modification

As a result of any reassessment conducted pursuant to Section 5.2.1, EPA/State, the City (when conditions at the CWTP are specifically affected) or OCC may propose monitoring program (including associated response action triggers) modifications, if any, consistent with applicable objectives described in Section 1.0. Such modifications may include, without limitations, the following: the number and location of monitoring sampling points, the response action triggers associated with that program, the frequency of such sampling, the parameters to be analyzed, the levels related to such parameters, and the frequency of future reassessments required in Section 5.2.1. In the event EPA/State and OCC do not agree regarding the proposed modification of a monitoring program, the party seeking such modification may petition the Court to resolve the dispute. The petitioner shall bear the burden to demonstrate to the Court that the continued utilization of the existing monitoring program is inappropriate in assessing whether a remedial system is attaining its objectives as described in Section 1.0 and that the proposed modification is consistent with those objectives. If the petitioner seeks to change any response action triggers which are agreed to as part of the RRT Stipulation, there will be a rebuttable presumption that the response actions triggers then in effect under

Sections 2.0 and 4.0 are appropriate measures of meeting the objectives of Section 1.0.

5.3 System Operation Reduction

A. Operation of any component of a final remedial system installed under the S-Area RRT Remedial Plan may be reduced if it is determined by agreement of OCC and EPA/State, or by order of the Court, that the following conditions are met: (1) the remedial system as installed and without reductions is not triggering any applicable monitoring program response actions then in effect under Sections 2.0 and 4.0 and (2) the operation of the proposed reduced system would not trigger any of the applicable monitoring program response actions then in effect under Sections 2.0 and 4.0. Such reduction may include a reduction of pumping rates and/or in the number of purge wells and/or recovery wells. If such reduction triggers a response action as stated above, or if NAPL collection is reduced as a result of the system reduction, OCC shall reinstitute the program as it existed before the reduction.

B. Prior to any system reduction described in Section 5.3.A, OCC shall make a submission to EPA/State setting forth its proposed action and its assessment of the impact thereof, along with all underlying data. Such submission shall include, without limitation, an evaluation of whether more

frequent monitoring of the reduced system for a defined period of time is required, the need for continued maintenance of the subject system, and the circumstances under which pre-reduction system operations would be resumed.

C. Within 60 days of receipt of such submission, EPA/State will respond to OCC in writing stating either its agreement or disagreement with OCC's position. The operation and/or maintenance of the affected remedial system may be reduced by agreement of EPA/State and OCC. In the event EPA/State disagrees with OCC's proposal, the reasons for such disagreement will be set forth in its written response.

D. In the event that OCC and EPA/State do not agree regarding reduction of a remedial system, OCC may petition the Court to resolve the dispute. The operation and/or maintenance of the affected remedial system may be reduced if OCC demonstrates to the Court that after such reduction the system would not trigger any of the response actions then in effect under Sections 2.0 and 4.0. During the pendency of the Court's review of the matter, OCC shall continue operation, monitoring, and maintenance of the affected remedial system without implementing the proposed reductions.

5.4 <u>Termination</u>

A. Operation, monitoring, and maintenance activities undertaken in order to comply with the terms and conditions of

the Judgment and the RRT Stipulation shall not be terminated for 35 years following submission of the final design for the Bedrock RRT System as per Section 4.5.1. After such 35 year period, all or a portion of such activities may be terminated if it is determined, by agreement of EPA/State and OCC or by order of the Court, that such activities are no longer necessary to satisfy the goals of the Judgment.

B. Prior to any termination under this Section, OCC shall submit an assessment report to all other signatory parties setting forth the basis for its proposed termination along with all data relied upon by OCC in support of its position. The submission shall include, without limitation, the following: the impact of such termination with regard to the objectives of Section 1.0; the basis for OCC's conclusion that the activities are no longer necessary to satisfy the goals of the Judgment; proposals for a minimum three year post-termination monitoring program(s); maintenance programs for the terminated systems; and the response actions triggers which would require resumption of terminated activities.

C. Within 60 days of receipt of such submission, EPA/State will respond to OCC in writing stating either its agreement or disagreement with OCC's position. In the event EPA/State disagrees with OCC's proposal, the reasons for such disagreement will be set forth in its written response. The operation, monitoring and/or maintenance of the subject

remedial system(s) may be terminated by agreement of the parties and notice to the Court or by order of the Court.

D. In the event that OCC and EPA/State do not agree regarding termination under this Section, OCC may petition the Court to resolve the dispute. OCC shall not terminate any activities pursuant to this Section until a determination described in Paragraph A has been made, either by agreement of EPA/State and OCC or by order of the Court.

5.5 City Review and Approval Responsibility

A. Submittals

Any time a submittal or notice is required under Section 5.0, copies shall be provided to the City.

B. Approval

Any time review, approval, determination or concurrence is required of EPA/State under Section 5.0, the City (when conditions at the CWTP are specifically affected) may also conduct a concurrent review, approval, determination or concurrence process except that failure of the City to issue its approval, determination or concurrence decision timely in a particular instance shall be deemed a waiver of that right in that particular instance.

C. Comments

Nothing herein shall prevent the City from submitting timely comments on any other submittals; however, the parties shall consider, as appropriate, but are not obligated to respond to or adopt any such comments.

FIGURES

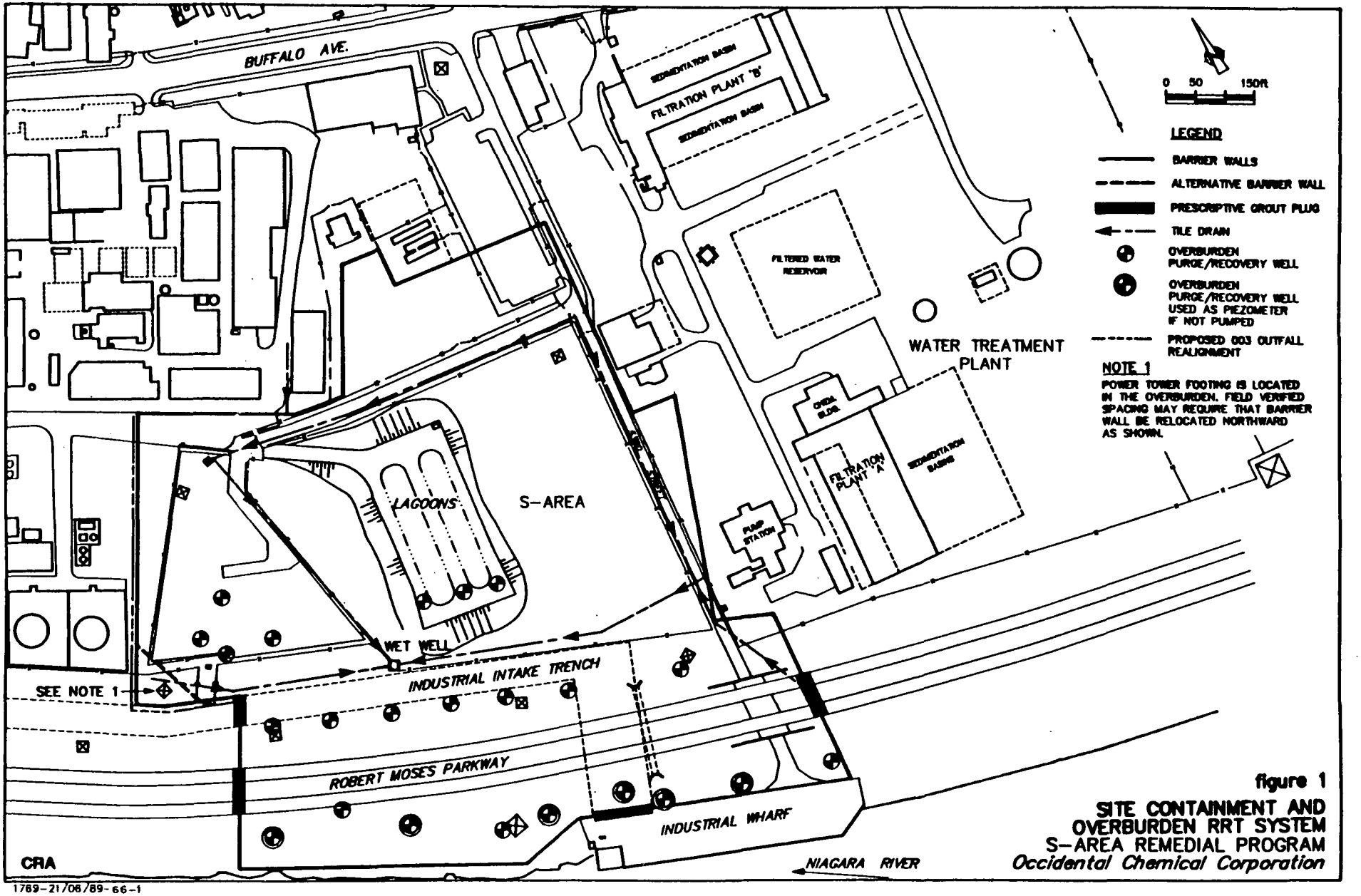

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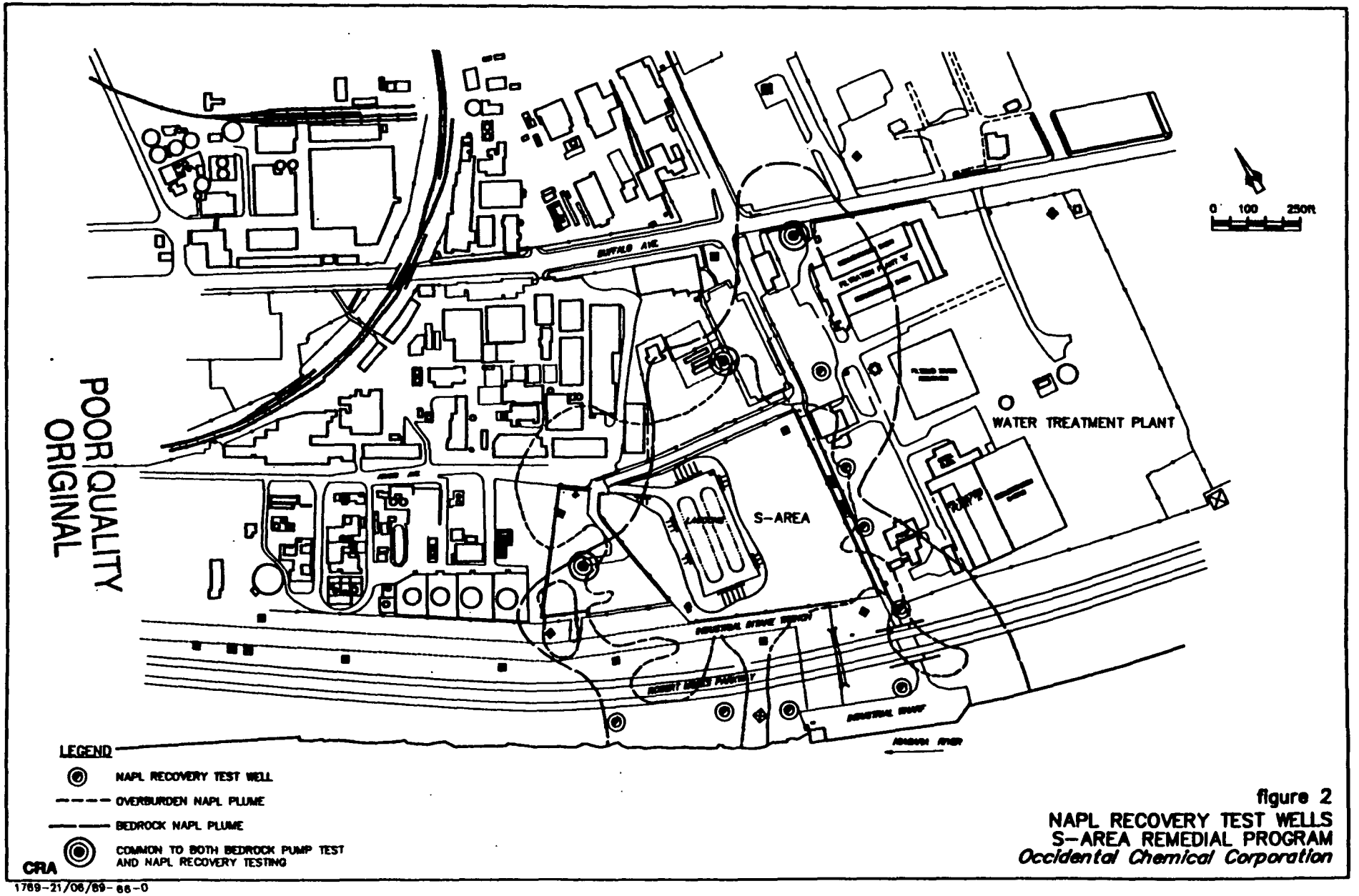
figure 1

SITE CONTAINMENT AND OVERBURDEN RRT SYSTEM

S-AREA REMEDIAL PROGRAM

Occidental Chemical Corporation



POOR QUALITY ORIGINAL

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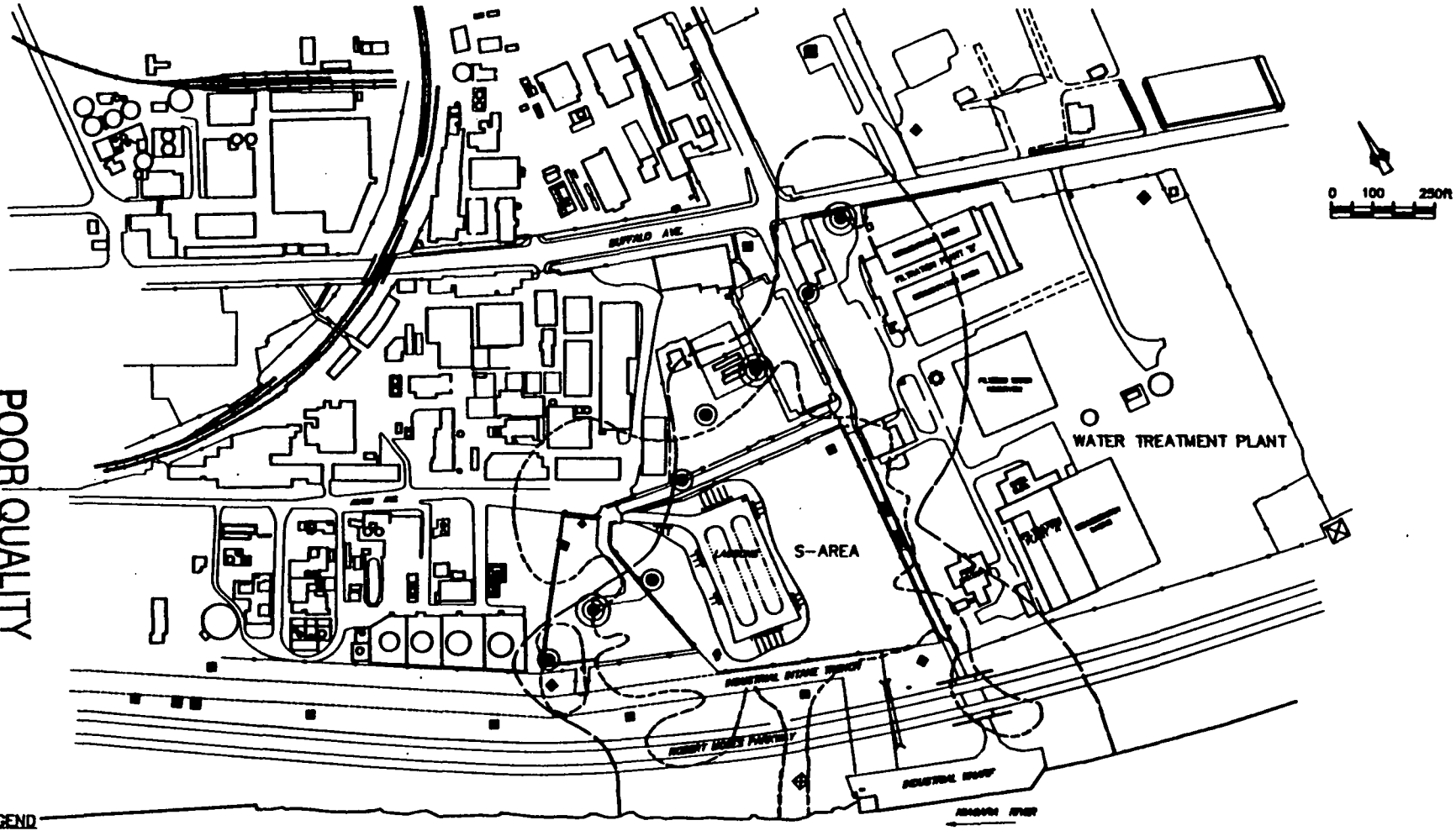
figure 2
NAPL RECOVERY TEST WELLS
S-AREA REMEDIAL PROGRAM
Occidental Chemical Corporation



POOR QUALITY ORIGINAL

LEGEND

- BEDROCK PUMP TEST WELL
- OVERBURDEN NAPL PLUME
- BEDROCK NAPL PLUME
- COMMON TO BOTH BEDROCK PUMP TEST AND NAPL RECOVERY TESTING

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1789-21/06/89-66-0

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

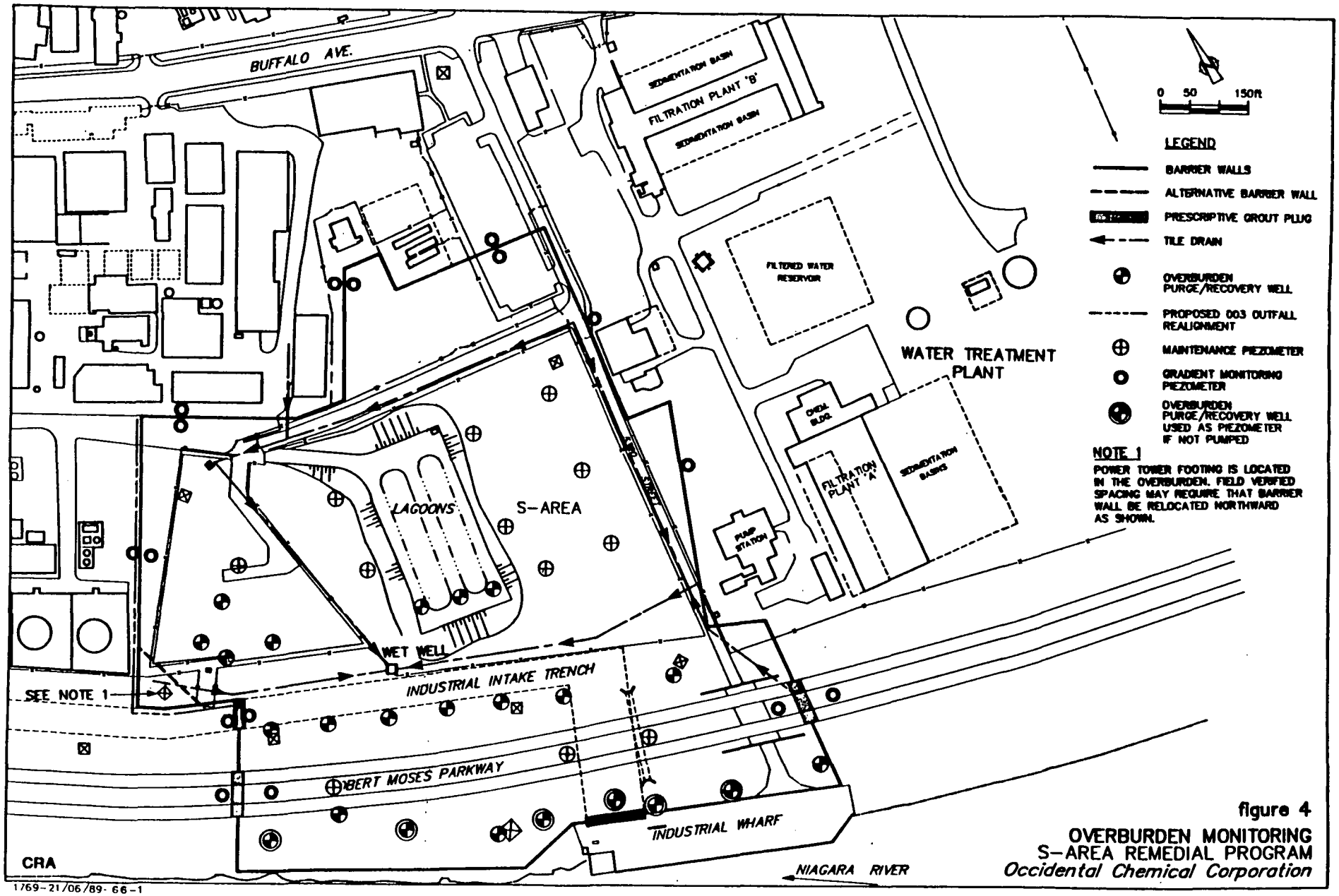
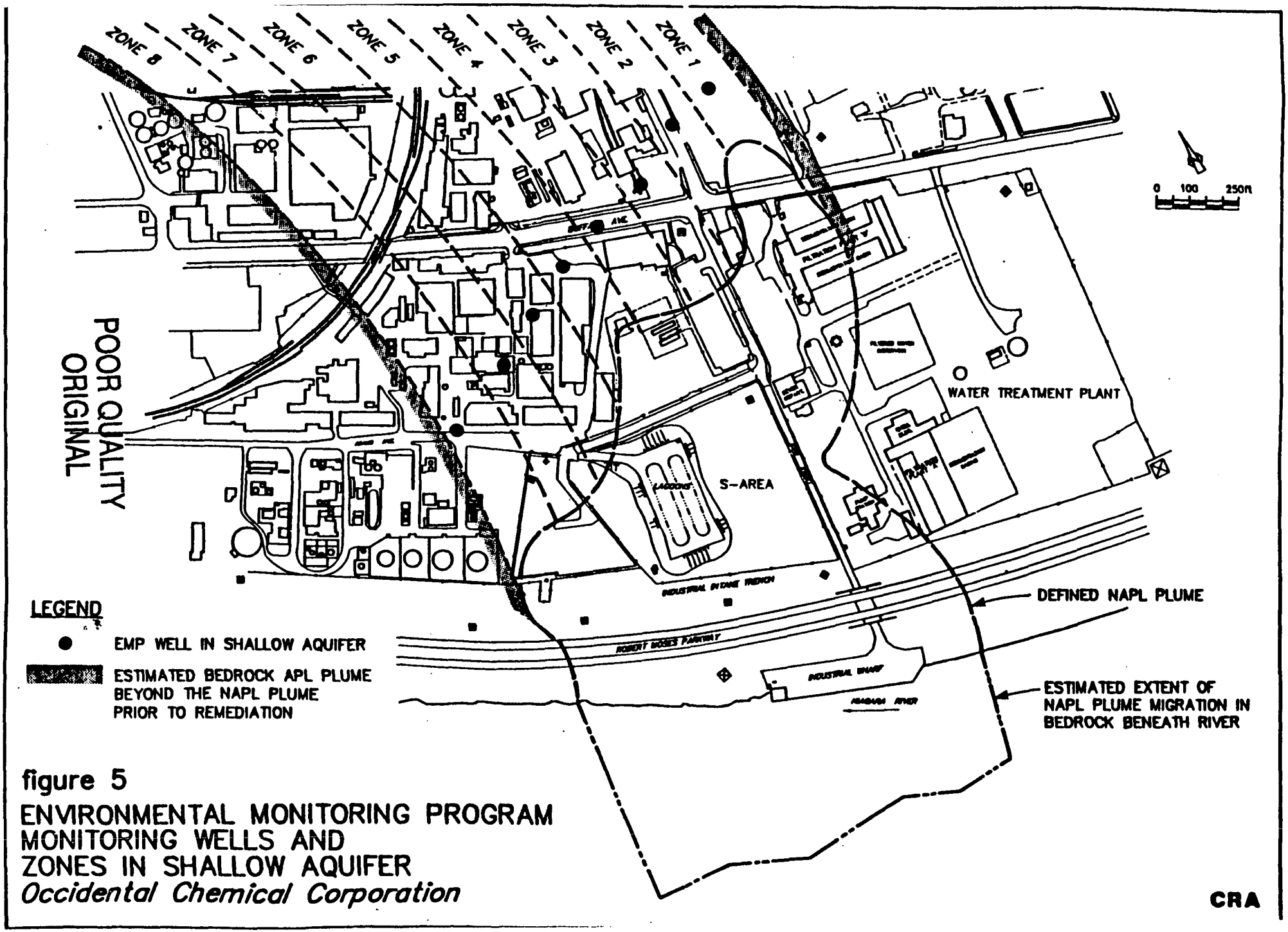


figure 4
OVERBURDEN MONITORING
S-AREA REMEDIAL PROGRAM
Occidental Chemical Corporation



POOR QUALITY ORIGINAL

figure 5

ENVIRONMENTAL MONITORING PROGRAM
MONITORING WELLS AND
ZONES IN SHALLOW AQUIFER

Occidental Chemical Corporation

APPENDIX II

ENVIRONMENTAL HEALTH AND SAFETY PLAN

APPENDIX II

ENVIRONMENTAL HEALTH AND SAFETY PLAN

1.0 The Environmental Health and Safety Plan set forth in Addendum V of the Judgment is modified as follows:

2.0 Section D - PERSONNEL EQUIPMENT, CLOTHING AND HYGIENE

2.1 Subparagraph (2)(c) shall be replaced by the following:

(c) Samples collected pursuant to subparagraph (a) at the Survey Site and the Working Site shall be assessed for the major components of the organic vapors (Subparagraph K(1)(c)). In the event that the time weighted average (TWA) exposure for any major component exceeds the appropriate American Conference of Government and Industrial Hygienists (ACGIH) Guideline, then the Safety Officer shall proceed as described in subparagraph (f).

2.2 Subparagraph (2)(d) shall be replaced by the following:

(d) Samples collected pursuant to subparagraph (a) at the Working Site shall be assessed for tetrachlorobenzene and hexachlorobenzene. In the event the levels exceed 1 ppm (8 mg/m^3) or 0.1 ppm (1 mg/m^3) respectively, the Safety Officer shall proceed as described in subparagraph (f).

2.3 Subparagraph (2)(e) shall be replaced by the following:

(e) Within seven days of the receipt of the analytical results, Hooker shall submit to the Governmental Parties all data relating to such detected organic vapors and/or particulate levels.

3.0 Section J - SURVEY MONITORING

3.1 Subparagraph (1)(a) shall be replaced with the following:

(1) (a) Organic vapor levels shall be monitored periodically at the perimeter of the Survey Site downwind of each Survey Site by use of a photoionization detector (PID), or its performance equivalent. In addition, the major components of the organic vapors shall be periodically monitored at the Survey Site.

3.2 Subparagraph (1)(b) shall be replaced by the following:

(b) If the Time Weighted Average (TWA) exposure for any major component exceeds one-half of the appropriate ACGIH Guideline, then the Safety Officer and EPA/State on-site representative shall determine what corrective action, if any, shall be taken. (The turnaround time for analytical

results will be specified in the plans,specifications and protocols.) Within seven days following receipt of analytical results, Hooker shall submit to the Governmental Parties all data relating to such detected organic vapor levels and the results of corrective action, if any, taken pursuant to this subparagraph.

4.0 SECTION K - SPECIAL CONSTRUCTION MONITORING

4.1 Subparagraph (1)(a) shall be replaced by the following:

(1) (a) Organic vapor levels shall be monitored continuously at each Working Site by use of a photoionization detector (PID), or its performance equivalent. In addition, the major components of the organic vapors shall be periodically monitored at each Working Site.

4.2 Subparagraph (1)(b) shall be replaced by the following:

(b) If the Time Weighted Average (TWA) exposure for any major component exceeds the appropriate ACGIH Guideline then the Safety Officer and EPA/State on-site representative shall determine what corrective action, if any, shall be taken. Within seven days following receipt of analytical results, Hooker shall submit to the Governmental Parties all data relating to such detected organic vapor levels and the results of corrective action, if any, taken pursuant to this subparagraph.

APPENDIX III

CITY DRINKING WATER TREATMENT PLANT REMEDIAL PROGRAM

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CITY DRINKING WATER TREATMENT PLANT REMEDIAL PROGRAM

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DRAFT
July 20, 1990

APPENDIX III

CITY DRINKING WATER TREATMENT PLANT REMEDIAL PROGRAM

1.0 INTRODUCTION

The City Drinking Water Treatment Plant (CWTP) Remedial Program described in Section E of the RRT Stipulation shall include the Interim CWTP Monitoring and Response Action Plan described below in Section 3.0 and either Plan A, Plan B, or any alternative plan (Plan "C") agreed to pursuant to Paragraphs 15 and 16, Section E, of the RRT Stipulation. Plan A consists of the activities described in Paragraph 10, Section E, of the RRT Stipulation; the Plan A Milestone Schedule is attached as Attachment A. Plan B consists of the activities described in Section 2.0 below; the Plan B Bar Sequencing Schedule is attached as Attachment B.

2.0 PLAN B

Plan B consists of the implementation by OCC and the City of the remedial systems and associated activities as described in Paragraph E of Addendum I; Paragraphs C through I of Addendum II; and Paragraphs C, D(1) and E of Addendum III, of the Judgment, except as modified as set forth in this Section 2.0.

2.1 Collection System Configuration

(a) OCC will install Collection Systems ("hereinafter CWTP Collection Systems") for the pump station, Filtration Plant "A" and the reservoir at the current CWTP, which will include the conceptual elements shown on Figures E-2, E-3, and E-4 of the Judgment.

(b) OCC will repeat the performance of soil and groundwater surveys at the five existing survey well locations adjacent to Filtration Plant "B," as shown on Figure III-2, and shall assess, as described in subparagraph E(3)(d), Addendum I of the Judgment, whether there are chemicals in the Overburden in the vicinity of Filtration Plant "B" which have migrated from the Landfill Site. OCC shall not be required to install the component of the collection system adjacent to Filtration Plant "B" unless it is determined, either by agreement of the signatory parties or by order of the Court, following the aforementioned survey and assessment, that chemicals have migrated to the vicinity of Filtration Plant "B" in the Overburden from the Landfill Site in excess of the survey levels described in subparagraph E(3)(c), Addendum I of the Judgment. OCC shall submit a report describing the results of the assessment described in this Paragraph at least 120 days prior to the scheduled date for submission of plans and specifications for design of the Filtration Plant/Reservoir Collection System.

(c) In addition, the conceptual elements of the CWTP Collection Systems for Filtration Plant "A" and the reservoir, as shown on Figures E-3 and E-4 of the Judgment, will be augmented to include french drain laterals to the 30-inch ductile iron waste water drain to provide groundwater control. The conceptual location of these laterals is shown on Figure III-1. OCC shall, as a component of the plans and specifications to be submitted for the monitoring systems described in Paragraphs C and D of Addendum II, include alarms which are triggered if a collection system is not functioning properly.

2.2 Collection System Design

In addition to the design considerations set forth in Paragraph E(2), Addendum I of the Judgment, design considerations applicable to the CWTP Collection Systems described in Section 2.1 will include the following:

(a) Drain tile systems will be capable of achieving an Overburden groundwater elevation lower than that of finished floors in the Plant A clearwell, the filtered water reservoir, control chambers, raw water forebays and high service pump forebay.

(b) The design of the CWTP Collection Systems will allow for partially flooded and non-flooded operation, and provide operational

flexibility sufficient to adjust Overburden groundwater elevations adjacent to critical pipelines and structures. This operational flexibility may require, but is not limited to, additional sump installations, added pumping capacity, or modifications of alignments conceptually indicated in the Judgment.

2.3 Collection System Operation

(a) The CWTP Collection Systems will be operated over a range of groundwater elevations so as to allow the systems to:

(i) minimize the submergence of active pipelines and structures in Overburden groundwater.

(ii) minimize partial dewatering of timber support pilings beneath these structures.

(iii) maintain, in conjunction with appropriate CWTP operations, an outward gradient from CWTP structures and water lines to the surrounding Overburden, and

(iv) seek to minimize upward vertical gradients from the Bedrock to the Overburden at the CWTP outside of the RRT and Site Barrier Walls.

(b) The operations described in subparagraph (a) shall be defined and limited by operating procedures described in a collection system operations manual to be included in the design plans and specifications for this system submitted to the Governmental Parties.

(c) Subparagraphs (a) and (b) shall be deemed to supersede the requirements of Paragraphs C(4)-(6) and D(4), Addendum II of the Judgment.

2.4 CWTP Service Line Monitoring and Response Actions

2.4.1 Purpose

The position and potential movement of the CWTP 42-inch diameter low service lines will be monitored to evaluate the effects on the timber piles supporting these lines of lowering the Overburden water table as a result of remedial system operations at the CWTP.

2.4.2 Monitoring Program

The CWTP Service Line Monitoring Program shall be implemented as follows:

- Proceed with the installation of the tile collection system and dewatering as provided in Plan B;
- Monitor the position of the 42-inch diameter low service discharge line for any movement; and
- Monitor the volume of groundwater collected from the drain tile system pursuant to Paragraph C(1)(b), Addendum II of the Judgment, to determine possible leakage from the 42-inch diameter low service lines due to dewatering by remedial systems.

2.4.3 Response Actions

If movement of the low service lines is detected, or if there is leakage from those lines, due to dewatering by remedial systems, OCC shall promptly so notify the Governmental

Parties and take action (including, as appropriate, raising of the groundwater table) in consultation with the City which is necessary and appropriate to provide adequate support for the service lines in all affected areas and adequate water pressure in the City's water distribution system.

