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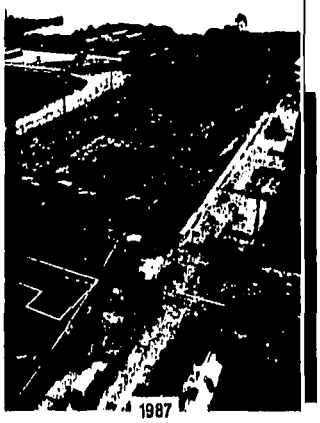
DEPARTMENT OF ENVIRONMENTAL
RESOURCES

Report on Final Remedial Action at the Wade Site Chester, PA

Volume I

June 1988



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REPORT ON IMPLEMENTATION OF FINAL REMEDIAL ACTIONS AT THE WADE SITE IN CHESTER, PENNSYLVANIA

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Section 1

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SECTION 1

INTRODUCTION

1.1 Purpose

The purpose of this report is to describe and document WESTON's activities in monitoring the performance of the Contractor selected for implementation of remedial actions specified for the Wade site in the Superfund Record of Decision (ROD) issued by the U.S. EPA on August 30, 1984 (see Appendix A). The prime contractor selected by the DER for this project was Rollins Environmental Services (FS), Inc. (hereinafter RES), of Chadds Ford, Pennsylvania. RES' activities, conducted pursuant to Contract ME-86311 dated December 22, 1986 (see Appendix B), took place between January 8 and July 9, 1987. The selection of the Contractor is described in a previous WESTON report to the DER entitled, "Evaluation of Proposals for Cleanup of the Wade Property", January 1987. In addition, WESTON's previous activities relative to the Wade site are described in the following reports:

- "Hazardous Waste Site Cleanup: Wade Property in Chester, Pennsylvania, Volume 1: Project Organization and Procurement of Contractors", January 1982.
- "Hazardous Waste Site Cleanup: Wade Property in Chester, Pennsylvania, Volume 2: Implementation of Initial Cleanup", August 1982.
- "Results of Soil Analysis and Cost Estimates for Selected Remedial Activities Regarding the Wade Hazardous Waste Site in Chester, Pennsylvania", Draft Report, November 1983.
- "Site Characterization Activities on the Wade Property, Chester, Pennsylvania", Draft Report, November 1983.

The DER's contract with RES and the Request for Qualifications and Proposals (RFQ/P) issued by the DER in July 1986, called for a seven-phased approach. The work associated with each phase is summarized below:

- Phase 1 - mobilization;

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- Phase 2 - removal and disposal of seven empty tankers, one stationary tank, and several surface piles of non-hazardous scrap metal and wood;

- Phase 3 - removal and disposal of surface piles of crushed drums, tires, shredded rubber, and contaminated soil.

- Phase 4 - excavation, removal, and disposal of contaminated soil beneath the surface of the site;

- Phase 5 - demolition of all site structures (including buildings, storage silos, machinery, etc.) and placement of backfill to achieve rough grade elevations;

- Phase 6 - final grading including placement of select fill and topsoil followed by seeding; and

- Phase 7 - demobilization and project closeout.

In addition to the scope of work described above, RES performed certain activities that arose from unforeseen conditions at the site. These unforeseen conditions resulted in submittal of a series of change order requests by the Contractor (detailed in Section 3). In every instance, the conditions that led to the change order requests were evaluated and verified by WESTON. Additionally, the change order requests were reviewed by WESTON and recommendations were made to the DER in regard to their acceptability.

Based upon field conditions, WESTON approved (and in some instances initiated) certain revisions to the specifications contained in the RFQ/P. These changes, which are detailed in Section 4, were performed by RES at no additional cost to the DER.

In performing the scope of work described in the RFQ/P, RES was compensated on a lump-sum-by-phase basis for a total fixed price of $2,966,287. Additionally RES was compensated on a time and materials (T&M) basis, totalling $93,277.22 for work performed under change orders approved by the DER. RES' total compensation for performing the remedial actions at the Wade site is therefore $3,059,514.22. Details of these expenditures are provided in Section 2.4 and Section 3.

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Work was begun by RES on January 8, 1987. WESTON's presence on-site was initiated on January 9, 1987 and remained essentially full-time with the exception of an approximately three-week interval during Phase 4 through June 25, 1987. During the course of the remedial actions, WESTON's activities included:

- maintaining detailed written, photographic, and videotape records of site work;
- reviewing the qualifications and approving the use of transporters, disposal facilities and laboratories not included in RES' proposal;
- assisting in project coordination with local authorities;
- reviewing and approving the Contractor's requests for (and in some instances initiating) field modifications necessitated by unforeseen circumstances;
- monitoring implementation of the Contractors' health and safety plan;
- reviewing and evaluating change order requests;
- reviewing the Contractor's invoices for payment; and
- monitoring the overall performance of the Contractor.

The remedial actions implemented at the Wade site were completed in substantial conformance with the specifications in the RFQ/P and the ROD, except for certain changes due to unforeseen site conditions. These changes are described in Sections 3 and 4.

1.2 Site History and Initial Status

The Wade site, located at the intersection of Flower Street and Delaware Avenue in Chester, Pennsylvania, is an approximately 3-acre parcel where various chemicals had been received, stored, and disposed of in the site's soils. The site is bounded on its southwestern side by the right of way for the Commodore Barry Bridge, on the northwest by Delaware Avenue and a railroad right of way, on the northeast by a Philadelphia Electric Company (PECO) property and on the southeast by the Delaware River.

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The site previously housed the Eastern Rubber Recycling Co., a firm engaged in shredding tires, rubber, and other post-consumer articles. Photographs taken from the deck of the Commodore Barry Bridge by the DER in 1977 show that drums of waste were emptied either directly onto the ground or into trenches (Figure 1-1). These activities contaminated much of the site. In February 1978, a severe fire occurred that resulted in the destruction of much of the drummed wastes stockpiled on-site. Due to the severity of the fire, the Commodore Barry Bridge was closed for six hours and 45 firemen were examined at a local hospital. One of the original buildings was completely destroyed during the fire and two others sustained heavy structural damage.

Following the fire, DER and EPA engaged a series of contractors to perform various remedial actions and studies at the site. A summary of these contracts, and the associated scopes of work is presented in Table 1-1.

A plan of the site conditions that existed at the initiation of the final remedial action is presented in Figure 1-2. Notable features include:

- seven structures varying in integrity from poor to moderate;
- four empty rubber storage silos and the associated air pollution controls (cyclones);
- seven empty tankers;
- a partially filled concrete sump;
- seven monitoring well installations; and
- eleven piles of soil and debris.

Important features not shown on Figure 1-2 are a pipe tunnel extending from grid 22 to grid 26 and an underground tank in grid 40. Heavy machinery associated with the rubber shredding operations was secured to the floor in two of the buildings with bolts approximately 2-inches in diameter. Electrical equipment associated with the heavy machinery was concentrated in three control panels. Two large boilers and the associated steam generating equipment were housed in the former boiler house.

The site was completely fenced, however it was apparent that unauthorized persons did occasionally gain access to the property. This was supported by the fact that 11 drums

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FIGURE 1-1 HISTORICAL PHOTOS (CIRCA 1977)

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TABLE 1-1

CHRONOLOGY OF PREVIOUS CONTRACTS

Approximate Date	Contracting Agency	Contractor	Scope of Work
12/13/79 - 6/3/80	DER	Rollins	• Remove intact, accessible drums. • Remove (to the extent possible) hazardous materials in five tankers located near the front of the site. • Overpack and secure drums of PCB wastes.
1980	EPA	Rollins	• Remove and dispose of drums of PCB wastes.
1980	EPA	BCM/Wehran	• Perform site investigation after drum removal.
1983-1984	DER	CECOS	• Sort through surface debris and categorize into discrete piles. • Remove/dispose of non-empty drums. • Install test pits according to grid/quadrant system to enable soil sampling. • Analyze soil samples.
8/8/85	DER	VFL Technology Corp.	• Implement final remedial actions in accordance with the RFQ/P issued 9/14/84[1].

[1] This contract was terminated due to the Contractor's inability to finalize disposal arrangements with qualified facility while maintaining bid price.

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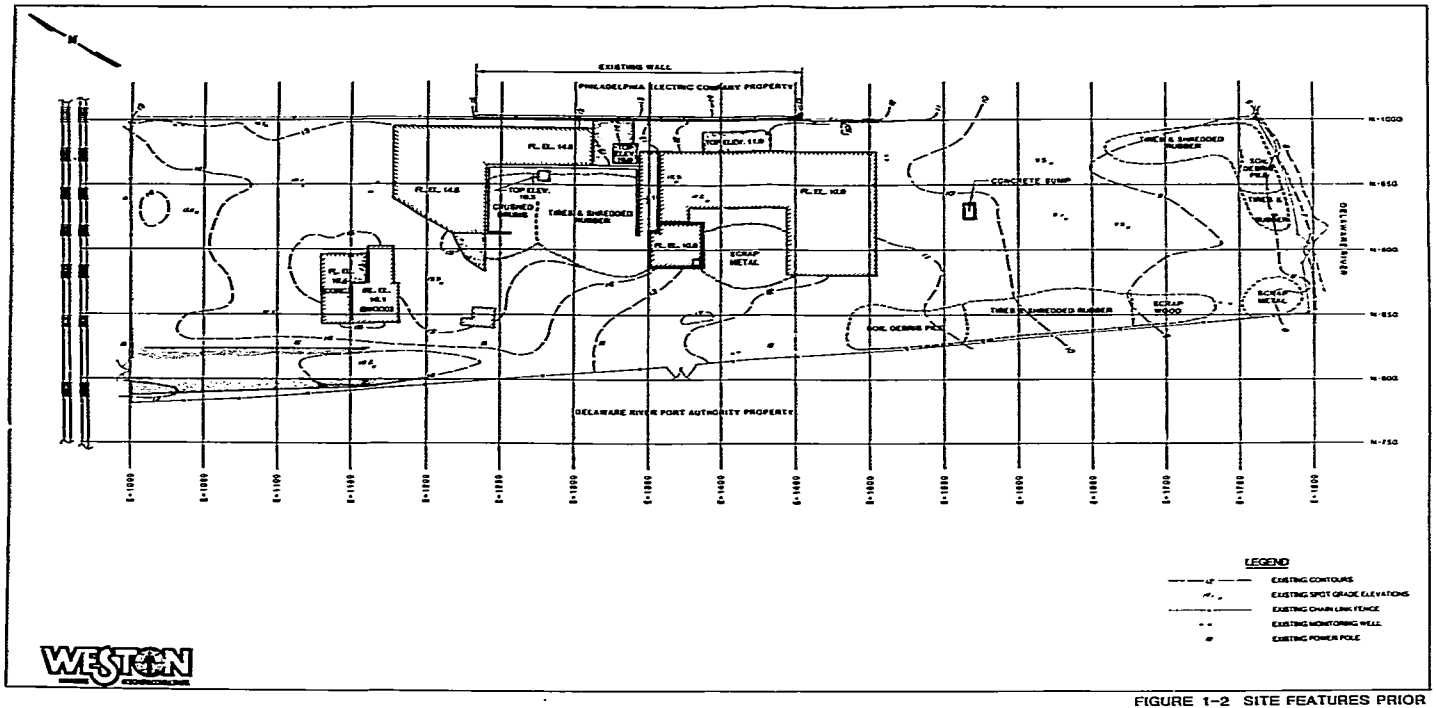

FIGURE 1-2 SITE FEATURES PRIOR TO FINAL REMEDIAL ACTION

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and a substantial amount of general trash were discovered on-site during the pre-bid site inspection. The site was heavily vegetated with tall grasses and small bushes which somewhat restricted personnel movement in certain areas. Remnants from a number of the test pits, installed to enable soil sample collection during the site investigation were readily apparent at the inception of site work.

