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Almy Brothers
Inactive Hazardous Waste Site

Binghamton, Broome County, New York
Site No. 7-04-021

RECORD OF DECISION

March 1994

Prepared by:

New York State Department of Environmental Conservation
Division of Hazardous Waste Remediation

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

April 1994
Division of Hazardous Waste Remediation

Langdon Marsh
Acting Commissioner

NOTICE OF RECORD OF DECISION

Almy Brothers Site
Site No. 7-04-021

Dear Interested Citizen:

The New York State Department of Environmental Conservation (NYSDEC) announces the issuance of the Record of Decision (ROD) for the Almy Brothers Inactive Hazardous Waste Site. The ROD is the culmination of extensive investigations and the remedy selection process.

The Almy Brothers site, located on Jackson St. in the City of Binghamton, Broome County, is a Class 2 inactive hazardous waste site. A Class 2 site is one which poses a significant threat to public health and/or the environment and action is required. The site was listed on the New York State Registry of Inactive Hazardous Waste Sites following a leak from one of several drums of herbicide wastes abandoned on site.

Remedial investigations performed by the NYSDEC have identified a number of areas of contamination. Widespread herbicide and pesticide contamination has been identified in the soils on and adjacent to the site. Sediments in the storm sewers and in the a basement sump contained elevated concentrations of herbicides and pesticides. Groundwater has been contaminated both by herbicides and pesticides as well as by petroleum hydrocarbons from on-site underground storage tanks. Additionally, two vehicles on site, a pickup truck and a sprayer truck, are contaminated.

A Feasibility Study was conducted which explored various remedial alternatives to ensure that the most suitable remedy would be selected. The selection process and the selected remedy were described in the Proposed Remedial Action Plan (PRAP), which was provided to the public for comment on December 27, 1993.

The ROD for the Almy Brothers site, signed on March 28, 1994 by Deputy Commissioner Ann DeBarbieri, identifies the following remedial actions:

- Soil and Sediments: excavation or removal, and on-site treatment with the base-catalyzed decomposition treatment process, with off-site incineration of the residual.

- Groundwater: removal of the sources of groundwater contamination as part of the other two remedial action categories, removal of any heavily contaminated groundwater and treatment with granular activated carbon, and evaluation of the need for continued groundwater treatment, based upon groundwater monitoring analytical results.

- Debris: Decontamination and off-site disposal of the contaminated vehicles, debris, and underground storage tanks, on-site treatment or off-site disposal of the UST contents and the associated contaminated soil, and on-site treatment of the sump water.

This project will now enter the design and construction phase. Additionally, the NYSDEC will conduct an Interim Remedial Action (IRM) this spring to remove the seven drums of herbicide wastes from the site for off-site incineration.

The ROD and other site-related documents are available for public review at the locations listed below:

Broome County Public Library
78 Exchange Street
Binghamton, New York 13901
(607) 778-6451
Hours: M-Th: 9 AM - 9 PM
F-Sa: 9 AM - 5 PM
Sun: Closed

NYSDEC
Region 7 - Kirkwood Office
Route 11
Kirkwood, New York 13795
(607) 775-2545
Contact: Tom Suozzo
(by appointment only)

NYSDEC, Region 7 Office
615 Erie Boulevard West
Syracuse, New York 13204
(315) 426-7400
Contact: Charlie Branagh
(by appointment only)

NYSDEC
50 Wolf Road
Albany, New York 12233-7010
(518) 457-4343
Contact: Catherine Klatt
(by appointment only)

These documents and others generated during the course of this project will remain available throughout the remedial activities at this site.

For More Information

Please contact the following if you have any questions:

Catherine A. Klatt
Project Engineer, NYSDEC
(518) 457-4343

Gary Robinson
NYS Department of Health
(315) 426-7610

Sue Van Patten
Citizen Participation Specialist, NYSDOH
(518) 458-6402

In addition to being able to contact the above noted people, you may wish to call our toll-free number, in Albany, at 1-800-342-9296, and a NYSDEC representative will return your call. Your interest in this project is appreciated.

15 (12-75)

New York State Department of Environmental Conservation

MEMORANDUM

TO: Distribution C.A. Klatt

FROM: Catherine A. Klatt, Env. Engineer, Bureau of Western Remedial Action, DHWR

SUBJECT: **Almy Brothers Inactive Hazardous Waste Site, Binghamton, Broome County, New York, Site No. 7-04-021**

DATE: April 14, 1994

Attached for your information is a signed copy of the Record of Decision (ROD) for the Almy Brothers Site. Also attached is a fact sheet, which we plan to mail out on April 19, 1994.

We have requested an early referral from DEE for the Remedial Design, which we plan to perform in-house. The tentative schedule is to complete the design by fall 1994, and perform the Remedial Action during the 1995 construction season.

If you have any questions, please contact me at 518/457-4343.

<u>DISTRIBUTION</u>
G. Carlson, DOH
G. Robinson, DOH
S. Van Patten, DOH
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J. Harrington
T. Suozzo, Region 7 (document repository)
C. Branagh, Region 7 (document repository)

Attachments

DECLARATION STATEMENT - RECORD OF DECISION

Almy Brothers Inactive Hazardous Waste Site
Binghamton, Broome County, New York
Site No. 7-04-021

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedial action for the Almy Brothers inactive hazardous waste disposal site which was chosen in accordance with the New York State Environmental Conservation Law (ECL) Article 27, Title 13, and Article 52, Title 3. The purpose of the ROD is to document the remedy selection process. The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (4O CFR 3OO).

This decision is based upon the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Almy Brothers Inactive Hazardous Waste Site, upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC during the public comment period (December 27, 1993 through January 25, 1994), with the guidance of the ECL and NYSDEC and U.S. Environmental Protection Agency (USEPA) guidance documents. A bibliography of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

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

Description of Selected Remedy

Based upon the results of the Remedial Investigation/Feasibility Study (RI/FS) for the Almy Brothers Site and the criteria identified for evaluation of alternatives, the NYSDEC has selected treatment of the contaminated soils with the on-site base-catalyzed decomposition process; extraction and treatment of any Non-Aqueous Phase Liquid (NAPL) layer or identified significant contamination in the groundwater with granular activated carbon; and on-site decontamination followed by off-site disposal or recycling of the contaminated vehicles, underground storage tanks, and debris. The components of the remedy are fully described in the Feasibility Study and in Sections 6.1 and 7 of this document, and are summarized as follows:

- Excavation of contaminated soils, removal of contaminated sediments from the storm sewers adjacent to the site and from a sump in the basement of 10 Jackson St. , and removal of the surface of contaminated floors, followed by on-site treatment using the base-catalyzed decomposition (BCD) process, shipment of the treatment residuals for off-site incineration, and placement of the treated soils and sediments back on site. The BCD treatment system must incorporate the following features:

    * indirect heating;

* temperatures beneath 1000°F;
* negative pressure with low airflow; and
* low oxygen atmosphere to prevent incineration from occurring.

- Following the removal of the sources of contamination impacting the groundwater (such as contaminated soil, and underground storage tanks), extraction and treatment of any non-aqueous phase liquid layer or identified significant contamination in the groundwater will be undertaken using granular activated carbon (GAC), to remove the majority of the contaminant mass in the groundwater. The spent GAC will be sent off-site for incineration.

- On-site decontamination of two contaminated vehicles, underground storage tanks (USTs), and debris, followed by off-site disposal or recycling, and removal and treatment of the UST contents and the adjacent soil.

New York State Department of Health Acceptance

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

Declaration

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

March 28, 1994

Ann Hill DeBarbieri

Date

Ann Hill DeBarbieri
Deputy Commissioner

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SECTION 1 : SITE LOCATION AND DESCRIPTION

The Almy Brothers Site occupies approximately two acres in the City of Binghamton, in Broome County. The site is located at the intersection of Jackson Street and Moore Street. Three warehouse/commercial buildings are located on the site, with one building on the property owned by Louis Stilloe at 10 Jackson St. , and two buildings (referred to as Almy East and Almy West) on the property owned by Leonard Almy at 8 Jackson St. The groundwater beneath the site is part of the Clinton St.-Ballpark Sole Source Aquifer, the sole or principal source of drinking water for, among others, the Town of Vestal, and the Villages of Johnson City and Endicott. The area surrounding the site is mixed residential and commercial/light industry. The area is topographically flat-lying, situated approximately 600 feet south of the Susquehanna River. See Figures 1 and 2 for the location and site maps.

SECTION 2: SITE HISTORY

2.1: Operational/Disposal/Ownership History

The site was originally occupied by a dairy processing facility. The buildings from the operations have subsequently been used for a variety of businesses.

Robert and Mary McMahon purchased the property in 1981. Robert McMahon and others had owned the McMahon Bros. pest control corporation; he sold his interest in that corporation to his son in the late 1970's. The company performed roadside herbicide application as well as providing commercial pest control. Based on current site conditions and the results of the Remedial Investigation described below, herbicides and pesticides were stored on site, and other pesticide related activities may have occurred. Spray trucks or other application equipment appears to have been washed or cleaned on site. Based upon the results of the Remedial Investigation, it appears that pesticide and herbicide handling activities occurred in the areas in and around the site buildings. (For the purpose of this document and the RI/FS, pesticides are defined as the list of parameters on the Target Compound List for pesticides according to NYSDEC Contract Laboratory Protocol, Method 89-3. The term herbicides refers to the compounds 2,4-D, 2,4,5-T, and 2,4,5-TP (otherwise known as Silvex).)

The property was eventually subdivided and sold in parcels. The parcel at 10 Jackson St. was sold to Louis Stilloe in 1988. The 8 Jackson St. parcel was sold to Leonard Almy in 1984 (Almy East). An adjoining parcel (Almy West) was sold to Leonard Almy in 1987.

In February 1989 Robert McMahon reportedly arranged with Almy to have Almy Brothers' employees move drums that were located in the alley between the 8 Jackson St. building (Almy East) and the 10 Jackson St. building. The drums were moved from their original position in the alley, adjacent to the 10 Jackson St. building owned by Stilloe, and were placed on the other side of the alley, adjacent to the 8 Jackson St. building owned by Almy.

2.2: Remedial History

In April 1989, the Binghamton Fire Department responded to reports of a chemical spill emanating from the drums in the alley. The Fire Department notified the NYSDEC, who responded and stabilized the situation. Laboratory analysis of the spilled material identified the presence of the herbicides 2,4-D, 2,4,5-T and 2,4,5-TP (also known as Silvex). 2,4-,5-T and Silvex are acutely hazardous wastes under RCRA (42 USC Sec. 6901 et seq.) and in accordance with 6 NYCRR Part 371, which is promulgated pursuant to Title 9 of Article 27 of the ECL, and hazardous substances under CERCLA (42 USC Sec. 9601(14), due to the presence of dioxin as a manufacturing process byproduct in most of the product produced in this country.

The DEC conducted additional spill response actions to overpack the drums in the alley, and to excavate and contain soil and asphalt obviously impacted by the release of the herbicides referenced above.

The contents of the drums present in the alley were analyzed to determine which drums contained herbicides. The 18 drums not containing Silvex were disposed of as part of the spill response action on March 14, 1991 and are no longer on site. Two of these drums contained non-hazardous debris and resin. Contents of the 16 drums containing hazardous waste included hydrochloric acid, waste oil, and 2,4-D. At the time of the emergency response action no facility in the United States was permitted by EPA to dispose of Silvex and 2,4,5-T, due to the presence of dioxin. Therefore, the drums containing Silvex and 2,4,5-T remained on site.

Seven overpacked drums of liquid and sludge containing Silvex, 2,4,5-T, and 2,4-D, and approximately 70 drums of excavated soil and asphalt resulting from the spill response action are presently stored within the alleyway. Access was restricted to the alley by the installation of a chain-link fence, with periodic monitoring. A more detailed chronology of the response actions is included as Appendix C to this document.

In August 1990 the site was listed on the NYS Registry of Inactive Hazardous Waste Sites as a Class 2 site, one that poses a significant threat to human health and the environment.

SECTION 3: CURRENT STATUS

In response to a determination that the presence of hazardous waste at the Site presents a significant threat to human health and the environment, a Remedial Investigation/Feasibility Study (RI/FS) was completed by the NYSDEC in December, 1993, using Environmental Quality Bond Act (EQBA) funds through the NYS Superfund program.

3.1: Summary of the Remedial Investigation

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

The RI was conducted in 2 phases. The first phase was conducted between April , 1991 and February, 1992, the second phase between August, 1992 and June, 1993. A report entitled *Remedial Investigation Report, June 18, 1993* has been prepared describing the field activities and findings of the RI in detail.

The RI activities consisted of the following:

- Installation of soil borings and monitoring wells for analysis of groundwater as well as physical properties of soil and hydrogeologic conditions.

- Collection of surface and subsurface soil samples to determine the nature and extent of soil contamination.

- Collection of samples of herbicide-contaminated liquids and sludges from the drums left on site, to determine the nature of the drum contents.

- Geophysical survey to identify any subsurface features including pipes and underground storage tanks.

- Collection of samples from the contents of underground storage tanks and from adjacent soil to determine if the USTs are impacting the groundwater.

- Drain Field investigation, to determine the discharge points of drains and manholes.

- Sampling and analysis of sediments and surface waters in the storm sewers, a sump in a building basement, and of the Susquehanna River.

- Air sampling to determine whether contaminants are present in the air.

- Collection of wipe samples to determine the presence of herbicides and pesticides in two vehicles on site.

- Collection of samples from drums of soil generated during the initial spill response, to determine disposal characteristics.

The analytical data obtained from the RI was compared to environmental Standards, Criteria, and Guidance (SCGs). Groundwater, drinking water and surface water SCGs identified for the Almy Bros. site were based on NYSDEC Water Quality Regulations for Surface Waters and Groundwaters (6 NYCRR Parts 700-705), Ambient Water Quality Standards and Guidance Values (NYSDEC Division of Water Technical and Operational Guidance Series 1.1.1), and NYSDOH Public Water Systems Maximum Contaminant Levels (Chapter I, State Sanitary Code, Subpart 5-1). For the evaluation and interpretation of soil analytical results, NYSDEC soil cleanup guidelines for the protection of groundwater (NYSDEC Division of Hazardous Waste Remediation Technical and Administrative Guidance Memorandum 4046, Determination of Soil Cleanup Objectives and Cleanup Levels), background conditions, and NYSDOH risk-based soil cleanup objectives were used to develop remediation goals for soil. NYSDEC sediment guidelines for the protection of fish and wildlife (NYSDEC Division of Fish and Wildlife Clean-up Criteria for Aquatic Sediments, December 1989) were used to develop remediation goals for sediment. The recommended cleanup objectives are summarized in Table 1.