2.5 CWTP Vertical Gradient Monitoring

OCC shall implement the CWTP Plant Vertical Gradient Monitoring Program described in this section.

2.5.1 Objective

The objective of this monitoring program is to monitor and record the vertical hydraulic gradient between the Bedrock and Overburden at the CWTP.

2.5.2 Program Implementation

(a) Three shallow Bedrock piezometers shall be installed by OCC outside of the Site and RRT Barrier Walls at the CWTP, as shown on Figure III-2.

(b) Water levels will be measured monthly by OCC in the three shallow Bedrock piezometers described above at the same time as water levels are measured in the CWTP maintenance piezometers and in the CWTP Collection System wetwells pursuant to Paragraph D, Addendum II of the Judgment. Measurements will be evaluated to determine the direction and magnitude of the

vertical hydraulic gradient between the Bedrock and Overburden at the CWTP outside of the Site and RRT Barrier Walls. Results will be reported monthly to the Governmental Parties.

(c) This monitoring system shall be installed concurrent with installation of the CWTP Collection Systems described in Section 2.1 above. This monitoring program shall be initiated upon operation of the CWTP Collection System.

2.6 Emerald Channel Intake Tunnel Monitoring

(a) Paragraph E(11)(1), Addendum I of the Judgment is replaced by the following:

"(1) In lieu of the activities described in subparagraphs (a)-(j), Hooker may, at its option, undertake the sleeving described in subparagraph (k). If Hooker undertakes such sleeving, Hooker and the City shall not thereafter conduct any activities described in subparagraphs (a)-(j) or subparagraph (14)."

(b) After the last sentence of Paragraph E(2), Addendum II of the Judgment, the following sentence is added:

"Hooker shall submit the statistical protocol to the Governmental Parties for their review and approval. The submission shall

include all data and methodologies used in developing the statistical protocol."

(c) The introductory sentence of Paragraph E(5), Addendum II of the Judgment is replaced by the following:

"If statistical analysis of data pursuant to subparagraphs (2)-(4) indicates that both of the conditions described in subparagraph (4) exist, and if the Emerald Channel Intake Tunnel and Shaft have not been sleeved by Hooker, the City and Hooker shall take the following actions:"

(d) Paragraph E(7), Addendum II of the Judgment is replaced by the following new paragraphs E(7), E(8) and E(9):

"(7) If Hooker undertakes the sleeving of the Emerald Channel Intake Tunnel and Shaft, the City shall thereafter conduct Emerald Channel Intake Tunnel Monitoring to determine the long term effectiveness of the newly relined intake tunnel and shafts. Hooker and the City shall proceed as described below if both of the conditions described in subparagraph (4) exist.

"(a) The City shall immediately so notify Hooker and the other Governmental Parties.

"(b) The City shall promptly make any appropriate modifications to its operational

or maintenance activities at the Treatment Plant which are required to address CWTP Monitoring Parameters (as defined in Paragraph 3.1.2.1.(c), Appendix III of the RRT Stipulation) entering the Treatment Plant water supply.

"(c) Upon receiving said notification, Hooker shall promptly undertake an assessment, using all available data, to evaluate the extent, if any, to which the condition is a result of the migration of chemicals from the Landfill Site or the Hooker Buffalo Avenue Plant through the lining of the New Intake System. To the extent required to achieve this objective, the assessment shall include the analysis of water samples from the Niagara River in the vicinity of the Emerald Channel and/or East Branch Intake Shafts, as appropriate; from the shoreshaft of the New Intake System; and from appropriate locations within Treatment Plant structures. Hooker shall submit the assessment, together with all underlying data, to the Governmental Parties within sixty (60) days following notification. If

it is determined, either by agreement of Hooker and the Governmental Parties or by the order of the Court, that chemicals which have migrated from the Landfill Site or the Hooker Buffalo Avenue Plant are entering the Treatment Plant water supply through the lining of the New Intake System, the parties shall proceed as described in subparagraph (8) below.

"(d) Hooker shall reimburse the City for reasonable costs incurred under Subparagraph (b) to address chemicals which have migrated from the Landfill Site or Hooker Buffalo Avenue Plant.

"(8) If so required pursuant to subparagraph (7)(c), the following response actions will be undertaken:

"(a) If such chemicals entering the Treatment Plant water supply as described in subparagraph (7)(c) are not adequately addressed pursuant to subparagraph (7)(b), Hooker shall, upon written request by the Governmental Parties, conduct a study to determine what Requisite Remedial Technology, if any, is required to address

the condition. This study shall be submitted no more than 120 days following the aforementioned request.

"(b) Following such submission, pursuant to Paragraph B(9), Addendum I of the Judgment, a determination shall be made regarding what Requisite Remedial Technology, if any, shall be implemented to address chemicals entering the Treatment Plant water supply as described in subparagraph (7)(c).

"(9) Hooker shall implement all remedial action required by the RRT determination described in subparagraph (8)(b). The City will be responsible for those costs which represent maintenance, repairs or replacements which the City would otherwise be required to perform at the same level and in the same manner in the absence of chemicals in the Treatment Plant water supply which have migrated from the Landfill Site."

2.7 Distribution Water Monitoring

Paragraph F, Addendum II, of the Judgment is replaced by the following:

"F. Within 30 days following completion of all activities described in Paragraph E of Addendum I, as modified pursuant to Appendix III, Section 2.0 of the RRT Stipulation, the City and Hooker shall initiate the following actions to monitor the quality of water supplied to the distribution system by the Treatment Plant:

"(1) The City shall take a daily (work day) grab sample of distribution water from a distribution water tap located at the Treatment Plant. Such samples shall be analyzed by the City for chemical parameters described in subparagraph E(1)(b) of Addendum II at the detection levels specified therein.

"(2) (a) In addition to the above, the City may develop and implement a distribution water monitoring program for any additional chemical. If any such chemical is detected in four consecutive samples, any signatory party may propose that such chemical be added to chemical parameters described in subparagraph (1). Such chemicals shall be added if it is determined, either by agreement of Hooker and the

Governmental Parties or by order of the Court, that such action is appropriate to collect data necessary to assess the impact, if any, on the quality of the Treatment Plant distribution water resulting from chemicals which may have migrated from the Landfill Site.

"(b) As used in this Paragraph F, the term "Treatment Plant Monitoring Parameter(s)" refers to each chemical described in subparagraph F(1) and each chemical added thereto pursuant to subparagraph F(2)(a).

"(3) The City shall make available to Hooker and EPA/State all data generated by the monitoring program, including QA/QC data.

"(4) (a) Using all City monitoring data for Treatment Plant Monitoring Parameters collected during the initial 12 months of observation, Hooker shall establish a baseline level of finished water quality against which subsequently-collected chemical concentration data will be evaluated. In addition, Hooker shall develop a statistical protocol, using non-parametric methods, comparable to the methods described in subparagraph E(2), Addendum II, to assess whether subsequently-collected chemical

concentration data indicates a statistically significant increase over the baseline level; provided, however, that the statistical analysis shall be carried out using the 0.01 significance level (99% confidence level). The protocol shall take appropriate account of seasonal trends in water temperature and other factors in selecting time periods and intervals for comparison. Hooker shall submit the statistical protocol to the Governmental Parties for their review and approval. The submission shall include all data and methodologies used in developing the statistical protocol.

"(b) Every five years during the course of such distribution water monitoring, Hooker shall assess the appropriateness of the baseline level taking into account the then existing quality of the water in the Emerald Channel and/or East Branch Intake Shaft, the shoreshaft, and the distribution water. Based on such data, the baseline level shall be modified, as appropriate, to reflect such water quality conditions.

"(5) Prior to and after the establishment of the baseline level and statistical protocol

described in subparagraph (4), the City and Hooker shall proceed as described in subparagraph (7) if monitoring described in subparagraph (1) or (2) indicates either of the following: (a) four consecutive samples having a Treatment Plant Monitoring Parameter concentration level in excess of one-half of the maximum contaminant level established under federal or state statutes applicable to any such parameter; or (b) a verified sample having a Treatment Plant Monitoring Parameter concentration level which requires the City to make a notification, pursuant to State Sanitary Code, Public Water Supplies, Subpart 5-1, that a violation of a maximum contaminant level has occurred.

"(6) After the establishment and approval of the baseline level and statistical protocol described in subparagraph (4), the City and Hooker shall proceed as described in subparagraph (7) in the event concentrations of a Treatment Plant Monitoring Parameter indicate a statistically significant increase over the established baseline level.

"(7) If so required pursuant to subparagraph (5) or (6), the City and Hooker shall take the following actions:

"(a) All signatory parties shall be immediately so notified;

"(b) The City shall promptly make any appropriate modifications to its operational or maintenance activities at the Treatment Plant which are required to address Treatment Plant Monitoring Parameters entering the Treatment Plant water supply. Likewise, Hooker shall make any modifications to its operational and maintenance activities relating to the Treatment Plant remedial systems (excluding the New Intake System) which are so appropriate.

"(c) Hooker shall promptly undertake an assessment of the data collected pursuant to this Paragraph F, data from the CWTP Vertical Gradient Monitoring Program (see RRT Stipulation, Appendix III, Section 2.5) and all other available data, to evaluate the extent, if any, to which the condition is a result of the migration of Treatment Plant Monitoring Parameters from the Landfill Site. If the condition is to any extent the result of such

migration, Hooker shall identify the location where such chemicals are entering the Treatment Plant water supply. To the extent required to achieve this objective, the assessment shall include the analysis of water samples from the Niagara River in the vicinity of the Emerald Channel and/or East Branch Intake Shafts, as appropriate; from the shoreshaft of the New Intake System; and from appropriate locations within Treatment Plant structures. In addition if such condition occurred during and/or immediately subsequent to the use of the Treatment Plant 48-inch raw water line, Hooker's assessment shall also include the analysis of water samples from the Niagara River in the vicinity of the Treatment Plant 48-inch raw water line intake structure and the pump station forebay. Hooker shall submit the assessment report, together with all underlying data, to the Governmental Parties within sixty (60) days following the aforementioned notification. In the event it is determined either by agreement of Hooker and the Governmental Parties or by the

order of the Court, that chemicals which have migrated from the Landfill Site are entering the Treatment Plant water supply, the parties shall proceed as described in subparagraph (8) below.

"(d) The City shall be reimbursed by Hooker for reasonable costs incurred under subparagraph (7)(b) to address chemicals entering the Treatment Plant water supply which migrated from the Landfill Site.

"(8) If so required pursuant to subparagraph (7)(c), the following response actions shall be undertaken:

"(a) If Landfill Site chemicals determined to be entering the Treatment Plant water supply per subparagraph (7)(c) are not adequately and promptly addressed pursuant to subparagraph (7)(b), Hooker shall, upon written request by the Governmental Parties, expeditiously conduct a focused feasibility study. The purpose of the study is to evaluate alternative Treatment Plant Remedial System Modifications, if any, which could be implemented to address the conditions. As used herein, Treatment Plant Remedial System Modifications ("TPRS Modifications") are defined to consist

solely of either the installation of additional components to the Treatment Plant Collection Systems, or the installation of purge wells which would achieve the same performance objective as such additional Collection System components. In addition, in the event that chemicals which migrated from the Landfill Site are determined to be entering the Treatment Plant water supply in the vicinity of the Treatment Plant 48-inch raw water line, the TPRS Modification alternatives shall also include lining or sealing interior portions of such line. OCC's focused feasibility study will address at least the following factors:

(1) The nature and extent of the condition triggering the response action;

(2) The degree to which the TPRS Modifications will enable the Treatment Plant remedial program to prevent further response action triggers and to meet the system design objectives of Paragraph G, Section 1.0, Appendix I; and

(3) The cost and schedule for implementing such TPRS Modifications.

This study shall be submitted to the Governmental Parties within 60 days after the aforementioned request by the Governmental Parties.

"(b) Within 60 days following receipt of Hooker's focused feasibility study, the

Governmental Parties will respond in writing to the submission. The Governmental Parties will either approve the recommendations in Hooker's feasibility study or propose (either from Hooker's feasibility study or any similarly prepared study of its own) cost effective TPRS Modifications which enable the Treatment Plant remedial systems to meet the system design objectives of Paragraph G, Section 1.0, Appendix I, and effectively prevent further response action triggers. Hooker will be required to implement the TPRS Modifications proposed by the Governmental Parties unless, upon the evidence, the Court determines:

(1) that the Governmental Parties proposal does not satisfy the definition of the TPRS Modifications set forth in subparagraph (8)(a), or

(2) that considering the factors set forth in subparagraph (8)(a)(1)-(3) and all relevant monitoring data, it would be arbitrary and capricious to require Hooker to implement the proposed TPRS Modifications.

"(9) TPRS Modifications implemented as a result of a focused feasibility study will be deemed effective when the Treatment Plant Monitoring Parameter concentration levels have

been reduced to previously existing baseline levels and trend analyses for each parameter do not indicate a statistically significant increasing trend.

"(10) If, after Hooker implements all required TPRS Modifications pursuant to subparagraph (8)(b), a response action described in subparagraph (5) or (6) is still being triggered, and if Hooker and the Governmental Parties agree or the Court determines that no further TPRS Modification(s) will enable the Treatment Plant remedial systems to meet the system design objectives of Paragraph G, Section 1.0 of Appendix I and to prevent response action triggers, Hooker shall undertake an RRT study to assess what response actions, if any, using Requisite Remedial Technology, should be implemented to satisfy the goals of the Judgment. The RRT Study shall include analysis, review and consideration of all available data regarding Treatment Plant Monitoring Parameters and other relevant data that is available at that time or that is provided to Hooker by EPA/State. The RRT Study shall also include an evaluation of whether the implementation of any other remedial

technology, including without limitation, lining the interior of water-bearing structures, the relocating of underground water lines to the ground surface, or the placing of water lines in dewatered vaults, would be more effective than modifications to the installed remedial systems in achieving the goals of the Judgment; provided, however, that such technology satisfies the definition of Requisite Remedial Technology set forth in Paragraph 4 of the Judgment. This study shall be submitted to the Governmental Parties within 60 days following the aforementioned notification.

"(11) Hooker shall implement all remedial actions required by the determination described in subparagraph (10) above in accordance with a schedule approved by the Governmental Parties. The City will be responsible for those costs which represent maintenance, repairs or replacements which the City would otherwise be required to perform at the same level and in the same manner in the absence of chemicals in the Treatment Plant water supply which have migrated from the Landfill Site."

2.8 Monitoring Program Assessment

Paragraph G, Addendum II of the Judgment is replaced by the following:

"G. Based on all available data, an assessment of monitoring programs referenced in Paragraphs E and F of Addendum II shall be made five years after the New Intake System is put into operation by the City, and a reassessment shall be made once every ten years thereafter by Hooker to evaluate the following, at a minimum: the number and location of sampling points referenced in Paragraphs E and F of Addendum II; the frequency of such sampling; the parameters to be analyzed; the detection and action levels related to such parameters; the adequacy of the statistical procedures used to assess the data; and frequency of future reassessments per this section. An unscheduled reassessment may be undertaken if the party seeking the reassessment demonstrates that such reassessment is necessary. Following such assessment or reassessment, appropriate modifications to the monitoring programs described in Addendum II shall be made either by agreement of Hooker and

the Governmental Parties, or by order of the Court."

2.9 Inoperative Paragraph

Paragraph E(13), Addendum I, of the Judgment is inoperative.

2.10 48-Inch Raw Water Line Monitoring

The City shall develop sampling and analysis protocols to assess the quality of water in the 48-inch raw water line for each of the following events:

(i) Use of the 48-inch raw water line during a non-emergency maintenance and/or cleaning activity; and

(ii) Use of the 48-inch raw water line during an emergency which requires a supplemental source of raw water.

The protocols shall include sampling and analysis of an appropriate number of water samples representative of the water in such line, and/or being supplied by such line. The samples shall be analyzed for the Treatment Plant Monitoring Parameters set forth in subsection 2.7, paragraph F(2)(b). The protocols will be submitted to EPA/State for approval at least 120 days prior to the scheduled date for City use of the newly relined bedrock intake tunnel.

2.11 48-Inch Raw Water Line Protection

Based on the Additional Investigations (as defined in subsection 3.2.2 below), and monitoring programs undertaken pursuant to Section 3.2 and all other relevant and available

data, OCC shall prepare and submit to the Governmental Parties an RRT study assessing what actions, if any, using Requisite Remedial Technology, are required to protect water in the 48-inch intake line from impact by the NAPL plume (including the associated APL within the NAPL plume). In no event will the eastern portion of the Barrier Wall be located east of the 48-inch line. If NAPL is found east of the Barrier Wall location, then it will be addressed pursuant to Appendix I, Subsection 2.3.1 C5 and C6. OCC shall prepare and submit the RRT study no later than 120 days following the determination that Plan B will be implemented.

3.0 INTERIM CWTP MONITORING AND RESPONSE ACTION PLAN

3.1 Interim Drinking Water Monitoring and Response Actions Program

3.1.1 Purpose

The purpose of this Program is to monitor for the possible presence of chemicals which migrated from the Landfill Site in the water supplied by the CWTP during the interim period before the new CWTP described in Plan A or remedial systems described in Plan B are fully operational and to take response actions in the event that any such chemicals are detected.

3.1.2 Water Monitoring

3.1.2.1 (a) The City shall continue to monitor the current raw and finished drinking water from sampling locations currently being utilized for the following list of CWTP Monitoring Parameters at the levels specified in subparagraph E(1)(b), Addendum II of the Judgment:

- trichlorobenzenes
- hexachlorobutadiene (C-46)
- hexachlorocyclopentadiene (C-56)
- tetrachlorobenzenes
- hexachlorobenzene (HCB)
- 2,4,5 trichlorophenol (2,4,5 TCP)

(b) In addition to the above, the City may develop and implement a water monitoring program for any additional chemicals. If any such chemical is detected in four consecutive samples, any signatory party may propose that such

chemical be added to the list described in subparagraph 3.1.2.1(a). Such chemicals shall be added if it is determined, either by agreement of OCC and the Governmental Parties or by order of the Court, that such action is appropriate to collect data necessary to assess the impact, if any, on the quality of the CWTP water supply resulting from chemicals which may have migrated from the Landfill Site.

(c) As used in this Section 3.0, the term "CWTP Monitoring Parameter(s)" refers to each chemical listed in subparagraph (a) and each chemical added to the list pursuant to subparagraph (b).

3.1.2.2 The City shall make available to OCC and EPA/State all data generated by the monitoring program, including QA/QC data.

3.1.2.3 Using City monitoring data provided to OCC for CWTP Monitoring Parameters for at least 12 consecutive months prior to September 1, 1990, OCC shall establish baseline levels of raw water and finished water quality against which subsequently-collected chemical concentration data will be evaluated. In addition, OCC shall develop a statistical protocol, using non-parametric methods, to assess whether subsequently-collected chemical concentration data indicates a statistically significant increase over the baseline level; provided, however, that the statistical analysis shall be carried out using the 0.05 significance level (95% confidence

level) for raw water results and the 0.01 significance level (99% confidence level) for finished water. The protocol shall take appropriate account of seasonal trends in water temperature and other factors in selecting time periods and intervals for comparison. Within 90 days following the lodging of the RRT Stipulation, OCC shall submit the statistical protocol to the Governmental Parties for their review and approval. The submission shall include all data and methodologies used in developing the statistical protocol.

3.1.3 Response Actions

3.1.3.1 Prior to and after the establishment of the baseline level and statistical protocol described in subparagraph 3.1.3.2, the City and OCC shall proceed as described in subparagraph 3.1.3.3 if monitoring pursuant to subparagraph 3.1.2 indicates either of the following: (a) four consecutive samples having a CWTP Monitoring Parameter concentration level in excess of one-half of the maximum contaminant level established under federal or state statutes applicable to any such chemical; or (b) a verified sample having a CWTP Monitoring Parameter concentration level which requires the City to make a notification, pursuant to State Sanitary Code, Public Water Supplies, Subpart 5-1, that a violation of a maximum contaminant level has occurred.

3.1.3.2 After the establishment and approval of the baseline level and statistical protocol described in

subparagraph 3.1.2.3, the City and OCC shall proceed as described in subparagraph 3.1.3.3 in the event concentrations of a CWTP Monitoring Parameter indicate a statistically significant increase over the established baseline level.

3.1.3.3 If so required pursuant to subparagraphs 3.1.3.1 or 3.1.3.2, the City and OCC shall take the following actions:

(a) All signatory parties shall be immediately so notified; and

(b) The City shall promptly make any appropriate modifications to its operational and maintenance activities which are required to address CWTP Monitoring Parameters entering that CWTP water supply.

(c) OCC shall promptly undertake an assessment to evaluate whether the condition is the result of the migration of chemicals from the Landfill Site into the CWTP water supply system and, if so, shall identify the location where such chemicals are entering the CWTP water supply. To the extent required to achieve this objective, the assessment shall include the analysis of water samples collected from the Niagara River in the vicinity of the 48-inch intake, from the shoreshaft and from appropriate

locations within CWTP structures. OCC shall submit an assessment report, together with all underlying data, to the Governmental Parties within 60 days following the aforementioned notification. In the event it is determined, either by agreement of OCC and the Governmental Parties or by order of the Court, that chemicals which have migrated from the Landfill Site are entering the CWTP water supply, the parties shall proceed as described in subparagraph 3.1.3.4.

(d) The City shall be reimbursed by OCC for reasonable costs incurred under subparagraph (b) to address chemicals entering the CWTP water supply which migrated from the Landfill Site.

3.1.3.4 If so required pursuant to subparagraph 3.1.3.3(c), the following actions shall be undertaken:

(a) If Landfill Site chemicals determined to be entering the CWTP water supply per subparagraph 3.1.3.3(c) are not adequately and promptly addressed pursuant to subparagraph 3.1.3.3.(b) above, OCC shall expeditiously conduct a "focused RRT study" to assess what response actions, if any, using Requisite Remedial Technology, should be implemented to satisfy the goals of the Judgment. The study

shall include analysis, review and consideration of all available data regarding CWTP Monitoring Parameters and other relevant data that is available at that time or that is provided to OCC by EPA/State. This study shall be submitted to the Governmental Parties within 60 days following the aforementioned determination. As used in this subsection and subsection 3.2.3 below, "focused RRT Study" means a study described in Paragraph B(8), Addendum I of the Judgment which evaluates only the following actions using Requisite Remedial Technology:

- The lining of operative CWTP water service lines,
- Installation of CWTP collection system(s); and/or
- Installation of purge wells at the CWTP.

(b) Following the submission described in subparagraph (a), a determination shall be made, pursuant to Paragraph B(9), Addendum I of the Judgment, regarding what Requisite Remedial Technology, if any, should be implemented by OCC to address chemicals entering the CWTP water supply which have migrated from the Landfill Site.

(c) OCC shall implement all remedial actions required by the determination described in subparagraph (b). The City will be responsible for those costs which represent maintenance, repairs or replacements which the City would otherwise be required to perform at the same level and in the same manner in the absence of chemicals in the CWTP water supply which have migrated from the Landfill Site.

3.2 Interim NAPL Presence Monitoring and Response Action Program

3.2.1 Purpose

The purpose of this program is to assess whether NAPL is present on CWTP property in the Overburden outside identified areas of the defined S-Area Overburden NAPL plume and to take appropriate response actions in the event NAPL is identified.

3.2.2 Investigations

OCC shall undertake the investigations regarding the presence of NAPL in the vicinity of the 48-inch raw water intake described in the document "Additional Investigations, City of Niagara Falls Drinking Water Treatment Plant, July 31, 1989" ("Additional Investigations"). OCC will use its best efforts to complete field work for the Additional Investigations by November 1, 1990. If NAPL is identified during installation of any borings or wells installed pursuant

to the Additional Investigations, OCC shall conduct NAPL mobility testing as described in Paragraph E(4)(b), Addendum I of the Judgment on appropriate soil samples.

3.2.3 Monitoring Program

Each of the four NAPL monitoring wells, the existing well OW-265, and the monitoring wells east and west of the D-Building at the CWTP, as shown in Figure III-2, shall be initially monitored quarterly for the presence of NAPL. This will be accomplished by lowering a bottom loading bailer to the bottom of the well and examining the contents of the bailer upon removal from the well. The field observation data shall be submitted to the Governmental Parties following each quarterly monitoring event. After completion of construction of the eastern-most barrier wall between the Landfill Site and the existing CWTP, such monitoring will be conducted annually. Such monitoring shall be continued until the earlier of the following: (i) OCC demonstrates that remedial or monitoring systems have been installed which render such monitoring unnecessary; or (ii) drinking water supply operations have ceased at the existing CWTP.

3.2.4 Response Actions

If NAPL is identified in any boring or well described in subparagraphs 3.2.2 or 3.2.3, OCC shall, within 60 days, submit to the Governmental Parties a focused RRT Study (as defined in subsection 3.1.3.4) assessing what response actions,

if any, are required to assure that the NAPL (including the associated APL within the NAPL plume) will not impact the CWTP water supply.

4.0 EASTERN PORTION STUDY

Paragraph E(23), Addendum I of the Judgment is replaced by the following:

"(23)(a) The eastern portion of the existing CWTP, as shown conceptually in Figure E-9 of the Judgment ("Eastern Portion"), including all studies, investigations and remedial measures, if any, relating thereto, will be initially addressed by the City under the State's Inactive Hazardous Waste Disposal Site Program, Environmental Conservation Law, Article 27, Title 13. The City shall perform the "Phase II" investigation which, under the Judgment, was to be performed by EPA. Within 60 days after DEC approval of the City's "Phase II" study, the City shall make a determination whether to proceed with an RRT Study under subparagraph (b) or whether to continue to proceed under the State's Inactive Hazardous Waste Disposal Site Program. If a consent order between the State and the City is achieved, the City will perform the investigation and any necessary remediation of the Eastern Portion pursuant to the terms of that consent order, and may apply, as appropriate, subject to all eligibility requirements, for

reimbursement under the Environmental Quality Bond Act of 1986 ("EQBA") and any subsequent Environmental Bond Acts. The City shall not be eligible for reimbursement under EQBA for any "Phase II" investigation or for any investigation of, or remediation costs for, any OCC wastes identified on said Eastern Portion. Such consent order under the State's Inactive Hazardous Waste Disposal Site Program may require disposal of Eastern Portion wastes in facilities other than the S-Area Landfill.

(b) If the City determines to proceed with an RRT Study in accordance with subparagraph (a), the City shall conduct a study to assess what Requisite Remedial Technology, if any, is necessary to address such situation. Thereafter, the parties shall proceed as described in subparagraphs B(8) and (9); provided, however, that for the purposes of such study and any subsequent action relating thereto pursuant to subparagraphs B(8) and (9) and Paragraph 4 of the Judgment, whichever obligations are applicable to Hooker in those subparagraphs shall instead be solely applicable to the City, and Hooker shall have no obligations in such instance.

(c) Regardless of which of the two options described in subparagraph (a) the City chooses to pursue, OCC shall have no obligations for any studies, investigations or remedial measures regarding the Eastern Portion performed under either option, except that, consistent with good engineering practice and prior to final Landfill Site capping, OCC will provide in accordance with the Remedial Waste Management Plan (Appendix IV to the RRT Stipulation) (i) disposal capacity at the Landfill Site prior to final capping for any solid waste generated by such investigative and remedial measures, if any, undertaken on the Eastern Portion, and (ii) treatment and/or incineration capacity at OCC's Buffalo Avenue Plant Site for liquid waste generated during such investigative activities. The City shall be responsible for transporting such wastes for disposal at the Landfill Site or treatment and/or incineration, as appropriate. Issues relating to City compensation to OCC, if any, for disposal of Eastern Portion solid waste at the Landfill Site and treatment and/or incineration of Eastern Portion liquid waste shall be the subject of a separate agreement between OCC and the City.

(d) If the City proceeds under the State's Inactive Hazardous Waste Disposal Site Program, after completion of the "Phase II" investigation pursuant to subparagraph (a) above, the City and State shall furnish to EPA copies of all reports concerning the above investigation and remedial activities at the Eastern Portion. Nothing herein
shall prevent the EPA from submitting timely comments on reports related to the Eastern Portion; however, the parties shall consider, as appropriate, but are not obligated to respond to or adopt any such comments."

5.0 EXISTING CWTP REMEDIAL/CLOSURE PLAN

The plan for the existing CWTP remediation and closure is set forth in Attachment C hereto.

FIGURES

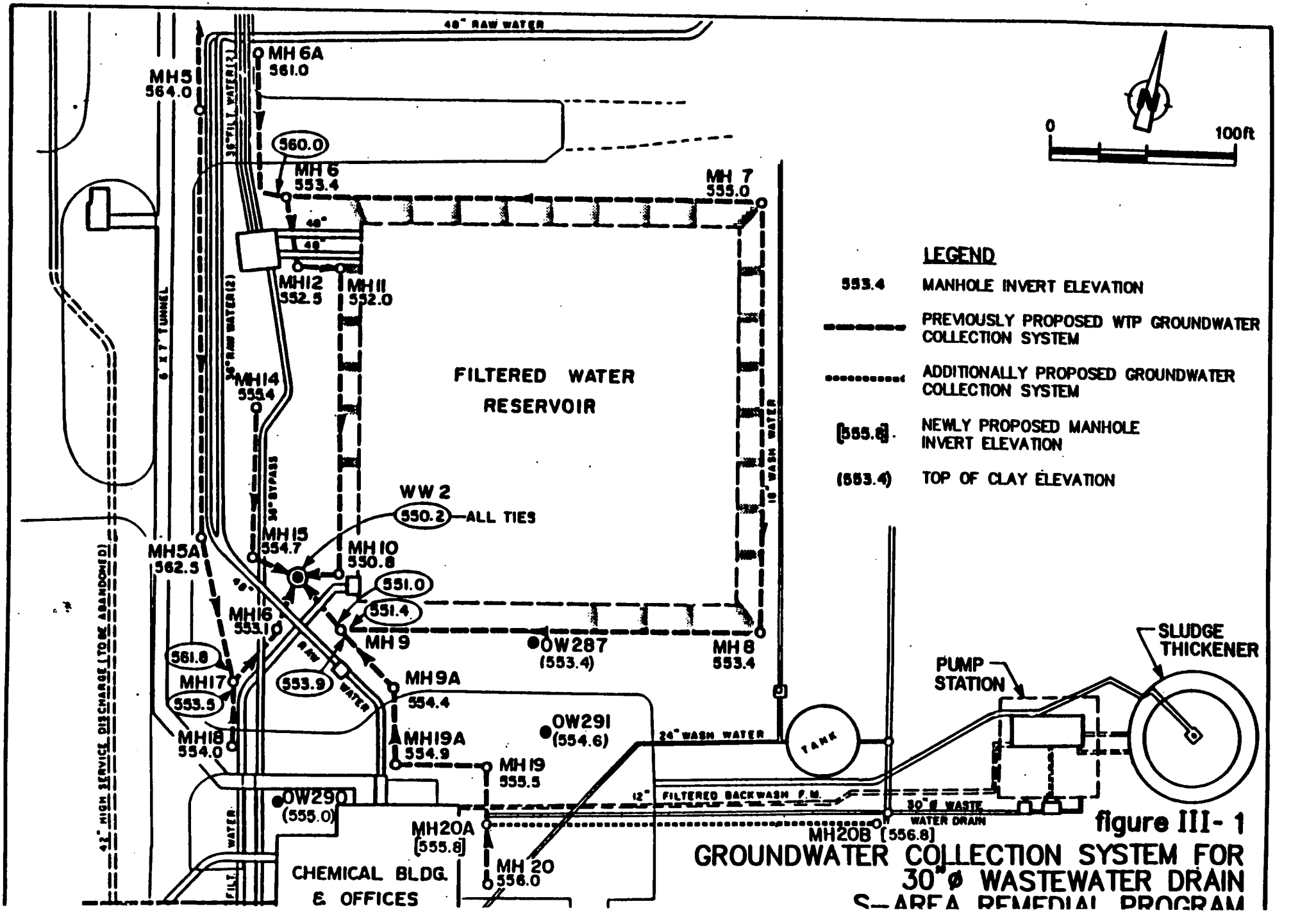
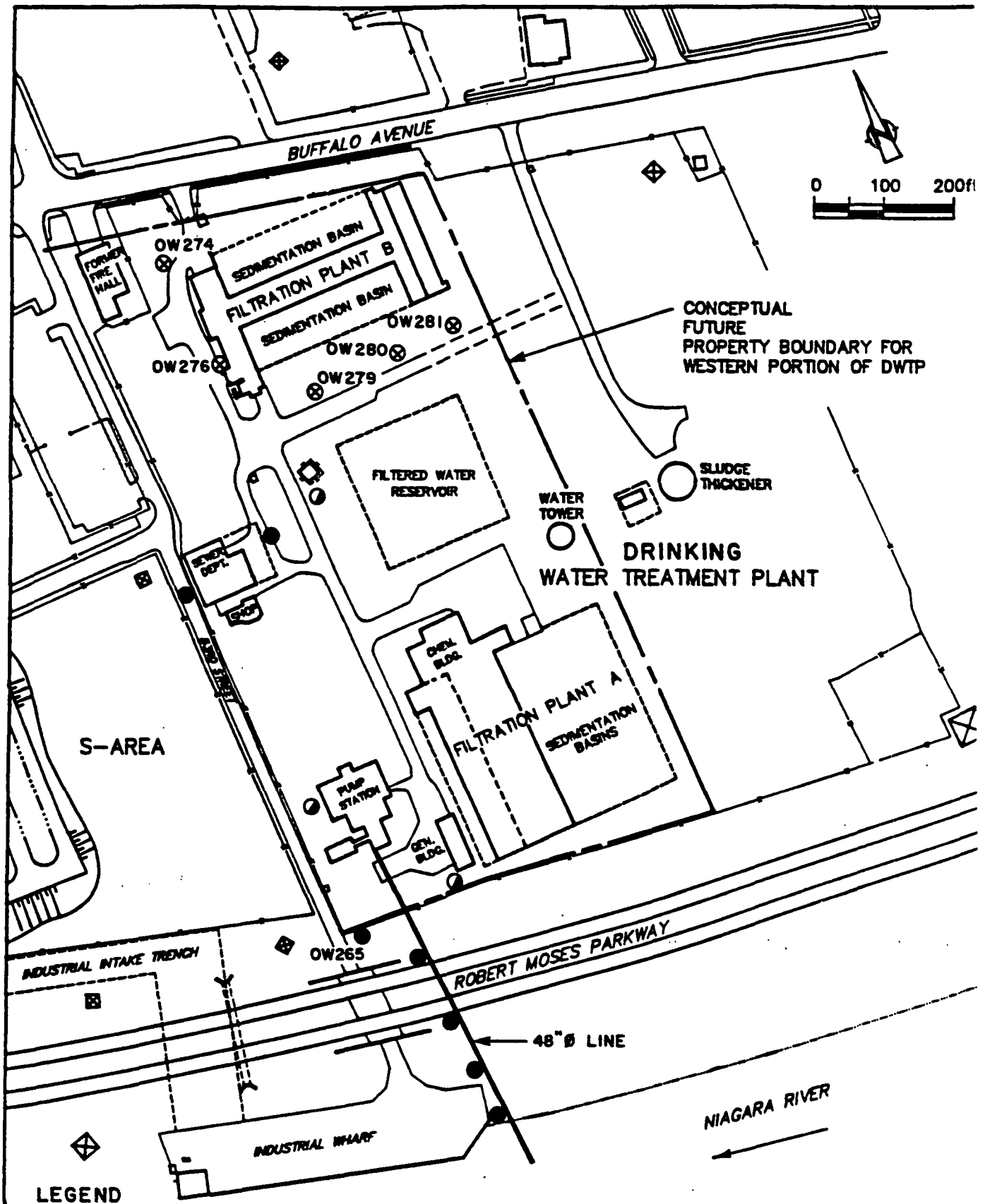


figure III- 1
GROUNDWATER COLLECTION SYSTEM FOR
30"ø WASTEWATER DRAIN
S-AREA REMEDIAL PROGRAM



LEGEND

- ● NAPL MONITORING WELL
- ◐ BEDROCK PIEZOMETER
- ⊗ OVERBURDEN SURVEY WELLS (EXISTING)

figure III-2

MONITORING WELLS
DRINKING WATER TREATMENT PLANT
Occidental Chemical Corporation

CRA

1769-23/05/90-L-0

ATTACHMENT A

Plan A Milestone Schedule

ATTACHMENT A

Plan A Milestone Schedule
(New City Water Treatment Plant)

CONSTRUCTION	Months afte: Stipulation Lodging witl the Court
1. All Parties Sign and Lodge the RRT Stipulation with the Court	--
2. City Council Pass Bond Resolution	2
3. City Submit Process/Treatability Studies/ Pilot Plant Program to NYSDOH for Approval	4
4. Receive NYSDOH Approval of Studies/Pilot Work	5
5. Start NYSDOH Approved Studies/Pilot Work	6
6. Start Facilities Planning	12
7. City Submits Facilities Plan to NYSDOH	21
8. Receive NYSDOH/EPA Endorsement of Facility Plan	23
9. Supplemental Bond Resolution or Other Financial Authorization Passed by City Council (if needed)	24
10. Start Detailed Design	26
11. City Submit Final Application for 601 and 608 Permits to NYSDEC	29
12. Receive Approved 601 and 608 Permits from NYSDEC and associated Corps of Engineers Permits	32
13. City Submits Detailed Design to NYSDOH	36
14. Receive NYSDOH/EPA Approval on Design	38
15. Supplemental Bond Resolution or Other Financial Authorization Passed by City Council (if needed)	39

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Revised: 07/19/90
13493-6:D.C.