1.3 Current Site Status

The Wade site is currently a grass covered field sloping moderately from north to south. The only remaining "structures" inside the perimeter chain link fence are seven monitoring well installations and the extension of Flower Street that extends along the western fence line approximately to gridline E-1475 (see Figure 1-2). As a result of the removal of all buildings, waste piles and native brush, the site now affords an aesthetically pleasing view of the Delaware River and the Commodore Barry Bridge.

The following structures remain beneath the surface of the site:

- foundations and floor slabs from all former buildings;
- concrete sump;
- concrete mass in the southern third of the site believed to a remnant from construction of the bridge;
- 10,000-gallon underground fuel oil tank, currently filled with sand, and the adjacent retaining walls; and
- 12-inch diameter reinforced concrete pipe in the vicinity of the concrete sump.

1.4 Quantity Summary

Table 1-2 presents a summary of all of the wastestreams generated during the remedial action at the Wade site, including quantities generated, transporters, disposal facilities and disposal methods employed. Quantities presented in Table 1-2 were developed from transportation records maintained by RES.

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TABLE 1-2

OVERALL WASTE DISPOSAL SUMMARY

Wastestream Description	Quantity/Units	Transporter(s)	Disposal Facilities	Disposal Method
Scrap wood, debris, and non-hazardous soil	1,260.02 tons	J. R. Savoy Aston, PA	Petrillo Bros. Minquedale, DE	Landfilling
Scrap metal and tankers	416.685 tons	J. R. Savoy Aston, PA	Camden Iron & Metal Inc. Camden, NJ	Recycling
Contaminated soil, rubber crushed drums, etc.	5,440.51 tons	Dart Trucking Co. Jack Gray Transport	GSX Services, Inc. Pinewood, SC	Landfilling
Wastewaters from several sources including vehicle decontamination, decontaminated tank cleaning, excavation dewatering, etc.	30,804 gallons	Chem-Clear, Inc.	Chem-Clear, Inc. Chester, PA	Biological Treatment
Wastewater as described above	7,401 gallons	Waste Conversion Hatfield, PA	Waste Conversion Hatfield, PA	Biological Treatment
Sanitary wastewater		Not applicable	DELCORA Chester, PA	Biological Treatment
Asbestos waste	5,100 lbs.	J. R. Savoy Aston, PA	Waste Management Pottstown, PA	Landfilling
Petroleum-laden soil	72.61 tons	J. R. Savoy Aston, PA	Grand Central Sanitation Pen Argyl, PA	Landfilling
Transformer dielectric	35 gallons	RES(FS), Inc.	RES(NJ), Inc. Bridgeport, NJ	Incineration
Electrical capacitors	882 pounds	S.J. Transp. Woodstown, NJ	National Electric, Inc. Coffeyville, KS	Incineration
Compressed gas cylinders	4 cylinders	S. J. Transp. Woodstown, NJ	Cylinder Recon Kearney, NJ	
Drums	12 drums	S. J. Transp. Woodstown, NJ	RES (NJ), Inc. Bridgeport, NJ	Incineration
Sludge from Underground Storage Tank	20.64 tons	S. J. Transp. Woodstown, NJ	Thermal Kem Columbia, SC	Incineration

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Section 2

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SECTION 2

DESCRIPTION OF LUMP SUM WORK

2.1 Phased Approach

The remedial action at the Wade Site was divided into seven distinct phases of work, described fully in the Request for Qualifications and Proposals (hereinafter the RFQ/P). A summary of the work and activities associated with each phase of the Project is presented in this section.

2.1.1 Phase 1 - Mobilization

Specifications for Phase 1 governed mobilization of the personnel, equipment, and facilities necessary for executing the work in the subsequent six phases. Activities under Phase 1 included establishing field offices, sheds, security services and staging/storage areas. Also as part of the mobilization activities, the Contractor was required to implement erosion control measures and to perform baseline perimeter air monitoring. An initial topographic survey of the entire site and identification of the 50 foot by 50 foot grid nodes were also planned as Phase 1 activities.

2.1.2 Phase 2 - Non-hazardous Debris Disposal

Phase 2 activities involved removal and disposal of non-contaminated surface debris including seven empty tankers, one empty tank, one pile of scrap wood, and two piles of scrap metal. The specifications for this work addressed cutting, loading, transportation, and disposal requirements. Provisions described in the RFQ/P for managing liquids found in the tankers and/or tank involved removal by draining to a holding tank and sampling/analysis prior to off-site disposal. Requirements for on-going activities including perimeter air monitoring, erosion and dust controls, and safety/emergency response applied to Phase 2 work.

2.1.3 Phase 3 - Disposal of Hazardous Waste in Surface Piles

The specifications for Phase 3 governed the removal and disposal of contaminated surface debris. Materials slated for removal and disposal under Phase 3 included one pile of

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crushed drums, two piles of soil and five piles of tires and/or shredded rubber. Requirements for closure of an underground tank believed to contain an unknown volume of an oil/water emulsion involved sampling, analyzing, removal, and disposal of the contents, followed by pressure washing and backfilling with clean sand. Removal and disposal of one drum of unknown contents as well as eleven drums discovered on-site during the pre-bid site inspection were also specified as Phase 3 activities. Requirements for on-going activities, such as erosion and dust control, perimeter air monitoring, and safety/emergency response, were described in the specifications of Phase 3 work.

2.1.4 Phase 4 - Excavation and Disposal of Hazardous Waste Soils

Phase 4 involved the excavation, staging, and disposal of soil from certain pre-designated grids in accordance with the Soil Removal Plan, Drawing 102. The site was divided into 50 foot by 50 foot grids with each grid subsequently divided into four quadrants. The maximum depth of excavation for any given grid or quadrant was five feet in accordance with the ROD. Excavations adjacent to existing fences and structures were required to include a one foot wide "buffer strip" to prevent damage due to undermining. The Contractor was required to excavate no more than three grids at any one time in order to minimize dusting and accumulation of contaminated surface water. Specifications for temporary stockpiling included provisions for covering the stockpiles with tarps or plastic sheeting.

One of the activities planned for Phase 4 was sealing an existing water service at the property boundary. The size and location of the service were unknown. Sealing the service was to be in accordance with requirements of the Chester Water Authority. Specifications for on-going activities applicable to Phase 4 work included requirements for dust, erosion and run-on/run-off controls, perimeter air monitoring, and safety/emergency response. Additionally, a topographic survey and update of the cross-sections were required at the completion of Phase 4.

2.1.5 Phase 5 - Demolition and Rough Grading

Phase 5 involved two distinct work activities:

- building and structure demolition; and
- backfilling and rough grading.

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With respect to the first activity, the Contractor was required to remove all buildings and structures in accordance with the Building and Structures Demolition Plan submitted as part of its proposal. Requirements for the demolition work included surface preparation (removal of debris), removal of wood and metal, removal of structural members, and toppling of masonry walls. Rubble generated during the demolition work could be backfilled on-site provided the dimensions of the pieces were less than 12 inches. Concrete floors and pads were required to be drilled prior to covering with backfill.

The second component of Phase 5 required the Contractor to place backfill and achieve rough grade elevations over the surface of the site. Backfill materials were to include rubble (as described above) and clean fill using an SM classification soil (silty-sands, sandy-silts). Subsurface structures and voids including the underground tank, a pipe tunnel in Grids 22 through 26, and the basement of the former office building were to be backfilled using clean sand. Requirements for backfilling included placement in 6-inch loose lifts followed by compaction to achieve a minimum uniform density of 90 percent of the maximum density determined using ASTM Method D-698. The Contractor was also required to perform compaction testing for each lift. A topographic survey followed by preparation of a topographic map and updating of the cross-sections was required at the completion of rough grading.

2.1.6 Phase 6 - Final Grading

Phase 6 involved final grading of the site, including placement of topsoil and seeding, followed by placement of site management controls. Soil with an ML classification (silts, silty clays, clayey silts, gravelly clays) was required to be placed and compacted into an 18-inch thick layer overlying the rough grade. A 6-inch, uncompacted layer of topsoil was required overlying the ML soil layer. Specification for seed mixes, seed bed preparation, planting, watering, and repair/maintenance were provided.

2.1.7 Phase 7 - Demobilization

Phase 7 involved demobilization and Project closeout. Work associated with this phase was essentially the inverse of Phase 1, i.e., removal (rather than establishment) of facilities and utilities. Provisions for final reporting by the Contractor were required.

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2.2 Schedule

2.2.1 Proposed Schedule

The RFQ/P specified that the work was to be executed in a sequential manner and that work on a given phase was not to be initiated until work on the previous phase had been completed. Additionally, the RFQ/P specified that the period of performance was not to exceed 120 calendar days. Bidders were required to submit a schedule as part of their proposals. The schedule contained in RES' proposal met the requirements of the RFQ/P in that a period of performance of 82 days was specified.

After completion of contract negotiations, WESTON learned that the period of performance for the contract had been extended to seven months after receipt of the Notice to Proceed. Inquiries to the DER indicated that the period of performance had been extended to account for possible weather delays anticipated for the winter months.

At the initial Project meeting at the site, it was learned that RES had extended its original schedule to encompass approximately six of the seven months in the period of performance. WESTON requested that RES submit a revised, detailed schedule for review by both the DER and WESTON. This request was made in writing on January 16, 1986 (Appendix C). RES' revised schedule is illustrated in Figure 2-1. During the course of the Phase 1 activities, it became apparent that overlapping would occur between the various phases of the work. Certain aspects of Phase 1, including construction of truck scales, repairs to the perimeter fence, and placement of sediment barriers at the site perimeter would lag into the period when Phase 2 activities were scheduled. A letter to the Site Supervisor, dated January 19, 1987 (Appendix C) identified the fact that Phases 1 and 2 were overlapping and that this was not in conformance with the requirements of the RFQ/P.