When the results of the remedial investigation and the potential public health and environmental exposure routes were compared to the site cleanup objectives and groundwater standards, it was determined that certain areas of the site require remediation. These are summarized below. More complete information can be found in the RI Report.

Chemical concentrations are reported in parts per billion (ppb) and parts per million (ppm) (1000 ppb equals 1 ppm) Wipe sample analytical results are given in terms of micrograms per square meter of surface area $\mu g/m^2$). For comparison purposes, where applicable, SCGs are given for each medium.

The following discussion presents a summary of the results of the Remedial Investigation for this site. More detailed information is contained in Section 5 of the RI Report, dated June, 1993.

SOILS

The extent of surface and subsurface soils exceeding the remediation goals developed for this site is depicted in Figures 3 and 4. This amounts to approximately 900 cubic yards of soil.

The herbicides 2,4-D and Silvex were found at numerous locations around the site in concentrations up to 1,100,000 and 17,000,000 parts per billion (ppb) respectively. The site cleanup objective for 2,4-D is 500 ppb, and for Silvex and 2,4,5-T is 700 ppb. In analytical samples Silvex, 2,4-,5-T, or 2,4-D were detected in 29 of 51 samples, and exceeded the site cleanup objectives for soil in 13 of these samples. The highest levels of herbicides were found in the alley between 8 and 10 Jackson Street where the original spill occurred, in a shed attached to the Almy West building, in the adjacent Broome County Humane Society courtyard, and in a large sump in the basement of the building at 10 Jackson Street.

Elevated levels of pesticides are also widespread on both of the Almy properties and on the Stilloe property. 4,4'-DDT is present in 41 of 58 soil samples collected throughout the site, at levels up to 46,000 ppb in the alley, and exceeds the site cleanup objective of 70 ppb in 24 of these samples. Chlordane was also present throughout the site, at levels exceeding the site cleanup objective of 110 ppb in 13 of 58 samples, with the highest level of 73,000 ppb in the shed attached to the Almy West building.

The metals cadmium and chromium were primarily detected in one location at levels exceeding the site cleanup objectives of 10 parts per million (ppm) and 50 ppm respectively. This location is in a portion of the eastern side of the alley, at levels up to 27.9 ppm for cadmium and 1,650 ppm for chromium. Cadmium and chromium are also present above the cleanup objectives in two locations in the Stilloe building basement, and in one sample south of the Almy West building. In all instances, exceedances for these metals are located where the soil also contains levels of pesticides and/or herbicides exceeding the soil cleanup objectives for the site.

GROUNDWATER

Groundwater samples from the wells located in the alleyway contained concentrations of herbicides, volatile organic compounds, and semi-volatile organic compounds exceeding New York State groundwater standards. 2,4-D was present at 50 ppb, as compared to the standard of 4.4 ppb, and Silvex was present at 17 ppb, as compared to the standard of 0.26 ppb.

Gamma-chlordane at levels exceeding the groundwater standard was detected in one side-gradient well during the first round of sampling, but was not detected during the second sampling round. Site contaminants were not detected in the other upgradient and side gradient wells, nor were they detected in the downgradient wells.

Benzene, a carcinogenic volatile organic compound, was present at 73 ppb, as compared to the groundwater standard of 0.7 ppb. 2,4-dichlorophenol, a breakdown product of 2,4-D, was present at 14.5 ppb, as compared to the groundwater standard of 1 ppb. Acetone was present at 140 ppb, as compared to the groundwater standard of 50 ppb. Other volatile and semi-volatile organic compounds present at concentrations exceeding groundwater standards include ethylbenzene (14 ppb), xylene (63 ppb), 2-methoxy-2-methyl-propane (320 ppb), other substituted propanes, substituted benzenes, and substituted cyclohexanes. Benzene, ethylbenzene, and xylene are typical components 0f gasoline, and were also present in the underground storage tanks on site. 2-methoxy-2-methyl-propane is an octane booster in gasoline.

UNDERGROUND STORAGE TANKS

Elevated levels of petroleum hydrocarbons were found in the three underground storage tanks, in two soil samples adjacent to the tanks, and in the groundwater downgradient from the tanks, indicating that the tanks are leaking or have leaked in the past. Elevated levels of three pesticides (heptachlor epoxide at 570 ppb, Endrin at 360 ppb, and Endosulfan II at 500 ppb) were also detected in one of the underground storage tanks.

STORM SEWERS AND RIVER SEDIMENTS

Site contaminants were found in the sediments in three storm sewer catch basins adjacent to the site. The storm sewer discharges into the Susquehanna River approximately 500 feet from the site. The pesticides Aldrin, 4,4'-DDT, 4,4'-DDD, and Endosulfan II were present at levels exceeding the NYS Aquatic Sediment Criteria guidance levels. Aldrin was present at 53 ppb, as compared to a guidance level of 2 ppb, 4,4'-DDT and 4,4'-DDD were present at 140 ppb and 150 ppb respectively, as compared to a guidance level of 20 ppb, and Endosulfan II was present at 37 ppb, as compared to a guidance level of 0.6 ppb. The herbicides 2,4-,5-T and Silvex were also detected in the storm sewers at concentrations of up to 64 ppb and 560 ppb respectively, although no sediment guidance levels have been set for these compounds. Sediment samples collected from the Susquehanna River at the storm sewer outfall did not contain detectable concentrations of pesticides or herbicides, indicating that the contaminated storm sewer sediments have not yet impacted the river. The total volume of sediment in the storm sewer catch basins, and in the storm sewer between the site and the river is estimated at 3 cubic yards.

10 JACKSON ST. BASEMENT

Based on indications of surface run-off from the alleyway, sediment and water samples were collected from a large sump in the basement of the Stilloe building at 10 Jackson St. The sediments contained elevated concentrations of 2,4-D and Silvex, at levels up to 4,000 ppb and 3,4-00 ppb respectively. The sediments also contained elevated concentrations of pesticides, with 4,4-'-DDT at 350 ppb, and total chlordanes at 1140 ppb. PCBs were also found in the sump at levels up to 65,000 ppb. This level of PCBs exceeds the 50 ppm level in 6 NYCRR Part 371 for categorizing the sediments as a listed hazardous waste in accordance with New York State law, as well as a defined toxic substance and hazardous substance in accordance with applicable federal laws.

The water in the sump also contained the herbicides 2,4-D and silvex, and the pesticides alpha-BHC, gamma-BHC, delta-BHC, and Dieldrin at concentrations exceeding groundwater standards, with 2,4--D at 23 ppb as compared to the standard of 4-.4 ppb, and silvex at 14 ppb, as compared to the standard of 0.26 ppb.

The total volume of sediment is estimated at 11 cubic yards. The total volume of water in the sump is estimated at 11,000 gallons.

DRUMS OF WASTE

Seven drums of Silvex-contaminated waste remain on site, stored in the alleyway between the two buildings. TCLP leaching analysis of a liquid composite sample from three drums of liquid waste and a sludge composite sample from two drums of sludge showed the presence of 2,4-D and Silvex at levels exceeding the TCLP standard of 10 ppm and 1 ppm respectively. The liquid sample contained 193 ppm of Silvex. The sludge leachate contained 2,110 ppm of 2,4-D and 460 ppm of Silvex. Individual analysis of the contents of six of the drums of waste found up to 49 ppm of 2,4-D, 360,000 ppm of Silvex, and 35,000 ppm of 2,4,5-T. Analysis for dioxins/furans was positive for two drums, with 2,3,7,8-TCDD (dioxin), a manufacturing byproduct of 2,4,5-T and Silvex, present at 10.4 ppb in one drum. The pesticide Dieldrin was present in one drum at 48,000 ppm. Disposal of the drums of waste is currently being pursued as an IRM.

DRUMMED SOIL

The DEC collected representative samples from the drums containing soil excavated during the initial spill response. All seven samples contained elevated levels of 2,4-D and Silvex, at levels up to 23,000 ppb and 104,000 ppb, respectively. Five of the seven samples also contained 4,4'-DDT at levels exceeding the site cleanup objective of 70 ppb. The total volume of drummed soil is estimated at 20 cubic yards.

VEHICLES

Nine wipe samples were collected from the bed of the McMahon pickup truck and from the sprayer tank truck with the McMahon Brothers' logo on the door. Five of the samples were analyzed for pesticides and four for herbicides. In addition, a sample of dirt, oil, and debris was collected from the bed on the pickup truck and analyzed for herbicides. Alpha and gamma chlordane were detected in all five samples from the pickup truck and tank truck at levels up to 25,000 $\mu g/m^2$. The herbicides 2,4-D, 2,4,5-T, and silvex were detected in three of the four wipe samples. The herbicides were also found in the dirt and oil sample at levels of 18,000 ppb of 2,4,5-T, 1,600,000 ppb of 2,4-D, and 960,000 ppb of Silvex.

AIR

Nine air samples were collected over a five-day period during the Phase I field investigation to assess the potential for off-site impacts. Each herbicide sample was collected over a two hour time interval. The pesticide samples were collected over an eight hour time interval. No herbicides were detected in the sample. Pesticides were detected in all nine air samples, with concentrations ranging from a low of 0.000089 $\mu g/m^3$ for alpha-BHC to a high of 0.001988 $\mu g/m^3$ for gamma-Chlordane, concentrations which the NYSDOH has determined to be below those of concern for human exposure.

3.2 Interim Remedial Measures:

Interim Remedial Measures (IRMs) were conducted at the site based on findings as the RI progressed. An IRM is implemented when a source of contamination or exposure pathway can be effectively addressed before completion of the RI/FS. In December of 1992 an IRM was conducted to double overpack the drums of waste and contaminated soil on site. The drums were placed inside plastic overpack drums and placed in a location partially protected by a roof. At the same time a layer of uv-resistant plastic was laid down over the alleyway, to replace the plastic originally placed in the alleyway to control odors.

The NYSDEC has determined that a permit to incinerate dioxin-contaminated wastes has recently been issued to one company. At this time an IRM to remove the remaining seven drums containing herbicide and pesticide wastes is being undertaken. This IRM would involve transporting the drums of waste to the RCRA permitted incinerator for destruction. It is anticipated that this IRM will be completed during the spring of 1994.

3.3 Summary of Human Exposure Pathways:

The analytical results of site samples taken during Phases I and II of the RI were compared with applicable standards, criteria and guidance. The site-specific Compounds of Concern (COCs) were chosen as a result of this comparison process. These contaminants include the herbicides 2,4--D, 2,4,5-T, and Silvex; the pesticides dieldrin, endrin, chlordane, 4,4'-DDT, and Aldrin; the metals cadmium and chromium; and in groundwater, the volatile and semi-volatile compounds 2,4-dichlorophenol , benzene, ethylbenzene, xylene, and 2-methylnaphthalene.

Potential pathways of exposure for those who may be on the site itself include direct skin contact with soil, accidental ingestion of soil, and inhalation of contaminated soil particles. If the site were to become residential or were to be retrofitted to another industrial use, construction activities would take place and exposures similar to those listed above could occur with the subsurface soil. Both construction workers and nearby residents could be receptors in this case.

At this time there is no direct impact to human health attributable to the groundwater contamination. The buildings on site are supplied by the municipal water system, and do not use the groundwater. No currently operating wells are drawing groundwater from the area of contamination, and groundwater contamination has not yet migrated as far as the river.

There is the possibility of future impact on human health. Ingestion of contaminated groundwater could occur under the following scenarios: wells were developed on site; the municipal well located across the Susquehanna was reactivated as a drinking water source; or if site contaminants were to migrate underneath the Susquehanna River into the more productive areas of the Clinton St.-Ballpark sole source aquifer.

3.4 Summary of Environmental Exposure Pathways:

The primary pathway of environmental exposure from the site would be the transport of contaminated sediments through the storm sewers to the Susquehanna River. While site contaminants are present at levels exceeding the sediment criteria in the storm sewer sediments adjacent to the site, river samples indicate that the contaminated sediment is not yet impacting the river. Another pathway would be the discharge of contaminated groundwater into the Susquehanna River. However, computations in the FS indicate that due to dilution, levels of contaminants if discharged to the river would be below levels of concern.

SECTION 4: ENFORCEMENT STATUS

The past owner/operators for the site include: the past site owners Robert and Mary McMahon, present site owners Leonard Almy and Louis Stilloe, and Almy Brothers, Inc.

These parties failed to implement the RI/FS at the site when requested by the NYSDEC. After the remedy is selected, they will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached, the NYSDEC will initiate the Remedial Action under the State Superfund.

The State of New York has filed claims against Almy Brothers, Inc., Leonard Almy, Louis A. Stilloe, and Robert J. McMahon and Mary A. McMahon in the U.S. District Court, Northern District of New York (Index No. 90-CV-818). The claims are pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. § 9601 et seq. and the New York State common laws of public nuisance and restitution. The State is seeking judgment requiring the defendants to remediate the site, reimburse the State for past and future costs, and reimburse the State for damages to the natural resources of the State.

SECTION 5: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1. These goals are established under the guideline of meeting all standard, criteria, and guidance (SCGs) and protecting human health and the environment.

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

The goals selected for this site are:

- Reduce, control, or eliminate the contamination present within the soils and sediment on site.
- Eliminate the threat to surface waters by eliminating any future contaminated surface run-off from the contaminated soils on site through the storm sewers to the river.
- Prevent, to the extent possible, migration of contaminants in the soils to groundwater.
- Prevent future exposures to the public and to on-site workers from air-borne vapors and dust.
- Provide for attainment of SCGs for groundwater quality at the limits of the area of concern (AOC).

SECTION 6: SUMMARY OF THE EVALUATION OF ALTERNATIVES

Potential remedial alternatives for the Almy Brothers site were identified, screened and evaluated in a Feasibility Study. This evaluation is presented in the report entitled Feasibility Study Report, ** [italics] November 1993. A summary of the detailed analysis follows.