	Months Afte Stipulation Lodging Wit the Court
16. Notice to Proceed to Contractor(s)	45
17. Receive First Payment Check from OCC	46
18. Construction Substantially Complete	69
19. NYSDOH Completed Works Approval Received and New Water Plant On-Line	71
20. Demolition of Existing Plant Complete	76
21. Title to Existing Plant Transferred to OCC	77

SITE ACQUISITION

1. Remedial Investigation and Delisting Petition for Portion of NYPA Buffalo Avenue Site Submitted to NYSDEC	17
2. Delisting Action Approved by NYSDEC or Other Acceptable Authorization(s) by NYSDEC	20
3. Site Acquisition Completed	21

APPENDIX VI

INSURANCE CERTIFICATE FORM

		Duration (months)	Float (months)	Critical
L.	CAPPING PROGRAMS			
L1A.	Plans & Specifications	4	17	No
L1B.	EPA/State Review & Approval	3	17	No
L1C.	Award Contract	2	17	No
L1D.	Installation	6	26	No
L1E.	Install East Cap	4	0	Yes
M.	SPECIAL CONSTRUCTION - HEALTH & SAFETY			
M1A.	EPA/State Review & Approval	1	2	No
M1B.	Install Monitoring Stations	2	2	No
M1C.	Perform 30 day Background Study	1	2	No
M1D.	EPA/State Review & Approval	3	2	No
N.	WASTE CELL CONSTRUCTION			
N1A.	Plans and Specifications	2 wks	21/2	No
N1B.	EPA/State Review & Approval	3	21/2	No
N1C.	Award Contract	2	21/2	No
N1D.	Contruction of Cell 1	1	1	No

* Activity is not critical. However, no float time is shown on the bar chart since the activity is tied to an on-going monitoring, operational or data collection activity. Some float time may actually be available as a delay in the start-up of the monitoring, operational or data collection activity would not affect the critical path.

			Duration (months)	Float (months)	Critical
K.	**BEDROCK MONITORING SYSTEM**				
K1.	Performance Piezometers				
	K1A.	Plans and Specifications	2	4	No
	K1B.	EPA/State Review & Approval	3	*	No
	K1C.	Award Contract	2	*	No
	K1D.	Installation	6	*	No
	K1E.	Perform Hydraulic Monitoring	ongoing		No
K2.	APL Dispersion Testing				
	K2A.	Award Contract	1	*	No
	K2B.	Installation	1	*	No
	K2C.	Inject Tracer	1 wk.	*	No
	K2D.	Collect Data	58	maximum	No
	K2E.	Submit Results	2	*	No
	K2F.	Plans and Specifications Monitoring Program (if required)	ongoing		No
K3.	NAPL Tracer Testing				
	K3A.	Award Contract	1	*	No
	K3B.	Installation	1	*	No
	K3C.	Inject Tracer Stage I	1 wk.	*	No
	K3D.	Collect Data Stage I	35	maximum	No
	K3E.	Submit Results	2	*	No
	K3F.	Inject Tracer Stage II	1 wk.	*	No
	K3G.	Monitor Stage II	ongoing		No
K4.	Chemical Monitoring Program				
	K4A.	Award Contract	2	*	No
	K4B.	Installation	1	*	No
	K4C.	Perform Monitoring	ongoing		No
K5.	Environmental Monitoring Program				
	K5A.	Plans and Specifications	2	*	No
	K5B.	EPA/State Review & Approval	3	*	No
	K5C.	Award Contract	2	*	No
	K5D.	Installation	2	*	No
	K5E.	Monitoring	ongoing		No

		Duration (months)	Float (months)	Critical
J1E.	NAPL Recovery Tests and Plans and Specifications Phase I	5	14	No
J1F.	EPA/State Review & Approval	3	14	No
J1G.	Award Contract Phase II	2	14	No
J1H.	Install Phase II	5	14	No
J1I.	Operate Phase II	23	0	No
J1J.	Plans and Specifications Phase III	2	0	Yes
J1K.	EPA/State Review & Approval	3	0	Yes
J1L.	Award Contract Phase III	2	0	Yes
J1M.	Install Phase III	2	0	Yes
J1N.	Operate Phase III	ongoing		Yes
J2.	APL Recovery Wells			
J2A.	Plans, Specificaitons and Protocols	completed		No
J2B.	EPA/State Review & Approval	3	12	No
J2C.	Award Contract	2	12	No
J2D.	Installation	2	12	No
J2E.	Pump Tests and Evaluate Data	2	*	Yes (first 2 months)
J2F.	Complete Remaining Pump Tests and Plans and Specifications Phase II	4	0	Yes
J2G.	EPA/State Review & Approval	3	*	No
J2H.	Award Contract Phase II	2	*	No
J2I.	Install Phase II	5	*	No
J2J.	Operate Phase II	24	*	Yes (first 15 months)
J2K.	Plans and Specificaitons Phase III	2	0	Yes
J2L.	EPA/State Review & Approval	3	0	Yes
J2M.	Award Contract Phase III	2	0	Yes
J2N.	InstallPhase III	2	0	Yes
J2O.	Operate Phase III	ongoing		Yes

			Duration (months)	Float (months)	Critical
	H2.	Overburden Collection Wells			
	H2A.	Plans and Specifications	2	12	No
	H2B.	EPA/State Review & Approval	3	12	No
	H2C.	Award Contract	2	12	No
	H2D.	Installation	3	*	No
	H2E.	Perform Pump Tests on NAPL Wells	2	*	No
	H2F.	Select NAPL Recovery Wells	1	*	No
	H2G.	EPA/State Review & Approval	1	*	No
	H2H.	Operate NAPL Recovery Wells and O/B Collection Wells	ongoing		No
I.	OVERBURDEN MONITORING SYSTEM				
	I1.	Gradient Monitoring Wells			
	I1A.	Plans and Specifications	2	12	No
	I1B.	EPA/State Review & Approval	3	12	No
	I1C.	Award Contract	2	12	No
	I1D.	Installation	2	*	No
	I2.	Maintenance Piezometers			
	I2A.	Plans and Specifications	2	12	No
	I2B.	EPA/State Review & Approval	3	12	No
	I2C.	Award Contract	2	12	No
	I2D.	Installation	2	*	No
	I3.	Conduct Monitoring Program	ongoing		No
J.	BEDROCK RRT SYSTEM				
	J1.	NAPL Recovery Wells			
	J1A.	Plans, Specifications and Protocols	completed		No
	J1B.	EPA/State Review & Approval	3	12	No
	J1C.	Award Contract	2	12	No
	J1D.	Installation	4	16	No

		Duration (months)	Float (months)	Critical
F. UTILITY REMEDIATION				
F1A.	Plans and Specifications	2	9 1/2	No
F1B.	EPA/State Review and Approval	3	9 1/2	No
F1C.	Award contract	2	*	No
F1D.	Construction	1	*	No
G. BARRIER WALL CONSTRUCTION				
G1.	Slurry Wall			
G1A.	DWTP Option A or Option B	74	0	No
G1B.	Plans and Specifications	4	*	No
G1C.	EPA/State Review & Approval	3	*	No
G1D.	Award Contract	2	*	No
G1E.	Installation of Utility Severance Plugs	1	*	No
G1F.	Installation of N., S. and W. Walls	5	*	No
G1G.	Install East Wall	2	0	Yes
G2.	Prescriptive Grout Plugs			
G2A.	Plans and Specifications	4	4	No
G2B.	EPA/State Review & Approval	3	4	No
G2C.	Award Contract	2	4	No
G2D.	Installation	4	*	No
H. OVERBURDEN REMEDIAL SYSTEM				
H1.	Tile Collection System			
H1A.	Plans and Specifications	4	8	No
H1B.	EPA/State Review & Approval	3	8	No
H1C.	Award Contract	2	*	No
H1D.	Installation	6	*	No
H1E.	Operate Tile Collection System	ongoing		No

		Duration (months)	Float (months)	Critical
D1D.	Award Contract	2	0	Yes
D1E.	Construction	9	0	Yes
D1F.	Startup	1	0	Yes
D1G.	Additional Storage Assessment/Approval	2	0	Yes
D1H.	Award Contract	3	0	Yes
D1I.	Construction - Additional Required Storage	10	0	Yes
D2.	APL Treatment			
D2A.	Plans and Specifications Process Design	8	11	No
D2B.	Plans and Specifications Detailed Design	10	12	No
D2C.	EPA/State Review & Approval	13	11	No
D2D.	Process & Approve Discharge to POTW	4	12	No
D2E.	Award Contract	2	11	No
D2F.	Construction	12	11	No
D2G.	Startup	4	11	No
D2H.	EPA/State Approval - Additional Treatment Capacity	3	17	No
D2I.	Award Contract - Additional Treatment Capacity	3	17	No
D2J	Construction - Additional Treatment Capacity	12	17	No
D3.	NAPL Treatment			
D3A.	Design, Install & Test Incinerator APCE	32	13	No
D3B.	Assess Incineration	3	16	No
D3C.	EPA/State Review & Approve APCE	5	13	No
E.	LAGOON DECOMMISSIONING			
E1.	Provide Alternate Treatment System	12	6	No
E2.	Clean Out Lagoons	2	6	No

4.0 DURATION OF ACTIVITIES

The following list of Activities identifies the scheduled duration, the available float time for each Activity before the critical path is affected and identifies those Activities which are currently on the critical path which controls the timely completion of the S-Area program.

			Duration (months)	Float (months)	Critical
B.	ACCELERATED MATERIALS TESTING				
	B1.	Slurry Materials			
		B1A. Conduct Testing	6	*	No
		B1B. Submit Results	2	*	No
		B1C. EPA/State Review & Approval	3	*	No
	B2.	Grout Materials			
		B2A. Conduct Testing	9	4	No
		B2B. Submit Results	2	4	No
		B2C. EPA/State Review & Approval	3	4	No
C.	ADDITIONAL SURVEY WORK				
		C1A. Award Contract	completed		No
		C1B. Installation (IIPT Wells, Water Plant Borings/Wells)	3 1/2	7 1/2	No
		C1C. Submit Results	2	5	No
D.	SITE FACILITIES				
	D1.	APL/NAPL Storage			
		D1A. Plans and Specifications Process Design	completed		Yes
		D1B. Plans and Specifications Detailed Design	4	0	Yes
		D1C EPA/State Review & Approval	7	0	Yes

3.0 GOVERNMENTAL APPROVAL PROCEDURES

Most RRT Components listed in Section 4.0 include a 90-day procedure for review and approval of OCC submissions of plans, specifications and protocols by EPA/State. This time interval is shortened from that provided in Paragraph 7 of the Judgment.

The elements of this procedure are as follows:

1) OCC prepares plans, specifications and protocols and submits them to the EPA/State.
   Scheduling Duration - as individually noted in Section 4.0.

2) EPA/State reviews the submitted plans, specifications and protocols.
   Scheduling Duration - 45 days

3) OCC reviews the EPA/State comments and subsequently revises and resubmits the plans, specifications and protocols.
   Scheduling Duration - 15 days

4) EPA/State reviews re-submission and approves plans, specifications and protocols.
   Scheduling Duration - 30 days

2.0 ASSUMPTIONS

The Bar Chart and Network Diagram are based on the following assumptions:

(1) OCC will utilize the amount of time indicated in Section 4.0 to complete each of the listed Activities.

(2) EPA/State will utilize the amount of the time indicated in Sections 3.0 and 4.0 for review and approval of all OCC submissions.

(3) Seasonal variations and weather conditions will have no adverse impact on the scheduled duration of Activities.

(4) Both governmental and private approvals and other authorizations necessary to perform an Activity will be obtained in a timely manner prior to initiation of such work.

(5) All prior dependent Activities and RRT Components listed in Section 4.0 are completed as scheduled.

addition, the initiation and completion of certain RRT Components is directly dependent upon the satisfactory completion of other RRT Components. Therefore, if any of these RRT Components or Activities are not completed as scheduled, it will have a consequential direct effect on the initiation and completion of the dependent RRT Component or Activity. RRT Components and Activities which could be effected in this manner are presented on both the Network Diagram and the Bar Chart.

The performance of certain RRT Components and Activities listed in Section 4.0 also is directly dependent upon the accuracy of each of the assumptions described in Section 2.0.

All revisions to the S-Area Project Schedule will be made in accordance with Section F of the RRT Stipulation.

1.0 INTRODUCTION

This project schedule ("S-Area Project Schedule") is applicable to activities related to implementation of the S-Area RRT Remedial Plan.

The S-Area Project Schedule consists of the following:

a) the assumptions set forth in Section 2.0;
b) the procedure relating to submission, review and approval of plans, specifications and protocols set forth in Section 3.0;
c) the major RRT components listed in Section 4.0 and the duration of each of the activities included under each component;
d) the Network Diagram included as an attachment hereto; and
e) the Bar Chart included as an attachment hereto.

Section 4.0 identifies the major components of the S-Area RRT Remedial Plan ("RRT Components"). It also includes various activities which will be carried out in implementing each RRT Component ("Activities"). However, the list cannot take into account additional unscheduled tasks and extensions in performance time of currently undefined Activities resulting from required response actions, such as Operational Modifications, System Modifications, focused feasibility studies, and RRT Studies.

The performance of certain activities listed in Section 4.0 is directly dependent upon the satisfactory completion of prior Activities. In

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3.0 GOVERNMENTAL APPROVAL PROCEDURES 4

4.0 DURATION OF ACTIVITIES 5

APPENDIX V

OCC S-AREA PROJECT SCHEDULE

C5.	Complete Trial Burns and, if Authorized, Initiate Restrictive Burning of Remedial Wastes, Including S-Area NAPL (OCC)	November, 1993
C6.	All Required Complete Submissions for Final Authorization (OCC)	February, 1994
C7.	Authorization to Incinerate S-Area NAPL in Solids Incinerator Under Final Permit Conditions (EPA/DEC)	July 1994** (five months after Item C6)

Schedule D: Other EPA/State Permitted Incineration/Treatment and Storage Alternatives specified in § 20(c)

D1.	If required per RRT Stipulation paragraph 20(c) assess specified alternatives and proceed as provided therein.	Will be scheduled pursuant to Stipulation § 20(c)

Schedule E: Other Incinerator/Treatment and Storage Alternatives described in Paragraph 20(e)

E1.	If required per RRT Stipulation paragraph 20(e) assess described alternatives and proceed as provided therein.	Will be Scheduled Pursuant to Stipulation § 20(e)

* Assumes no adjudicatory hearing
** Assumes no further permit modification required

Schedule B: Upgrade for Liquid Incinerator Air Pollution Control Equipment (APCE)

B1.	Approval Determination of APCE Technology (EPA/DEC)	September, 1990
B2.	Submit Complete Final APCE Design (OCC)	March 1991 (six months after Item B1)
B3.	Authorization Determination of APCE Construction (EPA/DEC) Start of APCE Construction (OCC)	July 1991 (four months after Item B2)
B4.	Submit Complete APCE Trial Burn Plan (OCC)	January 1992 (six months after Item B3)
B5.	APCE Trial Burn Plan Approval (EPA/DEC)	June 1992 (five months after Item B4)
B6.	Completion of APCE Construction and APCE Start-up (OCC)	July 1992 (twelve months after Item B3)
B7.	Submit complete APCE Trial Burn Report (OCC)	March 1993 (eight months after Item B6)
B8.	Submit Remedial Waste Treatment Assessment Report Per Stipulation § 20(b) Assessing Status of APCE Upgrade (OCC)	January 1993 (three months after Phase I pump tests)
B9.	Approval Determination for NAPL Incineration with APCE (EPA/DEC)	August 1993 (five months after Item B7)

Schedule C: OCC's Solid Hazardous Waste Incinerator

C1.	Incorporate Liquid Remedial Waste Streams into Permit Applications and DEIS for OCC's Solids Incinerator (OCC)	Ongoing, concurrent with Schedules A & B
C2.	All Required Complete Submissions Made (OCC)	February, 1991
C3.	Permit Determination for OCC's Solids Incinerator (EPA/DEC)	December 1991* (ten months after Item C2)
C4.	Submit Remedial Waste Treatment Assessment Report per Stipulation § 20(b) Assessing Status of OCC's Solids Incinerator (OCC)	January 1993 (three months after Phase I pump tests)

ATTACHMENT A
TO APPENDIX IV

The dates set forth below for OCC to make complete submissions require OCC to make its best efforts to provide complete submissions in compliance with § 5(g) of the RRT Stipulation. It is contemplated that these submissions will be followed by written and oral communications between EPA/DEC and OCC during governmental reviews prior to final governmental determinations that the OCC submissions are complete.

Final governmental determinations or approvals on the permit applications are dependent on receipt of OCC submissions which are complete.

REMEDIAL WASTE TREATMENT MILESTONE SCHEDULE (RWTMS)

Schedule A: Approval to Incinerate S-Area NAPL at OCC's Liquid Incinerator

A1.	Submit Preliminary S-Area NAPL Characterization Data Report (OCC)	October, 1990
A2.	Submit Representative S-Area NAPL Sample Collection Plan (OCC)	December 1990 (two months after Item A1)
A3.	Approval Determination of Item A2 Submission	March 1991 (three months after Item A2)
A4.	Complete Implementation of Item A2, Submit Complete Application for Approval to Incinerate S-Area NAPL per permit (OCC)	July 1991 (four months after Item A3)
A5.	Approval Determination for S-Area NAPL Incineration (consistent with confirmatory analyses required pursuant to the permit) (EPA/DEC)	September 1991 (two months after Item A4)
A6.	If APCE is required for capacity to treat all of S-Area NAPL, continue authorization process to incinerate S-Area NAPL under (RWTMS) Schedule B. If APCE is not required to treat all S-Area NAPL, then schedule B is inoperative.	
A7.	Submit Remedial Waste Treatment Assessment Report per Stipulation § 20(b) Assessing Status of Liquid Incinerator (OCC)	January 1993 (three months after Phase I pump test)

ATTACHMENT A TO APPENDIX IV

REMEDIAL WASTE TREATMENT MILESTONE SCHEDULE (RWTMS)

APPENDIX F

GROUTING PROCEDURE FOR WELL CLOSURE

In the event that any well is to be grouted and removed from service, the following procedures are to be implemented:

1) Place polyethylene on ground surface around well.

2) Install a water tight connection with tremie tube access over well.

3) Set up water collection tank on polyethylene.

4) Insert tremie tube to bottom of hole.

5) Pump groud into the well lifting the tremie tube as the grouting proceeds.

6) Place tremie tube into a steel barrel (placed on top of polyethylene) as it is removed from the well.

7) Pump fresh water used to purge the tremie tube at the completion of grouting into the grout mixing drum.

8) Cover the tremie tube with polyethylene and return to the cleaning area where the tubing exterior will be cleaned along with all other equipment used in the grouting procedure.

9) Contain all well water and transport to a permitted treatment facility. Depending on the volume, wastewater may be pumped into a wastewater haul vehicle or into 55-gallon drums as appropriate. Excess grout will be placed into 55-gallon drums for transport to the spoils cell.

10) Retop the grout with additional grout.

11) Cut casing off at or below grade.

12) Dispose of appropriate safety equipment and material in 55-gallon steel drums and transport to the drum storage facility.

13) Restore site to original condition or better.

The above procedure will be used for all wells screened in the bedrock or above the top of the confining layer (clay/till). For overburden wells screened in the clay or till unit, the well will be overdrilled, the well pipe removed to the extent practicable and then the grouting procedure will be implemented.

APPENDIX F

GROUTING PROCEDURE FOR WELL CLOSURE

MINIMUM REQUIRED STEEL SLIP-IN BLANK THICKNESS

PIPE SIZE INCHES	1	5	10	25	50	75	100	150	200
1	1/16	1/16	1/16	1/16	1/8	1/8	1/8	1/8	3/16
2	1/16	1/16	1/8	1/8	3/16	3/16	3/16	3/16	1/4
3	1/16	1/8	1/8	3/16	3/16	3/16	1/4	1/4	5/16
4	1/16	1/8	1/8	3/16	1/4	1/4	5/16	5/16	3/8
6	1/8	3/16	3/16	1/4	5/16	3/8	3/8	7/16	1/2
8	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	11/16
10	1/8	3/16	1/4	5/16	7/16	1/2	9/16	11/16	13/16
12	3/16	1/4	5/16	3/8	1/2	5/8	11/16	13/16	15/16

YES	NO	
☐	☐	Process fluids removed from equipment or lines broken.
☐	☐	Necessary blanks installed?
☐	☐	Drain valve to be installed?
☐	☐	On-Site Personnel assigned to job instructed in proper method?
☐	☐	Has safety shower been located and tested?
☐	☐	Line or equipment has been properly prepared and is safe to break into.
☐	☐	All pumps and starters locked out?

SPECIAL PRECAUTIONS

_____

_____

_____

I certify that the precautions checked and/or written out above have been taken, and will be followed for the duration of the job.

OCC SAFETY OFFICER

Signed _____

CHECK LIST MUST BE COMPLETED
BEFORE ANY PROCESS LINE IS OPENED WHICH
CONTAINS OR HAS CONTAINED HAZARDOUS MATERIAL

Date _____ From _____ To _____

Department _____ Location _____

Work To Be Done _____

_____

_____

_____

MATERIAL POSSIBLY IN LINE

Name of Material _____

_____

Complete this section before checklist is signed. Check the precaution to be taken before line opening starts. Cross out those not applicable to the particular job being done at the time.

YES	NO	
☐	☐	All necessary protective equipment, including rubber suits, face shield (or hood) rubber foot wear, liquid proof gloves to be worn?
☐	☐	Respiratory protection needed and/or available? If so state type _____.
☐	☐	Area barricaded for maximum protection of other On-Site Personnel?
☐	☐	Scaffolding installed or other safe access to equipment provided?
☐	☐	"Hot Work Permit" provided as needed?
☐	☐	Line or equipment drained into a suitable container?
☐	☐	All valves properly identified, tagged and locked out?
☐	☐	All pumps and starters locked out?

A. Pipelines Containing Hazardous Materials

(1) When these pipelines are worked on, valves that stop material flow must be closed, locked, tagged and tried.

(2) Where possible, at least two valves on the upstream side of the point of work should be closed, locked, tagged and tried. No dependence should ever be placed upon check valves to prevent flow of materials.

a. If lines are tied to a common header, it may also be necessary to lock out and tag additional valves to prevent backflow.

b. All material should be bled from the lines and, where possible, a positive means of keeping the line vented, such as a double block and bleed, should be used.

c. When a bleed point is not available, the source of pressure on the material in a pipe line should be removed (shutting down and locking out a pump feeding the line).

(3) When lockout of the valve or valves, due to its construction is impractical, a "Danger" tag, properly filled out, dated and signed, must be securely affixed to the valve stem.

(4) The contaminated lines will be flushed with clean water than cutup and placed in 55 gal. barrels and disposed at the secure landfill. (All water used for flushing will be collected and treated according to the Hyde Park Consent Agreement).

4. The On-Site Personnel will fill out the checklist before starting the job and the Safety Officer will periodically audit to insure that this is being done. This checklist will be given to the Safety Officer upon completion of the line breaking job, who will review and initial the work permit sheet and retain it for one calendar quarter.

5. Barricading Area

   Before the moment of breaking occurs, the surrounding area shall be barricaded for maximum protection of other On-Site Personnel.

6. Downtime After Line Breaking

   A. When line breaking includes a period of downtime greater than the shift during which the breaking occurred, the open system shall be secured or closed by one of the following means:

      (1) double block and bleed

      (2) blind flanges - refer to blank flange sizes (attached)

      (3) a properly designed closure

      Exceptions to 6a would be where a crew can maintain continuity thru a shift change.

      Where there is a possibility of a line refilling and no other drain exists, a drain valve shall be attached to the blank flange or closure.

   B. Safeguards such as locked switches and locked valves shall be continued until the system is again closed.

7. Safety Showers

   Before breaking into equipment, a safety shower will be situated within 15' of the equipment before making the break.

8. Plastic Piping and Fittings in Hazardous Service

   Some forms of plastic piping can become brittle with age and chemical exposure, others are affected by extreme temperatures. Care must be exercised when working with these plastics.

9. Safety locks and "Danger - Do Not Operate" tags must be installed on closed valves when:

   The flow of air, steam, water, flammable liquids or chemicals through unblanked pipe lines would present a hazardous condition.

S-AREA REMEDIAL PROGRAM
Safety Operating Procedure S#10

SUBJECT

Line Or Equipment Breaking Checklist

PURPOSE

To establish a standard procedure for minimum safe preparation and opening of equipment or pipeline which have or could contain hazardous materials. Individual circumstances may require more stringent procedures.

AFFECTS

All Construction Activities during the S-Area Remedial Program.

PROCEDURE

1. Checklist

   A. Line breaking checklist (Appendix E, Page E-4) shall be filled out before Personnel break into equipment or pipelines which have or could contain hazardous materials.

2. Required Protective Apparel

   A. Face Shield and Goggles
   B. Safety Hard Hat
   C. Liquid Proof Gauntlet Gloves
   D. Protective Footwear Covered by Rain Suit
   E. Respiratory Equipment ad Defined in S#3

3. Duration of Mode of Operation

   A. The protective equipment must be worn when On-Site Personnel open as isolated line or equipment for the first time and work on open lines and/or equipment as long as the hazard of exposure exists. The hazard of exposure may be considered eliminated and the Safety Officer may approve removal of protective equipment to the minimum requirement of goggles, gloves, respirator, and hard hats when all of the following exist:

      (1) The line or equipment is drained and vented to a proper means of containment.

      (2) The line is physically disconnected (opened) at all low points.

      (3) Interconnecting lines are blanked or locked out and tested not to leak through.

      (4) Lines or equipment which have contained hazardous materials have been flushed.

APPENDIX E

SAFETY OPERATING PROCEDURE S#10

LINE OR EQUIPMENT BREAKING CHECKLIST

i. Washable coveralls - cotton jump suit type.

j. Cold weather gear - when and if needed, jackets, hats, insulated underwear.

k. Disposable shoe covers.

Protection level S-4 - Project Site Workers. There is no need for the following classification of workers to enter a Survey Site or to handle any potentially contaminated material or equipment: equipment operators outside the Survey Site, technicians,*/ supervisors, engineers, office workers who must go to a Survey Site, service personnel, janitorial service personnel, and general site visitors. These Project Site Personnel will be provided with and wear:

a. Respirator - Scott 64-OAF or approved equivalent. (Available for immediate use)

b. Hard hat. (to be worn)

c. Safety glasses with side shields. (to be worn)

d. Protective rubbers - neoprene reusable. (Available if required by Site conditions.)

e. Outer gloves - janitorial personnel only.

Protection Level S-5. Office workers, clerical workers, visitors, and others who remain within the fenced area near the offices will not need nor be issued any special personal protective equipment. Scott 64-OAF or approved equivalent respirators will be available in the office for emergency purposes.

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*/ the air monitoring technician will adjust his personal respiratory protection depending on the readings from his instruments.

c. Hard hats.

d. Safety glasses with side shields.

e. Full face shields or approved equivalent will be used when drilling through waste or through the lower section of the Lockport Dolomite.

f. Cotton gloves (inner glove).

g. Outer gloves (two sets).

h. Work boots.

i. Outer boots (neoprene reusable).

j. Washable coveralls - cotton jump suit type.

k. Cold weather gear - when and if needed - jackets, hats, insulated underwear.

l. Sock and underwear.

m. Disposable Hood (unlaminated Tyvek type 2196).

Protection Level S-3 - Survey Site Workers with Minimum Potential of Exposure to Survey Liquids. The following classification of worker will be working at Survey Sites located in areas other than on the S Area Landfill or in areas with minimum potential for contact with Survey Liquids. These workers include: soil and water samplers, sample handlers, and personal protective equipment cleaners. They will be provided with :

a. Respirator - Scott 64-OAF or approved equivalent. (Available for immediate use).

b. Disposable coveralls - For expected wet conditions use item b in Level S-2 above; for expected dry conditions, uncoated TYVEK may be used.

c. Hard hat. (to be worn)

d. Safety glasses with side shields. (to be worn)

e. Cotton gloves (inner glove). (to be worn)

f. Outer gloves. (to be worn)

g. Work boots. (to be worn)

h. Protective rubbers (neoprene reusable). (to be worn)

APPENDIX D

Subject

Levels of Worker Protection

Protection Level S-1 - Confined Space Survey Site Workers. Because of the higher potential for exposure to chemicals while in a confined space or while drilling within the interior of the S-Area Landfill, worker classification for Survey-Site Personnel who work in these areas will be provided with and wear:

a. Pressure Demand Supplied air (1980 ANSI Standard Z88.2).

b. Five minute positive pressure escape air pack independent of primary air source. (Available for emergency use)

c. Fully encapsulating chemical resistant suit (Coated Chemical Resistant TYVEK, Kapplar Model 77 or approved equal).

d. Washable coveralls.

e. Socks and underwear.

f. Gloves outer (chemical resistant neoprene) - the most effective glove will be provided.

g. Gloves inner (cotton).

h. Work boots - the most effective work boot will be provided.

i. Outer boots (neoprene reusable) will be provided.

j. Hard hat - an ANSI approved hard hat equivalent to Wilson Alpha Safety Cap #82AC and compatible with item c. will be provided.

Protection Level S-2 - Survey Site Workers. The following classification of workers might on occasion handle potentially contaminated material or equipment. They will be working around mobile equipment, wells and the spoils cell and will include drillers and driller helpers drilling on the immediate perimeter of the S Area Landfill, equipment operator cleaners and those involved in the operation of the spoils cell.

a. Respirator - Scott 65-OAF or approved equivalent (Cartridges to be replaced daily).

b. Disposable coveralls - splash resistant polylaminated coated TYVEK type P2126-1 with closure capacity at wrists and neck. Equipment cleaner to have laminated hood.