RES advised the DER and WESTON that it had been told during contract negotiations with the DER that any reasonable schedule was acceptable. It was RES' interpretation that some overlapping of phases was both reasonable and necessary. Following WESTON and DER review of the schedule, the work was allowed by the DER to proceed with some overlapping of phases.

The substantial overlap planned for Phases 4 and 5 gave rise to some health and safety concerns with respect to conducting several tasks posing differing degrees of hazard

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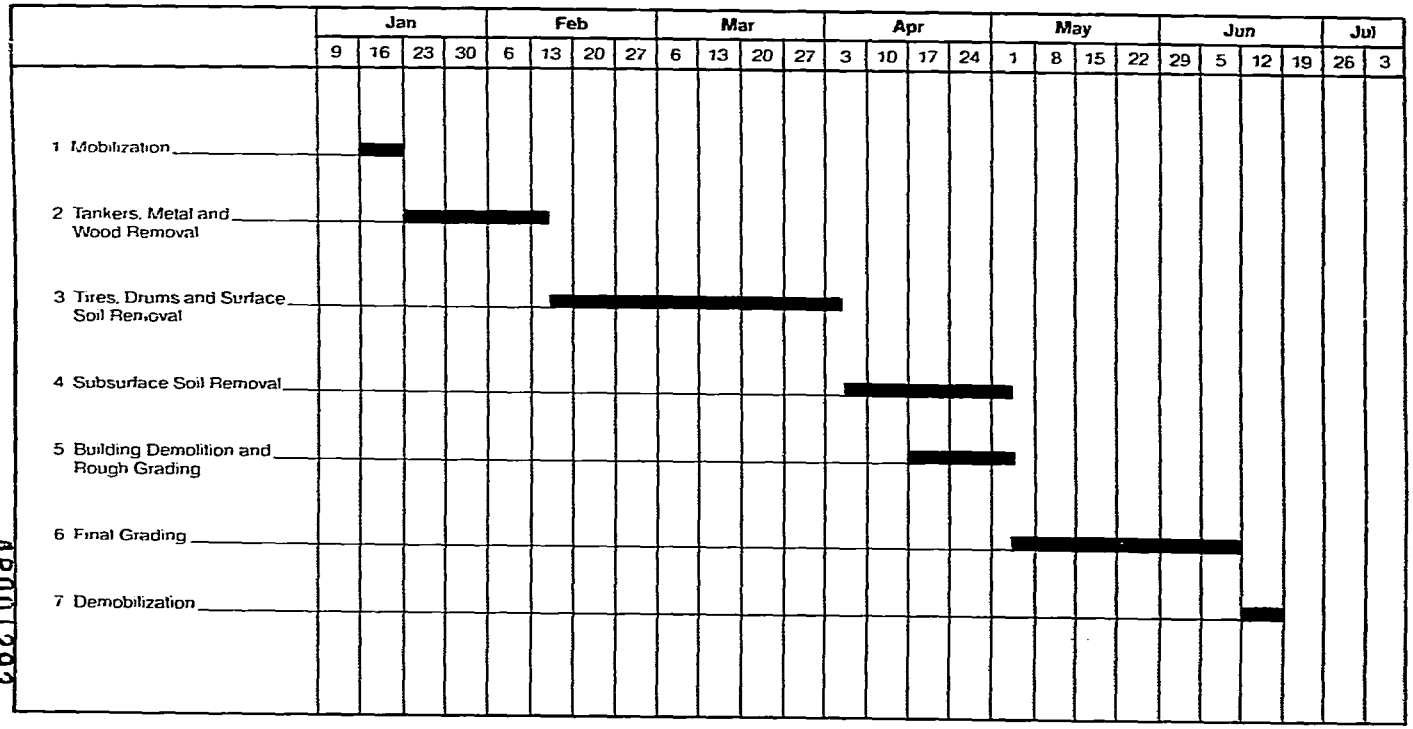

FIGURE 2-1 PROJECT SCHEDULE

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in the same or adjacent areas. RES submitted a formal request on January 31, 1987 for "progressive sequencing" of the Phase 5 demolition work. According to this request, demolition activities would occur in Phases 2 through 5, inclusive. Review and approval of this request is described in Section 4.6.1.

2.2.2 Actual Progress

The actual progress of the work is illustrated in Figure 2-2. It should be noted that less than one week of downtime was experienced due to weather delays. This was despite the fact that the site received two very heavy snowfalls during the month of January 1987.

Some schedule difficulties were experienced due to the protracted negotiations regarding the requests for Change Order Nos. 1 and 2 (see Section 3). Specifically, the soil stockpile, resulting partly from the sorting of the Grid 41 pile during Phase 3, was not transported off-site until late May 1987. This did not pose a substantial problem, as other phases were allowed to proceed essentially uninterrupted. However, the delay in disposal of the Grid 41 pile did pose some logistical problems regarding excavation of those soils underlying the pile.

A delay in the disposal of a pile of petroleum contaminated soil, originating from Grids 1, 17, 33, and 49, was attributed to difficulties in identifying an in-State disposal facility permitted (and willing) to accept this waste. Demobilization was completed while this waste was stockpiled on-site. Transportation and disposal necessitated remobilizing the Contractor's personnel and heavy equipment on July 9, 1987.

2.3 Contractor Performance

2.3.1 Phase 1 - Mobilization

RES initiated mobilization on January 8, 1987 with the delivery of two office trailers, a guard house, a personnel locker trailer, and an equipment trailer. The office trailers were blocked up and levelled for use during the pre-construction meeting held on-site on January 9, 1987. Installation of the required utilities, including electric, telephone, water, and sewer services, was completed in accordance with the requirements of the RFQ/P. Due to the impending winter weather, all water lines were traced with heat tape and insulated to prevent freezing.

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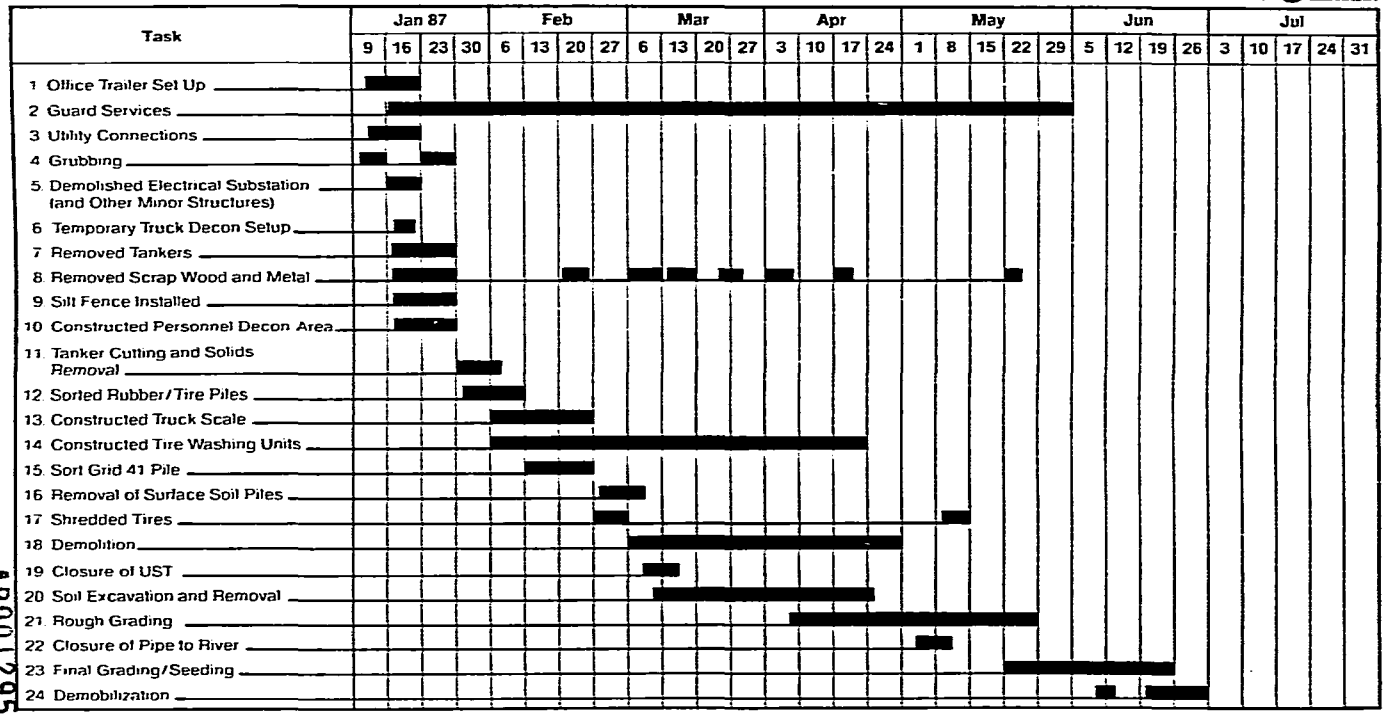

FIGURE 2-2 ACTUAL PROGRESS

AR001295

A great deal of other mobilization activities occurred within the first two weeks of site work, including:

- provision of 24-hour guard service and initiation of site access control;
- assembly of water storage tanks inside the former office building;
- construction of vehicle and personnel decontamination facilities (a temporary wooden vehicle decontamination pad was built pending assembly of the welded steel containment pad);
- excavation and installation of the footers and ramps for the on-site truck scale;
- installation of silt fence for erosion control during site work (frequent maintenance was necessary due to strong winds and inadequate installation of the silt fence); and
- collection of background perimeter air samples.

Some of these activities are illustrated in Figures 2-3 through 2-5.

RES subcontracted with H. Gilroy Damon Associates, Inc. of Sharon Hill, Pennsylvania to perform the initial topographic survey of the site. Due to the surface area occupied by the 11 debris piles throughout the site, RES submitted a request to the Site Representative to postpone the initial topographic survey until after the surface debris had been removed. The Site Representative approved the request, but advised RES that payment for Phase 1 would not be authorized until the initial topographic survey had been completed. RES proceeded with the initial topographic survey as specified in the RFQ/P.

Due to the somewhat limited working space available within the site, RES removed certain minor structures during Phase 1. One such structure was the main electrical substation located adjacent to Flower Street near the former grinding building. During removal of this structure, RES removed and staged one transformer and seven large capacitors. This electrical equipment was staged on the paved portion of Flower Street south of monitor wells B-4 and B-4A. Removal and disposal of the transformer and its dielectric fluid was accomplished during Phase 4 activities (Section 2.3.4). Disposal of the capacitors is discussed in Section 3.