6.1: Description of Alternatives

The potential remedies are intended to address the contaminated soils and sediments, groundwater, and vehicles USTs and debris at the site.

SOIL AND SEDIMENTS

In addition to the contaminated soil identified in Figures 3-8, included in the remedial alternatives for soil and sediment are contaminated soils contained in the drums in the alley, sediment from the storm sewers adjacent to the site, sediment from the sump in the basement of the 10 Jackson St. building, and contaminated soil and concrete located inside the buildings.

No Action

The no action alternative is evaluated as a procedural requirement and as a basis for comparison. The site would remain in its present condition, and human health and the environment would not be provided any additional protection.

Excavation and Off-Site Thermal Treatment

Present Worth:	$19,730,300
Capital Cost:	$19,730,300
Annual O&M:	0
Time to Implement:	6 months

In this alternative the contaminated site soil would be excavated, and contaminated sediments, as described above, would be removed from the storm sewers and basement sump. These soils and sediments, as well as the drummed soil from the alley, would be sent off-site for thermal treatment at a commercial, RCRA permitted rotary kiln incinerator, complying with all pertinent regulations. Excavated areas would be backfilled with clean soil, and revegetated or paved. After remediation, no further monitoring of site soils would be required.

Excavation, On-Site Base-Catalyzed Decomposition and Off-Site Incineration of the Residual

Present Worth:	$2,102,200
Capital Cost:	$2,102,200
Annual O&M:	0
Time to Implement:	12 months

In this alternative the contaminated soil and sediments would be excavated and treated on site by a process which chemically destroys the chlorinated pesticides and herbicides. A transportable treatment unit would be set up on the site and would process contaminated soils and sediments after they are excavated. The treated soil would then be replaced on the site. Site preparation activities such as establishment of utilities and construction of a concrete pad for the treatment unit would be required prior to installation of the unit. The material, once treated to concentrations below the site cleanup objectives for site contaminants (subject to verification sampling), would be placed back in the excavation, as per the RCRA Corrective Action Management Unit regulations, 40 CFR (Code of Federal Regulations) Part 264 Subpart S, as published in the 2/16/93 Federal Register. After remediation no O&M or further monitoring would be required.

The base-catalyzed decomposition unit would be a fully mobile system owned and operated by a commercial vendor using indirect heating at temperatures below 1000"F, negative pressure with low airflow, and a low oxygen atmosphere to prevent incineration from occurring. A bench-scale treatability study using contaminated soils from the site has been performed for this technology. Analytical results indicate that site contaminants would be destroyed to well below the site cleanup objectives for soil.

Due to the nature of the contaminants there is the potential for nuisance odors or dust during the excavation, handling and storage of the soils to be treated. These operations would be subject to an extensive air monitoring program and various control strategies would be implemented on site and at the perimeter as needed to control nuisance odors and dust. These considerations apply to all alternatives requiring excavation.

<u>Excavation, On-Site Solvent Extraction, and Off-Site Incineration of Residuals</u>.

Present Worth:	$4,768,400
Capital Cost:	$4,768,400
Annual O&M:	0
Time to Implement:	6 months

In this alternative, the contaminated soil and sediments would be excavated, and the contaminants extracted using a solvent extraction treatment unit. The extracted residual contaminants would then be sent off-site for incineration at a RCRA-permitted facility, and the treated soil replaced on the site. Site preparation activities such as establishment of utilities and construction of a concrete pad for the treatment unit would be required prior to installation of the unit.

The solvent extraction unit would be a fully mobile system owned and operated by one of several commercial vendors.

The treated material would be handled, and placed back in the excavation under similar considerations as the previous alternatives.

Excavation, On-Site Thermal Extraction , and Off-Site Incineration of Extract

Present Worth:	$3,754,800
Capital Cost:	$3,754,8000
Annual O&M:	0
Time to Implement:	6 months

In this alternative the contaminated soil and sediments would be excavated, and the contaminants extracted using a thermal extraction treatment unit. The extracted residual contaminants would then be sent off-site for incineration at a RCRA-permitted facility, and the treated soil replaced on the site. Site preparation activities such as establishment of utilities and construction of a concrete pad for the treatment unit would be required prior to installation of the unit.

The thermal extraction unit would be a fully mobile system owned and operated by one of several commercial vendors.

The treated material would be handled and placed back in the excavation under similar considerations as the previous alternatives.

GROUNDWATER

The location of the contaminated groundwater is localized in the alleyway where the original spill occurred. Groundwater remediation would focus upon both the herbicide contamination resulting from the contaminated soil, and upon the petroleum hydrocarbons from the leaking underground storage tanks.

No Action

Present Worth:	$403,100
Capital Cost:.	0
Annual O&M:	$26,200
Time to Implement:	NA

The no action alternative is evaluated as a procedural requirement and as a basis for comparison. The site would remain in its present condition, and human health and the environment would not be provided any additional protection. Contravention of a sole source aquifer at concentrations exceeding groundwater standards would continue unabated. The groundwater would be monitored on a regular basis.

Groundwater Recovery; On-Site Treatment (GAC)

Present Worth:	$102,040
Capital Cost:	$41,600
Annual O&M:	$ 29,483
Time to Implement:	6 months

In this remedial alternative and the following one, first action would be the removal of the identified sources of groundwater contamination, primarily the herbicide contaminated soil in the alleyway and the

Underground Storage Tanks along with any associated contaminated soil. The removal process is described under alternatives for soil and sediment, and for vehicles, Underground Storage Tanks, and debris. During the excavation, the groundwater will be evaluated to determine whether a non-aqueous phase liquid (NAPL) layer or other high levels of contaminants exist that could act as a continuing source of contamination to the groundwater. If such a contaminant source to the groundwater does exist, contaminated groundwater would be removed and treated as follows :

- Design a groundwater recovery system to recover NAPL and/or heavily contaminated groundwater as expeditiously and as thoroughly as is practical.

- Remove groundwater at a rate determined during the design.

- Construct an on-site water treatment system to remove organic compounds from groundwater. The treatment system will include particulate removal and granular activated carbon (GAC) unit(s) to remove the organic contaminants from the groundwater. Additional pretreatment to remove metals, such as iron and manganese may also be necessary as the metals could decrease the effectiveness of the GAC.

- Discharge treated groundwater to a POTW or to the Susquehanna River.

- Send the spent carbon off site for incineration at a RCRA permitted facility.

Contaminated water from the sump in the basement of the building at 10 Jackson St. would also be treated by the system to remove organic contaminants.

Continued groundwater recovery and treatment system operation and maintenance, as well as monitoring of groundwater quality and piezometric levels would be performed on a regular basis to ensure continued effectiveness of the system. Monitoring and recovery data would be evaluated continuously to determine the necessity of continued system operation. The present worth cost estimate is based upon a two year base line for the length of remediation.

<u>Groundwater Recovery; On-Site Treatment (UV Oxidation)</u>

Present Worth:	$248,673
Capital Cost:	$ 47,060
Annual O&M:	$ 47,060
Time to Implement:	6 months

As with the remedial alternative described above, the known sources would be removed. If a layer of NAPL or other source exists, groundwater would be removed and treated as follows:

- Design a groundwater recovery system to recover the NAPL and/or heavily contaminated groundwater as expeditiously and as thoroughly as is practical.

- Remove groundwater at a rate determined during the design.

- Construct an on-site water treatment system to remove organic compounds from groundwater. The treatment system would utilize ultraviolet light and hydrogen peroxide to catalyze the chemical oxidation of organic contaminants in water. Additional pretreatment to remove iron would be necessary since the presence of high concentrations of iron and manganese would hinder the UV absorption capacity of the water.

- Discharge treated groundwater.

Contaminated water from the sump in the basement of the building at 10 Jackson St. would also be treated by the system to remove organic contaminants.

Continued groundwater recovery and treatment system operation and maintenance, as well as monitoring of groundwater quality and piezometric levels would be performed on a regular basis to ensure continued effectiveness of the system. Monitoring and recovery data would be evaluated continuously to determine the necessity of continued system operation. The present worth cost estimate is based upon a two year baseline for the length of remediation.

As described in the previous alternative, the need for continued groundwater extraction and treatment would be evaluated following completion of the other remedial alternatives.

VEHICLES, USTs AND DEBRIS

No Action

The no action alternative is evaluated as a procedural requirement and as a basis for comparison. The site would remain in its present condition, and human health and the environment would not be provided any additional protection.

Decontamination and Off-Site Disposal

Present Worth:	248,600
Capital Cost:	$248,600
Annual O&M:	0
Time to Implement:	6 months

The sprayer tank truck, pickup truck, and miscellaneous debris such as debris from the basement sump and metal beams in the alleyway, would be cleaned (i.e., decontaminated) and sent to a scrap yard for recycling or to a permitted landfill for disposal. The rinsate would be treated by granular activated carbon. The clean water would be discharged, and the carbon sent for off site incineration at a RCRA permitted facility.

The contaminated water in the sump in the basement of the 10 Jackson St. building would be treated by granular activated carbon. The clean water would be discharged, and the carbon sent for off site incineration at a RCRA permitted facility.

The contents of the three underground storage tanks located behind the Almy Brothers building would be removed and the aqueous phase either treated on site, by activated carbon, or sent along with the non-aqueous phase for off site treatment at a permitted TSDF. The tanks would be excavated, decontaminated and disposed off site as scrap, The adjacent contaminated soil would be excavated and, depending upon analytical results, either treated on site or disposed of off site at a permitted facility, and the excavation filled with clean soil.

There is the potential for nuisance air emissions during the cleaning due to the high levels of contaminants present. These operations would be subject to an extensive air monitoring program, and various control strategies would be implemented on site as needed to control these emissions.

6.2 Evaluation of Remedial Alternatives

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

The first two evaluation criteria are termed threshold criteria and must be satisfied in order for an alternative to be considered for selection.

1. Compliance with Applicable Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

SOIL AND SEDIMENT

The no-action alternative would not meet SCGs, as uncontrolled listed hazardous waste would remain on site. Off-site incineration would meet SCGs as there now exists a commercial incinerator permitted to incinerate dioxin-contaminated materials. The three on-site treatment alternatives, base-catalyzed decomposition, thermal extraction, and solvent extraction, would meet SCGs, under the new Corrective Action Management Unit (CAMU) regulations referenced above.

GROUNDWATER

The no-action alternative would not meet SCGs, as groundwater contaminant levels currently exceed the MCLs. Treatment of groundwater with Granular Activated Carbon (GAC) would meet treatment SCGs, as the GAC, which would become an F027 listed hazardous waste, would be sent to an off-site incinerator permitted to incinerate dioxin-contaminated materials. Treatment of groundwater on site with UV oxidation would meet treatment SCGs, as the groundwater contaminants would be destroyed. It is uncertain whether groundwater contaminant concentrations would be reduced to beneath the MCLs by removing and treating the groundwater, whether with GAC or UV oxidation, given the limitations of removal and treatment technologies in removing all of the contaminant mass (discussed under Criteria 4, long-term effectiveness and permanence). However, most of the contaminant mass, both of herbicides and of petroleum hydrocarbons resulting from the leaking Underground Storage Tanks, would be removed from the groundwater and destroyed.

VEHICLES AND DEBRIS

The no-action alternative would not meet SCGs. The treatment and off-site disposal alternative would meet SCGs under the newly promulgated regulations regarding the disposal of contaminated debris (40 CFR Parts 148, 260, 261, 262, 264, 265, 268, 270 and 271, Final Rule for Land Disposal Restrictions for Newly Listed Wastes and Hazardous Debris).

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

Each of the remedial alternatives, except the no action alternatives, would be protective of human health and the environment. Alternatives determined to not be protective of human health and the environment, such as capping the site, were eliminated from consideration during the preliminary screening conducted in the FS.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

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

SOIL AND SEDIMENTS

The no action alternative would have the least short-term impact.

The excavation required for the four treatment alternatives involves the risk of odors and fugitive dust emissions; this can be addressed with standard engineering and operational controls. Off-site incineration would involve potential impacts resulting from the transportation of contaminated soils. Multiple runs of the soil through the thermal desorption or the solvent extraction process may be required to achieve the clean-up objectives, while the BCD process is expected to achieve site cleanup objectives in one run. As a result, the BCD process would have the least materials handling of the on-site treatment options, resulting in less possibility of odors or fugitive dust emissions. The BCD process would also require less space for materials handling, since the soil would not have to be stockpiled for additional treatment.

The BCD process, with its indirect, low temperature heating, and resulting low air flow, would have less short-term impact from air emissions than the thermal and solvent extraction processes. thermal extraction operating under the same conditions of indirect, low temperature heating and low air flow would also have low air emissions. However, because of the multiple runs possibly required to achieve the clean-up objectives, the processing time per ton of soil would be greater than for the BCD process, resulting in higher total air emissions. In addition, most of the thermal extraction units commercially available use direct heating with forced hot air, which significantly increases the volume of air emissions. Any air emissions from the base-catalyzed dechlorination or the thermal or solvent extraction process would be treated using air emission controls such as activated carbon. However, the air emissions treatment train for thermal or solvent extraction would be both larger, increasing the amount of space required, and more complex, increasing both the cost and the maintenance requirements.

Excavation and off-site incineration would require less time on site to implement, although when the off-site operations are considered, implementation time would be equivalent to the other three treatment alternatives. The on-site implementation time of the base-catalyzed decomposition, thermal extraction and solvent extraction processes would be similar.

GROUNDWATER

Workers involved with the installation of the groundwater recovery and treatment system may come in direct contact with the groundwater. This potential exposure would be minor and would be easily mitigated with protective equipment.

#While under both groundwater treatment alternatives the decision whether groundwater treatment is necessary would not be made until the UST removal, the treatment system would already be on site for treating water from the sump in the 10 Jackson St. building and for treating the debris decontamination fluids. Therefore, there should be no delay in implementing groundwater treatment.

VEHICLES, USTS, AND DEBRIS

The no action alternative would have the least short-term impact, followed by off-site treatment and disposal. On-site treatment may generate odors, which would be controlled as necessary by standard construction practices.

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

SOIL AND SEDIMENTS

Off-site incineration would have the greatest long-term effectiveness, as the contaminated soil and sediments would be permanently removed from the site and destroyed.