APPENDIX D

LEVELS OF WORKER PROTECTION

APPENDIX C

Soil Testing Procedures - QA/QC Plan

All imported clay to be used for the construction of the Disposal Area berms and capping of the Site (interim and final) shall be tested for the following parameters at the frequency noted:

• Grain Size Distribution	(ASTM D-422-63)	- once/1,000 c.y.
• Moisture Content	(ASTM D-2216-80)	- once/1,000 c.y.
• Atterburg Limits	(ASTM D-4318-84)	- once/1,000 c.y.
• Triaxial Permeability	Engineering Manual Number EM 1110-2-1906: Appendix VII "Permeability Test with Back Pressure"	- once/5,000 c.y.
• Moisture Density Test	(ASTM D698 OR D1557)	-once/5,000 c.y. and at least once during base placement, once during each interim lift cover placement (3-inch layer) and once during final cover placement

Physical testing data from proposed clay sources will be provided prior to bringing the materials to the Site (grain size, moisture content, Atterburg limits, triaxial permeability and moisture density relationship). Results of three historic test sets will be forwarded to the EPA/State Field Representative for review and approval.

In the case where clay is being used for capping purposes, the following testing shall be performed at the frequency indicated:

• In-place Compaction Test	(ASTM D-2922-81 or D-1556-82)	- nine tests/acre/lift
• In-place Moisture Content	(ASTM D-3017-78)	- nine tests/acre/lift
• Triaxial Permeability (Final Cap Only)	Engineering Manual Number EM 1110-2-1906: Appendix VII "Permeability Test with Back Pressure"	- one/acre

In the case where clay is being used for berm construction, the following testing shall be performed at the frequency indicated:

• In-place Compaction Test	- one test/150 LF of berm
• In-place Moisture Content	- one test/150 LF of berm

APPENDIX C

SOIL TESTING PROCEDURES - QA/QC PLAN

It is to be noted that:

i) The Safety Officer is responsible for inspecting all vehicles/equipment prior to final release from the Site.

ii) All wash water will be contained and treated at the Niagara Plant Calgon Unit.

iii) All sediment from wash water will be drummed and disposed at the Landfill Site.

iv) All dirty haul roads will be removed and disposed on Site at the conclusion of each phase of the remedial program unless programs are running concurrently or consecutively.

APPENDIX B

On-Site Traffic Standard Operating Procedures

All vehicles and equipment entering the Landfill Site are required to adhere to the following SOP for cleaning prior to leaving the Site:

Condition A - Vehicles/equipment that do not handle waste and do not use dirty haul roads or enter open sections of waste disposal areas are not required to undergo cleaning.

Condition B - Vehicles/equipment used to haul/handle waste material are exempt from cleaning between loads if all of the following conditions are met:

- provisions are made to protect the exterior of the haulage vehicle during the loading and unloading operations.
- The vehicle/equipment does not use dirty haul roads or enter open sections of the waste disposal area (unless clean haul roads are extended into the area). Otherwise, the undercarriages must be cleaned at a wash station prior to leaving the defined work zone. All waste material adhering to the exterior of the vehicle (excluding the inside face of the box container) will also be removed at the wash station.

Condition C - Vehicles/equipment permanently leaving the Site which have been used to haul/handle waste material must have:

- their undercarriages cleaned as noted in Condition B before leaving the defined dirty work zone.
- Drive to or be transported to the decontamination facility (if transported, the undercarriage cleaning can be deleted).
- Clean the entire exterior of the vehicle/equipment with a pressurized water wash.

APPENDIX B

ON-SITE TRAFFIC STANDARD OPERATING PROCEDURES

7. Proper placing and maintenance of fifth wheel jack supports.

   A. Fifth wheel jack supports must be properly adjusted so it is against the face of the fifth wheel.

   B. The surface of which the jack is placed must be level.

   C. Fifth wheel jacks must be maintained in good operating condition and if damaged must be replaced.

surface. When a tanker or trailer is spotted for purpose of loading or unloading, the driver will place a nose jack support. If the tanker or trailer is spotted for storage only, a nose jack need not be used.

After a loading or unloading operation has been completed, the tractor driver must never couple to a trailer or tanker without first getting consent from the loader or unloader.

3. Stake Trucks and Dump Trucks

Wheel chocks need not be used with these vehicles, unless mobile equipment is being driven onto them.

When chocking is needed, they must be placed at the front and rear of an outer rear wheel on both sides of the truck.

4. Parked Trailers, Tankers and Trucks

If there is no loading or unloading to be done and trailers, tankers or trucks are to be left parked on an even surface, it will not be necessary to chock the wheels.

However, if there is work to be done on any unit whether it be loading, unloading, maintenance or painting, the wheels must be chocked to prevent both backward and forward movement.

In either case, the brakes must be applied after spotting the unit.

5. Removal of Wheel Chocks

A. Wheel chocks MUST NEVER be removed from position until approval has been given by the loader or unloader. After getting this approval, the tractor or truck driver may remove the wheel chocks.

B. The loader must closely examine all drain valves and other outlets to insure that all outlets are secure and not leaking prior to giving approval for removal of the wheel chocks.

6. Proper Placing and Maintenance of Wheel Chocks

A. Chocks must be squarely placed against the tire of the vehicle with the toothed edge gripping the surface on which it rests.

B. The surface on which the wheel chock is placed must be free of ice and snow. If it is a concrete surface, the area where the chocks are placed must be free of gravel, dirt and etc.

C. Wheel chocks must be maintained in good condition and if damaged, must be replaced.

SUBJECT

Loading and Unloading of Trailers, Tankers, and Trucks

PURPOSE

To prevent accidental movement of trucks, trailers and tankers during loading and unloading operations.

AFFECTS

All construction activities during the S-Area Remedial Program.

PROCEDURE

1. Loading or unloading trucks and trailers or tankers with tractor attached.

   A. Responsibilities of the Tractor Driver or Truck Driver

   After spotting the unit at its loading or unloading position, the driver must test the brake system on both the tractor and trailer. This is done by applying the air brakes to the trailer and the hand emergency brake to the tractor and with the motor running and transmission in gear attempt to move the unit forward. The test must show that there is enough restraining force of the applied brakes to prevent forward movement. After this test has been satisfactorily completed, the driver will shut off the tractor motor and place the transmission in reverse gear.

   Trailers or tankers must have chocks placed at the front and rear of an outer wheel or set of wheels on both sides of trailer to prevent movement in either direction. The tractor driver must then notify the On-Site Personnel responsible for the loading or unloading operations that the above precautions have been taken.

   The tractor driver must never pull the trailer or tanker away from this secured position until he has received permission from the On-Site Personnel responsible for the loading or unloading operations.

2. Loading or unloading trailers or tankers without the tractor attached.

   A. Responsibilities of Tractor Driver

   Before uncoupling the tractor the driver must set the trailer or tanker air brakes. He must then test these brakes by attempting to move the trailer or tanker forward with the tractor as the moving force. The driver must then place the wheel chocks as previously outlined and then lower the trailer or tanker dolly wheels making sure that the dolly wheels are setting on a firm

APPENDIX A

SAFETY OPERATING PROCEDURE S#6

LOADING AND UNLOADING OF TRAILERS, TANKERS AND TRUCKS

h) All areas outside the placement cell which are impacted by leakage will be cleaned up according to the procedures described in the appropriate Health and Safety Plan.

The pump and hoses will be transferred from cell to cell as work progresses. Upon completion of the final cell, the pump and hoses shall be buried with the final waste placement prior to final capping.

5.10 HEALTH AND SAFETY PLAN

The Health and Safety Plan to be followed during the placement of the waste in the placement cell will be in accordance with the Health and Safety Plan applicable to the remedial work which generates the waste. The Health and Safety Plan will typically be one of the following:

- Environmental Health and Safety Plan for Survey Activities, or
- Environmental Health and Safety Plan for Special Construction Activities.

In cases where two waste generating activities are ongoing concurrently, the more stringent Health and Safety Plan will be implemented at the waste placement cell.

a) Immediately shut down any operating pumping equipment.

b) Notify the appropriate personnel that repairs are required immediately.

c) Drain and collect all liquid from the hoses and isolate the leaking portion.

d) Perform all line breaking in accordance with Safety Operating Procedure S#10 "Line or Equipment Breaking Checklist" (See Appendix E).

e) Repair or replace the leaking portion of hose as necessary.

f) Should repairs be lengthy or further pumping be required before repairs can be completed, make provisions for temporary bypass of the damaged area.

g) In addition to the normal safety clothing requirement, the following safety equipment must be worn for work on leaking hoses:

- rubber rain suit
- rubber gloves
- rubber boots
- face shield
- respirator (Scott 64 OAF or approved equivalent).

Precipitation falling within a prepared area that has begun to receive waste material will be contained within the excavation and shall be removed to a trailer or storage on the AOC. Where possible, precipitation landing on placement areas that have been capped with clay will be diverted to the local surface drainage courses for discharge off the Landfill Site. The daily inspections will insure that this precipitation remains as non-waste contact surface water.

If water is sediment-laden, it will be allowed to settle until the water is of reasonable clarity so as not to impair the operation of OCC's Treatment facilities. In order to reduce the potential for sediment discharge with the waste contact surface water, OCC will install a filter (See Plan 1) around the pump to reduce the sediment intake.

A submersible pump and dedicated flexible chemical-resistant hose will be used to pump the water from the waste cell area. At OCC's option, either manually-controlled or level-activated pumps may be used to pump water from the disposal area. Any joints in the hose shall be wrapped with duct tape and shall be inspected once per day during pumping operations to monitor the integrity of the line. If manually-activated pumps are used, single hoses with hourly inspections will be used. If level-controlled pumps are used, encased hoses and daily inspections will be used.

In the event that leakage is detected in any of the hoses, the following procedures will be followed:

above-grade haul roads will be scraped down and made level with the existing grade. This material will be placed within the waste cell area.

Dust control measures on haul roads shall be implemented on an as-needed basis. These measures will include the application of water or calcium chloride. Maximum speed on haul roads will be limited to ten miles per hour to further reduce dust generation.

5.9 SURFACE WATER HANDLING

The waste placement and cell preparation areas shall be constructed in such a sequence as to maintain positive surface drainage of rainwater away from the active cell placement area and toward existing surface water drainage systems. Surface water shall be diverted around the prepared areas by means of swales as shown on enclosed Plan 1. Wherever possible, sheet flow conditions are preferred as opposed to concentrating surface water flow in swales.

Precipitation falling within a prepared area that has not yet begun to receive waste material will be pumped from the cell and discharged to the surrounding drainage swale. A clean pump and discharge line will be installed in the low corner of the prepared area and the water pumped into the adjacent swale or off the Landfill Site, whichever is most appropriate.

b) During cell placement activities for personnel within prepared area but not within waste cell use Level S-3 protective equipment (See Appendix D).

c) During times of entry with all waste covered or sealed use Level S-3 protective equipment.

The above levels of worker protection will be upgraded by the Safety Officer should the air monitoring being conducted indicate that such an upgrade is warranted. The Safety Officer will follow the guidelines for the pertinent health and safety plan per Section 5.10 in determining whether such actions are required.

Access into the prepared cell areas will be through an opening in the temporary fence. The openings will be closed nightly with fencing or similar material.

The location of haul roads and accesses into the cell areas will depend upon the cell location. The intent will be to maximize the use of haul roads once they are constructed.

Haul road requirements must be determined in the field to suit the conditions and needs encountered. Haul roads within cell areas will simply consist of a layer of stone consistent with the intended purpose and estimate of usage and will be upgraded as required. If deemed appropriate by the OCC Field Representative, a filter fabric may be used in the haul road construction. Prior to final capping of the Landfill Site, all

- collection systems,
- site benchmarks,
- advisory signs, and
- fences.

Based upon the inspections made, OCC shall promptly repair or modify any problems identified.

All records shall be kept available at the OCC Field Office for reference.

Upon completion of each cell placement area, OCC shall submit a copy of the records of waste placement and a record drawing stamped by a New York State registered Professional Engineer to the EPA/State.

5.8 SECURITY FENCE AND ACCESS REQUIREMENTS

A temporary security fence (snow fence) will be placed around the perimeter of the prepared area. Access within the fenced areas will be restricted to personnel equipped with the following equipment:

a) During cell placement activities for personnel entering waste cell use Level S-2 protection equipment (See Appendix D).

In addition to the above activities, a daily record of waste placement and inspection activities shall be maintained at the project site. The daily record shall include:

- records of waste placement in cells:
  - date,
  - type,
  - quantity,
  - container type or bulk,
  - location (accurate to 50'±), and
  - disposal method;

- records of Landfill Site testing, (soil density, moisture for clay cap), and

- records of daily inspections:
  - clay cover,
  - disposal area inspections (and sideslopes under interim cover),
  - surface water control and discharge, and
  - haul roads.

Regular maintenance inspections shall be made on a weekly basis as specified in Addendum III of the Settlement Agreement for the following:

- slopes,
- vegetation,
- drainage structures,

aspects of the waste cell placement program to ensure compliance with approved plans and specifications:

- cell construction,
- berm construction,
- waste placement,
- waste compaction,
- material transfer,
- haul road conditions,
- requirement for dust control,
- equipment cleaning,
- interim cover placement,
- surface water control,
- health, safety and personal hygiene, and
- air monitoring.

The air monitoring requirements during the period of active cell operation will be identical to the air monitoring program implemented at the point of waste generation. In cases where two waste generating activities are ongoing concurrently, the more stringent air monitoring plan will be implemented at the waste disposal cell.

It is to be noted that air monitoring of the waste cell operation will not be required in cases when the waste material being placed into the cell is contained in sealed units (i.e. 55-gallon steel drums or fiber drums).

The preferred source of loam to be used for the final cap is the residual from incineration of OCC remedial wastes at the proposed Niagara Plant solid waste incinerator. It is currently estimated that this incinerator will generate approximately 35,000 cubic yards of ash residue per year.

OCC will apply for governmental "de-listing" of the residual ash from its status as a hazardous waste. Concurrently with this application to de-list the residual ash, OCC will petition NYSDEC for the beneficial use of this residual ash for use as fill, including its use as intermediate loam in the final caps at the S-Area and the DWTP.

If the ash is delisted and its use satisfies all applicable state and federal regulations, it will be used as intermediate loam for the final cap. If, at the time of final capping, the residual ash has not been de-listed and accepted for beneficial use, does not meet applicable state and federal regulations, or is not available, it will not be used, and an alternate source of intermediate loam will be readily available for immediate use.

5.7 SUPERVISION, DOCUMENTATION AND MONITORING REQUIREMENTS

The OCC Safety Officer shall be present at the project site whenever waste materials are being placed into the daily cells. The Safety Officer or his appointed designee will provide oversight of the following

The final top slope of each waste cell will be set at a minimum of two percent grade. This will not only promote surface drainage, but also provide a base for any required additional lifts. The exterior side slopes of each cell will be kept to a minimum of 1:2 and in those cases where the cell lies along the outside edge of the Landfill Site, the slope shall be graded according to the final Landfill Site closure plan.

Typical waste cell construction progression is presented in enclosed Plan 1.

5.6.2 Final Capping

As major portions of the Landfill Site reach final grade, OCC will install the final cap, as specified in the S-Area Settlement Agreement, over the completed areas. The final landfill cap shall consist of:

- 6 inches of topsoil, overlying
- 18 inches of intermediate loam, overlying
- 36 inches of clay ($K \leq 1 \times 10^{-7}$ cm/sec).

The 18-inch intermediate loam layer described above will required the use of approximately 11,000 cubic yards of material as a part of the final cap at the Landfill Site. In addition, if the DWTP is removed, the DWTP structures will be demolished and most of the DWTP will be capped as described above. This will require approximately 6,500 cubic yards of loam material as part of the final cap at the DWTP.

- 30 mil polyethylene film or equivalent.

The polyethylene film will only be used in cases in which disposal activities are planned to be resumed within 72 hours.

It should be noted that fiber drums may be kept within the designated drum storage area in the disposal areas for extended periods as long as the drums are covered with polyethylene.

In all other cases, the waste will be capped with a minimum compacted thickness of six inches of clay. The clay will be obtained from sources as directed by OCC. The clay will have a permeability of 1×10^{-7} cm/sec or less with a minimum of 40 percent fines passing the #200 sieve. Prior to and during use at the Landfill Site, the imported clay shall be tested in accordance with the requirements specified in Appendix C. This includes the clay used for the initial six-inch base.

Results of these tests will be forwarded to EPA/State prior to use of the material on the Landfill Site.

The size of each daily spoils cell will be based on the volume of waste available for disposal on that particular day. Sections of the disposal cell which will not be reused for periods in excess of 180 days will be capped with an additional three inches of clay. The additional three inches of clay will be compacted with a smooth drum roller to the density specified to meet the 1×10^{-7} cm/sec requirements.

5.5 LAGOON DECOMMISSIONING

The S-Area lagoons will be decommissioned. This will involve the cleaning of the lagoons in accordance with standard plant operating procedures and then dismantling the water handling functions of the lagoons including:

- removal of the slurry inlet pipe, and
- plugging the outfall structure with cement.

The outfall pipe is connected to the portion of the 003 Outfall within the Site Barrier Wall that is to be severed and plugged. Severing and plugging of the 003 Outfall will effectively isolate the outfall pipe.

5.6 WASTE CAPPING

5.6.1 Interim Capping

At the conclusion of each working day, or as necessitated to control vapor emissions, the waste cell shall be covered with one of the following caps:

- six inches of low-permeability clay ($K \leq 1 \times 10^{-7}$ cm/sec); or

- crane, or
- conveyor system

- dump/unload directly into place from within the cell (requires dirty haul road designations)

Depending upon the waste volume and character, the methodology for waste placement and transfer will vary and is not necessarily limited to those described above.

5.4 OTHER CONSIDERATIONS

Placement of waste on the Landfill Site will not interfere with the installation of the proposed wells and collection systems. The condition of the Landfill Site at the time of construction of various appurtenances will be taken into consideration. Possible additional loading due to increased heights of fill will also be considered.

Any wells in existence at the time the waste cells are constructed will either be removed or extended as appropriate. Wells not included in the ongoing monitoring programs will be removed subject to EPA/State concurrence and the others will be extended as appropriate. Any well included in the ongoing monitoring programs which become damaged will be replaced with a new installation unless an appropriate alternate well already exists. Wells installed after the waste cells are constructed will be integrated into the cover design. Removal of wells will be undertaken in accordance with the protocols described in Appendix F.

"contaminant reduction zone" at the equipment wash facility or other agreed-upon location. Standard Operating Procedures for On-Site Vehicle Traffic are presented in Appendix B.

Construction and maintenance of haul roads will be an on-going operation with clean gravel being added on an as-needed basis.

Specific details of waste placement, haul road designations (i.e. clean, dirty), contaminant reduction zone locations and container loading and unloading will be determined in the field by the OCC Field Representative, when concurrences by the EPA/State Field Representative prior to implementation. The following options are available for waste placement:

Waste Transport Containers

- 55-gallon steel drums - secured lid
- watertight dump truck with polyethylene cover
- watertight lugger box with polyethylene cover
- DOT approved fiber waste container
- fiber drums

Waste Transfer

- dump/unload directly into cell from edge of cell
- dump/unload into a staging area and transfer into place using a:
  - backhoe
  - bulldozer
  - dragline

areas recompacted by large equipment when they return to the Landfill Site for the larger waste volume programs. Typical equipment to be used for compaction include:

- Self-propelled vibratory Sheeps Foot Compactor typical model numbers:
  - Raygo 320
  - Dynapac CA25
  - Bomag BW605

- A small vibratory roller available at the Landfill Site for all of the small programs for compaction purposes.

Compaction procedures will be determined in the field by the OCC Field Representative, taking all of the pertinent factors into account. The test results will be reviewed with the EPA/State Field Representative. Prior to proceeding to the second and third lifts of waste placement, all of the waste disposal areas will be proof-rolled with a 20-ton (static) smooth-drummed roller to reduce the potential for future subsidence. Care will be taken in the area of drummed waste placement to maintain the integrity of the underlying drums while proofrolling. The OCC and EPA/State Field Representatives shall determine the level of compaction required in drum disposal areas.

Vehicles hauling waste material to the placement area will not enter and leave the waste cell unless appropriate haul road provisions have been made. These provisions will include construction and maintenance of "clean" and "dirty" haul routes and allowances for a

5.3 PLACEMENT IN WASTE WELLS

All waste placement into the landfill site will be completed under the direction of the OCC Field Representative in accordance with the overall grading plan and an individual plan describing the proposed disposal activities for each individual disposal area. The individual plan will be subject to concurrence of the EPA/State Field Representative.

All bulk and drummed wastes will be placed into the prepared placement area in the corner opposite the lowest base elevation. The size of the area prepared to receive waste will be consistent with the estimated volume of waste expected to be generated during that disposal period. A disposal period typically would last for one to six months depending upon the type and amount of remedial activity scheduled for the Site. Typical cells will range in size from 7,500 square feet to 85, 000 square feet.

The material shall be shaped into a lift of approximately five feet in height consistent with the final grading plan which has been designed to improve the surface water runoff characteristics from the Landfill Site. The material shall be compacted to the extent practicable, given the equipment available at the time of placement. For the large volume waste placement programs, specific heavy equipment will be dedicated to the compaction and interim operations. The small volume waste placement programs for which heavy compaction equipment will not be available at the Landfill Site will utilize alternate compaction equipment. Further compaction of these small volume wastes will be addressed by having these

to insure that precipitation landing on completed areas maintains its non-waste contact status and can, therefore, be allowed to discharge off the Landfill Site.

The berms will be constructed using clay which shall be compacted in six-inch to nine-inch lifts to a density at least equal to 90 percent of the Maximum Modified Proctor Density or to the density specified by the clay testing laboratory to attain an in-place permeability of 1×10^{-7} cm/sec, whichever is greater. The berm will be keyed three inches into the six-inch compacted clay base to prevent surface water from entering or leaving the cell. In the case of cells constructed on top of previous cells, the berms shall key into the interim cap of the underlying cells. The clay key will be constructed by pressing pieces of lumber into the lower berm, removing the lumber, and then placing the upper clay berm. All upper cells are to be constructed in such a manner as to provide the same drainage configuration as that constructed for the first layer of cells.

The berms will have an interior slope of 1:1 and an exterior slope of 1:2 or be constructed to match the final contours of the Landfill Site, allowing for the five-foot cap, if the cell lies along the edge of the Landfill Site. The berms shall be three feet wide.

Plan 1 presents a typical cell construction detail for disposal area 3A.

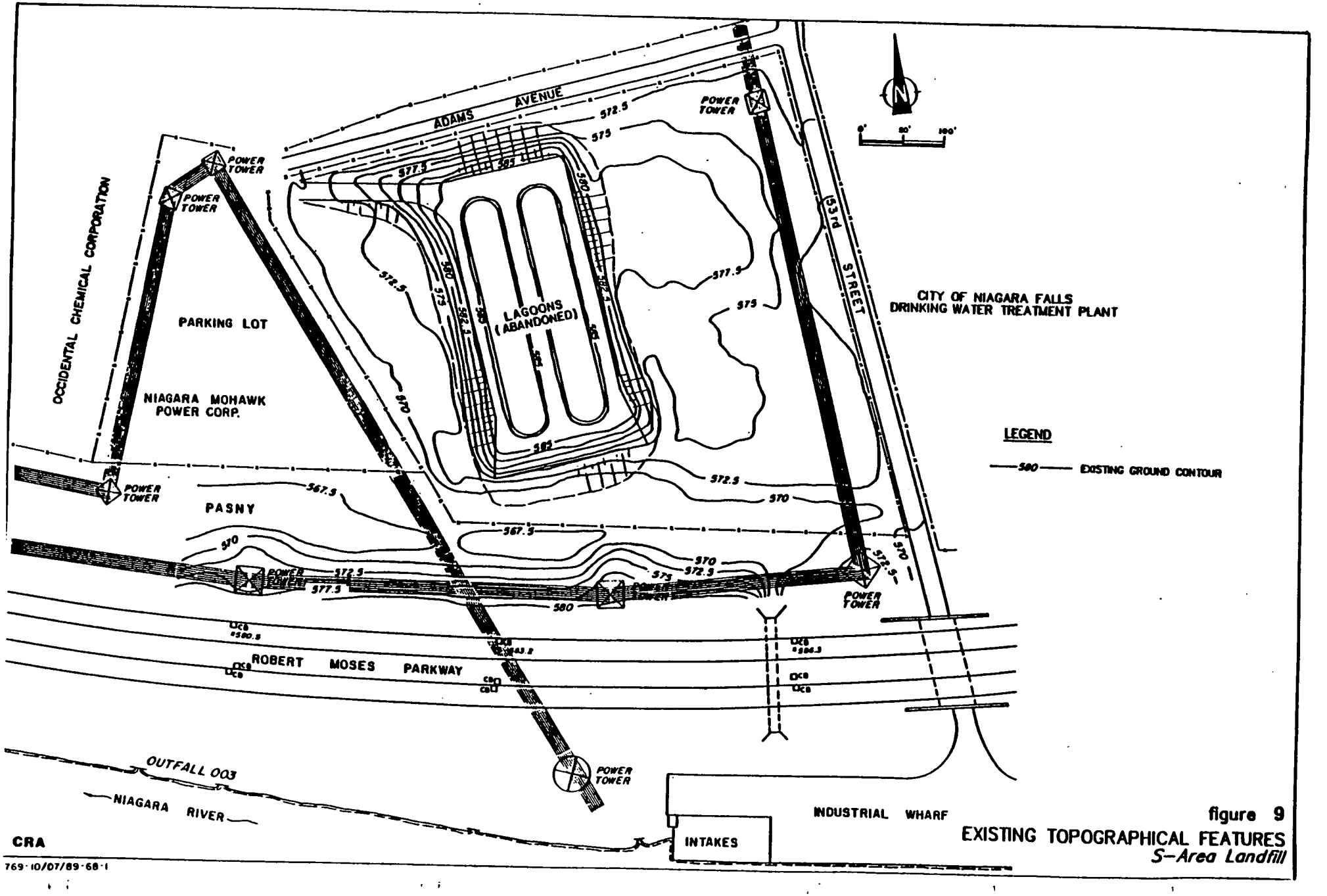


figure 9
EXISTING TOPOGRAPHICAL FEATURES
S-Area Landfill

5.2 LANDFILL SITE PREPARATION

Prior to waste placement at the site, a layer of clay (minimum six-inch compacted thickness) will be placed on the Landfill Site on which all waste will be placed. This clay placement will take place as each disposal cell is constructed. No pregrading will be done as the first lift of waste will vary somewhat in thickness to accommodate the topographical irregularities. Efforts will be made to overcome the irregularities in grade over the first two waste lifts to even out lift heights to the extent practicable. A map depicting existing topographical features is presented in Figure 9.

To prepare cells for each five-foot lift of waste, clay berms will be constructed around the entire perimeter of the proposed disposal cell area. The berms will be at least two feet in height at all locations around the perimeter and shall be of sufficient height to contain a 25-year storm event (approximately four inches of rain in a 24-hour period).

In order to insure that the placement can continue to accommodate a 25-year storm event while the available storage area within the cell shrinks due to waste placement, surface water landing on top of the completed placement area (daily clay cover in place) will be directed away from the unused portion of the disposal area. This will be accomplished by leaving a windrow of clay along the edge of the covered cells to direct clean surface water to adjacent completed areas and ultimately off the Landfill Site. Inspection of the clay capped waste areas will be included in a daily inspection