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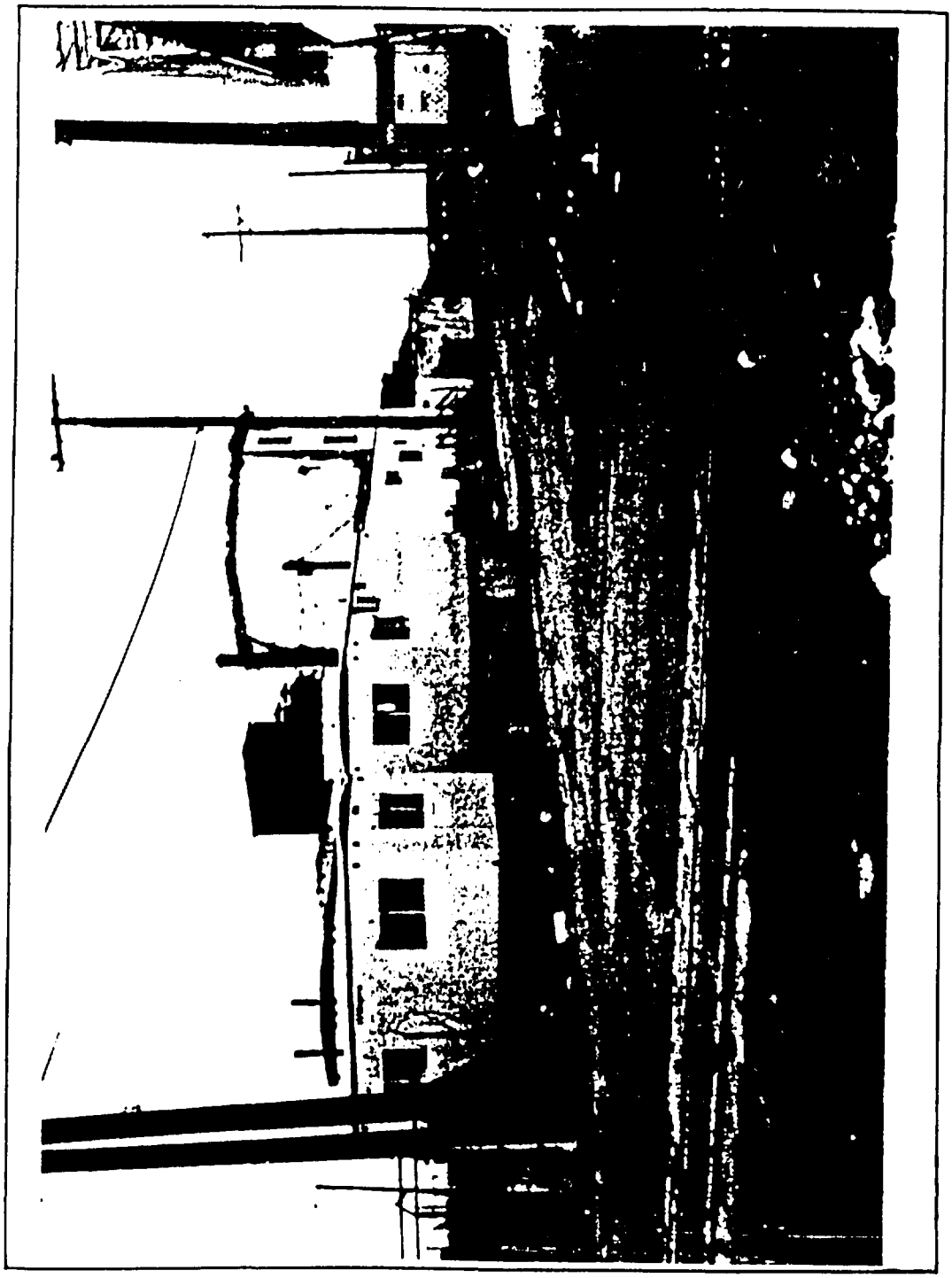