Base-catalyzed decomposition, thermal extraction, and solvent extraction would result in the separation and removal of the site contaminants to beneath the soil cleanup objectives. Based upon the results of the BCD treatability study, the BCD process would be most effective in treating the soil to beneath the cleanup objectives. The thermal extraction process could also achieve the cleanup objectives. However, multiple passes of the soil through the treatment process, and higher temperatures during the process, would probably be required. Solvent extraction is less effective than thermal extraction in removing contaminants from the soil, with concentrations of semivolatile organics remaining in the soil. The no-action alternative would have the least long-term effectiveness, as there would be no controls to prevent human exposure to contaminants.

GROUNDWATER

The no action alternative would depend upon the gradual natural flushing of contaminants from the soil. If no source control actions were taken, the concentrations of contaminants in the groundwater may decrease extremely slowly. However, the extent of the groundwater contamination source areas and the heavily contaminated groundwater is not fully definable, making it impossible to predict the extent to which contaminant concentrations in the groundwater would decrease.

If the known sources of groundwater contamination were removed, i.e. the contaminated soil, the underground storage tanks, and any free product in the groundwater, as specified in both of the removal and treatment alternatives, the time required for natural attenuation would be significantly reduced. The effectiveness of removal and treatment technologies in reducing concentrations of all of the contaminants of concern to beneath the site cleanup objectives is questionable, as concentrations of many of the contaminants are already near the lower limits of what can be achieved with removal and treatment technologies. An additional difficulty at this site is the large quantities of water in the aquifer and high porosity of the soil, which increases the volume of water which must be treated. However, with the source control actions, most of the contaminant mass impacting the groundwater would be removed and destroyed, and contaminant concentrations in the groundwater could be modeled and would be monitored to determine if further treatment is necessary.

VEHICLES, USTs AND DEBRIS

The cleaning and off-site disposal of the vehicles and debris, treatment of the sump water, and the excavation and removal for treatment of the USTs and the adjacent contaminated soil would have the greatest long-term effectiveness and permanence, as the contaminants would be destroyed.

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

SOIL AND SEDIMENTS

Off-site incineration would have the greatest reduction of toxicity, as contaminants would be destroyed to 99.9999% efficiency. Base-catalyzed decomposition, thermal extraction, and solvent extraction would in that order be next in permanence, as the contaminants would be destroyed to below the site cleanup objectives. As discussed under the previous criterion, the BCD process appears to have the best destruction efficiency of the on-site treatment methods, followed by thermal extraction, then by solvent extraction. The no-action alternative would not reduce the toxicity, mobility or volume of the contaminants.

GROUNDWATER

Removing and treating the sources of groundwater contamination, including any NAPL layer in the groundwater, would destroy most of the contaminant mass impacting the groundwater. The no-action alternative would not reduce the toxicity, mobility, or volume of the contaminants.

VEHICLES, USTS & DEBRIS

On-site cleaning of the vehicles and debris, and disposal of the rinsate by incineration, would permanently destroy the contaminants. Excavation and treatment of the USTs, their contents, and the adjacent contaminated soil would either destroy or reduce the mobility of the contaminants, and would eliminate a source of long-term groundwater contamination.

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

SOIL AND SEDIMENTS

The no-action alternative requires no construction or operation, and therefore is easily implemented.

The existence of one incinerator with the proper permits to incinerate F027 wastes means that off-site incineration is implementable, although administratively, gaining approval of a sole-source contract can be difficult.

The treatment system for base-catalyzed dechlorination is available commercially, and has been used at other hazardous waste sites in the country. It will be able to operate in the limited space available on the site with the treatment unit itself requiring a space approximately 40' by 80', and the associated materials handling requiring approximately 40' by 120'. The treatment process is relatively simple, and is expected to have few operational difficulties.

The treatment systems for thermal and solvent extraction are also available commercially, and have also been used at other sites. The treatment processes for both are more complicated than for the BCD process, and would generate a number of waste streams. Most of the commercially available units are sized for a significantly larger volume per day. In addition, as discussed under short-term effectiveness, since the soil would probably require multiple runs through the process to achieve the cleanup objectives, more space would be required for materials handling. As a result, it may be more difficult to find a commercially available unit capable of operating in the limited space available on the site. The larger volume per day capacity would also make it less cost-effective for a site such as this, with under 1000 cubic yards of soil to treat.

GROUNDWATER

The no-action alternative does not require any construction or operation, and therefore is readily implementable. The on-site treatment alternatives are readily constructable and implementable using routinely available equipment and techniques, although the UV oxidation equipment is somewhat more sophisticated than the carbon treatment equipment. Operation and maintenance of the UV oxidation equipment is more labor intensive than for the carbon, but is routinely available.

The sources of contamination in the groundwater include both the herbicide-contaminated soil and petroleum hydrocarbons from the underground storage tanks. Because of the presence of hazardous wastes in the groundwater, site remediation will be implemented by the inactive hazardous waste site program, rather than the oil spills program, which would respond to a typical petroleum hydrocarbon groundwater contamination.

VEHICLES, USTS AND DEBRIS

The no action alternative has a higher degree of administrative feasibility than the on-site cleaning alternative since it would require only minimal coordination. However, the treatment alternative would alleviate the need for future actions.

Because of the presence of pesticides in the surface soils and in two of the USTs, site remediation will be implemented by the inactive hazardous waste site program, rather than the oil spills program, which would usually address removal of leaking USTs.

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 1.

This final criterion is considered a modifying criterion and is taken into account after evaluating those above. It is focused upon after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance. Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan have been evaluated. The "Responsiveness Summary" included as Appendix A presents the public comments received and the Department's response to any concerns raised. In general, the community was supportive of the selected remedy.

SECTION 7: SUMMARY OF THE SELECTED REMEDY

Based upon the results of the RI/FS, the evaluation presented in Section 7, and consideration of public comments, the NYSDEC has selected the following remedy for this site:

- Soil and Sediments: excavation, on-site base-catalyzed decomposition and off-site incineration of the residual.

- Groundwater: groundwater recovery, and on-site treatment with granular activated carbon. The following activities are included:

  - Removal of sources of groundwater contamination as part of the other two remedial alternative categories:
  - Removal of any NAPL layer by groundwater extraction and treatment with granular activated carbon and off-site incineration of the carbon; and

    - Evaluation of the need for continued groundwater treatment, based upon groundwater monitoring analytical results.

- Debris: decontamination and off-site disposal. The following activities are included:

    - Decontamination and off site disposal of two contaminated vehicles, debris, and underground storage tanks;
    - On-site treatment or off-site disposal of the ust contents;
    - treatment or off site disposal of the associated contaminated soil;
    - on-site treatment of the sump water; and
    - offsite incineration of the drums of miscellaneous wastes.

This selection was based upon the following reasoning:

Soil:

The no-action alternative does not meet SCGs and is not protective of human health and the environment. All four treatment alternatives meet the SCGs, and are protective of human health and the environment.

All of the treatment alternatives would be long-term, effective remedies for the soils and sediments, as the contaminants would be destroyed to below the site cleanup objectives for soil. However, previous treatability studies have shown solvent extraction to be less effective than the other treatment alternatives at achieving the site cleanup concentrations for the compounds of concern in soils. Thermal extraction is more effective than solvent extraction, but multiple passes of the soil through the process, and higher process temperatures, would be required to achieve the removal efficiency of the BCD process. Reduction of toxicity, mobility, or volume would be accomplished by the destruction of the site contaminants. While incineration provides the greatest degree of destruction, both thermal extraction and base-catalyzed decomposition treatment are expected to successfully meet these objectives.

The short-term impacts of all four treatment alternatives are easily controlled by standard construction methods. Off-site incineration would have the fewest short-term impacts, with base-catalyzed decomposition being the next most desirable, followed by thermal extraction.

Thermal and solvent extraction have been frequently used on other sites, and from that perspective would be the most implementable. However, it may be difficult for these alternatives to operate in the limited space available on this site. Implementation of off site incineration depends upon the continued availability of the one incinerator in the country that is permitted to incinerate F027 wastes. Although base-catalyzed decomposition is a relatively new technology, it has been demonstrated at other sites, and a small-scale unit is available. A treatability study has been completed using contaminated site soil, demonstrating that this technology is successful in treating soil from this site.

Since all four treatment alternatives meet all the evaluation criteria, and the BCD treatment system appears to meet the evaluation criteria to a higher degree overall than the others in terms of such criteria as effectiveness, short-term impact, and cost, BCD was selected as the preferred remedial alternative.

Groundwater:

Although present information indicates that there are no known completed pathways for human exposure to the contaminated groundwater, future exposure is possible under the three future use scenarios described in section 4.3. The groundwater contaminants include both herbicides from the contaminated soils on site, and petroleum hydrocarbons from the leaking underground storage tanks.

The no action alternative would not prevent potential future exposure to the groundwater, and therefore is not protective of human health. The no action alternative would also do nothing to reduce the contaminant mass or lower the contaminant levels in a sole source aquifer to beneath the drinking water standards , and therefore would not meet the SCGs. Because the concentrations of contaminants are near or below the concentrations that could be achieved by groundwater extraction and treatment, the remedial alternatives focus upon removing and destroying most of the contaminant mass impacting the groundwater. This would allow natural attenuation to occur, which would mitigate to the extent practicable the threat to human health. The treatment alternatives also provide for an evaluation of the need for further remedial action if groundwater monitoring indicates that natural attenuation is not occurring. Therefore, one of the two treatment alternatives will be chosen.

The two treatment alternatives are equivalent with respect to short and long term effectiveness, and the reduction of toxicity, volume, or mobility. The GAC alternative is both easier to implement than the UV oxidation, and less expensive, and as a result is the selected alternative.

VEHICLES, DEBRIS AND USTS:

The no action alternative is not protective of human health, and is therefore rejected. The treatment alternative will be protective of human health by destroying the contaminants or removing the contaminated media to a secure landfill. This alternative meets all of the evaluation criteria, including long term effectiveness and permanence, and reduction of toxicity, mobility, or volume, and is the alternative selected for the site.

SECTION 8: SUMMARY OF CITIZEN PARTICIPATION ACTIVITIES

As part of the remedial investigation process, a citizen participation plan was developed for the Almy Brothers site. The principal objectives of the Citizen Participation Plan are: inform the public about conditions at the site; educate the public about the PRAP; obtain public comment on the PRAP; obtain support (community acceptance) of the remedial action; and ensure that all comments obtained from the public are evaluated and answered in a Responsiveness Summary.

The following public participation activities were conducted for the site:

- March 20, 1991 — Public meeting to present the N/FS Work Plan
- July 15, 1993 — Public meeting to present the results of the Remedial Investigation
- December 27, 1993 — Start of the Public Comment Period for the Proposed Remedial Action Plan (PRAP)

- January 12, 1994 — Public meeting to present the Proposed Remedial Action Plan, and *receive public comment*
- January 25, 1994 — Close of the Public Comment Period for the PRAP

Table 1

Recommended Cleanup Objectives

Contaminants of Concern	Soil (ppm)	Groundwater (ppm)	Sediment (ppm)
2,4,5-TP (Silvex)	0.70	.00026	NA
2,4,5-T	0.70	NA	NA
2,4-D	0.50	.0044	NA
4,4'-DDT	0.07	NA	0.02
4,4'-DDD	NA	NA	0.02
Total Chlordane	0.11	0.0001	NA
Endrin	0.10	NA	NA
Aldrin	NA	NA	0.002
Dieldrin	0.001	ND0.001	ND
Endosulfan	NA	NA	0.0006
Cadmium	10	NA	NA
Chromium	50	NA	NA
Toluene	1.5	NA	NA
Ethylbenzene	5.5	.005	NA
Benzene	NA	.0007	NA
Xylenes (total)	1.2	.005	NA
Naphthalene	13	NA	NA
2-Methylnaphthalene	36.4	.005	NA

NA Compound not identified as a Contaminant of Concern for this media

Table 2

Remedial Alternative Costs

Alternative	Capital Cost	Annual O&M	Present Worth
Soil:			
● No Action	$0	0	$0
● Off-Site Thermal Treatment	$19,730,300	0	$19,730,300
● On-Site Base-Catalyzed Decomposition Treatment	$2,102,200	0	$2,102,200
● On-Site Solvent Extraction	$4,768,400	0	$4,768,400
● On-Site Thermal Extraction	$3,754,800	0	$3,754,800
Groundwater:			
● No Action (Monitoring)	$0	$26,200	$403,100
● Groundwater Recovery, On-Site Treatment (Carbon)	$41,600	$29,483	$102,040
● Groundwater Recovery, On-Site Treatment (UV Oxidation)	$152,200	$47,060	$248,673
Vehicles, USTs and Debris:			
● No Action	$0	0	$0
● Decontamination, Off-Site Disposal	$248,600	0	$248,600