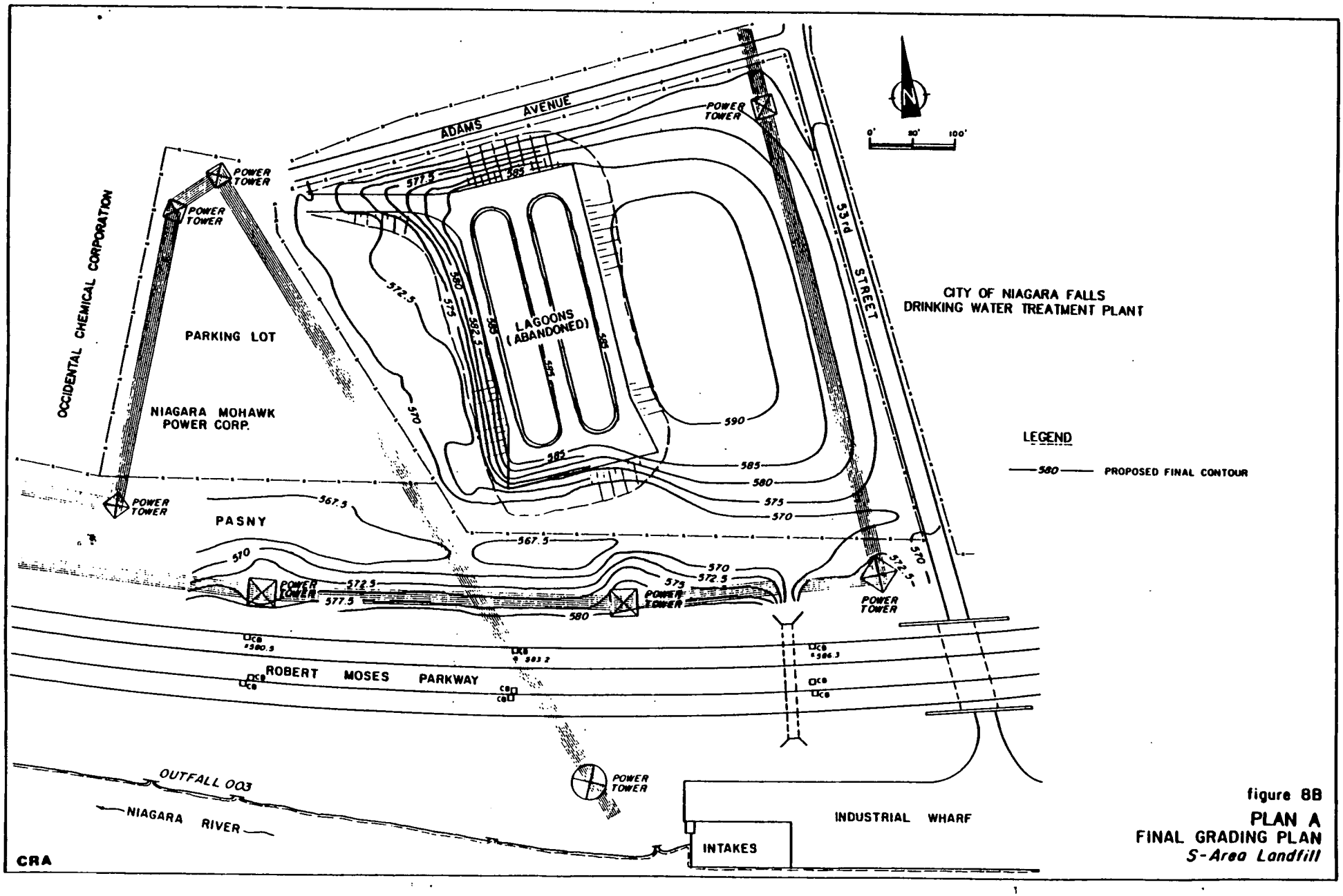


figure 8B
PLAN A
FINAL GRADING PLAN
S-Area Landfill

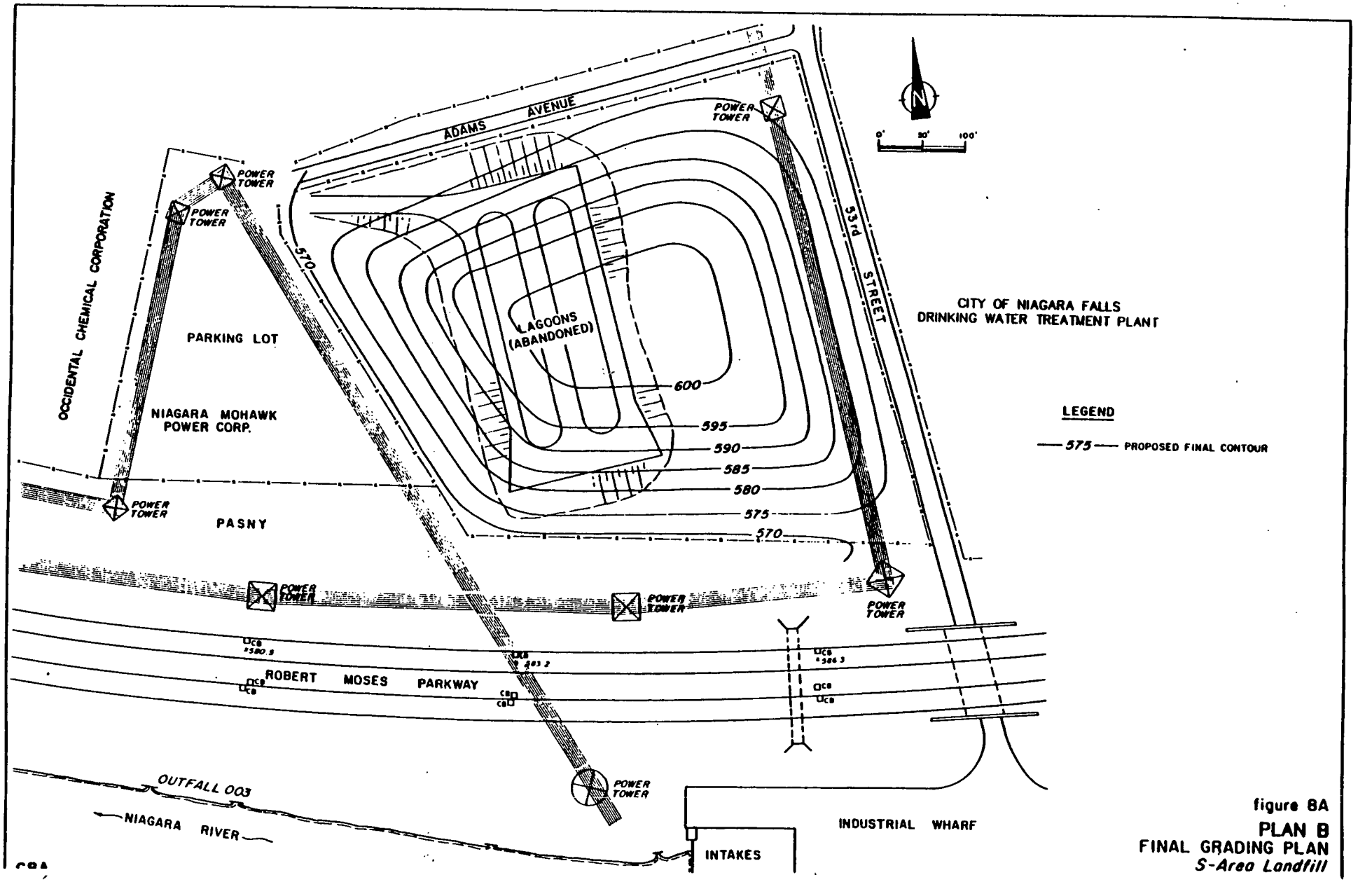


figure 8A
PLAN B
FINAL GRADING PLAN
S-Area Landfill

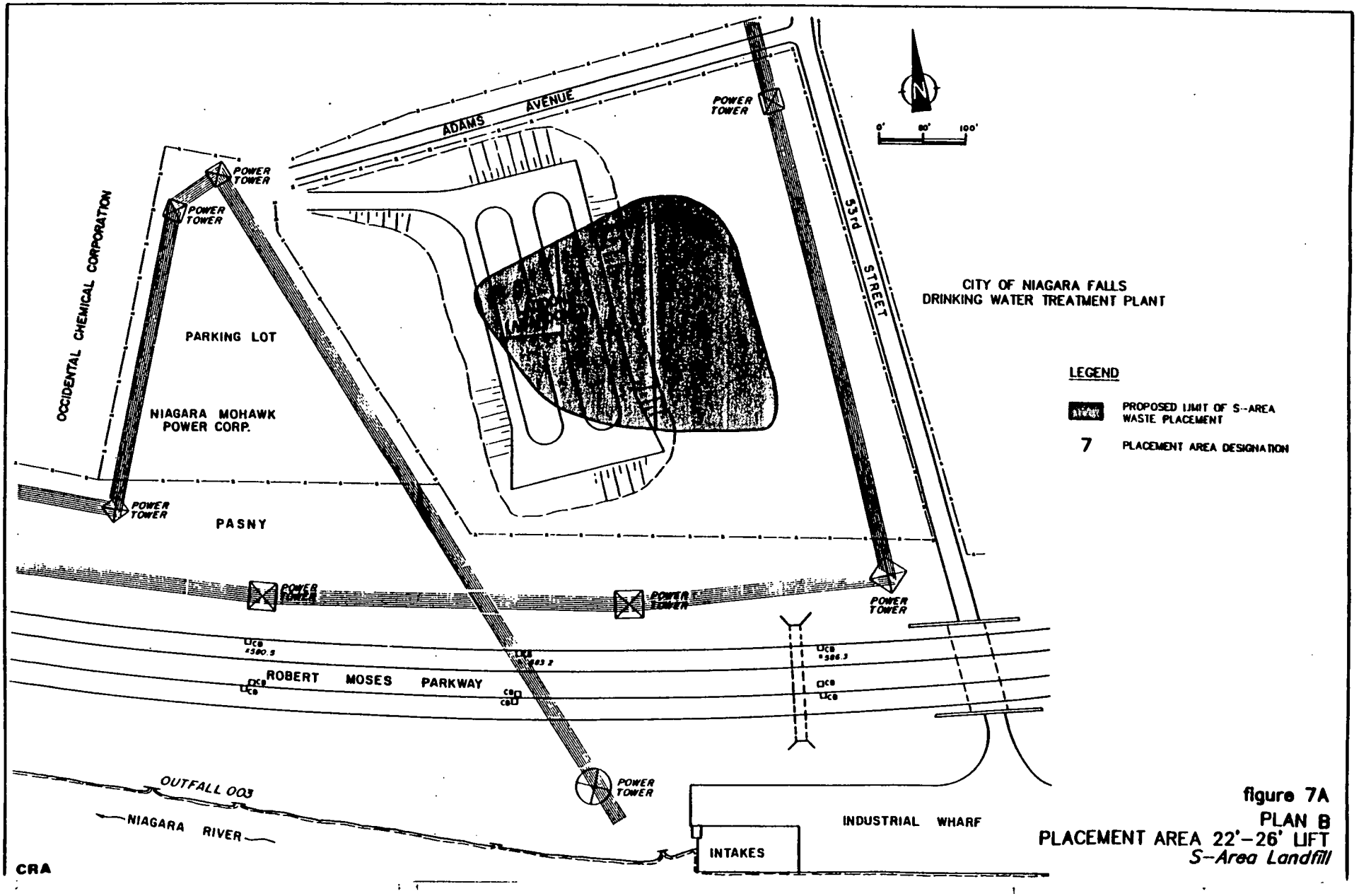


figure 7A
PLAN B
PLACEMENT AREA 22'–26' LIFT
S–Area Landfill

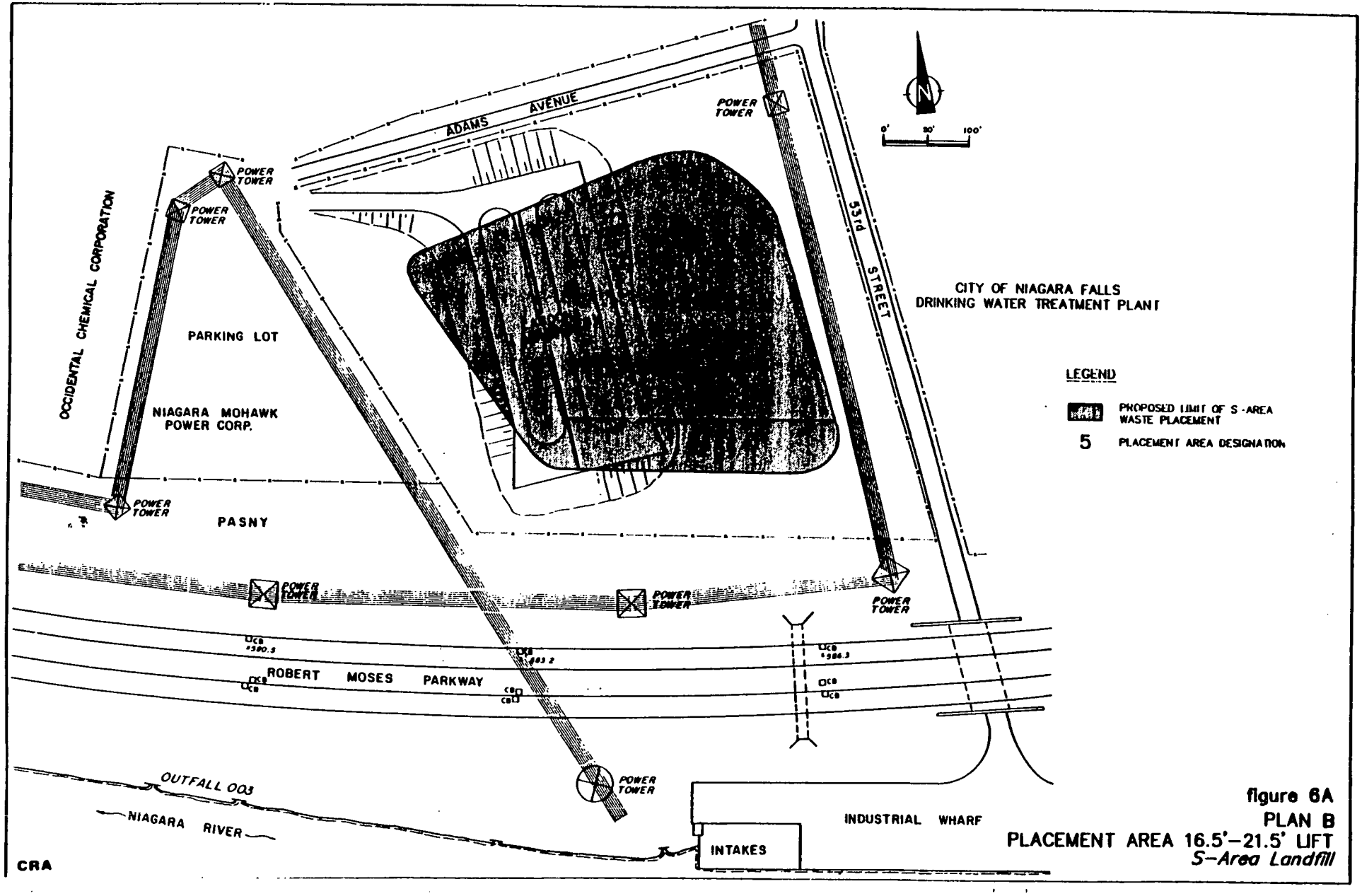


figure 6A
PLAN B
PLACEMENT AREA 16.5'–21.5' LIFT
S–Area Landfill

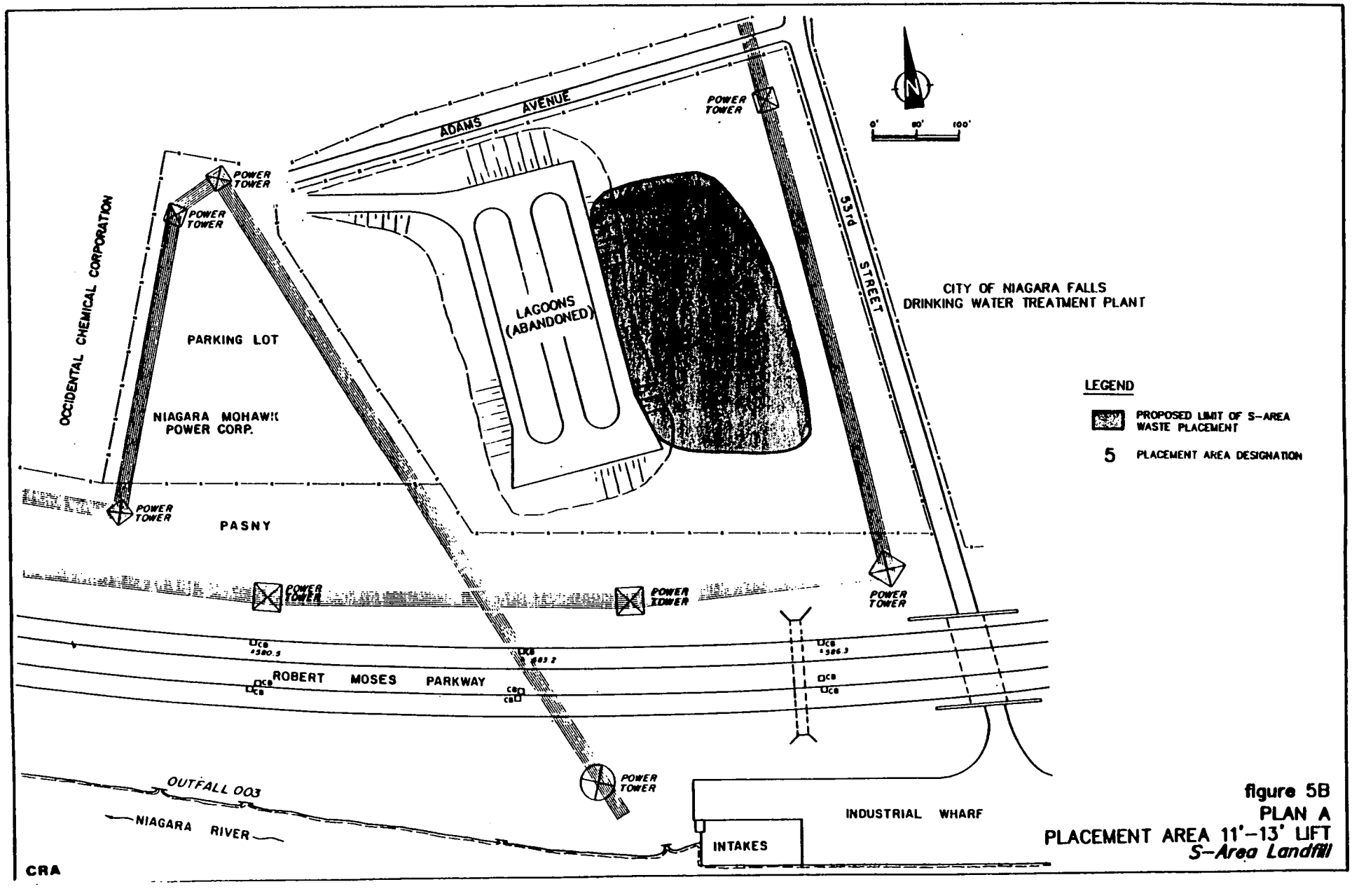


figure 5B
PLAN A
PLACEMENT AREA 11'-13' LIFT
S-Area Landfill

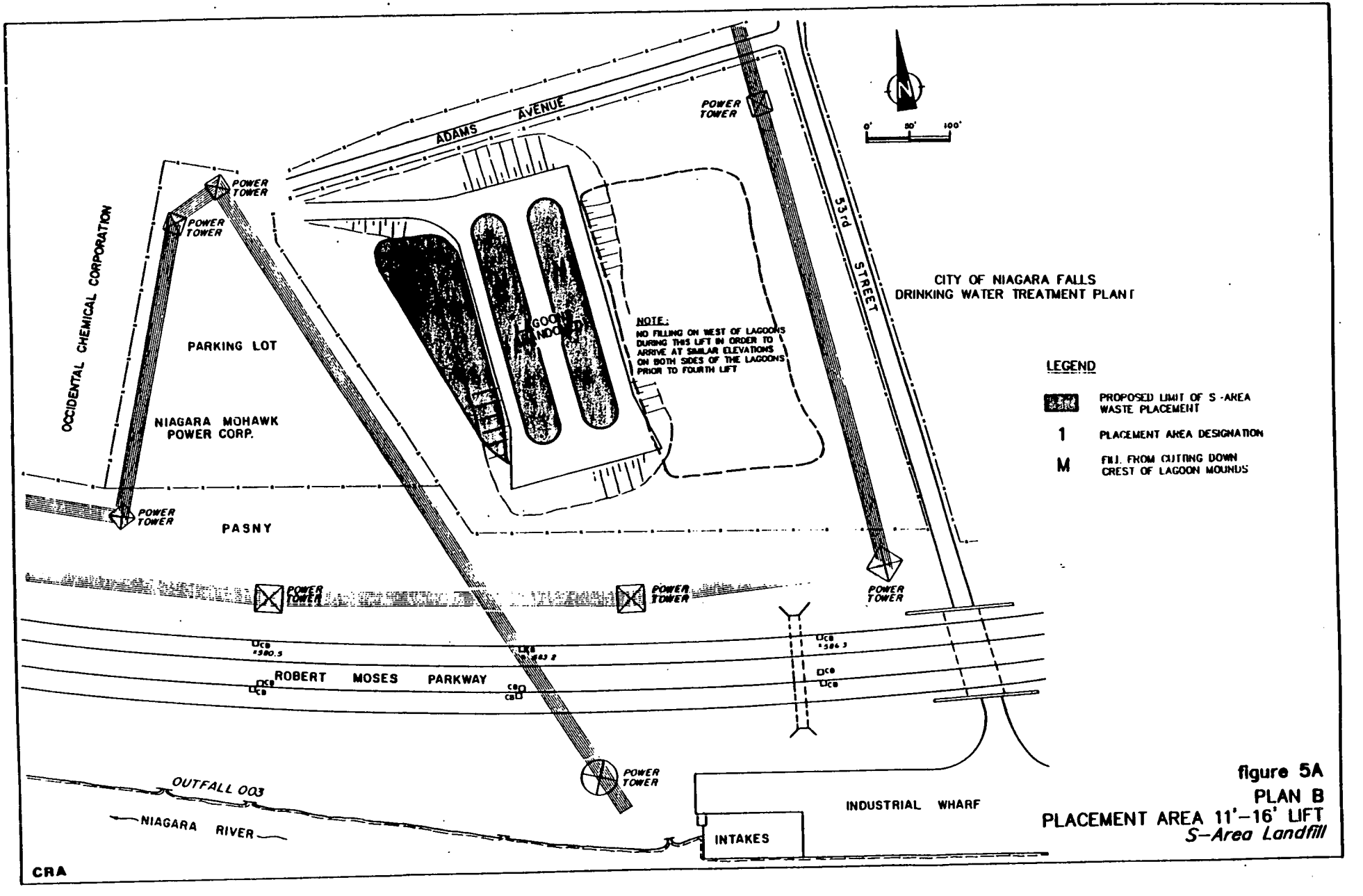


figure 5A
PLAN B
PLACEMENT AREA 11'–16' LIFT
S–Area Landfill

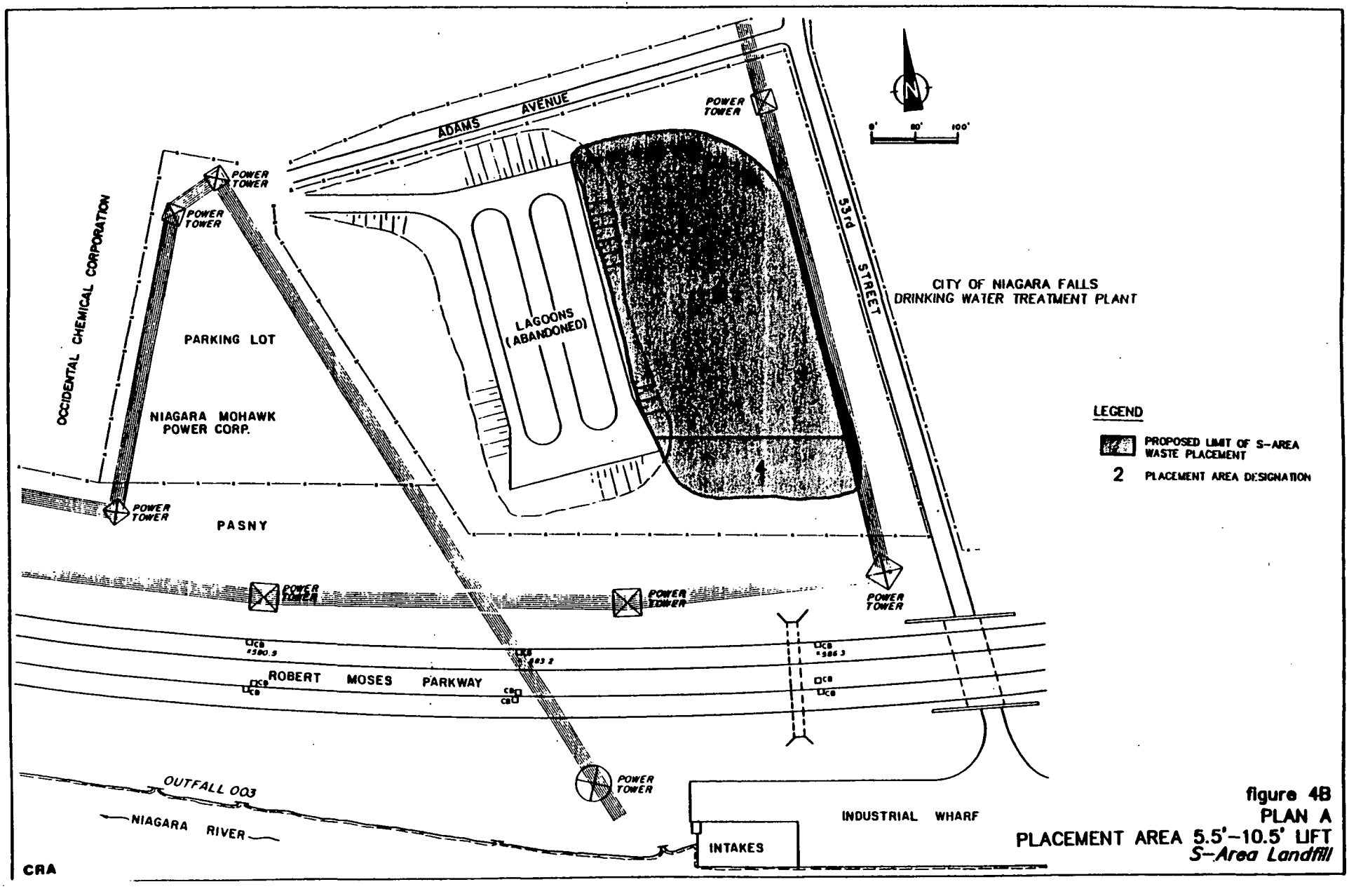


figure 4B
PLAN A
PLACEMENT AREA 5.5'–10.5' LIFT
S–Area Landfill

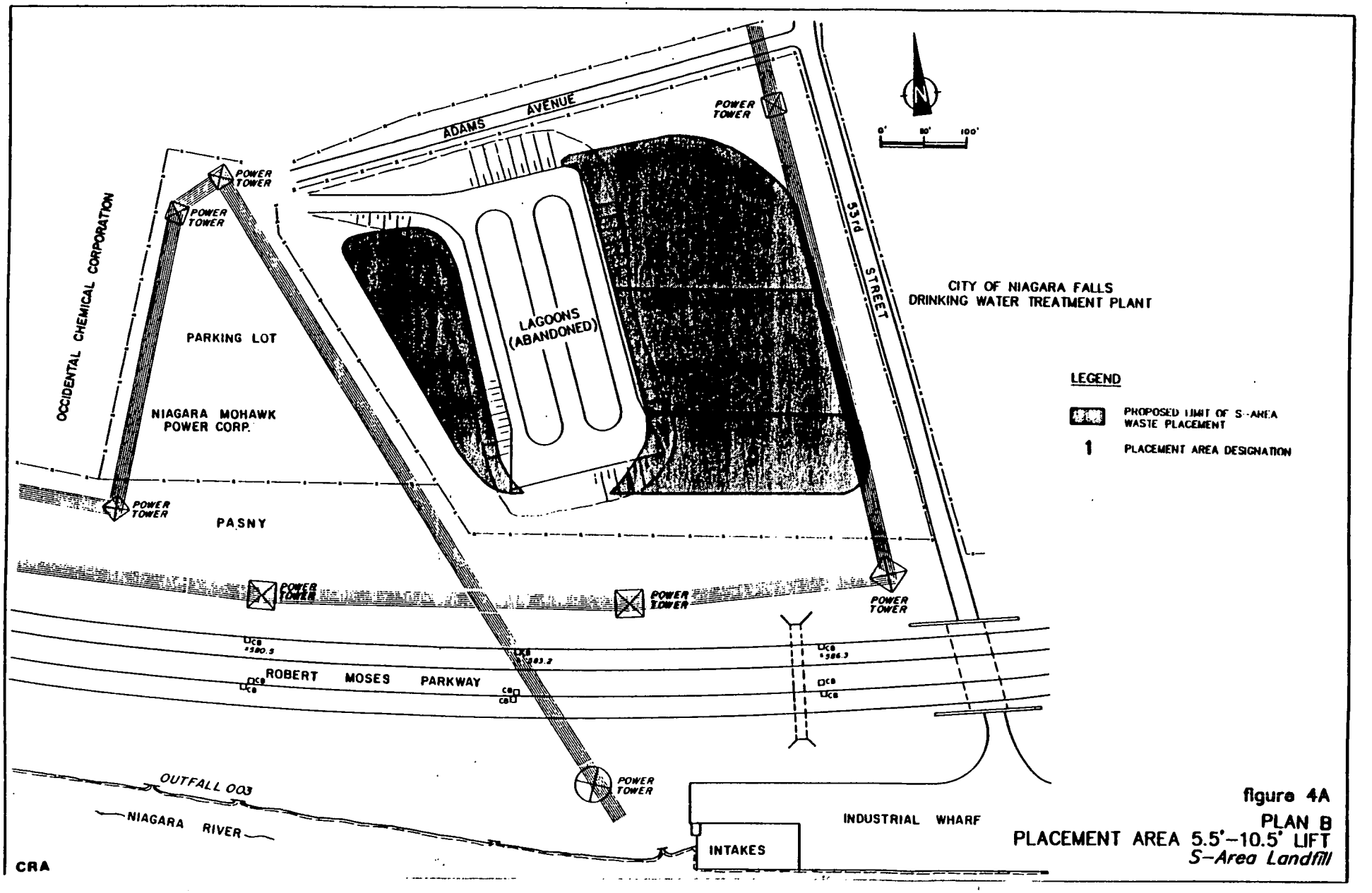


figure 4A
PLAN B
PLACEMENT AREA 5.5'–10.5' LIFT
S–Area Landfill

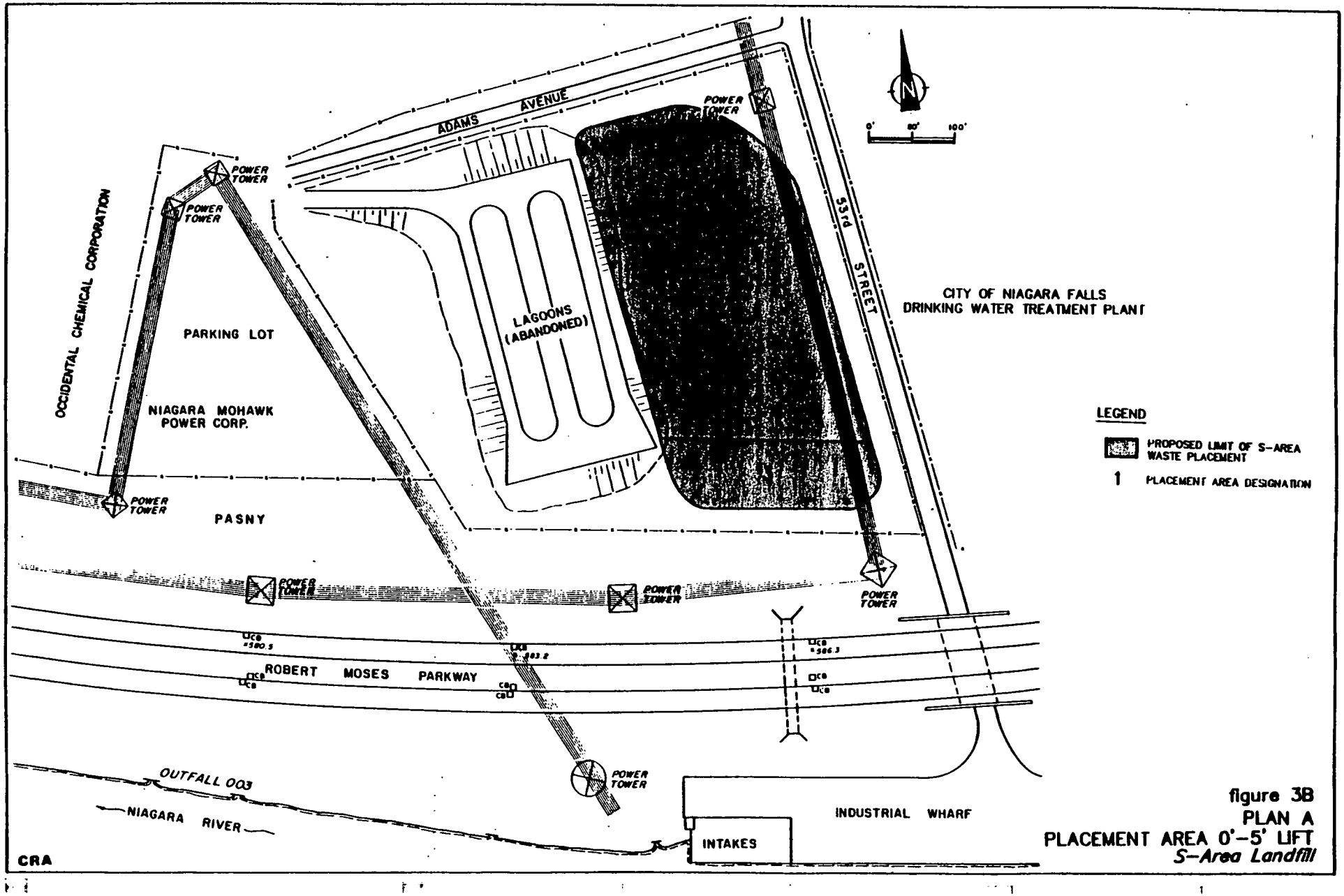


figure 3B
PLAN A
PLACEMENT AREA 0'-5' LIFT
S-Area Landfill

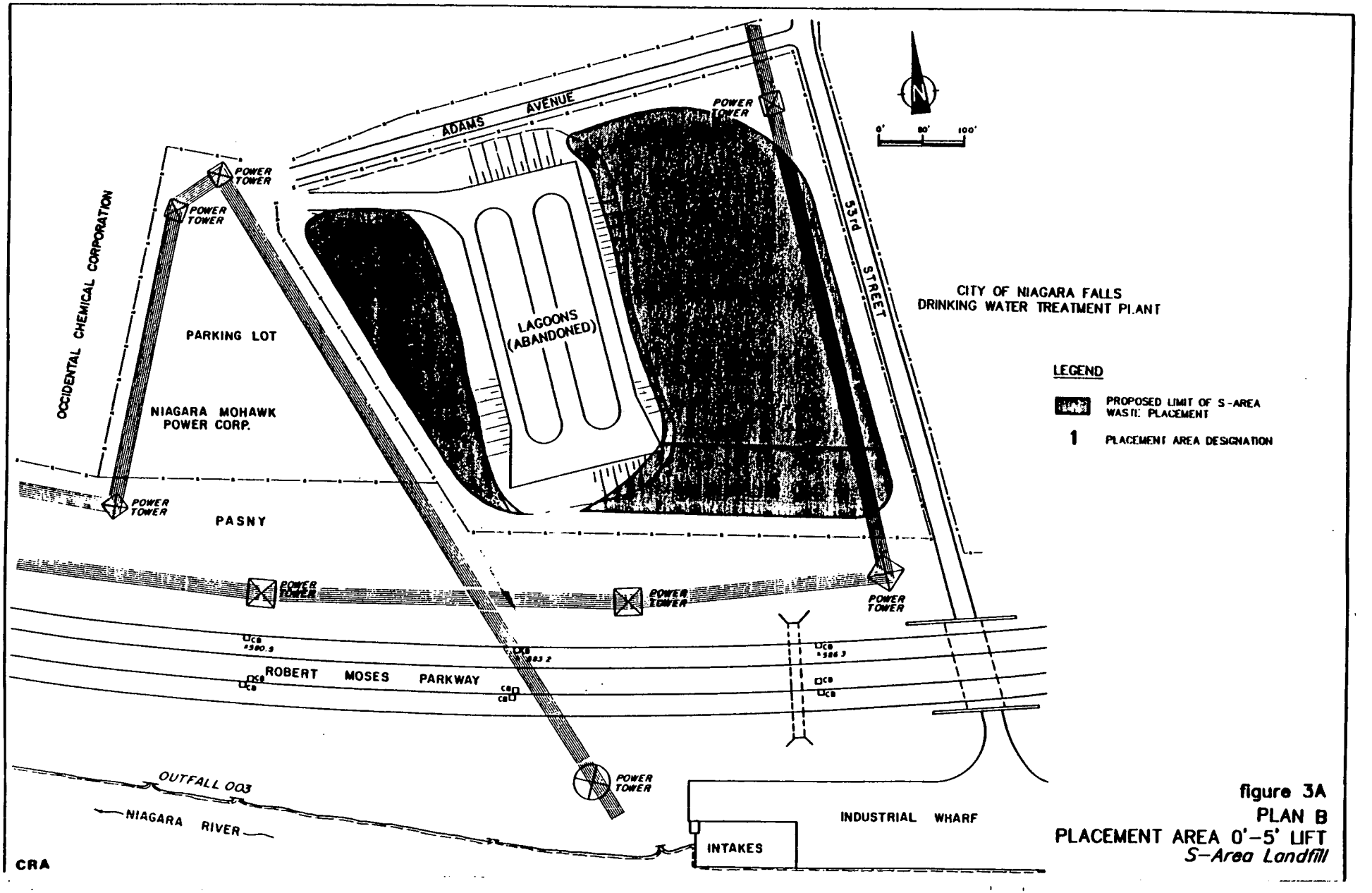


figure 3A
PLAN B
PLACEMENT AREA 0'-5' LIFT
S-Area Landfill

to minimize erosion and still provides a reasonable slope which facilitates maintenance of the final cap. The actual final Landfill slope and area will vary to accommodate the actual waste volume requiring placement. A minimum three percent slope has been used for the top surface of the landfill.

Based upon the S-Area Remedial Program Schedule and the estimate of waste volume to be generated, a general plan has been prepared identifying where the wastes from each phase of the S-Area Remedial Program will be placed. The preliminary disposal area locations for Plan B waste staging are presented in Figures 3A through 7A for the five successive lifts of waste planned for placement. Figures 3B through 5B illustrate the waste staging for Plan A indicating three successive lifts of waste. Based on the fact that the waste volumes expected are only estimates, it is understood that actual disposal volumes and conditions will change and, therefore, it will be necessary to periodically update the estimated volumes shown in Tables 4A and 4B and to account for the differences encountered.