FIGURE 2-3 ON-SITE FACILITIES

WESTON

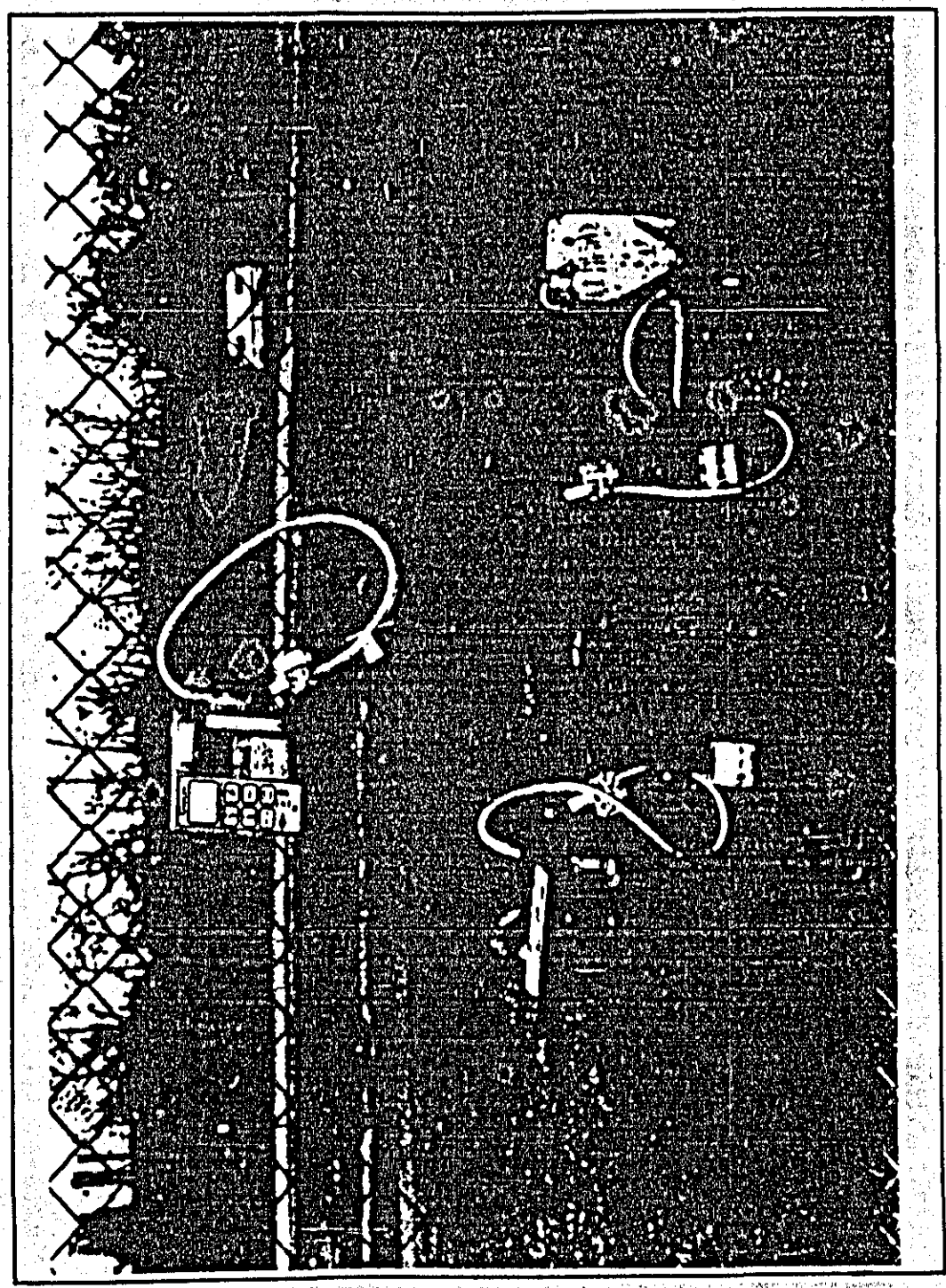

FIGURE 2-4 PERIMETER AIR MONITORING STATION

WESTON

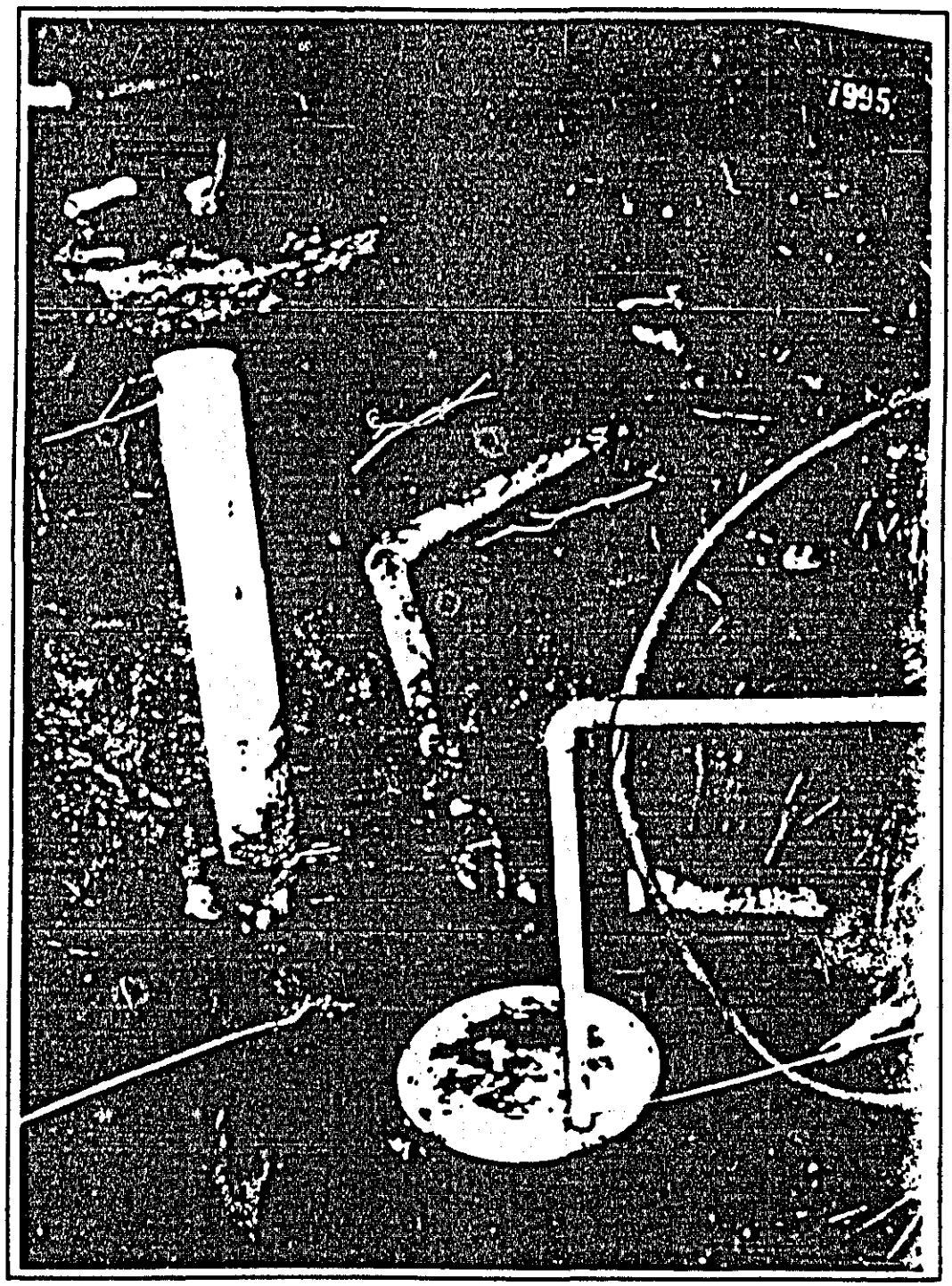

FIGURE 2-5 INSTALLATION OF SEPTIC WASTE SYSTEM

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Two important meetings were held during the Phase 1 mobilization activities. The pre-construction conference required by the RFQ/P was held on-site on January 9, 1987. Representatives of RES, DER and WESTON attended the meeting during which the project schedule, RES' anticipated need to conduct hot work, and the City's requirements during demolition were discussed. The second meeting was held at the Chester Municipal Building to discuss the planned work with the local authorities. Local truck routes, closure of the water main, and the City's requirements for vector (rat) control during demolition were discussed. As required by the RFQ/P, RES prepared minutes of both meetings.

2.3.2 Phase 2 - Non-hazardous Debris Disposal

RES initiated Phase 2 activities with the removal of accumulated stormwater from the seven tankers on-site. The water was transferred to one of two 5,000 gallon temporary tanks located on the first floor of the former office building (Figure 2-6). After the stormwater had been removed, the tankers were either loaded onto flatbed trailers or connected directly to a tractor for off-site transport.

RES advised the Site Representative that it intended to use torches to cut the tankers prior to transporting them to a scrap yard. As on-site hot work was prohibited by the specifications in the RFQ/P, RES elected to transport the tankers to a nearby yard where hot work could be performed. After cutting of the first tanker had been initiated, RES found that small amounts of residual solids were present in some of the tankers. The tankers which had been removed from the site were returned to the Wade Property for removal of the residual solids (see Section 3 for a description of this work). After final decontamination, the tankers were crushed and loaded onto demolition trailers for transport to a scrap yard in Camden, New Jersey.

RES also removed three piles of non-hazardous debris as part of its Phase 2 work. Two piles of scrap metal were loaded onto a demolition trailer for transport to a scrap yard, whereas scrap wood was transported and disposed of at the Petrillo Brothers landfill in Minquadale, Delaware.

2.3.3 Phase 3 - Disposal of Hazardous Waste In Surface Piles

RES' Phase 3 work was initiated with the removal of two piles of contaminated soil. The soil was loaded onto dump

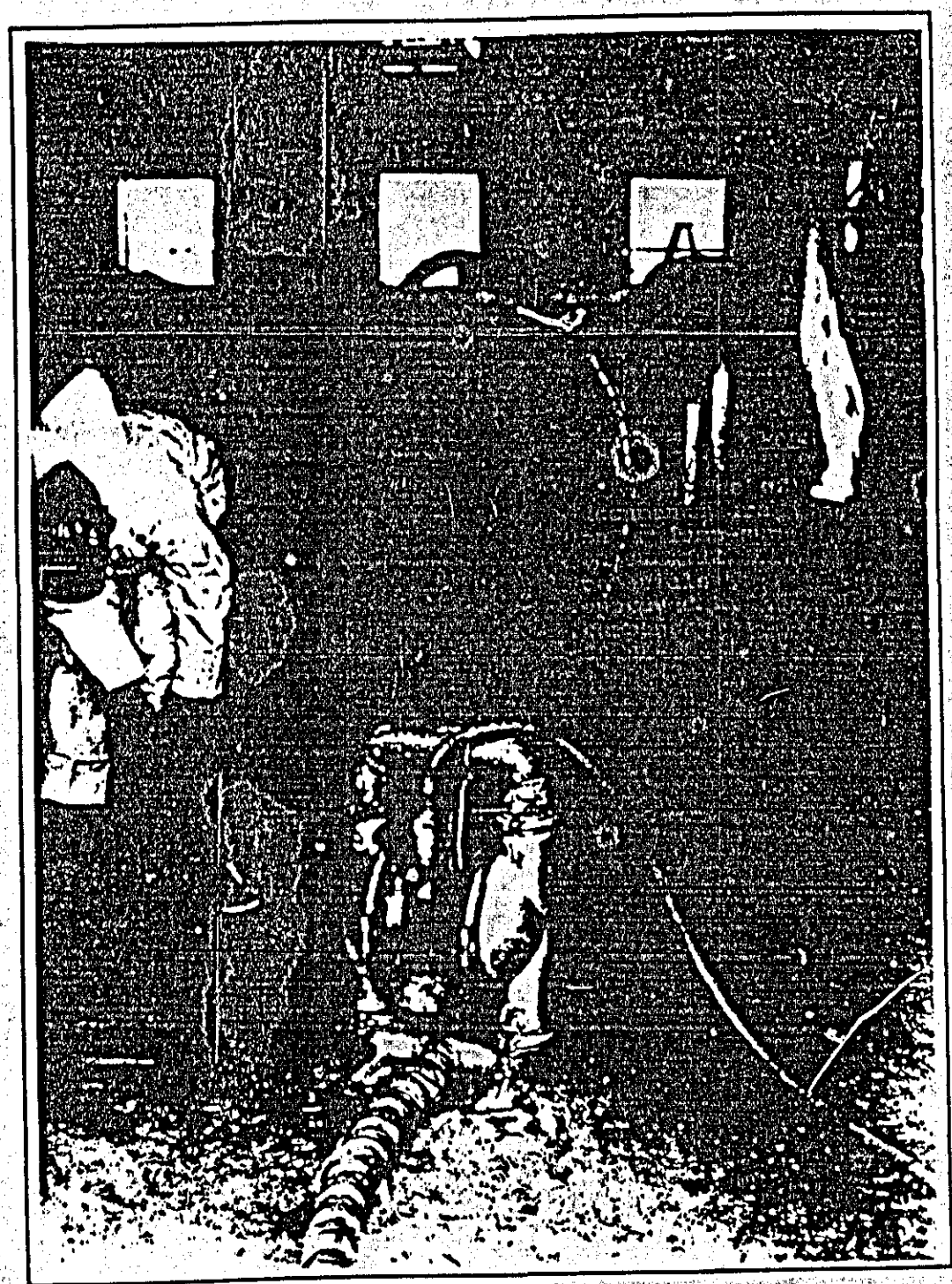

FIGURE 2-6 TEMPORARY WATER TANKS IN FORMER OFFICE BUILDING

AR001301

trailers for transport to the GSX landfill in Pinewood, South Carolina. Tare and loaded weights of the dump trailers were obtained and recorded using the on-site, state certified scale (Figure 2-7). The trailers were lined with plastic sheeting prior to loading. Prior to departing the site, the loads were covered with tarpaulin to prevent loss of the soil during transport and the required documents including weight records, bills of lading, and hazardous waste manifests were completed and provided to the transporter. It should be noted that RES prepared the manifests for signature by the DER.

A second component of RES' Phase 3 work was the removal and disposal of five piles of contaminated tires and/or shredded rubber. RES utilized a transportable shredder to process the tires for volume reduction. Concurrent with the shredding work, RES fabricated a process for decontaminating the shredded rubber. The process consisted of two rotating cylinders fitted with internal spray bars and liquid collection sumps (Figure 2-8). The washing liquid utilized in the first rotating cylinder contacted the shredded rubber only once prior to being transferred to the water storage tanks inside the former office building. The rinse water utilized in the second cylinder was recycled and replenished as needed. Due to operational problems during shakedown of the rubber washing process, RES elected to decontaminate only a small portion of the shredded rubber. The shredded rubber was subsequently loaded into dump trailers and transported to GSX in Pinewood, South Carolina. The loading and recordkeeping procedures previously described for contaminated soil were also employed for the shredded rubber.

The last major component of the Phase 3 work was closure of the underground tank near the former boiler house. RES initiated this work by measuring the depth of the contents of the tank and estimating the quantities of material contained in the tank. RES estimated the size of the tank was approximately 10,000 gallons. RES also learned that the tank contained a predominantly aqueous layer overlying a thick black sludge believed to be residual fuel oil for the boiler house. These findings were communicated to the DER, as they differed substantially from the assumptions stated in the RFQ/P.

RES proceeded with closure of the underground tank in accordance with the requirements of the RFQ/P. A square opening was cold cut in the top of the tank to facilitate personnel entry. The wastewater layer was removed by transfer into a vacuum trailer and was disposed at Chem-Clear in Chester, Pennsylvania. The underlying sludge was

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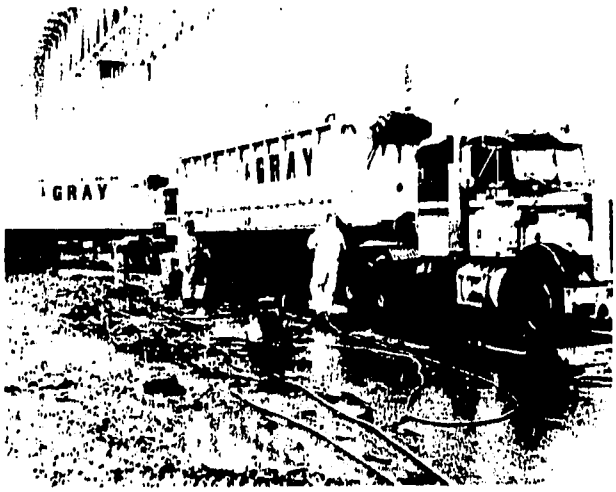
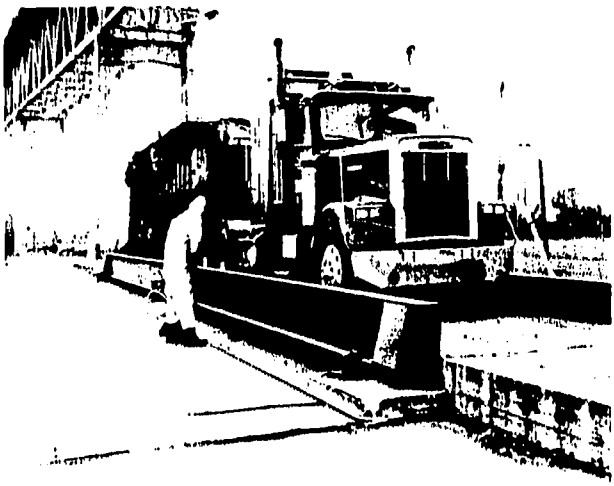