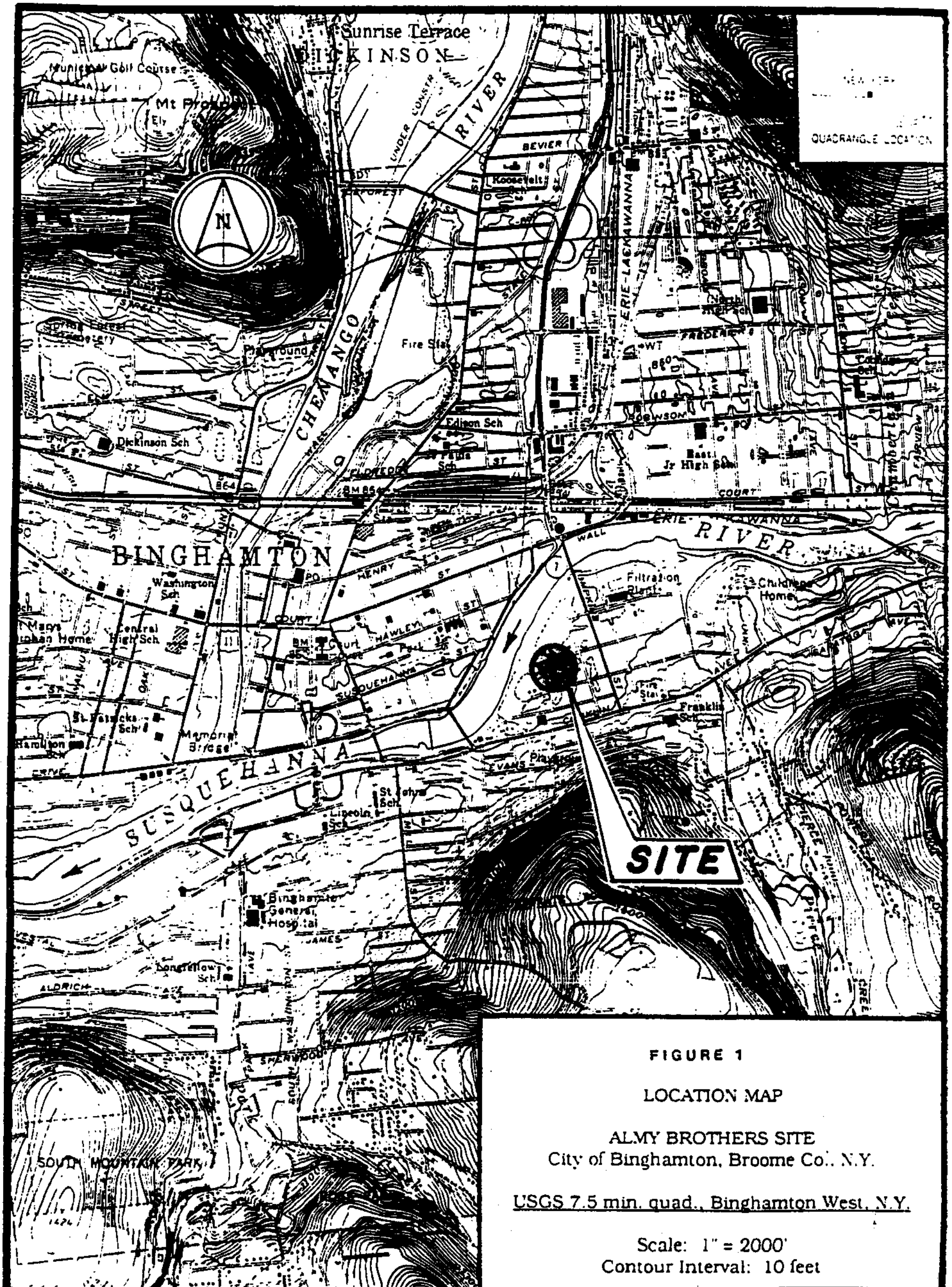


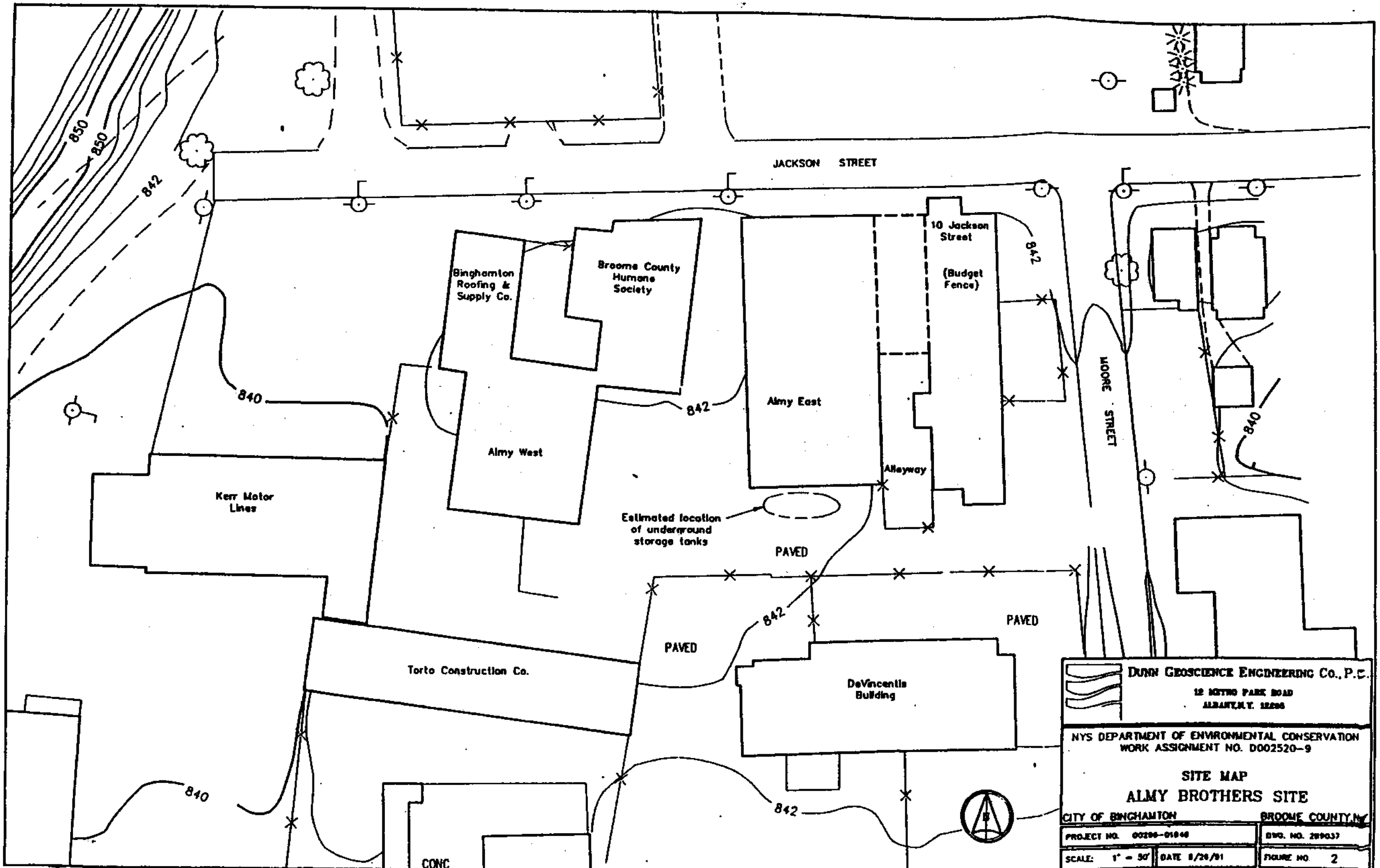
FIGURE 1

LOCATION MAP

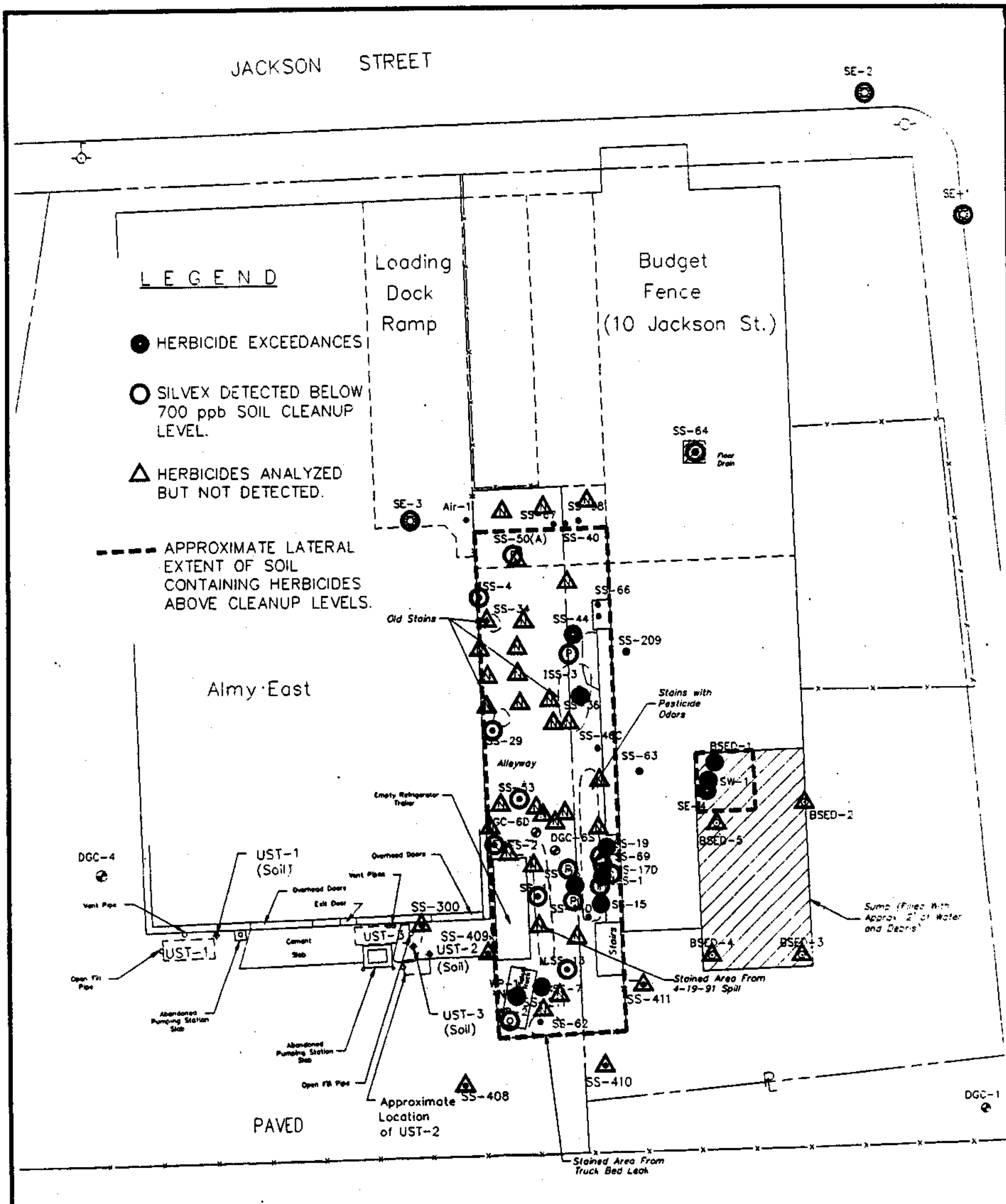
ALMY BROTHERS SITE
City of Binghamton, Broome Co., N.Y.

USGS 7.5 min. quad., Binghamton West, N.Y.

Scale: 1" = 2000'
Contour Interval: 10 feet

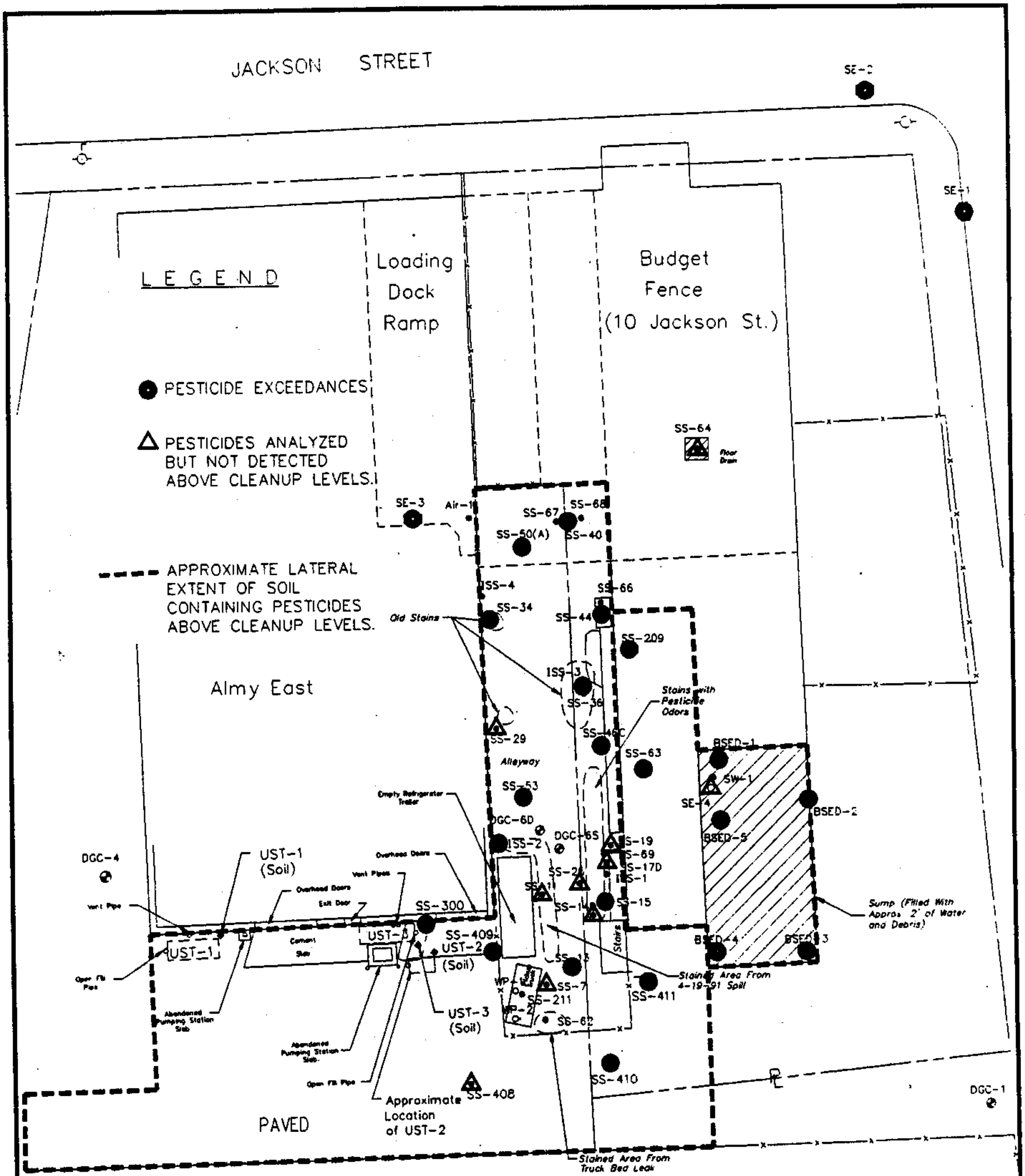


JACKSON STREET
MOORE STREET
850
850
842
840
842
842
842
842
840
840
10 Jackson Street
(Budget Fence)
Binghamton Roofing & Supply Co.
Broome County Humane Society
Almy West
Almy East
Alleyway
Kerr Motor Lines
Estimated location of underground storage tanks
PAVED
PAVED
PAVED
Torto Construction Co.
DeVincentis Building
CONC
DUNN GEOSCIENCE ENGINEERING Co., P.C.
12 METRO PARK ROAD
ALBANY, N.Y. 12205
NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WORK ASSIGNMENT NO. D002520-9
SITE MAP
ALMY BROTHERS SITE
CITY OF BINGHAMTON
BROOME COUNTY, NY
PROJECT NO. 00296-01946
DWG. NO. 289037
SCALE: 1" = 50'
DATE 8/28/91
FIGURE NO. 2