Based on a cap with 20 percent grade and the generation volumes of Table 4, preliminary final grading plan for the Landfill Site have been developed for both plans and are presented in Figure 8A and 8B. These grading plans will accommodate a 5-foot cap over the expected required capacity of 66,000 cubic yards (65,100 cubic yards bulk; 900 cubic yards drums) for Plan B and 33,700 cubic yard, (32,000 cubic yard, bulk; 900 cubic yards drums) for Plan A. The S-Area Remedial Program will be undertaken in a manner which minimizes solid waste generating activities so that the height of waste placement areas can be kept as low as possible.

TABLE 4B

SOLID WASTE VOLUMES AND WASTE STAGING PLAN (PLAN A - RELOCATED DWTP)

Disposal Area	*Remedial Construction Survey/Activity*		*Waste Volume* Bulk (cy)	Drums
Area 1	Northern Containment System Boreholes (1)		-	
	Water Treatment Plant Wells (1)		-	
	Chemical Monitoring Wells (1)		-	
	Tracer Monitoring Wells (1)		-	
	S-Area Bedrock/Overburden Study Wells (1)		-	
	S-Area Barrier Well Investigation (1)		-	
	Bedding Study (1)		-	1,548
	Monitoring Program-Bedrock Wells		-	300
	48" Intake Line Survey			11
	Clay Trench Investigation			10
	DWTP Rehabilitation Wastes		1,000	-
	Trench:		2,500	
	Underground Utilities relocation			
	Severence of Underground Utilities			50
	at Barrier Wall		12,900	-
	S-Area Barrier Wall Construction	Area 1 Totals	15,400	1,898
			10,500	-
Area 2	S-Area Collection System	Area 2 Totals	10,500	-
Area 3	Lagoon Cleaning		450	-
	Northern Area Capping (2)		1,125	-
		Area 3 Totals	1,575	-
Area 4	DWTP Collection System		2,500*	
	DWTP Capping		0	-
		Area 4 Totals	2,500	-
	* DWTP Coll. System - assume 1000' length, 4' wide, 14' depth average and 1.2 bulking factor = 2500 c.y.			
Area 5	S-Area Capping		1,800	-
		Area 5 Totals	1,800	-
		Combined Area Totals	32,800 cy	1,898 (or 900 c.y.)

Survey Waste from DWTP - Eastern Area (EPA Investigation) - estimated volume = 10 drums
Total available capacity at S-Area is 90,000 cubic yards.
Total remaining available capacity for additional S-Area wastes is 56,300 cubic yards.

Notes:

(1) Completed Activities, combined number of drums from these activities is 1548.

(2) Assuming clay cap for the whole area north of Adams Ave. (i.e. worst case)

TABLE 4A

SOLID WASTE VOLUMES AND WASTE STAGING PLAN (PLAN B - DWTP IN PLACE)

Disposal Area	*Remedial Construction Survey/Activity*		*Waste Volume Bulk (cy)*	*Drums*
Area 6	Water Treatment Plant Capping		12,300	-
	Water Treatment Plant Monitoring			60
		Area 6 Totals	12,300	60
Area 7	Concrete Liner Removal/Intake Tunnel		1,300	-
		Area 7 Totals	1,300	-
Area 8	S-Area Capping		2,200	-
		Area 8 Totals	2,200	-
		Combined Area Totals	65,100 cy	1,970 Drums (or 900 c.y.)

Survey Waste from DWTP - Eastern Area (EPA Investigation) - estimated volume = 10 drums
Total available capacity at S-Area is 90,000 cubic yards
Total remaining available capacity for additional S-Area wastes is 24,000 cubic yards.

Notes:

(1) Completed Activities, combined number of drums from these activities is 1548.
(2) Assuming clay cap for the whole area north of Adams Ave. (i.e. worst case)

TABLE 4A

SOLID WASTE VOLUMES AND WASTE STAGING PLAN (PLAN B - DWTP IN PLACE)

Disposal Area	*Remedial Construction Survey/Activity*		*Waste Volume Bulk (cy)*	*Drums*
Area 1	Northern Containment System			
	Boreholes (1)		-	
	Water Treatment Plant Wells (1)		-	
	Chemical Monitoring Wells (1)		-	
	Tracer Monitoring Wells (1)		-	
	S-Area Bedrock/Overburden Study Wells (1)		-	
	S-Area Barrier Well Investigation (1)		-	
	Bedding Study (1)		-	1,548
	Monitoring Program-Bedrock Wells		-	300
	48" Intake Line Survey			11
	Clay Trench Investigation			10
	DWTP Test Pits		8,100	
	DWTP Rehabilitation Wastes		1,000	-
		Area 1 Totals	9,100	1,869
Area 2	Trench:			
	Underground Utilities relocation		2,500	
	Severence of Underground Utilities at Barrier Wall			50
	S-Area Barrier Wall Construction		12,900	-
		Area 2 Totals	15,400	50
Area 3	S-Area Collection System		10,500	-
		Area 3 Totals	10,500	-
Area 4	Lagoon Cleaning		450	-
	Replace 42" High Service Discharge Lines		100	-
	Access Shaft		825	-
	Northern Area Capping (2)		1,125	-
	Collection System Pump Station		3,300	-
		Area 4 Totals	5,800	-
Area 5	Optional Collection Systems			
	1) Filtration Plant "A"		1,600	
	2) Filtration Plant "B"		1,400	
	3) Filtered Water Reservoir		5,500	-
		Area 5 Totals	8,500	-

POOR QUALITY ORIGINAL

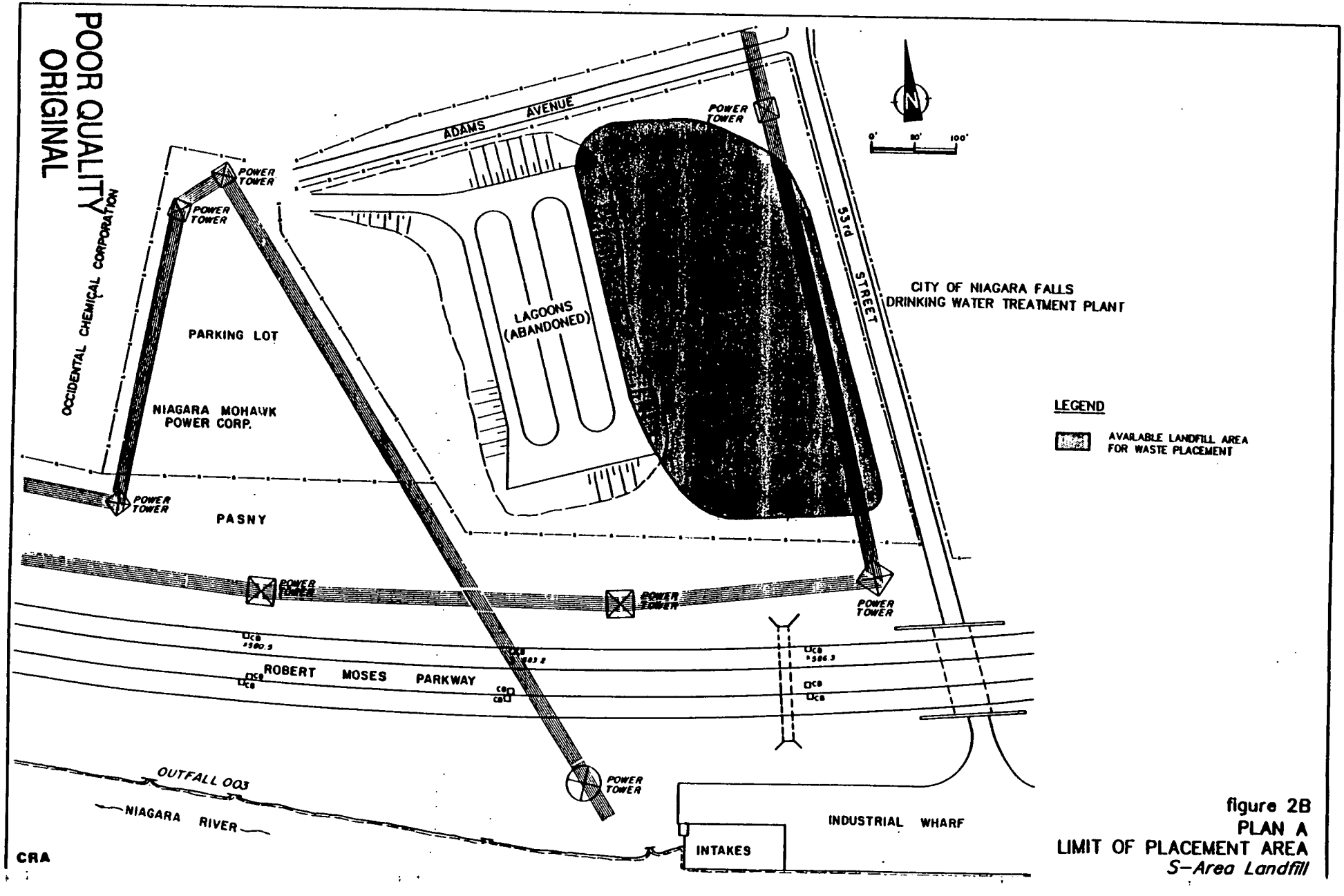


figure 2B
PLAN A
LIMIT OF PLACEMENT AREA
S-Area Landfill

POOR QUALITY ORIGINAL

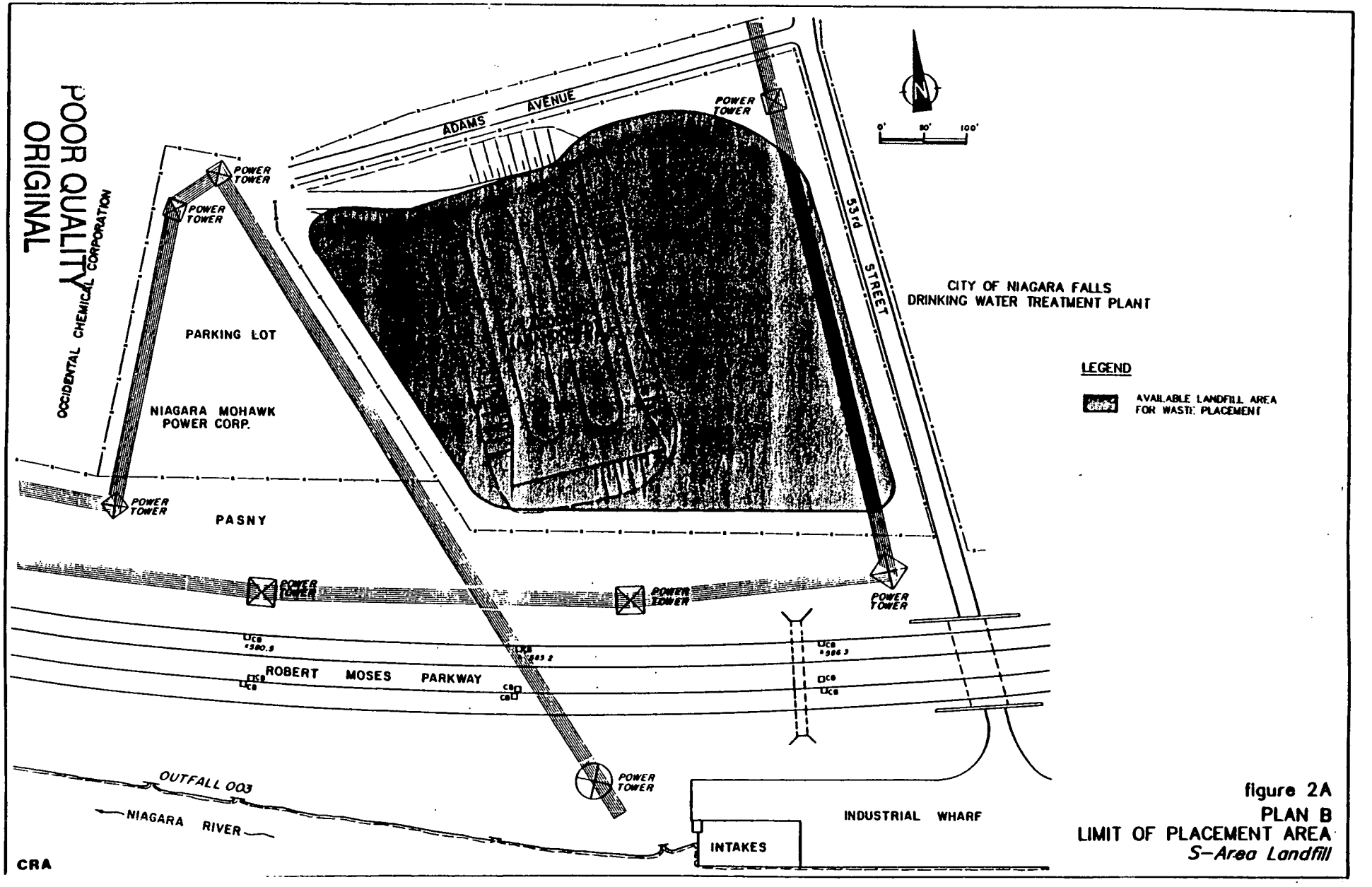


figure 2A
PLAN B
LIMIT OF PLACEMENT AREA
S-Area Landfill

CRA

5.0 SITE PLACEMENT

5.1 SOLID WASTE DISPOSAL AREA

Solid and Semi-Solid Waste materials will be placed within the area defined by the Site Barrier Wall at the Landfill Site. For the purposes of this plan, OCC intends to use only those areas historically utilized for S-Area waste disposal.

Because the existing lagoon at the landfill will be taken out of service, this area can be available for waste placement disposal for Plan B, the areal extent of the proposed Site placement area is presented in Figure 2A. Figure 2B indicates that the areal extent of the proposed Site placement area for Plan A has been restricted to the east side of the lagoons as a smaller volume of waste is available for disposal. Table 4A and 4B present a sequential plan for waste placement in various areas and the anticipated volumes depending upon whether the DWTP is left in place (Table 4A) or relocated (Table 4B).

All waste will be placed in lifts of up to approximately five feet in height in accordance with the final grading plan. During the first lift, some areas may be in excess of five feet thick to account for present topographic irregularities. Waste cells will be stacked on top of each other to accommodate waste placement and to match the final grading plan. The final grading plan is based on assumed final side slopes of approximately 20 percent although a final slope of up to 25 percent is acceptable. A final slope of 20 to 25 percent is stable, provides good surface water drainage, can be controlled

Judgment. Discharge to a permitted outfall at the Buffalo Avenue Plant will require OCC to obtain permit authorization for such discharge. OCC shall use its best efforts to obtain all permits, approvals or authorizations for discharge by the scheduled start of remedial systems operation that will require APL Treatment.

4.4.7 Containment Dike

The design of the S-Area APL/NAPL storage facility will include a concrete containment dike to be constructed surrounding an area sufficient to permit the construction of 6 tanks of 158,000 gallons each. This containment dike will have a capacity of at least 110 percent of the capacity of the largest tank plus allowances for rainwater. The floor of the containment area will be sloped to direct spills, leaks, and rainwater to a sump from which it will be pumped back to a storage tank for subsequent treatment.

for installation of APCE equipment on OCC's Liquid Incinerator, for permitting OCC's Solids Incinerator to incinerate liquid waste and for other incineration, treatment and storage alternatives, if required.

c) APL Treatment

Initially, all APL collected from the sources described in Section 2.2 will be trailered or piped directly to OCC's existing Niagara Plant Carbon Treatment facility following the separation of NAPL in the decanters at the S-Area APL/NAPL Storage Facility. Once the rates of APL collection are better defined following Phase I remedial activities, OCC plans to construct a Carbon Treatment facility adjacent to the existing Carbon Treatment facility. It is presently anticipated that this new treatment facility will be capable of handling approximately 300 gpm. This facility will also be designed with an allowance for expansion capacity in the event the actual APL treatment requirements are higher than anticipated. The new treatment facility will use two stages of carbon adsorption to remove organic compounds from the APL.

The carbon from the first stage (sacrificial bed) will be containerized and stored in permitted facilities at the Niagara Plant pending incineration in the OCC Solids Incinerator. The spent carbon from the second stage adsorbers will be returned to the carbon vendor for regeneration.

Effluent from both carbon treatment facilities will be discharged to the City of Niagara Falls POTW or to a permitted outfall at the OCC Buffalo Avenue Plant. Discharge to the City's POTW shall be subject to the requirements of subparagraph G(1) and (2) of Addendum I of the

OCC's activities to obtain governmental authorizations to incinerate NAPL generated by activities under the Judgment at the OCC Liquids Incinerator and the OCC Solids Incinerator will include the following:

(i) OCC will collect samples of NAPL from the Landfill Site from two existing bedrock wells and two existing overburden wells selected in consultation with EPA/State. A total of 100-200 gallons will be collected. The sample from each well location will be analyzed for heavy metals, ash, and BTU value. OCC will submit a report describing the results of the sampling and analysis to EPA/State in accordance with Schedule A of the Remedial Waste Treatment Milestone Schedule (RWTMS). Within 60 days following such submission, the Program Coordinators or their designees will meet to discuss the report.

(ii) Pursuant to the Supplementary Approval Procedures described in paragraph 4(b), Section B, Attachment F-2, of OCC's Liquids Incinerator permit, OCC will submit to EPA/DEC a plan to collect a representative sample of NAPL from the Landfill Site ("NAPL Collection Plan") for characterization in accordance with permitting requirements. The Plan will include a description of collection procedures and a schedule for completing sample collection and analysis. OCC will submit the plan in accordance with Schedule A of the RWTMS and will implement the Plan following approval by EPA/DEC permitting authorities in accordance with the schedule set forth in the approved plan.

(iii) In addition to these activities, OCC will pursue governmental approvals as described in Paragraph 20 of the RRT Stipulation and in the RWTMS

Treatment Facility. Following completion of the Phase I activities per Section 4.3 of Appendix I, OCC will estimate whether the installed APL storage tanks provide sufficient capacity for APL volumes expected to be collected during one day's normal operations of remedial programs installed under the Judgment and if one day storage is sufficient or necessary for operational needs. Within 30 days following completion of Phase I activities, OCC will submit a report to EPA/State describing the results of the estimate. If that estimate concludes that the installed APL tanks do not provide sufficient storage capacity, OCC shall promptly install additional tanks to provide such storage capacity.

The facility has been designed and will be authorized to accommodate a maximum of six storage tanks. In no event will OCC be required to install more than six tanks at the S-Area APL/NAPL Storage Facility except as provided in Paragraph 20(d) or 20(e) of the Stipulation.

b) NAPL Treatment

NAPL collected from sources described in Section 2.2 and from the investigation activities described in Section 4.0, Appendix I will be treated at a facility which satisfies all applicable regulatory and permitting requirements. As described in the RRT Stipulation, the OCC Liquids Incinerator and the OCC Solids Incinerator, either singly or in combination, are the preferred facilities for the treatment of NAPL generated during activities under the Judgment.

4.4.6 APL/NAPL Storage and Treatment

a) APL/NAPL Storage

APL and NAPL collected from the sources described in Section 2.2 and from the investigation activities described in Section 4.0, Appendix I will be temporarily stored in tanks pending APL treatment or NAPL incineration. The S-Area APL/NAPL Storage Facility will be located north of Adams Avenue, west of 53rd Street (see Plan 1). Each tank at the facility will be approximately 30 feet in diameter and 32 feet high, with a capacity of approximately 158,000 gallons.

Initially, one NAPL storage tank will be installed at the facility to meet the anticipated operational needs of the thermal treatment facility that is authorized or expected to be authorized for the S-Area NAPL. Within 30 days following the completion of the Phase I activities per Section 4.3 of Appendix I, OCC will estimate the monthly NAPL volumes expected to be generated by normal remedial system operations under the Judgment and will submit a report to EPA/State describing the results of its estimate. If that estimate indicates that three months of NAPL generation will exceed the capacity of the installed NAPL storage tank, OCC will also include in its submissions an assessment whether the installation of additional NAPL capacity is required to meet the operational needs of the NAPL thermal treatment facility.

Initially, two APL storage tanks will be installed at the facility to meet the anticipated operational needs of the Niagara Plant APL

Dimensions and capacity of the decanters are as follows:

Decanter dimensions:	8 feet diameter
	32 feet high
Decanter Capacity:	11,200 gal

A total of five decanters for the separation of NAPL from the recovered APL/NAPL will be used.

Two decanters to process all of the APL/NAPL from the overburden (purge wells and collection systems) will be used. The flow from the overburden purge wells (6 gpm) into a single decanter creates a detention time of 1,900 minutes. The flow from the combined landfill site (6 gpm) and Pump Station (22 gpm) Collection Systems into a single decanter creates a detention time of 400 minutes. If the DWTP is relocated the Pump Station Collection System would not be constructed. However, a drain tile collection system would be constructed at the DWTP. Flow rates will be determined after finalization of the reduced system location.

Flow from the bedrock purge wells, which is estimated to be 270 gal/min., will be directed to three decanters. The use of three decanters will result in an average detention time of 120 minutes.

Handling Facility. As such, the decanter size, decanting times, and storage volumes are consistent with the Hyde Park system.

The NAPL (having a Specific Gravity of 1.6) will settle to the bottom of the decanter while the APL (Specific Gravity = 1.0) will remain above the NAPL. NAPL will then be drawn off from the bottom of the tank and APL can be removed from the top of the tank.

A small proportion of the NAPL may be lighter than water and will float on top of the APL. The conceptual design of the decanters provides for a number of pipe outlets situated at varying heights. Lighter-than-water NAPL will be removed from the decanter periodically using these outlets by reducing the fluid volume in the decanter to a level below a selected pipe outlet. A small increase in the fluid volume will then allow the light NAPL to flow out of the selected outlet and it can then be piped to the NAPL storage tank.

The required settling time is dependent on the physical characteristics of the liquids being separated. The rate of settling is more rapid for larger droplet sizes, large density difference between phases, and low viscosity of the continuous phase (APL).

The volume of the decanter vessel is selected to provide a detention time sufficient to allow adequate separation of the two phases.

Detention time is calculated from the relation:
Holding time = decanter vol./flow rate.

4.4.3 Chemical Composition

Chemical analyses of samples from overburden and bedrock survey wells are compiled in the reports entitled "Information Summary Report, Volume II, Appendix 6 - Analytical Results, S-Area Remedial Program" and "NAPL in Bedrock Beneath the Niagara River, Assessment of Human Endangerment, S-Area Remedial Program".

4.4.4 Piping of APL/NAPL to Storage Facility

Efficient separation of NAPL from the collected APL/NAPL and treatment of APL must take into consideration the differences in the APL/NAPL characteristics from each area (volume fraction and chemical composition). For this reason, APL/NAPL from the overburden collection systems, overburden purge wells, and bedrock purge wells will be piped separately to the S-Area APL/NAPL Storage Facility.

4.4.5 APL/NAPL Separation

Separation Method

NAPL will be separated from the recovered APL/NAPL using gravity separation (decanting). It should be noted that the conceptual design of separation methods for this plan are based on the separation methods incorporated in the design of the Hyde Park Leachate Storage and

The water from construction dewatering activities will be pumped through a filtration unit such as a sand filter to remove suspended material. Thereafter, the water will be trailered or piped to the S-Area Storage Facility and carbon treated at an OCC Facility and discharged in accordance with all applicable laws and regulations at the OCC Niagara Plant. Solid or semi-solid sediment will be collected, solidified and placed in sealed units and placed in the landfill site as described in Section 4.1.

Chart 2 presents the flow diagram for handling liquid wastes.

4.4.2 Physical Characteristics of APL/NAPL

Specific Gravity of NAPL

Based on the results of physical testing completed on a number of S-Area bedrock samples of NAPL, the specific gravity of NAPL was determined to be approximately 1.6.

Viscosity of NAPL

Based on the results of physical testing completed on a number of S-Area bedrock samples of NAPL, the viscosity of NAPL was determined to be approximately 0.000118 lb sec/ft^2 (5.6 centipoise).

The design of the separation decanters, storage tanks, and ancillary equipment for S-Area APL/NAPL will be based on the design of the Hyde Park Leachate Storage and Handling Facility, including the requirements of detention times for APL/NAPL separation. The design capacity of the storage facility is discussed in Section 4.4.6 and 4.4.7.

4.4.1 Tunnel Water/Construction Water

In order to perform the visual inspection of the Emerald Channel Intake Tunnel, it will be necessary to dewater the tunnel and maintain it in a dewatered state for the duration of the inspection. It is anticipated that approximately two days will be required to complete the inspection. This activity will not be undertaken if a new DWTP is constructed.

It is estimated that the initial volume of water in the tunnel is 860,000 gallons. This water will be discharged to the sanitary sewer at the DWTP for treatment at the City of Niagara Falls POTW. Once this volume of water has been discharged, pumping will continue to keep the tunnel dewatered. It is presently anticipated that a pumping rate of 70 gpm will be required to accomplish this. The pumping of water beyond the initial 860,000 gallons will be handled in the same manner as construction dewatering activities as described in the next paragraph.

treatment of the APL. This storage facility will be located north of Adams Avenue, west of 53rd Street (see Plan 1).

This section discusses the conceptual design of the S-Area APL/NAPL Storage Facility. This conceptual design addresses the requirements of the APL/NAPL Storage Facility regarding:

1) expected volumes of APL/NAPL to be pumped from the overburden collection systems, the overburden purge wells and the bedrock purge wells, as discussed in Section 3.2.1 and 3.2.2;

2) estimated volume of NAPL to be recovered, as discussed in Section 3.2.2;

3) physical properties of the APL/NAPL as they relate to separation of NAPL;

4) temporary storage of the APL/NAPL; and

5) treatment of the APL at the Niagara Plant APL Treatment Facility and incineration of the NAPL at the Niagara Plant Liquid Incinerator.

The S-Area RRT Program provides for pumping and collection of APL/NAPL from the overburden and bedrock. This APL/NAPL will be transported from their source to the APL/NAPL Storage Facility, NAPL and APL will be separated, and the NAPL and APL will be stored prior to incineration or treatment, respectively.

spread over semi-solid wastes to promote stabilization. The use of absorbent material will be at the direction of OCC's Representative in the field. Materials which do not stabilize will be reworked until suitable stabilization has been achieved. Where appropriate, the paint filter test methodology (Method 9095 as described in EPA Publication SW846) will be used to determine stability of semi-solid wastes. In cases where OCC and EPA/State's Field Representatives do not agree as to when stabilization has occurred, a paint filter test shall be conducted to confirm the degree of stabilization that has been achieved.

Absorbent materials to be used for stabilization purposes may include flyash, portland cement and "speedi-dry" type materials. OCC's Field Representative will select the absorbent to be used in each case and will inform the EPA/State Field Representative of the selection. Should a material other than one of the above be selected, concurrence with the EPA/State Field Representative will be obtained prior to use.

4.4 LIQUID WASTE

Due to the anticipated volume of S-Area liquid wastes to be handled, it will be necessary to construct a permanent storage facility within the AOC. The proposed S-Area APL/NAPL Storage Facility will be designed to be consistent with all applicable regulations and will include decanters for the separation of NAPL from the APL and tanks for the temporary storage of all the liquids prior to incineration of the NAPL and

implemented. If the changes implemented do not resolve the handling problems, the use of fiber drums will be discontinued.

4.2 BULK SOLID WASTES

All bulk solid waste will be transferred from its area of generation or storage to the waste placement area on the Landfill Site. The wastes will be placed into the daily spoils cell and covered in accordance with the specified operating procedures in Section 5.0. All loading and unloading of waste from trucks will be done per Section 5.3 and Safety Operating Procedure S#6 (see Appendix A).

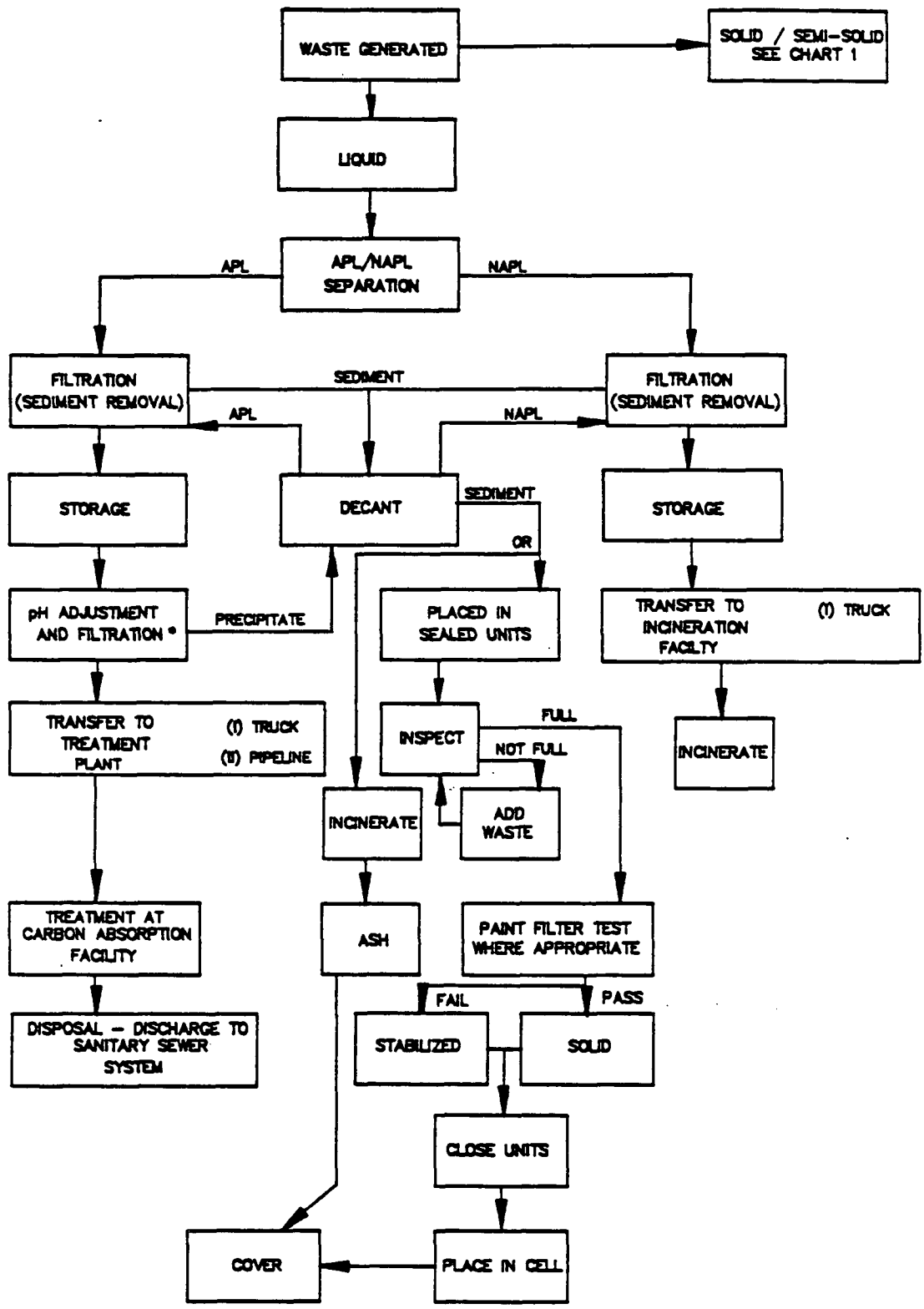
4.3 SEMI-SOLID WASTES

Semi-solid wastes described in Section 2.1 will be placed directly into a selected area of the active waste disposal cell and allowed to decant. The area chosen for semi-solid decanting will be field selected by the OCC Field Representative in concurrence with the EPA/State Field Representative. Factors such as weather conditions, volume of semi-solid waste, amount of observed decanting occurring and other relevant information shall be taken into consideration in this matter. Any collectable liquid will be pumped out to a trailer or stored within the AOC on a daily basis. Once suitably decanted, the material shall be capped in place (or consolidated as appropriate) and the waste cell closed in accordance with the specified operating procedures. If necessary, an absorbent material will be

generated drummed waste to insure that drums contain no greater than five percent void space. Any identified unfilled drums shall be topped up with waste material. In the case of sludge wastes to be drummed, the OCC Field Representative shall perform a paint filter test for free liquids (Method #9095 as described in EPA Publication SW846). The test shall be performed once for every ten drums of each sludge-type waste or more often at the discretion of the OCC and EPA/State Field Representatives. Material failing the test shall have absorbent material added in sufficient amounts and mixed to achieve stabilization.

Any drum placement at the Landfill Site will be upright, side by side and covered so that material enters the voids between them. The drums may be double stacked. As an alternative to steel drums, OCC may, at its option and with the EPA/State Field Representative's concurrence, use fiber drums for non-saturated waste materials or DOT-approved fiber waste containers. These substitute containers would be placed in the cell in the same manner as the drums. The use of fiber drums will be restricted to materials which are compatible (based on moisture conditions, size, chemical reactivity and corrosivity and shape) with the specific containers proposed for use.