1. Dump Trailer Undergoing Decontamination On Steel Containment Pad.



2. Transport Vehicle Being Weighed Prior To Departure.

FIGURE 2-7 TRUCK DECONTAMINATION AND WEIGHING

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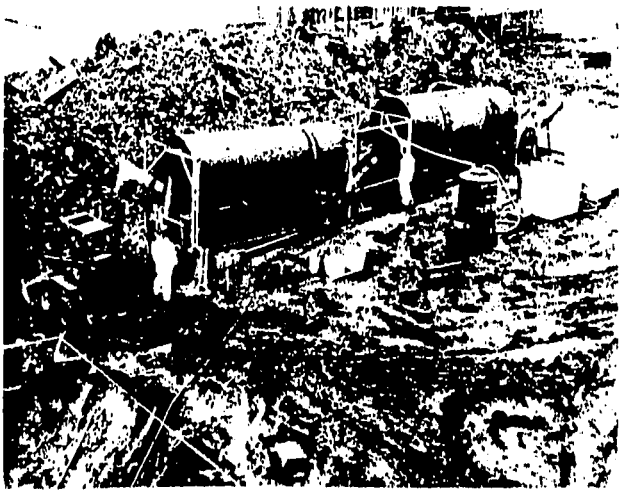
WESTON

1. Transportable Tire Shredder



2. Shredded Rubber Decontaminating Processor

FIGURE 2-8 TIRE SHREDDING AND DECONTAMINATION

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removed using a high-vacuum truck. The sludge was subsequently transferred into drums and small, lined containers and staged adjacent to the former office building (Figure 2-9). Residual solids were removed using shovels and buckets prior to pressure washing the internal surfaces of the tank (Figure 2-10). The wastewater resulting from the pressure washing work was removed by vacuum truck and the tank was filled with sand.

2.3.4 Phase 4 - Excavation and Disposal of Hazardous Waste Soils

RES initiated excavation of soils according to the Soil Removal Plan (Drawing 102 of the RFQ/P) within the grids located near the front fenceline. The soils were stockpiled near the former office building (Figure 2-11) prior to loading, transport, and disposal according to the procedures described in Section 2.3.3 for the surface piles. Excavation of the soils along the front fenceline resulted in a noticeable aromatic odor; however, this was of very short duration and was observed only in the immediate vicinity of the site (within approximately 25 feet). Perimeter air samples on the front fence revealed that air quality in the area was well below the action limits set for the site.

Excavation in the southern portions of the site revealed the presence of a large concrete mass, encountered at depths of one to two feet. The concrete was found to be up to three feet thick and was believed to be associated with washout of concrete delivery trucks during construction of the adjacent bridge. The existence of the mass was recognized in the RFQ/P and it was determined that the material would remain on-site (see Section 4.6.2).

2.3.5 Phase 5 - Demolition and Rough Grading

RES executed the demolition work during Phases 3, 4, and 5, as described in Section 4.6.1. Selected demolition activities are illustrated in Figures 2-12 through 2-14. A significant difficulty during this phase was controlling and authorizing the use of hot work to remove selected structures and equipment. Specifically, torches were used to cut the bases of the rubber storage silos and grinding machinery mounts. This occasionally resulted in the ignition of rubber tires in the vicinity of the torch cutting.

The second component of the Phase 5 work was the placement of rough grade. Building rubble (structural fill)

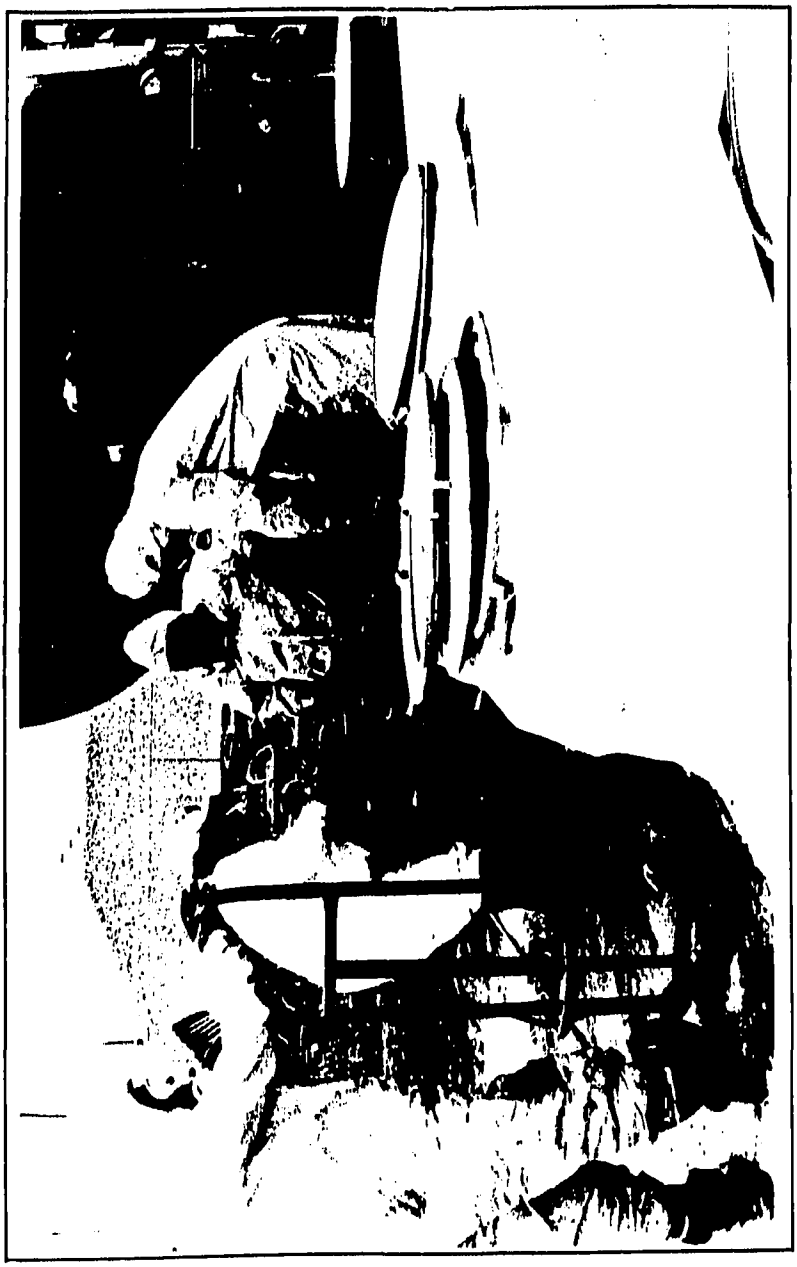

FIGURE 2-9 TRANSFERRING OILY SLUDGE INTO DRUMS

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FIGURE 2-10 PRESSURE WASHING INTERIOR OF UNDERGROUND STORAGE TANK

WESTON

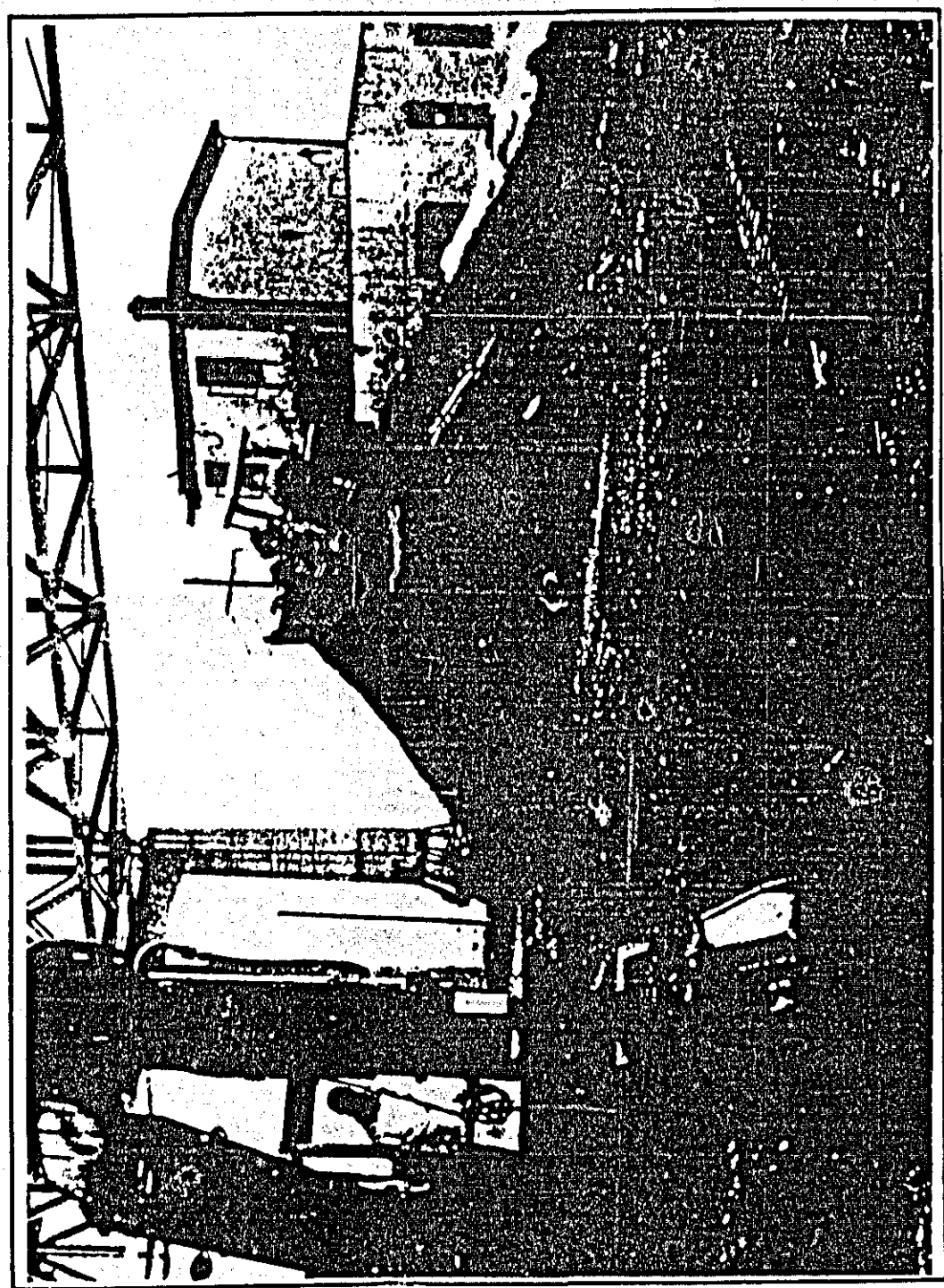

FIGURE 2-11 EXCAVATED SOIL STOCKPILE

from Mr. Klotzback to Mr. Claypool. Copies of this and all subsequent correspondence relating to Change Orders are presented in Appendix F.