DUNN ENGINEERING COMPANY 12 Metro Park Road Albany, NY 12205	NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION SUMMARY OF MEDIA IN EXCESS OF CLEANUP STANDARDS – ALLEYWAY City of Binghamton — Broome Co., NY

PROJECT NO. 296-1946	DATE 9/93	DWG. NO. A9037EH	SCALE 1"=30'	FIGURE NO. 3



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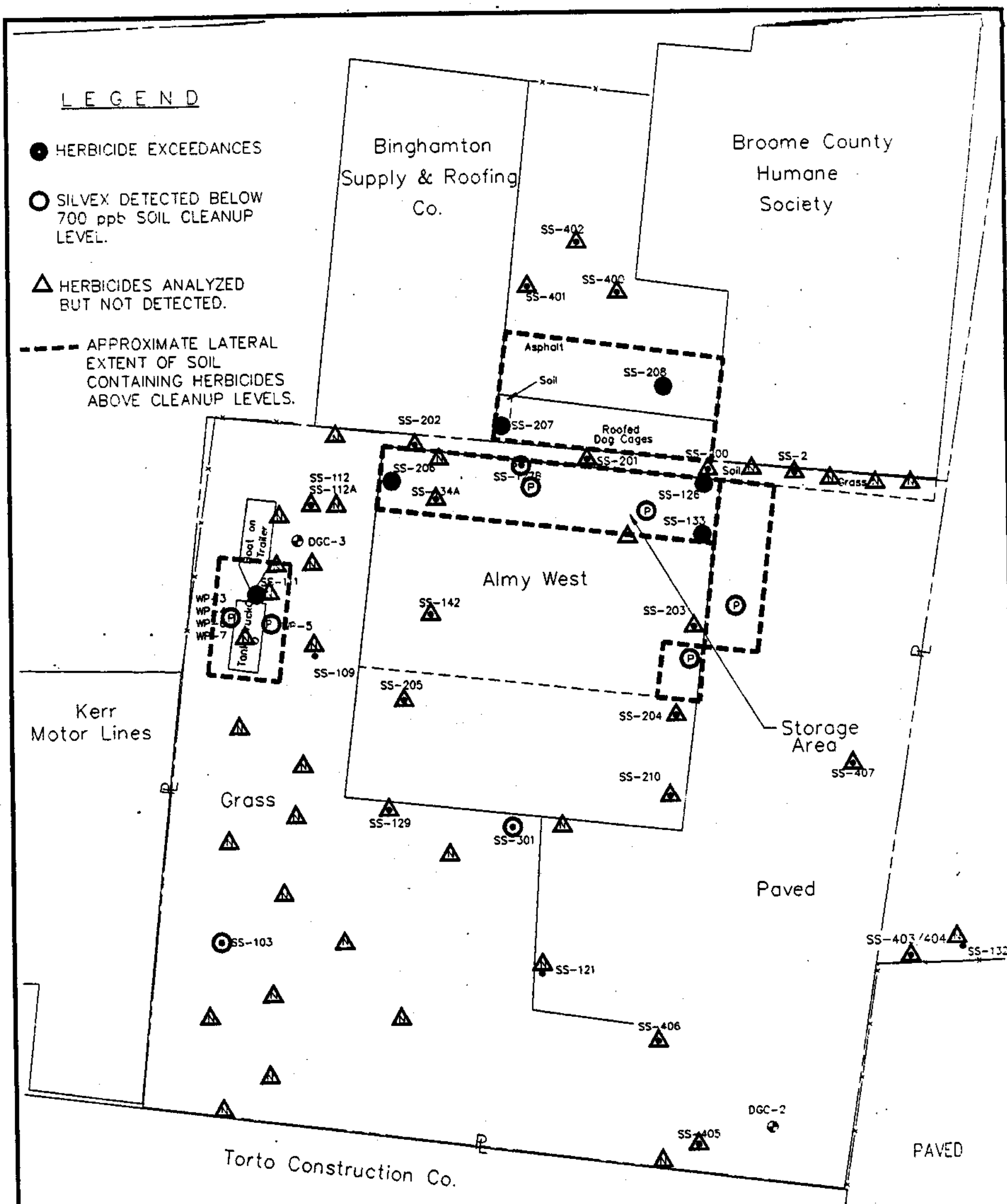
NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SUMMARY OF MEDIA IN EXCESS OF CLEANUP STANDARDS – ALLEYWAY

City of Binghamton — Broome Co., NY

PROJECT NO. 296-1946	DATE 9/93	DWG. NO. A9037EP	SCALE 1"=30'	FIGURE NO. 4



DUNN ENGINEERING COMPANY
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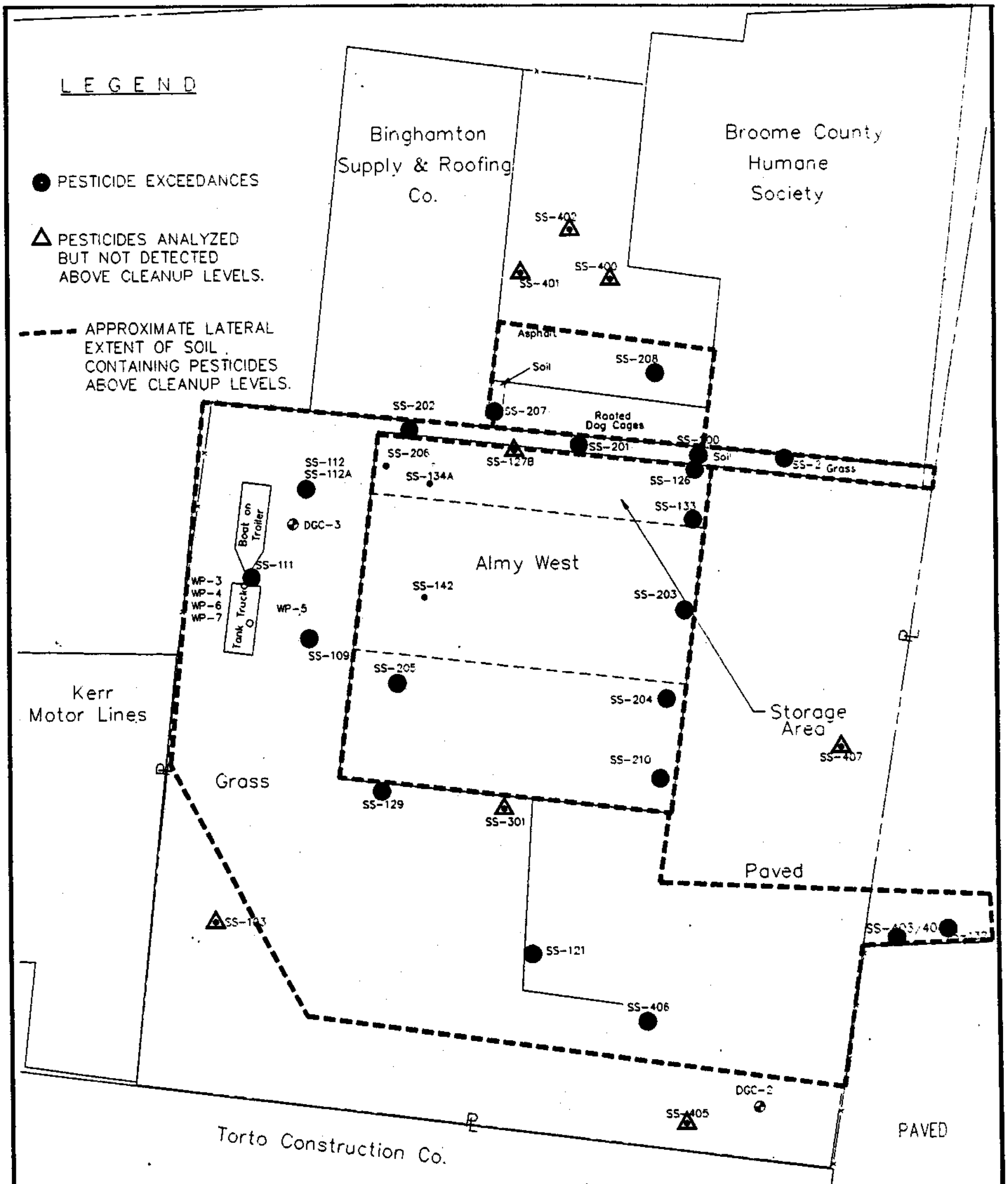
Albany, NY 12205

NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WORK ASSIGNMENT NO. D002520-9
SUMMARY OF MEDIA IN EXCESS OF CLEANUP STANDARDS – WEST AREA
ALMY BROTHERS SITE
City of Binghamton — Broome Co., NY

PROJECT NO. 293-1946	DATE 9/93	DWG. NO. A9037WH	SCALE 1"=30'	FIGURE NO. 5



DUNN ENGINEERING COMPANY
12 Metro Park Road
Albany, NY 12205

NYS DEPARTMENT OF ENVIRONMENT CONSERVATION
WORK ASSIGNMENT NO. D002520-9
SUMMARY OF MEDIA IN EXCESS OF CLEANUP STANDARDS – WEST AREA
ALMY BROTHERS SITE
City of Binghamton Broome Co., NY

PROJECT NO. 296-1946	DATE 9/93	DWG. NO. A9037WP	SCALE 1"=30'	FIGURE NO. 6

APPENDIX A

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

for the

PROPOSED REMEDIAL ACTION PLAN

Almy Brothers Inactive Hazardous Waste Site

Binghamton, Broome County

Site No. 7-04-021

The Proposed Remedial Action Plan (PRAP) was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the local document repository on December 27, 1993. This Plan outlined the preferred remedial measures proposed for remediation of the Almy Brothers site. The preferred remedy consists of:

* excavation and removal of contaminated soil and sediments, and on-site treatment using the Base-Catalyzed Decomposition process, followed by placing the treated soil back on site and sending the condensate off-site for incineration.

* Removal of contaminated groundwater, and treatment using granular activated carbon.

* Decontamination and off-site disposal of contaminated vehicles, underground storage tanks, and debris.

The release of the PRAP was announced via a notice to the mailing list, informing the public of the PRAP's availability

A public meeting was held on January 12, 1994 which included a presentation of the PRAP and discussion of the proposed remedy and at which comments on the proposed remedy were recorded and transcribed. These comments have become part of the administrative record for this site. No written comments on the PRAP were received.

This Responsiveness Summary responds to all questions and comments raised at the January 12, 1994 public meeting which relate to the selection of the proposed remedy. Several of the questions and comments at the public meeting dealt with issues not related to the proposed remedial action. These included the Department's initial spill response action, and an underlying criminal enforcement action. As the Responsiveness Summary is intended to deal only with public comments on the proposed remedy and its selection, these questions and comments have not been responded to here. The transcript from the meeting is available in the document repositories.

The following summarizes the comments received at the public meeting related to the PRAP, and provides the State's response.

Commentor: Robert McMahon:

1. What is the contamination level in the test that you have in the first 33 barrels?

   RESPONSE: Analytical results of soil samples collected during the Remedial Investigation (RI) from the first 33 drums of contaminated soil generated during the spill response action are included in the Remedial Investigation Report, on pp. 44 and 45, for sample numbers DMSS-1-2, DMSS-2-15, DMSS-3-27, DMSS-4-5, and DMSS-5-22. These pages are included as Attachment 1 to this summary.

2. The compounds found on the site are not toxic. I have requested information on the health effects of the herbicides found at the site, 2,4-D, 2,4,5-T, and Silvex, and have never received anything.

   RESPONSE: The statement that the compounds on the site are not toxic is inaccurate. Information regarding the toxicity of the site specific contaminants 2,4-D, 2,4,5-T and Silvex (2,4-,5-TP) has been placed in the document repository. Anyone wishing to receive this information as an individual mailing should send a letter requesting the material to:

   The Health Liaison Program (HeLP)
   NYS Department of Health
   2 University Place
   Albany, NY 12233

   The information will be sent at no charge.

3. The federal government has spent ten million dollars according to the press and they have yet to find anything wrong with brush killer, even Agent Orange in Vietnam. They said there is no hazard to the environment.

   RESPONSE: Information regarding the toxicity of 2,4-D, 2,4-,5-T and Silvex (2,4-,5-TP) is available at the document repository and by mail, as noted above. Agent Orange was not disposed of at this site, however two components of that formulation, 2,4-D and 2,4-,5-T, are found at the Almy Brothers Site. Both of these herbicides are found in soils at the site in concentrations exceeding the recommended cleanup level.

   The U.S. military forces sprayed millions of gallons of herbicides over South Vietnam between 1962 and 1971. Much of what they sprayed was Agent Orange. In 1993, the U.S. National Academy of Sciences (NAS) Institute of Medicine's Committee to Review the Health Effects in Vietnam Veterans of Exposure to Herbicides released a report that linked exposure to Agent Orange and five adverse health conditions. The Committee found "sufficient" evidence to conclude that there is a positive association between herbicides and three types of cancer (soft tissue sarcoma, non-Hodgkin's lymphoma and Hodgkin's disease) and two skin diseases (chloracne and porphyria cutanea tarda). The category of "sufficient evidence" represents the strongest link between adverse health effects and exposure to herbicides.

4. What did you find in the barrels on the truck?

RESPONSE: The analytical results of samples collected during the RI from the one drum identified as having been on the truck and containing product can be found in the RI Report, on p-41, for sample numbers DM-S-Comp and DM-G2-S. This page is included as Attachment 2 to this summary.