The use of fiber drums is further restricted to cases where the drums will be placed either directly into a waste cell for placement at the end of each working day or stored in the drum storage area for no longer than one work day unless suitably covered with polyethylene. If fiber drums exhibit handling problems, changes in the handling procedures will be



* REMOVAL OF PRECIPITATE, IF ANY, DUE TO pH ADJUSTMENT

chart 2

BASIC WASTE MANAGEMENT STEPS – LIQUID

S-AREA WASTE MANAGEMENT PLAN

S-Area Landfill

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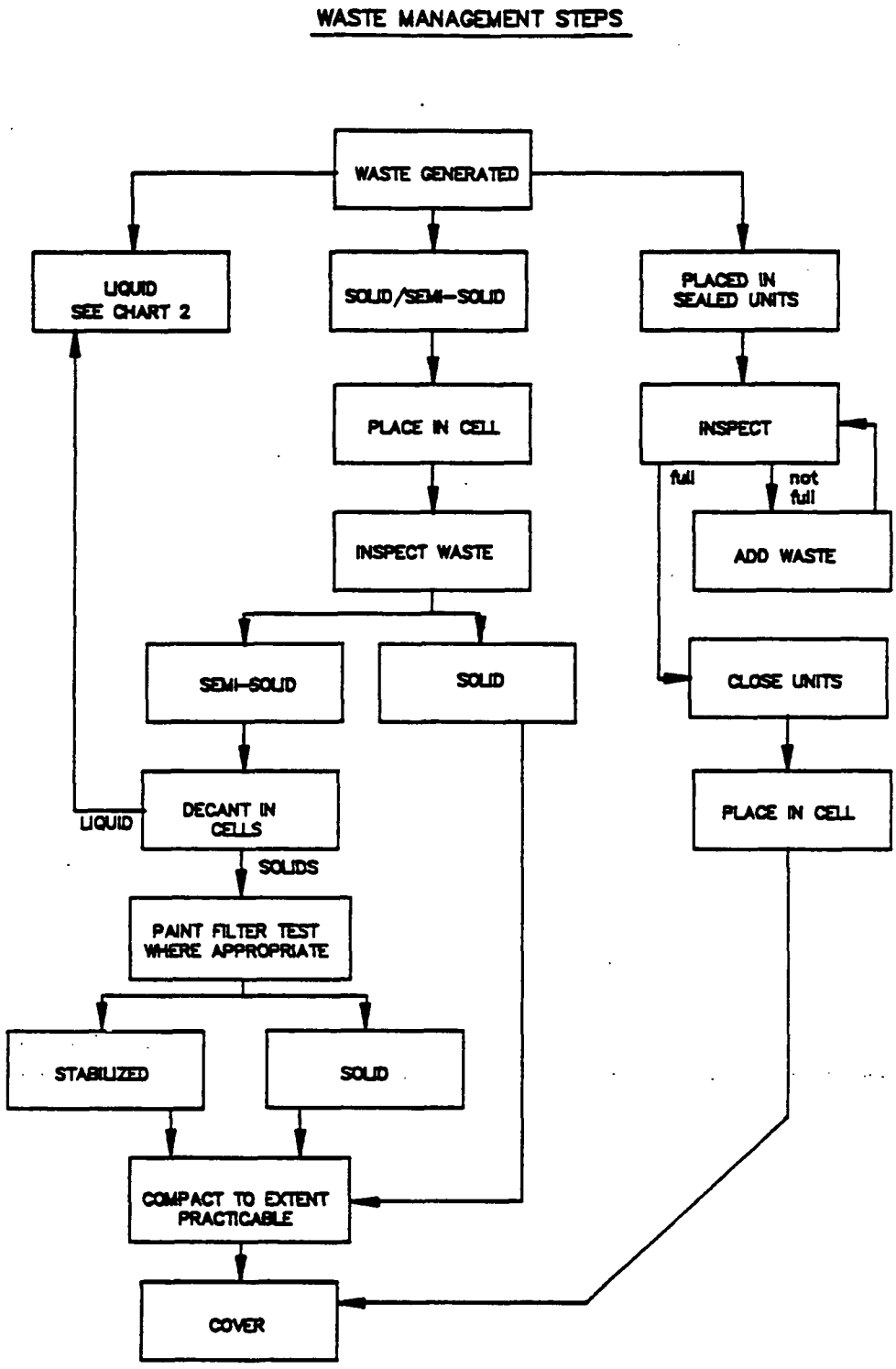


chart 1

BASIC WASTE MANAGEMENT STEPS
SOLIDS / SEMI-SOLIDS
S-AREA WASTE MANAGEMENT PLAN
S-Area Landfill

CRA

1769-24/11/87-68-0 (C-1)

4.0 WASTE MATERIAL STORAGE & HANDLING

The basic steps describing waste material handling are presented in Charts 1 and 2.

4.1 DRUMMED SOLID WASTES

Drummed solid waste materials described in Section 2.1 will be placed in a staging area in the active waste disposal cell in the S-Area. This staging area will be field selected by the OCC Field Representative subject to concurrence with the EPA/State Field Representative. As drums are accumulated in the staging area, the inventory of drums will be regularly reviewed. The decision to remove the drums from the staging area to the operating disposal face within the disposal area will be made by the OCC field representative in concurrence with EPA/State field representative. The drums will then be covered in accordance with the disposal protocols detailed later in this section. In the event that other remedial activities are taking place at the same time that drummed solid wastes are being generated, the drums may, at OCC's option, be disposed directly into the operating placement face in concurrence with the EPA/State field representative. The drums will be filled to the maximum extent practicable with waste. Empty drums disposed at the Landfill Site will be crushed prior to disposal.

As drummed wastes are generated or prior to site placement, the drums will be filled to contain less than five percent void space. The OCC Field Representative shall make daily inspections of

TABLE 3

NAPL VOLUME FLOW RATES

APL/NAPL Source System	*Estimated Start Date*	*APL/NAPL Flow Rate (gpm)*	*% NAPL*	*NAPL Flow Rate (gpm)*	*Total NAPL Volume/Time Period (gallons)*		*Note*
Overburden Collection System and Purge Wells	May 1993	12	1	0.12	5,200	-	First 30 Days
			0.1	0.01	--	-	After 30 Days
Pump Station(1) Collection System	March 1993	22	0	0	0		
Bedrock Purge Wells	June, 1995	270	8	21.6	31,100	-	First Day
		270	4	10.8	15,550	-	Second Day
		270	0.4	1.1	1,584	-	Third Day and thereafter
					(91,000)	-	First 30 Days

Note:

(1) If the DWTP is relocated, the Pump Station Collection System would be eliminated and a smaller collection system will be implemented in its place.

TABLE 2

NAPL GENERATION RATES

Description	*Estimated Duration*	*Incremental Rate (gpm)*	*NAPL Volume (gallons)*
Overburden Collection System and Purge Wells (0.12)(1) (During Initial Startup Period) and Pump Tests on 11 Bedrock Purge Wells (0.2) (2)	1 month (1993)	0.32	13,820
Overburden Collection System and Purge Wells (0.01) (3) + Pump Test on 11 BR Purge Wells (0.2) (4)	4 months (1993)	0.21	40,820
Overburden Collection System and Purge Wells (Estimated Long Term NAPL Collection Rate)	Continuous in 1993	0.01 (3)	Continuous
Pump Test on 2 Bedrock Wells	2 Weeks (1992)	1.71 (5)	17,240
Pump Test on 6 Bedrock Wells	One Month (1992)	2.4 (6)	72,580
Prototype Bedrock Purge Well System (During initial Startup Period)	One Month (1993)	2.1 (7)	90,720
Prototype Bedrock Purge Well System (Estimated Long Term NAPL Collection Rate)	Continuous (1993)	1.1 (8)	Continuous

Notes:

(1) 1% of OBCS flow (see Table 3) for first 30 days

(2) Test 11 wells for 5 days each at 5 gpm. Allow week for recovery between tests

therefore, $Q = 5 \text{ gpm} \times \frac{5 \times 11}{7 \times 22} = 1.79 \text{ gpm}$

Assume 10% NAPL $= 0.2 \text{ gpm}$

(3) 0.1% of OBCS flow (see Table 3) after first 30 days

(4) See (2) above

(5) Test 2 wells for 24 hours each at 75 gpm. Allow one week to perform both tests

therefore, $Q = 75 \text{ gpm} \times \frac{2}{7} = 21.4 \text{ gpm}$

Assume 8% NAPL $= 1.71 \text{ gpm}$

(6) Test 6 wells for 24 hours each at 100 gpm. Allow three weeks to perform all tests.

therefore, $Q = 100 \text{ gpm} \times \frac{6}{21} = 28.6 \text{ gpm}$

Assume 8% NAPL $= 2.4 \text{ gpm}$

(7) 9 wells at 30 gpm each. Q = 270

NAPL = 270 x (1 x 0.08 + 1 x 0.04 + 28 x 0.004)/30 = 2.1 gpm (see Table 3)

(8) See Table 3 - Bedrock Purge Wells

the operation of the bedrock purge wells. A total of 9 wells are included in the initial design of the bedrock remediation system. Each well is planned to operate at 30 gpm. This is based on the experience gained at the Hyde Park Landfill where well yields of up to 20 gpm were measured. Since S-Area is expected to have more groundwater available for extraction than Hyde Park therefore a factor of 1.5 was applied to the 20 gpm. In addition, a pump test performed at 53rd Street identified well yields in excess of 100 gpm with considerable drawdown criteria. Pump tests will be conducted as a part of RRT Remedial Plans (see Appendix I, Section 4.3.2). Data collected from these tests will be used to determine appropriate pumping rates for each well. Based upon current information, an initial pumping rate of 270 gpm is reasonable.

3.2.2 NAPL Volume

This section addresses the volume of NAPL generated for future treatment from the S-Area Remedial Program.

The estimated NAPL volumes and rates generated for future incineration are summarized on Tables 2 and 3, respectively.

TABLE 1

APL VOLUME ESTIMATES

Source	*Flow Rate Range (GPD)*	*Estimated APL Volume (gallons)*	*APL Flow Rate (gpm) (with DWTP)*
A. Construction Water			
1) Test excavations(1)	1,370-8,410	51,700	
Waste Cell runoff	1,340	14,700	
Equipment decontamination	200	2,200	
	2,910-9,950	68,600	
2) Utility Relocations	0.0-40,600	590,900	
Waste Cell Runoff	1,340	104,500	
Equipment decontamination	200	11,800	
	1,540-42,140	717,200	
3) Slurry Walls	0.0	0.0	
DWTP Tile Collection System(1)	720-11,810	231,100	
S-Area Tile Collection System	2,960-13,100	471,200	
Waste Cell Runoff	1,340	332,300	
Equipment Cleaning	200	35,400	
	5,220-26,450	1,070,000	
4) Continued Dewatering of DWTP Tunnel (for inspection only of Emerald Channel Tunnel)(1)	100,800	201,600	
Total Construction Waste Water Quantity		= 2,057,400 Gallons	
Dewatering Activities			
5) Initial Dewatering of DWTP Tunnel(1)		860,000	
Total Dewatering Waste Water Quantity		= 860,000 Gallons	
C. S-Area Remedial System Operation			
6) i) Overburden collection system(2)		–	6
ii) Overburden purge wells (12 wells @ 0.5 gpm)		–	6
iii) Bedrock purge wells (9 wells @ 30 gpm)		–	270
iv) DWTP overburden collection systems(3)			
• Pump Station		–	22
• Optional Systems		–	not estimated
Total Operations Waste Water Quantity			= 304 Gallons/Minute

Notes:

1) These activities would be deleted if the DWTP is relocated.
2) APL flow rate is for scenario of completed Barrier Wall but no capping.
3) These activities would be reduced if the DWTP is relocated.

3.2 LIQUID WASTE VOLUME

Estimates have been made of the anticipated volumes of liquid waste to be generated by the S-Area Remedial Programs.

The APL and NAPL liquid volume estimates are individually calculated in the following sections.

3.2.1 APL Volume

APL generated by the S-Area Remedial Programs will be treated at the existing Niagara Plant Carbon Treatment Facility or an additional carbon facility to be built at the Niagara Plant. Effluent from the existing treatment facility will be discharged to the Niagara Falls POTW. The effluent from the new treatment facility will be evaluated to determine whether it will be discharged to the City of Niagara Falls POTW or a Niagara Plant permitted outfall as per Paragraph 4.4.6.

The estimated APL sources and volumes generated are presented on Table 1. The major portion of the APL waste generated is from

3.0 WASTE VOLUMES

3.1 SOLID WASTE VOLUME

Estimates have been made of the anticipated volumes of solid waste to be generated by the S-Area Remedial Programs. The estimated waste volume is as follows:

Plan A (new DWTP is constructed)

- 33,700 cubic yards of S-Area and DWTP Remedial Activity Wastes (32,800 c.y. bulk and 900 c.y. drums);

Plan B (DWTP remains in place)

- 66,000 cubic yards of S-Area and DWTP Remedial Activity Wastes (65,100 c.y. bulk and 900 c.y. drums);

The S-Area solid wastes generated during the investigation phases of the programs that have already been completed are currently stored in Building V-60. These wastes will be incinerated at OCC's proposed solid waste incinerator. Details of the CSF, its operation, remote site locations, and waste volume estimates are found in the following document:

In addition, as set forth in Section 5.6.2, ash residue from OCC's proposed thermal destruction unit at its Niagara Plant (OCC's Solids Incinerator), may be used as intermediate fill for the contouring and final capping. Any waste generated within the AOC that is removed from the AOC will not be returned to the Landfill Site unless such waste is treated pursuant to applicable regulations.

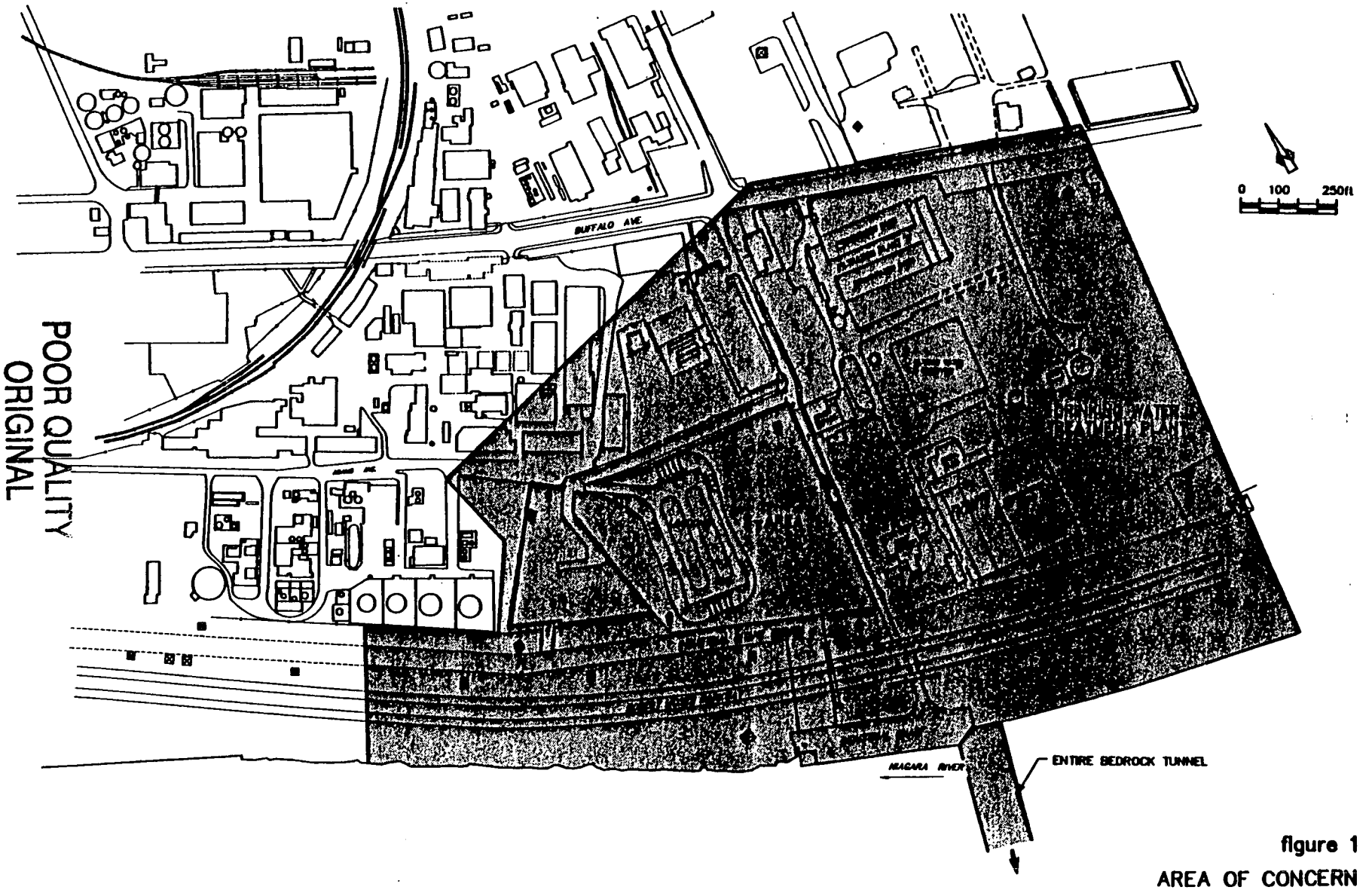
2.2 LIQUID WASTE

All APL and NAPL wastes from the S-Area Remedial Program activities will be separated and subsequently treated at OCC's facility at the Niagara Plant. The sources of APL and NAPL wastes will include the following:

1. Groundwater from dewatering activities during construction including APL and NAPL collected during S-Area Remedial Programs.

2. Cleaning liquids generated from washing operations, including solvents.

3. APL/NAPL recovered from S-Area Remedial Program operations, including overburden collection systems, overburden and bedrock purge wells and overburden and bedrock NAPL recovery wells.



POOR QUALITY ORIGINAL

figure 1

AREA OF CONCERN

S–Area Landfill

CRA

1769-10/07/89-68-1

2.0 WASTE SOURCES

2.1 SOLID WASTE

The following solid and semi-solid waste from the following sources (resulting from investigative and remedial activities) will be disposed of at the landfill site:

1. Solid and semi-solid waste from the S-Area Remedial Programs,

2. S-Area Survey wastes to be generated in the future and stored within the Area of Concern (AOC) at the Niagara Plant as shown on Figure 1,

3. Any waste related to the remediation activities on the eastern portion of the Drinking Water Treatment Plant (DWTP), and

4. Any waste generated from rehabilitation work at the DWTP which cannot be disposed at a sanitary landfill.

All solid and semi-solid waste managed by this section will be generated within the AOC as shown in Figure 1 and will remain within the AOC, until placement in the landfill. Because the AOC encompasses the area impacted by the migration of chemical residue from the S-Area Landfill, activities under this plan relating to solid waste placement may be considered "replacement" of material historically deposited at the landfill. All solid and semi-solid waste will be placed within the boundaries of the historic S-Area disposal area.

1.0 INTRODUCTION

This document describes the plan of Occidental Chemical Corporation (OCC) to manage waste materials generated during the S-Area Remedial Program (all investigation and remedial programs required under the S-Area Settlement Agreement, including court-approved modifications such as the RRT program) including remedial and rehabilitation work at the DWTP. These plans includes the handling, treatment and placement of solid, semi-solid, aqueous phase liquids (APL) , and non-aqueous phase liquids (NAPL) waste materials.

At the present time, either of two alternative remedial plans will be implemented at the City of Niagara Falls Drinking Water Treatment Plant (DWTP). One remedial plan will be essentially as described in the S-Area Settlement Agreement (Plan B) and the alternative plan will involve the construction of a new DWTP at a different location and closure of the existing plant (Plan A). In order to make this waste management plan as complete as possible, both plans are considered throughout the remainder of this report. Whenever wastes generated by the S-Area Remedial Program (solid, semi-solid, APL or NAPL) are referenced to in this document, these wastes are intended to include wastes from both the S-Area and the selected remedial plan for the DWTP.

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REMEDIAL WASTE MANAGEMENT PLAN

VOLUME II

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF NEW YORK

UNITED STATES OF AMERICA, THE STATE OF NEW YORK, Plaintiffs, v. OCCIDENTAL CHEMICAL CORPORATION and THE CITY OF NIAGARA FALLS, NEW YORK, Defendants.	Civil Action No. 79-988 (JTC) (S-Area Landfill)

STIPULATION ON
REQUISITE REMEDIAL TECHNOLOGY (RRT) PROGRAM

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COST REDUCTION SUMMARY
New WTP Transmission Pipelines
(August 1988 Dollars)

1. Porter Road Location:

48-inch Raw Water Pipeline	14,000 l.f.	$4,300,000
48-inch High Service Pipelines	5000 l.f.	1,500,000
20-inch Hich Service Pipeline	2000 l.f.	400,000
	Sub-Total:	$6,200,000
Engineering, Legal, Admin. (25%)		1,600,000
Contingency (10%)		600,000
	Total:	$8,400,000

2. Adjacent Buffalo Avenue Location

Raw Water Pipeline	500 l.f.	$ 150,000
High Service Pipelines	1500 l.f.	470,000
	Sub-Total:	$ 620,000
Engineering, Legal, Admin. (25%)		
Contingency (10%)		210,000
	Total:	$ 830,000

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

April 19, 1990

Mr. John R. Westendorf
Director of Water Facilities
City of Niagara Falls Water Treatment Plant
5317 Buffalo Avenue - P.O. Box 69
Niagara Falls, New York 14302-0069

Re: Costs for New Water Treatment Plant Transmission Pipelines

Dear Mr. Westendorf:

As you know, Malcolm Pirnie assisted the City's independent consultant in August 1988 by preparing a preliminary cost estimate for a new water treatment plant located on Porter Road. This cost estimate was conceptual in nature, as no detailed facility planning had been authorized, and the actual site had not been selected. The August 1988 estimate included $8,400,000 in new transmission pipelines, in addition to approximately $310,000 for re-routing existing pipelines along Buffalo Avenue.

In accordance with your request, we have attached a worksheet which documents the reduction in transmission pipeline costs associated with siting a new treatment plant adjacent to the existing facilities instead of at Porter Road. Essentially, the amended conceptual estimate of $830,000 (which was provided to the City in December 1988) assumed that only about 2000 linear feet of 48-inch diameter pipeline would be required for the adjacent location, instead of the <u>four miles</u> of pipe needed to service the Porter Road site. As before, the transmission pipeline costs do not include re-routing the existing Buffalo Avenue pipelines.

Please note that all of the above costs remain in August 1988 dollars, as requested, and include a "nominal" 25 percent surcharge for hazardous construction activities. Please feel free to contact us if you have any questions about this estimate.

Very truly yours,

MALCOLM PIRNIE, INC.

David B. Schendel, P.E.
Senior Project Engineer

enc.

c: E. Markus, Ernst Young
P. Werthman, Malcolm Pirnie
File: 0337-24-1, CE-1

0337-24-1

S. 3515 ABBOTT ROAD P.O. BOX 1938 BUFFALO, NY 14219 716-828-1300 FAX 716-828-0431

Demolition of the Existing Plant:	
Mid - 1988 Bid Estimate:	$1,800,000
Mid - 1994 Bid Estimate:	$2,412,000
Water Storage Facilities:	
Mid - 1988 Bid Estimate:	$3,800,000
Mid - 1994 Bid Estimate:	$5,092,000
Relocation of Offices:	
Mid - 1988 Bid Estimate:	$900,000
Mid - 1994 Bid Estimate:	$1,206,000
Transmission Mains (Buffalo Ave.):	
Mid - 1988 Bid Estimate:	$310,000
Mid - 1994 Bid Estimate:	$415,000

Total Construction Costs:

$6,000,000
52,009,000
2,412,000
5,092,000
1,206,000
415,000
$67,134,000

CITY OF NIAGARA FALLS
WATER TREATMENT FACILITIES
CONSTRUCTION COST UPDATE - 4/16/90

Raw Water Intake:

Mid - 1988 Bid Estimate by Malcolm Pirnie, Inc.:	$16,900,000

Treatment/Pumping:

Mid - 1988 Bid Estimate by MPI:	$30,500,000

New Transmission Lines - Buffalo Ave. Plant Site:

Mid - 1988 Bid Estimate by MPI:	$830,000

Total Costs for the Intake, Treatment/Pumping and Transmission Lines in Mid - 1988: $48,230,000

Using a 5% annual inflation factor for construction costs:

Mid - 1988 Bid Estimate:	$48,230,000
Mid - 1989 Bid Estimate:	$50,642,000
Mid - 1990 Bid Estimate:	$53,174,000
1990-1 Design & Related Expenses:	$6,000,000
Remaining Mid - 1990 Bid Estimate :	$47,174,000
Mid - 1991 Bid Estimate:	$49,532,000
Mid - 1992 Bid Estimate:	$52,009,000

Ernst & Young

787 Seventh Avenue
New York, New York 10019
Telephone: (212) 830-6000

April 17, 1990

Mr. John R. Westendorf
Director of Water Facilities
City of Niagara Falls Water Treatment Plant
Buffalo Avenue & 53rd Street
Niagara Falls, New York 14302

Dear Mr. Westendorf:

This letter is to confirm our recent telephone conversation relative to the updating of previous project cost estimates for the proposed new water treatment plant. The October 1988 report of Arthur Young & Company and Hazen & Sawyer, Inc. evaluated alternative water supply options for the City using preliminary construction cost estimates prepared by Malcolm Pirnie, Inc. Given the most recent City schedule for implementing the new plant and the time which has elapsed since the date of our report, you requested that the October 1988 cost estimates be updated.

The enclosed calculations have been prepared to update the previous construction costs to the expected project timetable of the City. As we understand, the design phase will occur from 1990 - 91, with construction to begin in mid-1992. The updated costs reflect the original estimates of Malcolm Pirnie, Inc. for each item of the proposed work, adjusted for an assumed 5% annual increase in construction costs due to inflation. In addition, the site for the new water plant used in our October 1988 report was on Porter Road, requiring substantial new transmission piping. The current proposed location for the new water plant is adjacent to the current plant along Buffalo Avenue, resulting in a significant savings in transmission main cost.

We are pleased to have the opportunity to assist the City in its efforts to implement the new water treatment facilities. Should you have any questions or comments, please do not hesitate to contact the undersigned at (212)-773-6365.

Very truly yours,

ERNST & YOUNG

By: Edward J. Markus (gh)
Edward J. Markus

costs associated with any real property acquired by the City to proceed with the new CWTP project and ancillary facilities. Investigation and remedial costs for any City wastes identified on the site acquired by the City shall not be included in project costs. Any design modifications to the new CWTP required by any state or federal agency shall be included in the project cost. Any EQBA reimbursement received by the City for investigation or remediation of wastes other than identified City wastes, if any, on this property shall be subtracted from the project cost to offset cost overruns.

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13493-6:D.C.

ATTACHMENT D

Project Cost
New City Water Treatment Plant
June 1990

The project cost for the new City Water Treatment Plant (CWTP) has been estimated based on preliminary engineering and water supply options studies performed for the City by Malcolm Pirnie Engineers, Inc., and by Ernst & Young. The attached letters dated April 17, 1990 (Ernst & Young) and April 19, 1990 (Malcolm Pirnie) predict that the new CWTP, assuming a mid-1992 construction start, will cost $67,134,000, which includes a 25% allowance for engineering, legal and administrative costs and a 10% contingency. Included in these costs are provisions for relocating the Meter Shop and Outside Maintenance Division facilities and offices. In addition to the above construction costs, the cost of site acquisition and associated investigations and remedial actions (if any) must be added to the project costs. Current estimates are as follows:

Site acquisition, investigations and remedial costs	$ 700,000
Construction costs from 04/17/90 Ernst & Young letter	67,100,000
Project Cost	**$67,800,000**

Investigation and remedial costs included in project costs shall be limited to those investigation and remedial

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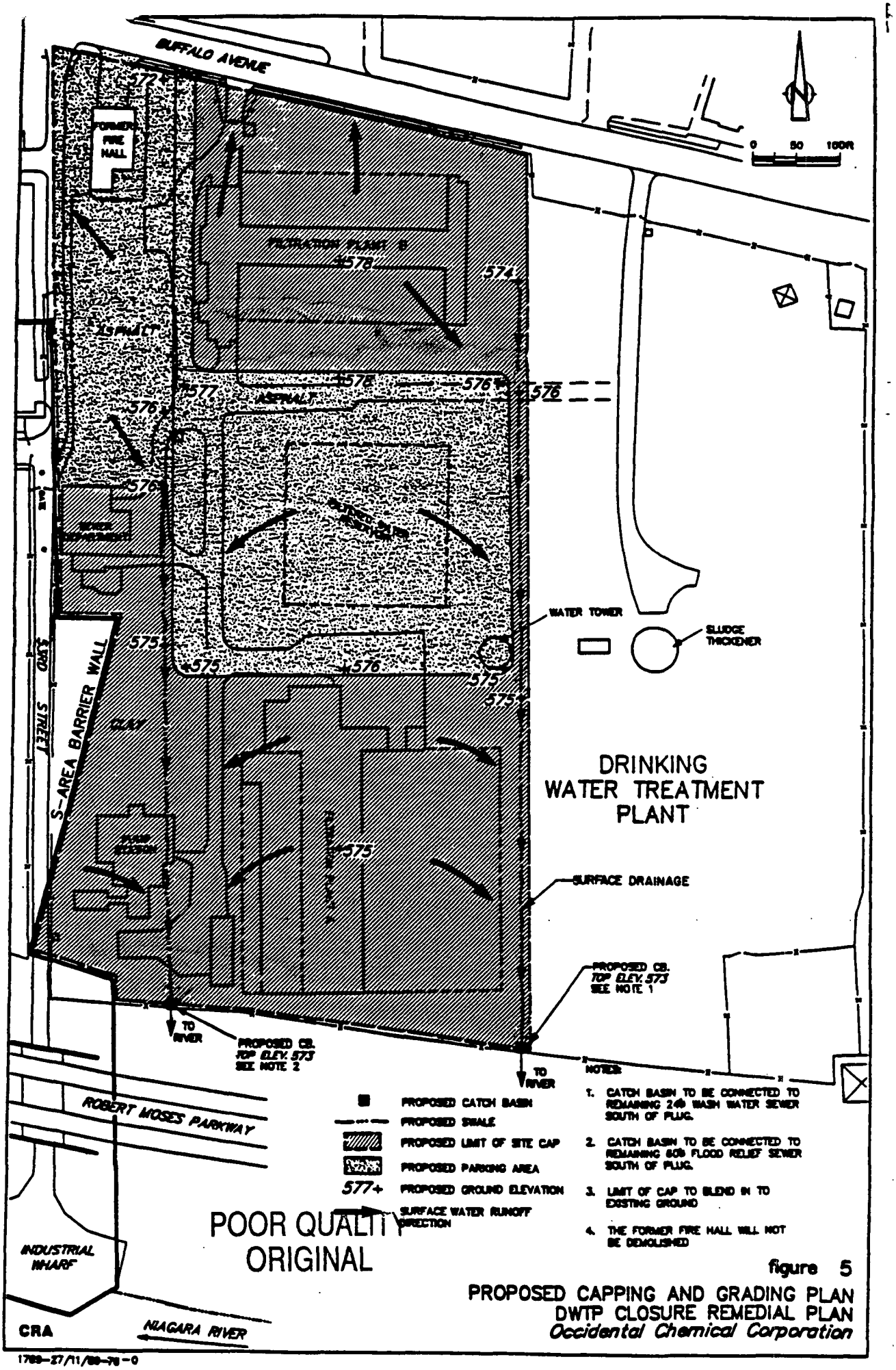
13493-6:D.C.

ATTACHMENT D

New CWTP Project Cost Estimate

A swale for controlling surface water runoff will be constructed to run parallel to the west side of the access road and will discharge into the existing 60-inch flood relief sewer south of the tile collection system located to the south of the pump station. On the east side of the parking lot, a swale will be located over the existing 24-inch wash water sewer and will discharge to the 24-inch wash water sewer south of the tile collection system.



POOR QUALITY ORIGINAL

figure 5

PROPOSED CAPPING AND GRADING PLAN
DWTP CLOSURE REMEDIAL PLAN
Occidental Chemical Corporation

1789-27/11/88-76-0

3.6 FINAL GRADING AND CAPPING PLAN

Prior to final grading it is estimated that additional fill materials will be required to bring the demolition areas up to grade. The storage capacity for demolition debris within the existing reservoirs and sedimentation basins is approximately 47,000 cubic yards. This has been calculated from the elevation of the existing ground surface to the basement elevation of the respective structures. The volume of debris created by demolition activities is approximately 37,000 cubic yards. A shortfall of 10,000 cubic yards occurs, necessitating additional fill materials to bring the demolition areas up to final grade prior to capping. Subject to EPA/State approval delisted OCC Solid Waste Incinerator ash approved for use pursuant to the Waste Management Plan, Appendix IV will be used as fill or, if unavailable, another suitable clean fill will be imported.

It is proposed that the final grading plan for the DWTP property will consist of an asphalt parking lot surrounded by grass covered areas. Figure 5 presents the proposed capping and grading plan.

Access to the parking lot will be from Buffalo Avenue. The access road and the parking lot will consist of a light traffic asphalt cap.

The remainder of the site will be sealed with a clay cap and covered with grass. The clay cap will extend from the edge of the Barrier Wall to approximately 10 feet east of Filtration Plant A and from Buffalo Avenue to the existing fenceline on the southern property boundary.

collected. If the second collection of NAPL does not provide a substantial amount of NAPL, OCC will secure the entire intake tunnel and the shoreshaft as shown on Figure 4. If the second collection produces a substantial amount of NAPL, the tunnel will be secured south of a location to be determined by OCC and the governmental parties based on all the available data. OCC will submit a plan for monitoring and/or NAPL removal for the portion of the tunnel left open.

Securement of the 48-inch Intake Line will be performed in accordance with Table 2. Both inlet crib structures will be removed.