Subsequently, RES provided the DER with a cost estimate for completing the work associated with the change order requests. The estimate included costs associated with work performed by RES at its own risk and for work remaining to be done. The cost estimate, presented in a spreadsheet format, was transmitted to the DER in a letter dated February 27, 1987 to the DER Contract Officer, from RES' Contract Administrator. The cost estimates for the three items contained in the first Change Order request are summarized below:

• Item 1 - PCB Capacitors	$ 6,013.14
• Item 2 - Grid 41 Pile	113,448.18
• Item 3 - Tanker Solids Removal	17,395.49
TOTAL	$136,856.81

The combined cost estimated for sampling and analysis in Items 1 and 2 of Change Order No. 2 was $567.24. No cost estimate was submitted for Change Order No. 2, Item 3.

WESTON performed a detailed review of the technical information and cost estimates provided by RES for Change Order Nos. 1 and 2. RES' estimates for labor hours, equipment usage, and materials expended on work completed "at risk" were checked on a line-by-line basis against WESTON's written, photographic, and videotape logs. Costs associated with work remaining to be done were checked for reasonableness.

WESTON also evaluated RES' daily rates for equipment and safety supplies. This included consultation of the Construction Blue Book for heavy equipment rates and a comparison of RES' rate for Level C safety equipment with WESTON's rates for similar equipment. As directed by the DER, RES' labor rates for the personnel assigned to the site were not included in WESTON's evaluation of the change order request cost estimate. Additionally, at the request of RES, WESTON was not informed of the labor rate cost buildup information submitted to the DER. Labor rates and cost buildups were evaluated by the Comptroller's office.

RES' cost estimate spreadsheet was modified to reflect differences between RES' and WESTON's records. WESTON's comments and cost comparison were telecopied to the DER on March 3, 1987 and formally transmitted on March 10, 1987.

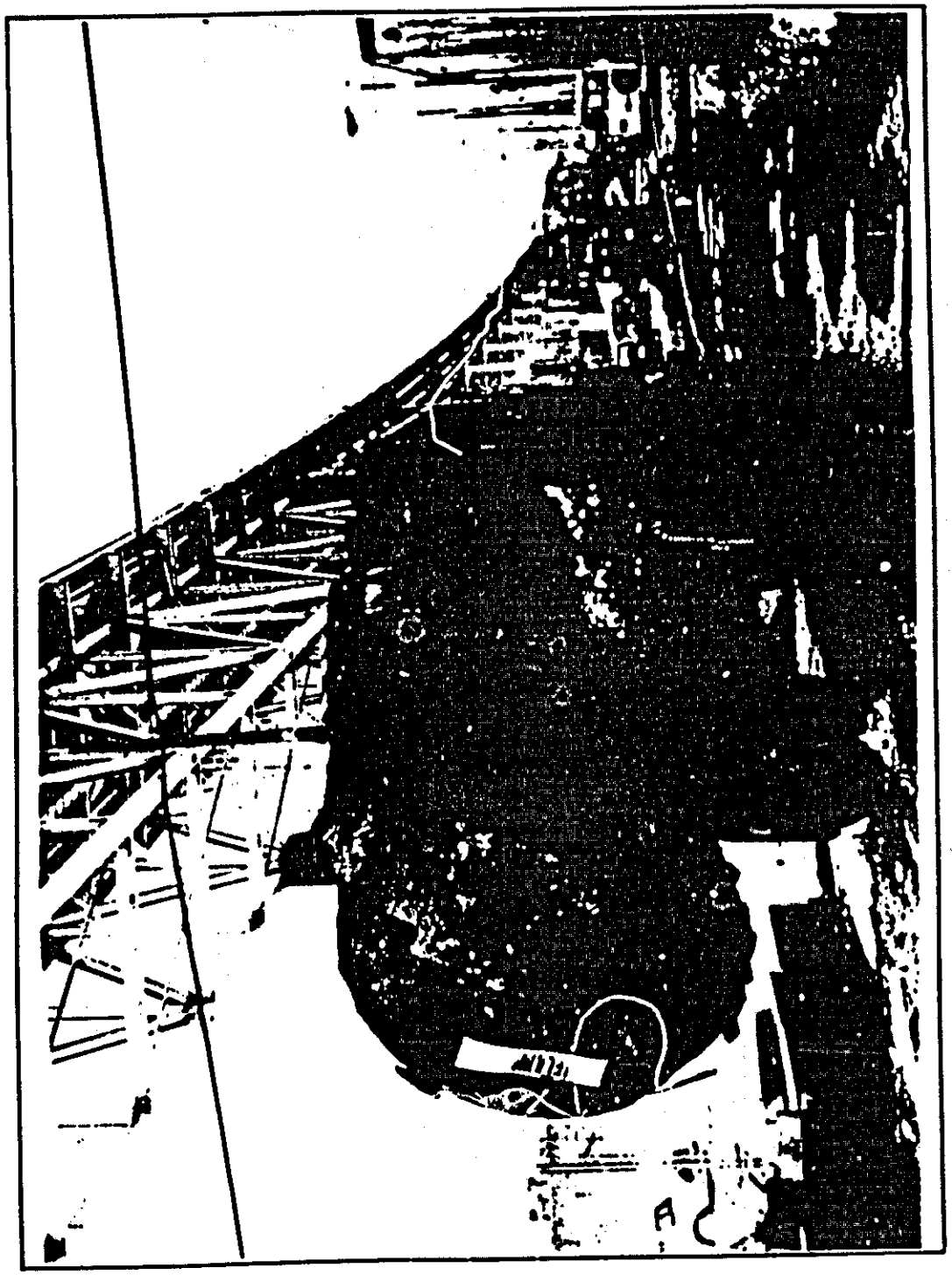

FIGURE 3-2 CRUSHED TANKER LOADED FOR OFF-SITE TRANSPORT

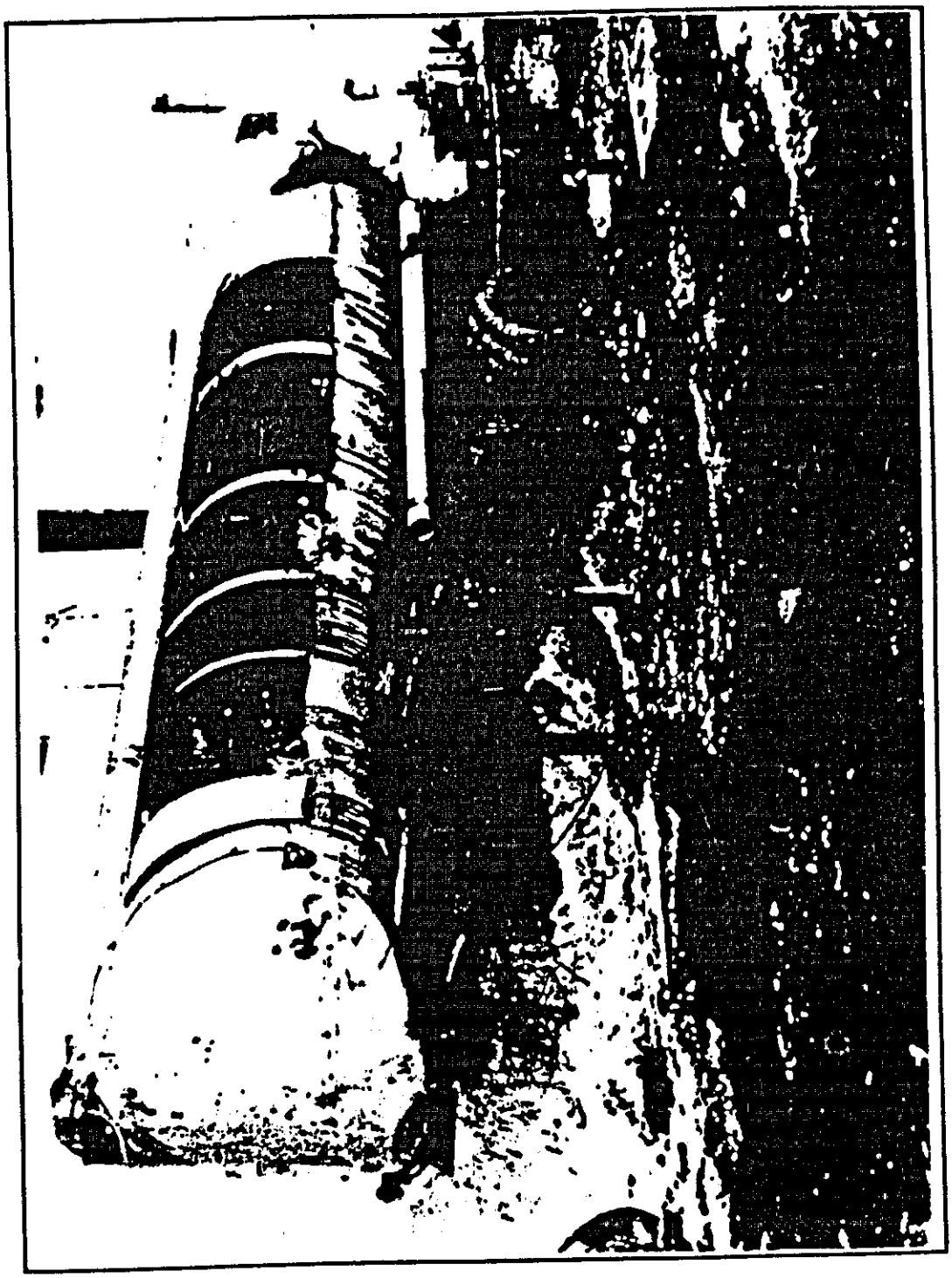

FIGURE 3-1 CUTTING TANKER SIDEWALLS

the work. RES' decision to proceed "at risk" was communicated to the WESTON Site Representative, who, in turn, informed the DER Cleanup Director and Contract Officer of RES' "at risk" approach. The DER decided that in the interests of completing the project on schedule, the "at risk" approach was acceptable. Furthermore, it was decided that WESTON would monitor RES' activities relating to the three items described above, as though this work was being conducted on a time and materials basis.