5. The spill took place over a sole water source. Do you know how much area is included in this?

RESPONSE: The spill took place over the Clinton St.-Ballpark Sole Source Aquifer, which serves as the primary drinking water source for Johnson City and Endicott. The boundaries of the aquifer are shown in Appendix F of the RI Report. A copy of a figure from Appendix F which shows the aquifer boundary is included as Attachment 3 to this summary.

6. Are you going to run all that soil through?

RESPONSE: We are going to treat the soils on this site which exhibit levels of the chemicals of concern above cleanup levels determined by the New York State Department of Health (NYSDOH) as protective of human health, and by the NYSDEC as protective of groundwater. This is estimated to be about 900 cubic yards of material from the areas of the site shown on the figure in Attachment 4.

Commentor: Matt Ryan:

7. The PRAP seems to be pushing the dechlorination process versus the thermal extraction process. I would like to see a little comparison between the two.

RESPONSE: Thermal extraction and Base-Catalyzed Decomposition (BCD) are very similar processes. In fact, the BCD process is initiated with a thermal extraction phase. In the BCD treatment process, the soil is indirectly heated, by running hot oil through the interior of the screw mechanism, to raise the temperature of the soil to approximately 650°F. At the beginning of this heating phase the soil is treated with compounds which start the decomposition process and enhance volatilization of the contaminants, therefore making it easier to remove them from the soil. The contaminants are volatilized out of the soil, and are then condensed. The condensate is treated again with the compounds which break them down by removing the chlorine atoms from the molecules. The resulting material, which consists of non-hazardous hydrocarbons and other breakdown products, will be disposed of by sending it off-site for incineration.

In a thermal extraction process, the soil would also be heated, and the contaminants volatilized out of the soil. The contaminants are then condensed out of the air stream, and sent off-site for incineration. Most thermal desorption units heat the soil by blowing large volumes of hot air through the soil, at rates of up to fifteen thousand cubic feet per minute. The process heats the soil to temperatures of up to 1400°F. This volume of air is treated by emission control processes such as oil and water scrubbers.

A number of areas of comparison between the two systems which favor the BCD process are discussed below.

Volume of Air Emissions: The BCD treatment unit would emit approximately 100 to 200 cubic feet per minute of air, which is similar to the output of an average bathroom fan. The air would be treated using activated carbon to remove any contaminants. Thermal extraction units using indirect heating would have similar volumes of air emissions, however, most of the thermal extraction units commercially available directly heat the soil using hot air. These units typically discharge 10,000 to 15,000 cubic feet per minute, much higher than the BCD treatment unit, requiring a much larger and more extensive air treatment system. The size of the unit to be used is a concern at this site due to its small area.

Noise: Because of the much higher volume of air blown through the unit, the thermal extraction unit is significantly more noisy than the BCD treatment unit due to the additional equipment needed. This is a concern at the site because of its proximity to a residential neighborhood, making the BCD process a more appropriate choice for this site.

Effectiveness: In the BCD treatability study performed using site soils, the concentrations of herbicides and pesticides in the soil after treatment, and in the condensate before and after treatment, were below the detection limits of the laboratory, which in turn were well below the site cleanup objectives indicating that the BCD treatment is highly effective. Historically, thermal extraction has not been able to match these results without running the unit at higher temperatures.

Area Required for the Process: The BCD treatment unit needs a space of approximately 40' by 80', with an additional 40' by 40' for operating room (stockpiling soil, etc.). Almost all commercially available thermal extraction units require more operating room than is available on the site.

Availability of Units: At this time one firm has been licensed by EPA to use this technology, and will have available in the near future the treatment unit described above. In addition, other firms expect to receive their license in the near future. As mentioned above, most thermal extraction units are significantly larger than the BCD treatment, and are typically available only for sites with a minimum of 5000 cubic yards of contaminated soil, as opposed to the approximately 900 cubic yards of soil at this site. In addition, most of the commercially available units are too large to fit on the site.

8. This sounds like a new technology versus thermal extraction, which is a more developed technology. How sure are you that this technology will work throughout the whole process?

RESPONSE: Thermal extraction has an established track record at sites with contaminants such as oil and PCBs. The process is well developed and reliable. The BCD process was developed by EPA with the type of compounds present at the site in mind, and is in the process of being put into full commercial use. As such, there is an increased risk that there may be operational difficulties. However, the BCD process has successfully completed a pilot study at the Koppers Superfund Site in North Carolina, and is currently being used at an Army base in California. We do intend to perform a pilot test prior to bringing the unit on site, to further verify its

Commentor: Rep. Bob Warner:

9. How many cubic feet per minute of air will the treatment process put out?

RESPONSE: The BCD treatment unit will put out approximately 100 to 200 cubic feet of air per minute.

10. In the overhead describing the process, it states that the treated soil could either be backfilled on site, or disposed of off site. What makes that determination?

RESPONSE: The overhead slide used during the presentation was a generic slide describing the process. At this site it is intended that the soil would be backfilled on site in the areas from which it was excavated.

11. You said you are going to take the vehicles off site and dispose of them. What kind of liability does that put the state at in getting rid of those vehicles, considering that the county disposed of a transformer that was contaminated with PCBs at a properly legal site authorized by the federal government, and then some years later when that site was declared an emergency site the county had to pay for that?

RESPONSE: Following the on-site decontamination, the debris made of metal, such as the vehicles and the underground storage tanks, will be sent for recycling; the state would then be sent a certificate that these items were destroyed. The non-metal debris would be sent to a landfill permitted to receive these wastes. This is not unique to this site, the state routinely sends material from other hazardous waste sites to hazardous waste landfills and other permitted solid waste landfills. In addition, confirmatory wipe samples will be collected following the on-site cleaning, to confirm that the materials have been appropriately decontaminated.

ATTACHMENT 1

Comment #1

TABLE 5.1D

Drummed Soil Sampling Results
TCLP, Dioxins/Furans, Pesticides and Herbicides

Almy Brothers Site
Binghamton, NY

Parameter	DMSS-1-2	DMSS-2-15	DMSS-DUP-1*	DMSS-3-27	DMSS-4-5	DMSS-5-22	DMSS-6-93	DMSS-7-95	TCLP Limits
TOXICITY CHARACTERISTIC LEACHATE PROCEDURE (Results are reported in ug/l):									
VOA	ND	ND	ND	ND	ND	ND	ND	ND	
SEMI-VOA	ND	ND	ND	ND	ND	ND	ND	ND	
PESTICIDES	ND	ND	ND	ND	ND	ND	ND	ND	
HERBICIDES									
2,4-D	99	1,400	3200	1500	ND 10	ND 10	ND 10	130	10,000
2,4,5-TP (Silvex)	6.7	57	87	150	2	ND 1	ND 1	13	1,000
METALS**									
Barium	1020	1080	996 B	749 B	1150	1010	1090	511 B	100,000
Cadmium	ND 3.0	5.0 B	4.0 B	3.0 B	4.0 B	ND 3.0	6.0 B	9.0 B	1,000
Chromium	14 B	48 B	5.0 B	ND 3.0	8.0 B	ND 3.0	4.0 B	14 B	5,000
Lead	ND 23	38 B	ND 23	776 B	ND 23	ND 23	ND 23	ND 23	5,000
Silver	13 B	8.0 B	ND 5.0	ND 5.0	ND 5.0	ND 5.0	ND 5.0	ND 5.0	

Notes: ND = Not detected above the indicated Instrument Detection Limits.
B (Metals only) = The reported value was obtained from a reading that was less than the CRQL, but greater than or equal to the IDL.
* Duplicate of DMSS-2-15 for all parameters except TCLP VOAs (for which it is the duplicate of DMSS-1-2).
** Analytes that were not detected in any of the referenced samples are not included in this table.

TABLE 5.1D (continued)

Drummed Soil Sampling Results
TCLP, Dioxins/Furans, Pesticides and Herbicides

Almy Brothers Site
Binghamton, NY

Parameter	DMSS-1-2	DMSS-2-15	DMSS-DUP-1*	DMSS-3-27	DMSS-4-5	DMSS-5-22	DMSS-6-93	DMSS-7-95
SOILS ANALYSIS (Results are reported in ug/Kg):								
DIOXINS/FURANS**								
OCDD	**0.93**	ND 0.65	**0.78**	ND0.09	**0.36**	ND2.5	**0.23**	**0.39**
PCDF	**0.10**	ND 1.9	**0.10**	**0.11**	ND3.7	ND2.4	ND15.4	ND15.8
PESTICIDES**								
4,4'-DDE	**240 PJ**	ND 180	ND 180	ND 180	**280 PJ**	ND 18	**38 PJ**	ND 180
4,4'-DDD	**200**	ND 180	ND 180	ND 180	**240 PJ**	ND 18	**26 PJ**	ND 180
4,4'-DDT	**370 PJ**	**220 PJ**	**200 PJ**	ND 180	**430 PJ**	ND 18	**120 PJ**	**200**
Endrin Aldehyde	ND 1800	ND 180	ND 180	ND 180	ND 190	ND 18	**22 PJ**	ND 180
HERBICIDES								
Samples Analyzed at Galson								
2,4,5-T	**360 J**	**230 J**	ND 220J	**270 J**	ND 240J	ND 56J	**62 J**	**470 J**
2,4-D	**9100 J**	**7500 J**	**3500 J**	**10000 J**	**2000 J**	**360 J**	**560 J**	**23000 J**
2,4,5-TP (SILVEX)	**4800 J**	**1800 J**	**1800 J**	**3000 J**	**1400 J**	**200 J**	**710 J**	**4200 J**
Samples Analyzed at NYSDEC								
2,4,5-T	ND 500	ND 500	NA	ND 500	ND 500	**950**	**630**	ND 500
2,4-D	**2100**	**2700**	NA	**2500**	**340**	**850**	ND 500	**590**
2,4,5-TP (SILVEX)	**6600**	**104000**	NA	**9700**	**1700**	**3900**	**5600**	**3700**

Notes:
BOLD = Indicates that the compound was detected.
P = There is greater than 25% difference for detected concentrations between the two GC columns.
The lower of the two values is flagged and reported.
J = Concentration is estimated.
ND = Not detected above the indicated Instrument Detection Limit.
NA = Not Analyzed
* = Duplicate of DMSS-2-15 for all parameters except Dioxins/furans (for which it is the duplicate of DMSS-1-2).
** Analytes that were not detected in any of the referenced samples are not included in this table.

<u>ATTACHMENT 2</u>

<u>Comment #4</u>

TABLE 5.1B

Drum Sampling Results
TCLP, RCRA Disposal Characteristics and
Dioxins/Furans
Almy Brothers Site
Binghamton, NY

Results are reported in ug/Kg (ppb) or ug/l (ppb) as noted.

Parameter	DM-L-Comp. (ug/l)	DM-S-Comp. (ug/Kg)	DM43-L (ug/l)	RCRA TCLP Limits(ppb)
VOA*				
Methyl ethyl ketone	97.4	ND200	ND200	200,000
Tetrachloroethylene	30	ND100	ND100	700
SEMI-VOA/PEST.*				
2,4,5 Trichlorophenol	13,300	3,400	ND3,200	400,000
HERBICIDES				
2,4-D	ND35,000	**2,110,000**	ND36	10,000
2,4,5-TP (Silvex)	**193,000**	**460,000**	ND7.2	1,000
METALS*				
Barium	120	200	200	100,000
Cadmium	ND2	3.9	ND2	1,000
Chromium	77	ND10	ND10	5,000
Lead	ND75	150	1,200	5,000

Notes: ND = Not detected above the indicated Instrument Detection Limit.
DM-L-Comp. = Composited liquid sample from drums DM35, DM42 and DM70
DM-S-Comp. = Composited sludge sample from drums DM-G2 and DM-M1
BOLD(for TCLP data) = Indicates that the value exceeds RCRA TCLP Limits.
* Analytes that were not detected in the referenced samples are not included in this table.

	DM-G2-S (ug/Kg)	DM-M1-S (ug/Kg)	DM-35-L (ug/l)	DM-38-L (ug/l)	DM-42-L (ug/l)	DM-70-L (ug/l)
DIOXINS/FURANS*						
2,3,7,8-TCDD	**10.4**	ND0.07	ND0.0021	ND0.001	ND0.0013	ND0.0013
TCDD	**10.4**	ND0.07	ND0.0021	ND0.021	ND0.0013	ND0.0013
PCDD	**0.17**	ND0.2	ND0.026	ND0.0175	ND0.024	ND0.0188
HxCDD	ND0.18	**0.19**	ND0.0034	ND0.0034	ND0.0048	ND0.0037
HpCDD	ND0.77	**4.5**	ND0.0044	ND0.0044	ND0.0043	ND0.0049
OCDD	**29.1**	**22.8**	ND0.051	ND0.0367	ND0.050	ND0.0154
2,3,7,8-TCDF	**1.8**	ND0.09	ND0.0013	ND0.0013	ND0.0019	ND0.00079
TCDF	**1.8**	ND0.09	ND0.0013	ND0.0013	ND0.0019	ND0.00079
PCDF	**2.6**	ND0.57	ND0.0028	ND0.0026	ND0.0043	ND0.0024
HxCDF	**0.18**	ND0.44	ND0.0024	ND0.0023	ND0.0026	ND0.0022
OCDF	**1.3**	ND0.76	ND0.0195	ND0.031	ND0.02	ND0.0168