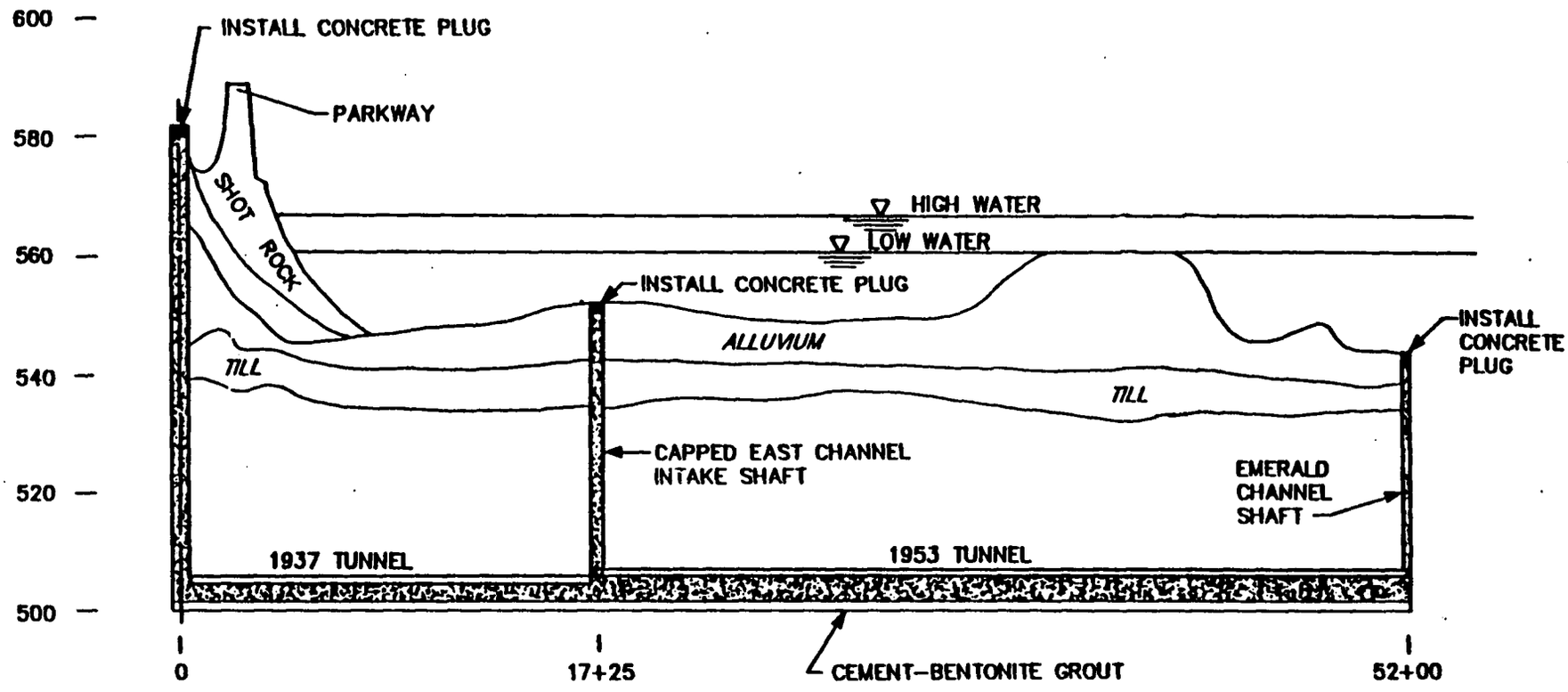


figure 4

SECUREMENT OF INTAKE STRUCTURE
DWTP CLOSURE REMEDIAL PLAN
Occidental Chemical Corporation

CRA

1769-29/11/89-76-0

3.5 SECUREMENT OF RAW WATER INTAKE STRUCTURES

The existing raw water intake structures requiring securement are:

- Shoreshaft, East Branch Intake Tunnel and Shaft Intake, Emerald Channel Intake Tunnel and Shaft Intake;

- East Channel Intake Line (48"Ø) and Intake Crib.

Securement of the Intake Tunnel network, including the shaft intakes and shoreshaft will be performed by grouting the entire system with cement/bentonite grout. To the extent that the tunnel underdrain is connected to the tunnel it will also be grouted. Figure 4 presents the tunnel closure concept.

Within 90 days after the start of construction of the new DWTP pursuant to Plan A, 1,000 feet of the northern portion of the Intake Tunnel commencing at the shoreshaft will be inspected with a video camera equipped with a TV monitor on the surface. Copies of the video tapes produced will be provided to the governmental parties. If collectable quantities of NAPL are present in the Tunnel, the NAPL will be removed. If substantial quantities of NAPL are not collected, OCC will secure the entire intake tunnel and the shoreshaft as shown on Figure 4. If substantial quantities of NAPL are collected, OCC shall schedule a followup inspection for 90 days prior to the start of grouting operations of the tunnel. If the followup inspection finds collectable quantities of NAPL, that NAPL will be

TABLE 2

SUMMARY OF AFFECTED UTILITIES

Utility	*Preliminary Activity*	*Plug Detail*
6" Ø Sanitary	abandoned	plug per S-Area Settlement Agreement
42"/36" high service discharge	abandoned	plug per S-Area Settlement Agreement
24" Ø Sanitary	abandoned	plug per S-Area Settlement Agreement
gas	closed	plug per S-Area Settlement Agreement
Abandoned Electrical Service	has been abandoned	plug per S-Area Settlement Agreement
12" Forcemain	abandoned	plug per S-Area Settlement Agreement
30" Wastewater line to sludge facility	abandoned	plug per S-Area Settlement Agreement
48" Raw Water Line	abandoned	plug River Side per S-Area Settlement Agreement
60" Wastewater Line	severed	plug River Side per S-Area Settlement Agreement
24" Washwater Sewer	severed	plug River Side per S-Area Settlement Agreement

3.4 UTILITY ABANDONMENT, REROUTING AND REPLACEMENT

Table 2 presents a listing of all known utilities affected by the closure of the DWTP. Except for those utilities with the bedding tied into the tile system (see Section 3.3), both ends and bedding of the severed utility will be plugged.

No groundwater flow, as monitored by the gradient monitoring, from within the existing APL Plume within the boundaries of the western portion of the DWTP will be allowed to flow east onto property owned by the City.

The DWTP overburden tile collection system (i.e. wet well and manholes) will be inspected weekly to confirm system operation.

It is to be noted that the operation of the proposed DWTP overburden tile collection system may impact the achievement of an inward gradient across the south-eastern leg of the S-Area Barrier Wall. Preliminary zone of influence estimates indicate an inward gradient to contain APL and NAPL within the S-Area Barrier Wall will be achieved. This is due to the fact that the S-Area Collection System will be operated to maintain the lowest achievable water level within the S-Area Barrier Wall. Conversely, the DWTP overburden tile collection system will lower the water table only low enough to create the zone of influence necessary to intercept the APL plume within the boundaries of the western portion of the DWTP as shown on Figure 2.

MONITORING

To evaluate the long term effectiveness and operation of the DWTP overburden tile collection system, hydraulic monitoring will be performed on a regular basis. The frequency of monitoring shall be consistent with the programs established to address the S-Area RRT Systems.

To determine that an inward gradient toward the DWTP overburden tile collection system across the existing APL plume within the boundaries of the western portion of the DWTP is achieved, additional monitoring wells shall be installed to evaluate groundwater gradients. To the extent possible, existing wells will be utilized. Efforts will be made during closure activities to prevent existing monitoring well destruction.

Installation of the overburden tile collection system may encounter subsurface utilities and appurtenances. Severance of the respective utilities encountered shall be performed when necessary to permit placement of the perforated piping. The utilities/bedding severed will have an appropriate section of piping removed and both ends of the pipe will be plugged and the respective River side bedding will be plugged. The bedding on the north side will be tied into the tile system.

Along the alignment of the overburden tile collection system, OCC will drill a line of borings at 50-foot centers down to the clay/till interface. Data from the borings will be used to determine if any NAPL is present along the alignment and to assist in the design and final location of the drain tile. If NAPL is encountered, then OCC will address the NAPL using appropriate technologies.

Details of typical utility severance and plugging are presented within Section 3.4.

System operation shall be adjustable to permit a greater or smaller zone of influence by variation of the liquid level within the wet well. Hydraulic monitoring, as discussed below, will be utilized to evaluate whether the desired zone of influence is achieved within the DWTP areas.

Groundwater collected within the wet well structure shall be pumped via HDPE forcemain and its companion containment/leak detection piping to the proposed S-Area APL Storage Facility.

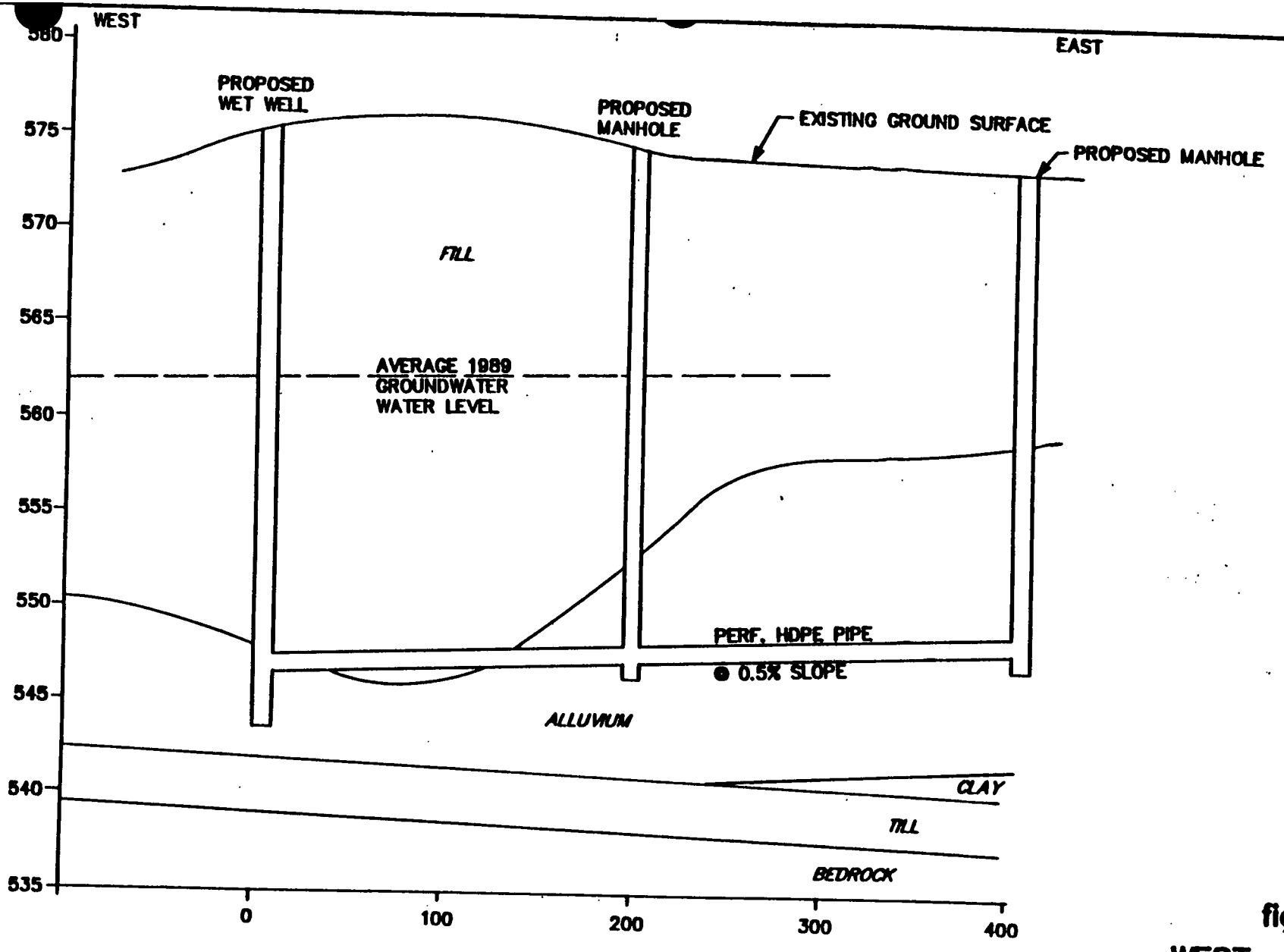


figure 3

WEST – EAST
COLLECTION SYSTEM CROSS SECTION
DWTP CLOSURE REMEDIAL PLAN
Occidental Chemical Corporation

CRA

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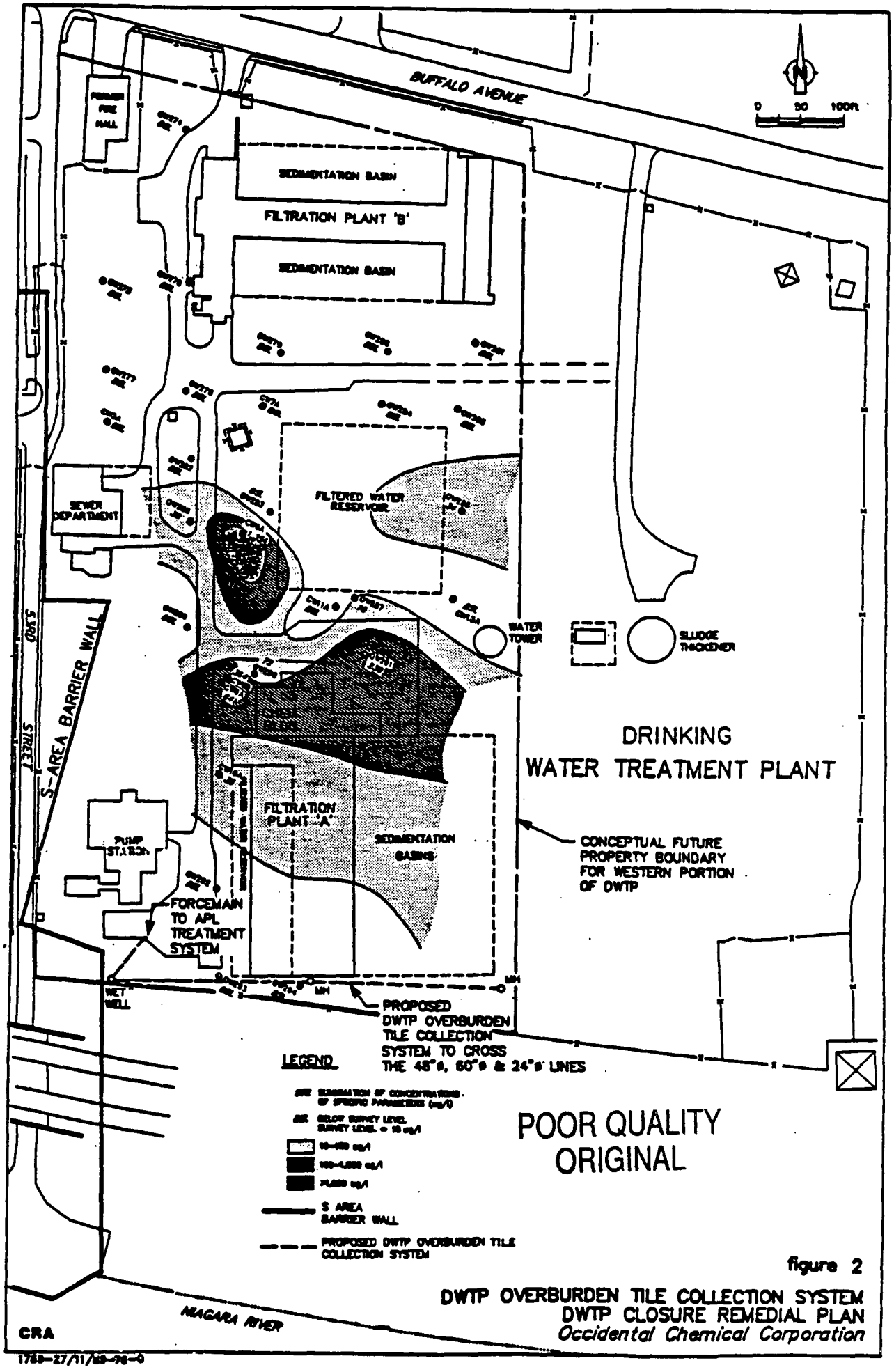

POOR QUALITY ORIGINAL

figure 2

DWTP OVERBURDEN TILE COLLECTION SYSTEM
DWTP CLOSURE REMEDIAL PLAN
Occidental Chemical Corporation

CRA

1789-27/11/89-76-0

3.3 APL CONTAINMENT AND COLLECTION

Figure 2 presents the areas of identified APL presence in the overburden groundwater at the DWTP as determined by the S-Area Remedial Program survey described in the document entitled "City of Niagara Falls Drinking Water Treatment Plant - • Assessment of Overburden Chemical Migration to the Water Treatment Plant".

This APL will be contained and collected by a DWTP overburden tile collection system as shown on Figure 2 and as described below:

i) wet well located south of the existing pump station building;

ii) perforated High Density Polyethylene Pipe (HDPE) collection tile installation, extending 400± feet east of the wet well, terminating at a manhole;

iii) HDPE forcemain within a HDPE containment pipe complete with leak detection manholes; and

iv) a submersible type effluent pump (size and type to be determined) with variable level controls installed within the wet well. The level controls shall be adjustable to permit flexibility in the system operation. Figure 3 presents the cross-sectional view of the West/East collection system alignment.

- water treatment chemicals, i.e. chlorine, fluoride, and associated handling equipment;
- solvents/oils, paints, i.e. materials in bulk quantities within shops/service areas;
- laboratory components, i.e. chemicals, acids, solvents, and associated equipment, storage areas; and
- fuel and storage tank removal and associated distribution piping.

iii) Identification, quantification, cleaning (if required) and removal of salvageable process equipment, appurtenances, furniture, office equipment, valuable metals, electrical generator and water tower;

iv) Identification and closure/shutoff of incoming/outgoing utilities including:
- electrical, subsurface and overhead;
- natural gas;
- telephone; and
- watermain closure at plant boundary;
- sanitary and storm sewers; and
- wastewater drain and forcemain to sludge facility.

v) Identification of subsurface utilities/services proposed for severance and/or plugging. Details of these are presented in Sections 3.4 and 3.5.

TABLE 1

PROPOSED
BUILDING/STRUCTURE DEMOLITION SUMMARY

Structures/Buildings Proposed for Demolition Program:

- Guard House
- Filtration Plant 'B' and Sedimentation Basins
- Sewer Department (Building D) and Underlying Reservoir
- Filtered Water Reservoir and Adjacent Control Chamber
- Former Carpenter Shop
- Filtration Plant 'A' and Sedimentation Basins
- Pump Station and Electrical Station
- Shore Shaft Enclosure
- Emergency Generator Station
- Underground Fuel Storage Tanks
- Water Tower

Structures/Buildings Remaining:

- Former Fire Hall

3.2 BUILDING DEMOLITION

Table 1 presents a summary of the buildings and structures proposed for demolition.

DEMOLITION APPROACH

Demolition of the DWTP facilities will be implemented by the City and includes demolishing existing structures in place and utilizing existing reservoirs and sedimentation basins as receptacles for debris. Filter media will be disposed at the historic S-Area Landfill.

DEMOLITION CONSIDERATIONS

The following is a listing of the major components requiring consideration when the decommissioning and demolition of a facility of this size is performed:

i) Accurate listing of buildings/facilities to be demolished and a listing of structures/utilities equipment to be saved.

ii) Identification, quantification and prior removal (regardless of disposal option selected) of potentially hazardous components and associated handling/storage systems, including but not limited to the following:
   - asbestos materials, i.e. insulation;
   - PCBs, i.e. transformer fluids and transformers;

3.1 NAPL CONTAINMENT AND COLLECTION

It is intended that prior to the implementation of this Plan at the DWTP, the S-Area RRT Program and Systems will address all NAPL present on the western portion of the DWTP. The S-Area RRT Program will detail the plan to address this NAPL presence. This closure remedial plan assumes that the overburden NAPL plume will be contained and collected by the S-Area RRT Systems, as described below:

i) Containment shall be performed by slurry wall construction through the overburden materials keying one foot into confining layer materials. Pending the final NAPL plume definition, the S-Area Overburden Barrier Wall alignment may be modified to address NAPL in the western portion of the DWTP.

ii) Collection of NAPL shall be performed by the S-Area tile collection system which will be located within the Barrier Wall. Pending the final NAPL plume definition, the location of this system may also be modified to address NAPL in the western portion of the DWTP.

If NAPL is not addressed by the S-Area RRT Program, this NAPL will be addressed using appropriate technologies.

Any underground utilities from the DWTP property that cross the alignment of the Barrier Wall shall be addressed by the S-Area RRT Program.

3.0 PLAN ACTIVITIES

The major Plan activities identified are listed as follows and discussed individually in the following sections.

- NAPL CONTAINMENT AND COLLECTION
- BUILDING DEMOLITION
- APL CONTAINMENT AND COLLECTION
- UTILITY ABANDONMENT, REROUTING AND REPLACEMENT
- SECUREMENT OF RAW WATER INTAKE STRUCTURES
- FINAL CAPPING AND GRADING

To achieve the proposed objectives identified in Section 2.0, the remedial closure plan concepts have been developed giving due consideration to:

i) hydrogeological and environmental conditions existing at the DWTP;
ii) structural conditions at the DWTP;
iii) proposed S-Area RRT Systems; and
iv) compatible construction techniques and methods.

2.0 OBJECTIVES

The objectives of this Plan are as follows:

- demolish existing structures in an environmentally acceptable manner;
- contain, collect and treat Aqueous Phase Liquids (APL) in areas not addressed by the S-Area RRT Program;
- contain, collect and treat Non-Aqueous Phase Liquid (NAPL) in areas not addressed by the S-Area RRT Program.
- abandon and plug existing utilities and bedding (underground watermain, sewers, etc.);
- secure raw water intakes;
- cap the demolished structures and surrounding areas with impervious surfaces that will minimize groundwater infiltration; and

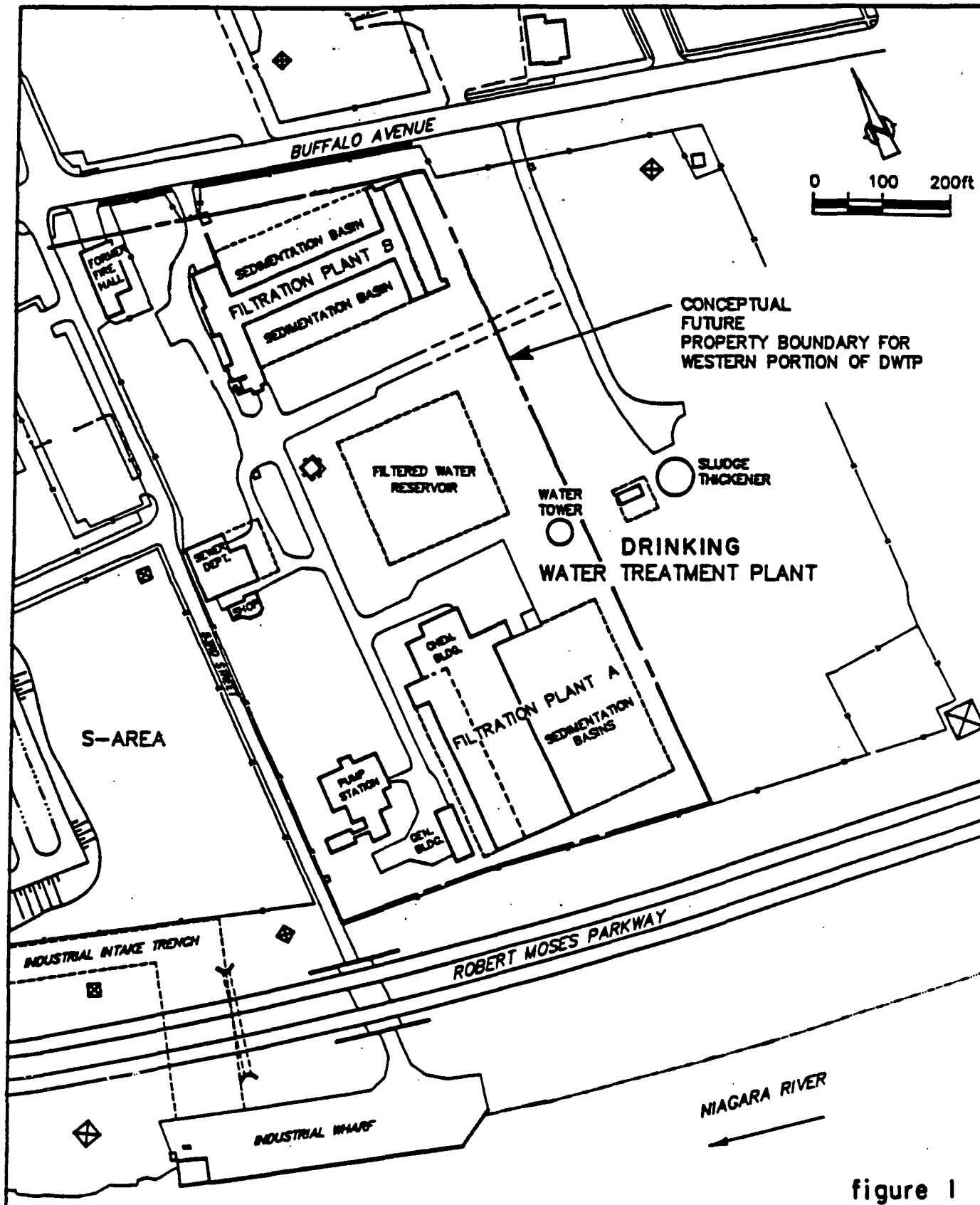

figure 1

PLAN VIEW
DRINKING WATER TREATMENT PLANT
DWTP CLOSURE REMEDIAL PLAN
Occidental Chemical Corporation

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ii) CITY OF NIAGARA FALLS DRINKING WATER TREATMENT PLANT
- Assessment of Groundwater Table Contours and Geologic Conditions
  S-Area Remedial Program June 1988

iii) CITY OF NIAGARA FALLS DRINKING WATER TREATMENT PLANT PUMP STATION
- Hydrogeologic and Environmental Conditions
- Collection System Design Consideration June 1988

iv) CITY OF NIAGARA FALLS DRINKING WATER TREATMENT PLANT
- Assessment of Overburden Chemical Migration to the Water Treatment Plant
  S-Area Remedial Program June 1988

v) REQUISITE REMEDIAL TECHNOLOGY STUDY OF CHEMICALS IN THE OVERBURDEN AND BEDROCK S-AREA LANDFILL
S-Area Remedial Program October 1989

Figure 1 presents the DWTP existing facilities and adjacent S-Area Landfill. A conceptual property boundary to define the boundary of the DWTP property after closure is indicated on Figure 1.

1.0 INTRODUCTION

Occidental Chemical Corporation (OCC) has prepared the following Plan for the remediation and closure of the western portion of the City of Niagara Falls Drinking Water Treatment Plant (DWTP) property in the event that operations of the Plant at this site are discontinued. OCC will take title to the western portion of the DWTP and the City will retain title to the eastern portion of the DWTP property and a strip immediately south of Buffalo Avenue.

This Plan incorporates engineering and construction practices accepted for use in containment projects and is applicable to the materials and hydrogeologic conditions at the S-Area/DWTP.

The geologic, hydrogeologic, environmental and structural conditions of the DWTP have been evaluated and are presented within the following S-Area/DWTP documents:

i) INFORMATION SUMMARY REPORT
- S-Area Remedial Program June 1988

Volume 1	Text
Volume II	Drawings
Appendix 1	Overburden Stratigraphic and Instrumentation Logs
Appendix 2	Bedrock Stratigraphic and Instrumentation Logs
Appendix 3	Historical Stratigraphic and Instrumentation Logs and Hydraulic Monitoring
Appendix 4	Well Development and Sampling Summary
Appendix 5	Soils Physical Testing Results
Appendix 6	Analytical Results

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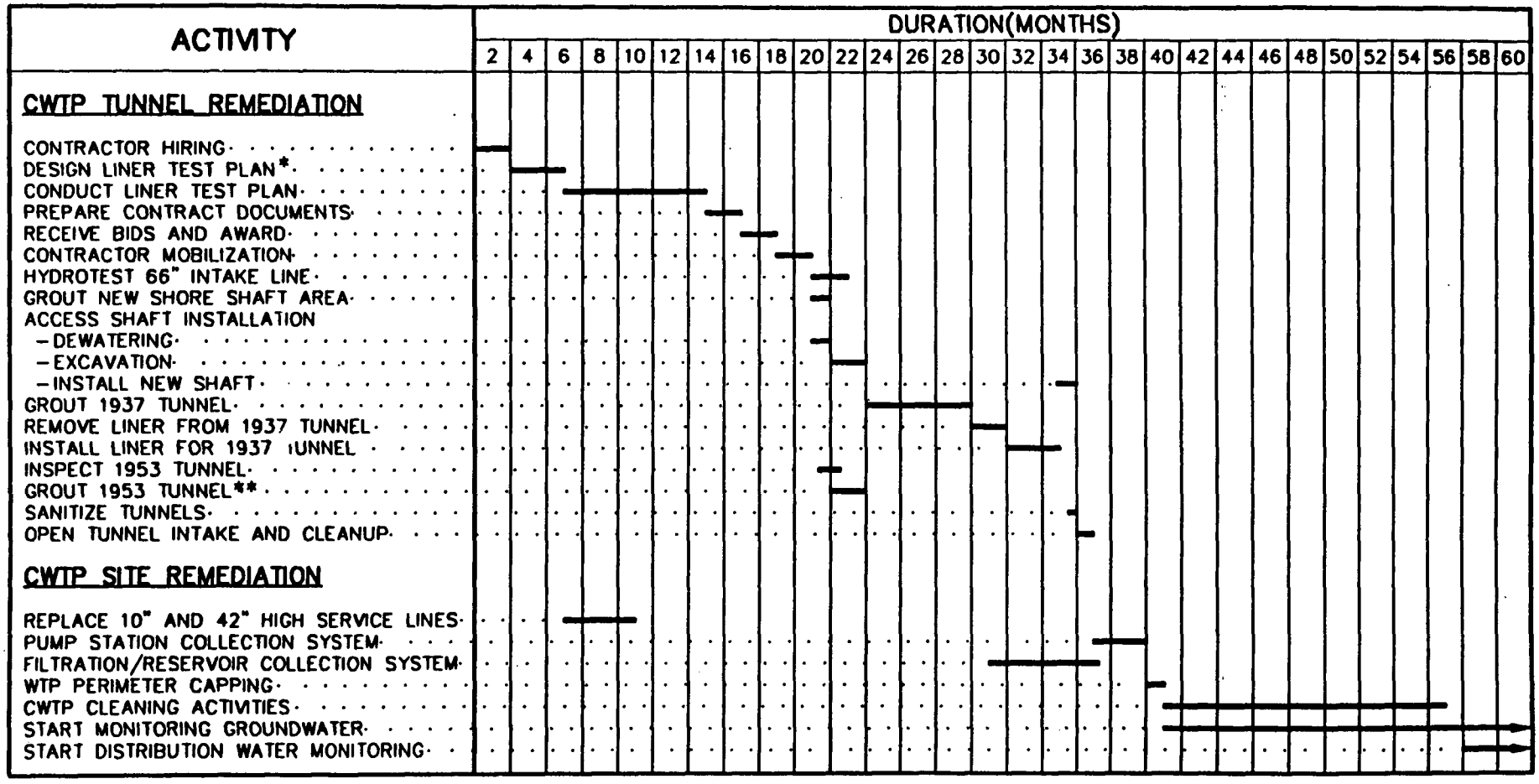
ATTACHMENT C

DWTP Closure/Remedial Plan

ATTACHMENT B



* USING S–AREA TILE TEST PROTOCOL, IF APPROPRIATE

** SCHEDULE ASSUMES THE 1953 TUNNEL WILL NOT REQUIRE SLEEVING

PLAN B BAR SEQUENCING SCHEDULE
Occidental Chemical Corporation

CRA

1769–18/07/90–L–1 (S–04)

ATTACHMENT B

Plan B Bar Sequencing Schedule

INSURANCE CERTIFICATE FORM

COVERAGES

THIS IS TO CERTIFY THAT POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS, AND CONDITIONS OF SUCH POLICIES.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIABILITY LIMITS IN THOUSANDS		
						EACH OCCURRENCE	AGGREGATE
A	GENERAL LIABILITY [X] COMPREHENSIVE FORM [X] PREMISES/OPERATIONS [X] UNDERGROUND EXPLOSION & COLLAPSE HAZARD [X] PRODUCTS/COMPLETED OPERATIONS [X] CONTRACTUAL [X] INDEPENDENT CONTRACTORS [X] BROAD FORM PROPERTY DAMAGE [X] PERSONAL INJURY				BODILY INJURY	$	$
					PROPERTY DAMAGE	$	$
					BI & PD COMBINED	$1,000,	$ 5,000,
					PERSONAL INJURY		$ 5,000,
A	AUTOMOBILE LIABILITY [X] ANY AUTO [ ] ALL OWNED AUTOS (PRIV. PASS.) [ ] ALL OWNED AUTOS (OTHER THAN PRIV. PASS.) [X] HIRED AUTOS [X] NON-OWNED AUTOS [ ] GARAGE LIABILITY				BODILY INJURY (PER PERSON)	$	
					BODILY INJURY (PER ACCIDENT)	$	
					PROPERTY DAMAGE	$	
					BI & PD COMBINED	$1,000,	
	EXCESS LIABILITY [ ] UMBRELLA FORM [ ] OTHER THAN UMBRELLA FORM				BI & PD COMBINED	$	$
	WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY				STATUTORY		
					$1,000 (EACH ACCIDENT)		
					$1,000 (DISEASE-POLICY LIMIT)		
					$1,000 (DISEASE-EACH EMPLOYEE)		
	OTHER						

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

POOR QUALITY ORIGINAL