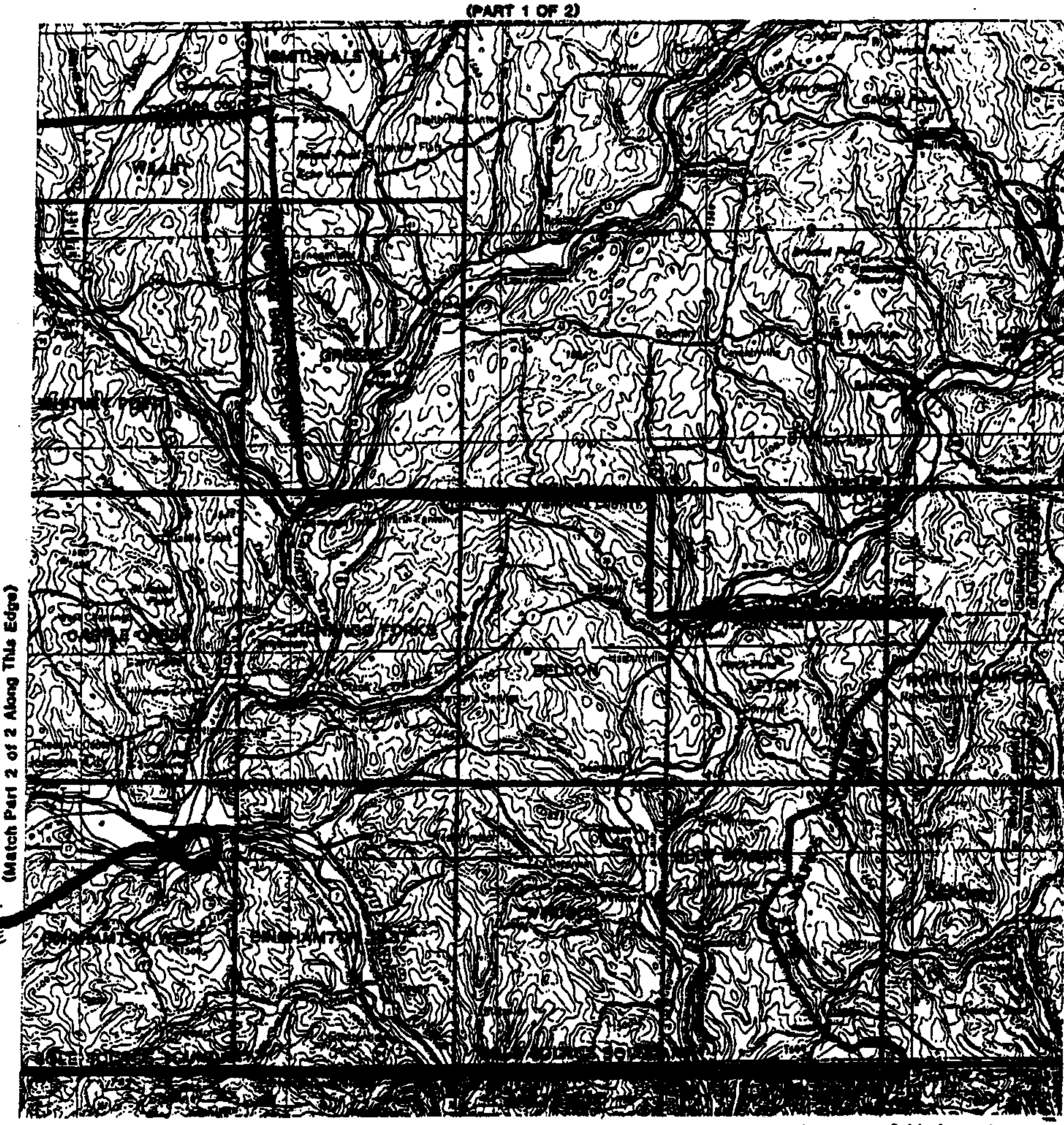
Notes: ND = Not detected above the indicated Instrument Detection Limit.
BOLD(for dioxin data) = Indicates that the compound was detected.
* Analytes that were not detected in the referenced samples are not included in this table.

ATTACHMENT 3

Comment #5

CLINTON STREET-BALLPARK SOLE SOURCE AQUIFER

(PART 1 OF 2)



Name and location of USGS 7.5-minute quadrangle for which detailed sole-source-aquifer boundaries are available for review from the USEPA office files.

SCALE 1:250,000

0 5 miles

CLINTON STREET-BALLPARK
SOLE SOURCE AQUIFER
(Part 1 of 2)

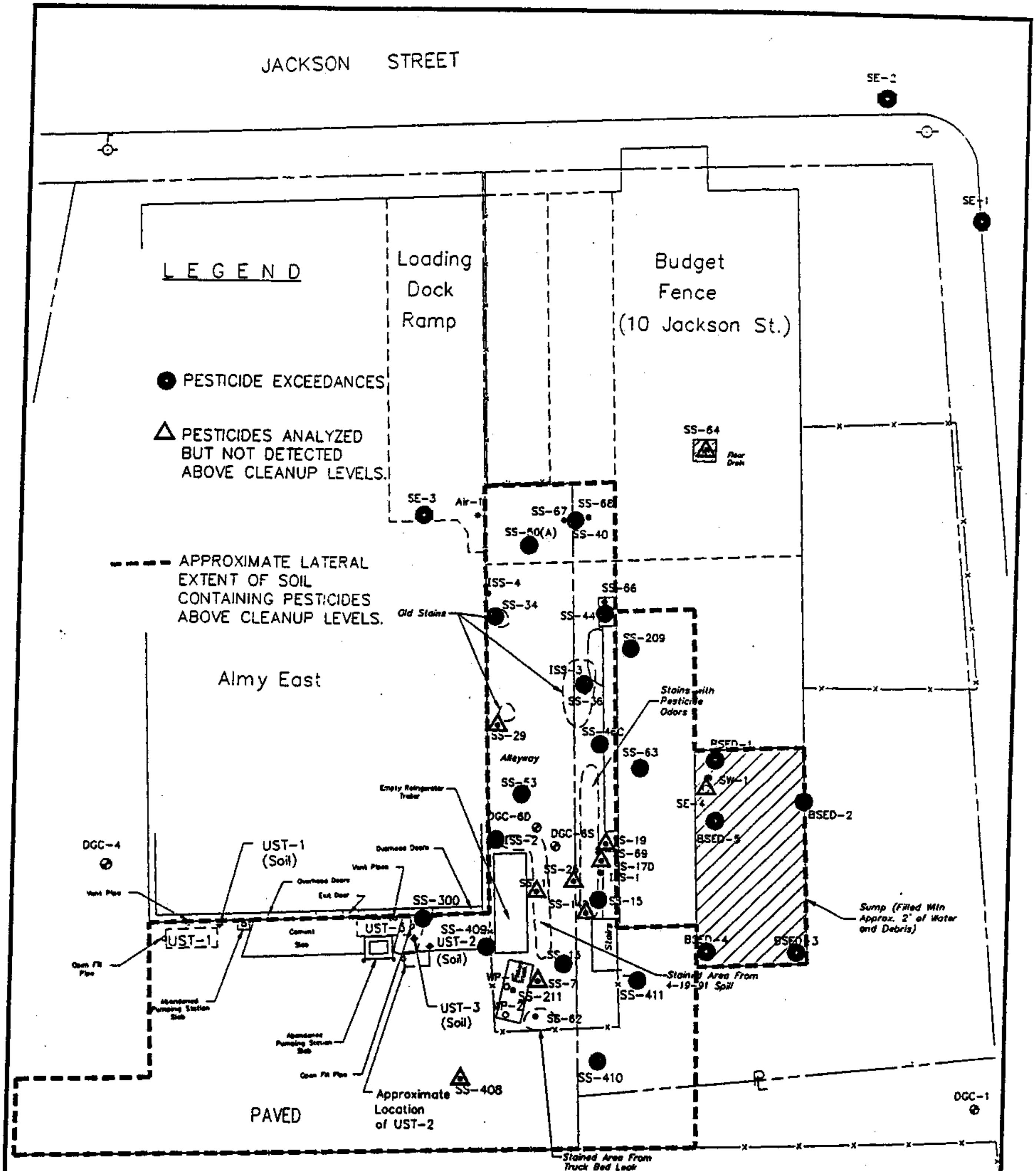
LOCATION MAP

APRIL 1990

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION II

ATTACHMENT 4

Comment #6



DUNN ENGINEERING COMPANY
12 Metro Park Road
Albany, NY 12205

NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SUMMARY OF MEDIA IN EXCESS OF CLEANUP STANDARDS – ALLEYWAY

City of Binghamton | Broome Co., NY

PROJECT NO. 296-1946	DATE 9/93	DWG. NO. A9037EP	SCALE 1"=30'	FIGURE NO. 4

APPENDIX B

ADMINISTRATIVE RECORD

ADMINISTRATIVE RECORD

The following documents constitute the Administrative Record for the Almy Brothers site Remedial Investigation/Feasibility Study (RI/FS).

1. Final RI Report
2. Final FS Report
3. Supplemental Sampling Report
4. Responsiveness Summary for the PRAP
5. Listing in the New York State Registry of Inactive Hazardous Waste Sites
6. Data Packages and Data Validation Reports
7. Work Plans, Quality Assurance Project Plans, and Health and Safety Plans, for the Phases I and II RI and FS
8. Treatability Study Report - Base Catalyzed Decomposition Process
9. Public Participation Plan
10. Public Notices and Fact Sheets
11. Proposed Remedial Action Plan (PRAP)
12. Transcript of the PRAP public meeting
13. NYSDOH soil cleanup levels - Almy Brothers Site
    a. Memo from Dr. Anthony Grey to Mr. Gary Litwin, September 10, 1993
    b. Memo from Dr. Anthony Grey to Mr. Gary Litwin, October 1, 1993
    c. Letter from Catherine Klatt (NYSDEC) to Gary Robinson, March 2, 1994
14. Administrative Summary from U.S. Institute of Medicine, Division of Health Promotion and Disease Prevention, Committee to Review the Health Effects in Vietnam Veterans of Exposure to Herbicides, Veterans and Agent Orange. Health Effects of Herbicides Used in Vietnam. 1994, National Academy Press
15. W.J. Hayes, Jr. and E.R. Laws, Jr., Handbook of Pesticide Toxicology, Volume 3. Classes of Pesticides. 1991, Academic Press, Inc., pp. 1319-1325 (2,4-D), 1325-1331 (2,4,5-T), 1336-1337 (Silvex).
16. Chronology of Response Actions
17. NYSDOH letter of concurrence with the ROD

APPENDIX C

CHRONOLOGY OF RESPONSE AND INVESTIGATIVE ACTIONS

CHRONOLOGY OF RESPONSE AND INVESTIGATIVE ACTIONS

ALMY BROTHERS SITE
BINGHAMTON, BROOME COUNTY
SITE NO. 7-04-021

April 19, 1989:	New York State Department of Environmental Conservation (NYSDEC) and the Binghamton Fire Department responded to a report of a chemical spill at the site. Robert McMahon performed a free product cleanup.
April 20, 1989:	NYSDEC personnel collected one sample from a recovery drum of waste-contaminated absorbent used to clean up the spill in the alley. Analytical results from Friend Laboratory showed the presence of Silvex and 2,4,5-T, which are classified as dioxin-contaminated, acutely hazardous waste.
May 2-3, 1989:	NYSDEC contractor (Domermuth Environmental Services) excavated and drummed approximately 27 drums of visibly contaminated contaminated soil and asphalt from the spill site.
May 3, 1989:	NYSDEC personnel collected 8 wipe samples and 4 soil samples, and sent them to Friend Laboratory for herbicide analysis. The soil samples were collected from the area of the initial spill. The wipe samples were collected from the adjacent building, the tires of a forklift used in the initial spill response, and from blacktop adjacent to the initial spill. Silvex and 2,4-D were detected in both soil and wipe samples.
May 6, 1989:	The City of Binghamton Police discovered Robert McMahon in the process of loading drums from the site into a pickup truck. At the request of the police, Robert McMahon left the truck and the drums in the alley.
May 9, 1989:	NYSDEC personnel and the Binghamton Fire Department Hazardous Material Response Team secured a drum containing herbicide waste at 91-93 Main St., which based upon the evidence is believed to have come from the Almy Brothers site.
May 9, 1989:	NYSDEC personnel numbered the drums of product and of excavated soil at the site.
May 16, 1989:	NYSDEC contractor (Domermuth Environmental Services) overpacked and secured the drum at 91-93 Main St., Binghamton.

May 22, 1989:	NYSDEC and NYSDOL personnel collected samples from 5 drums in the alley, 3 for EPTox analysis, and 2 for percent water and corrosivity (pH). The samples were analyzed by Aquatec Environmental Services. Two of the three drums analyzed for EPTox contained Silvex. The two drums analyzed for corrosivity had a pH of 14.4 and 1.6 respectively.
July 26, 1989:	NYSDEC contractor (Clean Harbors) overpacked 6 drums in the back of Robert McMahon's pickup truck, excavated and drummed 2 drums of visibly contaminated soil and asphalt, and wrapped the truck in polyethylene.
July 27, 1989:	NYSDEC personnel drummed approximately four shovelsful of contaminated asphalt.
July 29, 1989:	NYSDEC contractor (Domermuth Environmental Services) overpacked 21 drums of product, excavated and drummed 34 drums of visibly contaminated soil and asphalt.
September 21, 1989:	NYSDEC contractor (Clean Harbors) collected samples from 25 drums, and grouped them into 5 composite samples for analysis. Upstate Labs performed dioxin analysis on the 5 samples. Analytical results were negative, however, the detection limits were elevated, at 10 ppm. Clean Harbors performed herbicide analysis on four of the composite samples. Silvex and 2,4-D were detected in one of the composite samples.
November 1989:	Louis Stilloe and Leonard Almy installed a 6 foot chain link fence enclosing the alley.
May 9, 1990:	NYSDEC contractor (Clean Harbors) collected samples from 12 of the 13 drums in the composite sample that had positive hits for herbicides for herbicide analysis. Seven drums contained Silvex, 2,4-D, and/or 2,4,5-T. Contractor also replaced the plastic cover on the pickup truck.
June 7, 1990:	NYSDEC contractor (Clean Harbors) placed a layer of plastic over the spill area.
August 29, 1990:	The overpacked 55 gallon drum containing herbicide waste was moved from 91 Main St., Binghamton, to the site.
March 14, 1991:	NYSDEC contractor (Clean Harbors) removed from the site for disposal 18 drums of waste, 16 containing non-pesticide wastes, and 2 containing 2,4-D.

April 24, 1991:	NYSDEC contractor (Clean Harbors) overpacked 2 drums containing pesticide wastes.
December 15-17, 1992:	NYSDEC contractor (Environmental Products & Services, Inc.) overpacked all drums on site, and placed a player of plastic sheeting over the alley and the pickup truck to control odors.
April 7, 1993:	D/L Cooperative, Inc. removed 8 drums of materials (unrelated to the drums of waste in the alley) from the basement of the building at 10 Jackson St. for disposal.