The at risk work performed by RES on the PCB capacitors involved packing the units in drums as described previously. The drums were staged on-site during most of the remedial action pending identification of a qualified disposal facility. The capacitors were transported to National Electric in Coffeyville, Kansas for incineration.

The at risk work performed by RES on the Grid 41 pile included sorting through the material rejected by the scrap yard (and returned to the site) as well as that remaining in Grid 41. Use of an industrial electromagnet was attempted for removing ferrous metal, but this was quickly found to be ineffective. A hydraulic excavator was successfully used to sort through the pile. Scrap metals were loaded onto demolition trailers for transport to Camden Scrap Iron and scrap wood and soil were transported to the Petrillo Brothers landfill in Minquadale, Delaware.

Removal of the tanker solids was a relatively difficult task as reciprocating saws were used to cut through the steel sidewall of the tankers (Figure 3-1). The residual solids were initially removed using hand tools; however, when this was found to be prohibitively slow, heavy equipment was used to bang the tankers on the ground. The residual solids were collected and placed in a stockpile of contaminated soil using a front-end loader. An estimated one to two cubic yards of residual solids were accumulated in this manner. The tanker shells were crushed and loaded onto demolition trailers for disposal as scrap metal (Figure 3-2).

As directed by the DER Contract Officer, WESTON reviewed Mr. Jaffe's letter of January 29, 1987 and determined that the technical approaches outlined in that letter were not sufficiently detailed for a thorough evaluation of the requests for Change Order Nos. 1 and 2. A request for supplemental information was made by means of a letter dated February 9, 1987 from WESTON's Site Representative to RES' Site Supervisor. RES responded to this request for supplemental information in a memorandum dated February 11, 1987

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timbers, concrete block, tires and other debris. These other materials were not discovered prior to RES' work because they were obscured by the overlying scrap metal. The reason why these other materials were present in the scrap metal pile is not known.

- On January 22, 1987, RES inspected the seven tankers, identified in the RFQ/P as empty, and determined that three of the tankers contained small amounts of residual solids. The total quantity was estimated at less than two cubic yards.

Mr. Jaffe's letter of January 29, 1987, also included a request for Change Order No. 2, including the following three items:

- sampling and analysis of the electrical panels in Grids 26 and 9 to determine whether PCBs were present in the oily residues around the panels.

- sampling and analysis of the dielectric fluid in a transformer housed in the electrical substation that once served the facility.

- removal and disposal of several compressed gas cylinders found on-site.

It should be noted that the Site Representative inspected the seven capacitors discovered by RES and found that one of the insulator posts on one of the units was slightly damaged and had leaked some dielectric fluid onto the capacitor casing. Additionally, two of the capacitors found in the warehouse building were examined by the Site Representative and were found to be damaged and leaking. In light of these observations, RES was directed to place the capacitors in DOT approved drums containing a granular absorbent and to label the drums with a PCB marking (see letter dated January 21, 1987 from WESTON's Site Representative to the DER Cleanup Director, Appendix M). These actions were deemed necessary to ensure compliance with TSCA regulations (40 CFR 761).

RES decided to initiate means of addressing each of the items covered in the request for Change Order No. 1 at its own risk, i.e. prior to execution of a contract amendment for these items. This decision was made primarily with the intent of averting a substantial delay in the progress of

WESTON

TABLE 3-1

SUMMARY OF CHANGE ORDER REQUESTS

Change Order Number	Item Number	Description of Work	Reimbursement Requested	DER/RES Negotiated Settlement (1)
1	1	Remove and Dispose of PCB Capacitors	$ 6,012.04	$ 4,065.43
	2	Sort and Dispose of Materials in Grid 41	168,930.18	$ 15,785.52
	3	Remove Residual Solids from Tankers	17,395.49	5,908.83
		CHANGE ORDER NO. 1 SUBTOTALS	$192,338.71	$ 25,759.78
2	1	Test Electrical Panels for PCB	567.24	529.38
	2	Sample Transformer Dielectric for PCB		
	3	Dispose of Compressed Gas Cylinders	1,896.65	1,776.24
		CHANGE ORDER NO. 2 SUBTOTALS	$ 2,463.89	$ 2,305.62
3	1	Closure of 10,000 Gallon Underground Tank	$ 48,580.02	$ 55,023.81
4	1	Removal and Disposal of 105 CY of hydrocarbon Contaminated Soil	$ 9,613.08	$ 10,136.01
		TOTALS	$252,995.70	$ 93,227.22

(1) WESTON presented inititial recommendations to the DER regarding each change order item and these recommendations were used by the DER as its basis for negotiating with RES. In certain instances, WESTON's cost recommendations were revised upward following receipt and verification of additional information from RES.

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SECTION 3

DESCRIPTION OF OUT-OF-SCOPE WORK

3.1 Overview

During the course of the remedial action, certain unforeseen site conditions were encountered, ranging from minor findings, which the contractor addressed at no cost to the DER, to significant discoveries. The significant discoveries are classified as such because they resulted in submittal of series of change order requests by RES. Each of these requests, along with WESTON's evaluation and recommendations to the DER on those requests, is described in this section.

A summary of the change order requests is provided in Table 3-1. It should be noted that the DER Cleanup Director and the WESTON Site Representative (or both) were usually appraised of the unforeseen site conditions shortly after discovery. This initial notification was communicated to the DER Contract Officer.

3.2 Change Order Nos. 1 and 2

The first change order request, designated by RES as "Change Order No. 1", was submitted via a letter from Mr. Richard Jaffe of RES to Mr. Donald Becker of the DER, dated January 29, 1987. Copies of this letter and other correspondence relating to this change order request are contained in Appendix F. The request for Change Order No. 1 described three items RES believed were out-of-scope, including:

- On January 13, 1987, RES discovered seven large capacitors in the brick electrical substation building on-site. Subsequently, on January 21, 1987, WESTON observed three other capacitors in the warehouse portion of the building. These units were suspected of containing PCB dielectric fluid.

- On January 20, 1987, RES determined that the pile in grids 25, 26, 40, and 41, as shown in Figure 1-2, (collectively referred to as the Grid 41 pile), identified in the RFQ/P as a scrap metal pile, contained debris in addition to the scrap metal. The pile consisted of a scrap metal layer overlying a pile of soil,

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Section 3

WESTON

TABLE 2-1

PAYMENT SUMMARY

Phase	Date Invoiced	Invoice Number	Amount Invoiced	Date Payment Approved
1	2-25-87	14066	$ 104,804.00	3-25-87
2	2-25-87	14066	119,537.00	3-25-87
3	5-12-87	14081	826,719.00	5-14-87
4	5-12-87	14078	1,300,262.00	5-14-87
5	6-19-87	14092	410,116.00	6-26-87
6	7-17-87	14097	199,572.00	10-1-87
7	7-17-87	14097	5,177.00	10-1-87
(1)	12-23-87	15054	93,227.22	1-28-88
TOTAL			$3,059,514.22	

(1) Out-of-scope work per Contract Amendment No. 2.

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2.5 Payment

2.5.1 Phase Completion Checklists

Prior to the initiation of site work, WESTON developed a set of Phase Completion Checklists to monitor the progress of the Contractor and to serve as an aid in determining payment. The checklists included all of the work items specified in the RFQ/P and any additional work items RES included in its proposal submitted to the DER in response to the RFQ/P. As RES submitted invoices for phases it believed were complete, the DER and the Site Representative reviewed the checklists to ensure that the work invoiced had in fact been completed.

2.5.2 Payment

Copies of all of RES' invoices and related payment documents are included in Appendix E. RES was compensated on a lump-sum-by-phase basis for a total fixed price of $2,966,287. Additionally, RES was compensated on a time and materials basis for work performed under change orders approved by the DER for a total of $93,227.22. RES' total compensation for the work described herein was therefore $3,059,514.22. A summary of these payments is provided in Table 2-1.

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WESTON

2.4.4 Phase Out Report

Section 13.4.7 of the RFQ/P requires the Contractor to submit a Phase-Out Report at the completion of the work. The contents of the Phase Out Report were to include:

- a certification regarding decontamination of the site;
- a description of the procedures and techniques used to decontaminate equipment, vehicles, the shower facility, and the laundry facility; and
- signature of the Site Supervisor.

A copy of RES' Phase Out Report for this Project is provided in Appendix R.

2.4.5 Oversight Reports

A key aspect of WESTON's oversight of the Contractor's performance was the preparation of daily reports. These reports, presented in Appendix D, documented:

- the work performed by RES and its subcontractors;
- personnel, equipment, and materials used;
- comments, problems, and agreements made;
- test data received; and
- visitors to the site.

2.4.6 Comptroller's Audit Report

On February 13, 1987 Mr. Jim Johnson of the Commonwealth of Pennsylvania, Department of Treasury - Comptroller's Office, visited the Wade Site to review the types of records maintained by the DER, WESTON, and RES. Mr. Johnson's site visit subsequently led to an audit of the Project. A copy of the Comptroller's Audit Report is provided in Appendix S.

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WESTON

2.4.1 Meeting Minutes

Section 13.7.1 of the RFQ/P requires the Contractor to schedule and conduct progress meetings at a frequency of twice per month. During the initial phases of the Project, progress meetings were conducted on a much greater frequency, sometimes as often as one per day. The frequency of these meetings generally decreased as the work moved into the backfilling phases and as the lines of communication became more defined.

The RFQ/P required the Contractor to maintain certain records associated with the progress meetings. The formal agenda specified in the RFQ/P were not required by the Site Representative; however, written minutes were required. Copies of the progress meeting minutes are provided in Appendix Q. At the suggestion of RES, it was agreed that both the Site Supervisor and the Site Representative would sign the progress meeting minutes.

2.4.2 Bi-monthly Progress Reports

Section 13.8.3 of the RFQ/P required the Contractor to prepare and submit bi-monthly progress reports. The purposes of these reports were to:

- update the Project schedule;
- report on activities completed as the basis for payment; and
- discuss current and anticipated problems, delays, and corrective actions.

RES submitted progress reports on a semi-monthly frequency, primarily due to the accelerated pace of the site work. These reports relied primarily on the use of the phase checklists prepared by WESTON as a means of documenting activities that had been completed. Copies of RES' progress reports are provided in Appendix R.

2.4.3 Phase Completion Reports

On its own initiative, RES prepared and submitted Phase Completion Reports. These reports employed the phase checklists developed by WESTON as a means of documenting the completion of a given phase of work. Copies of the Phase Completion Reports are provided in Appendix R.

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WESTON

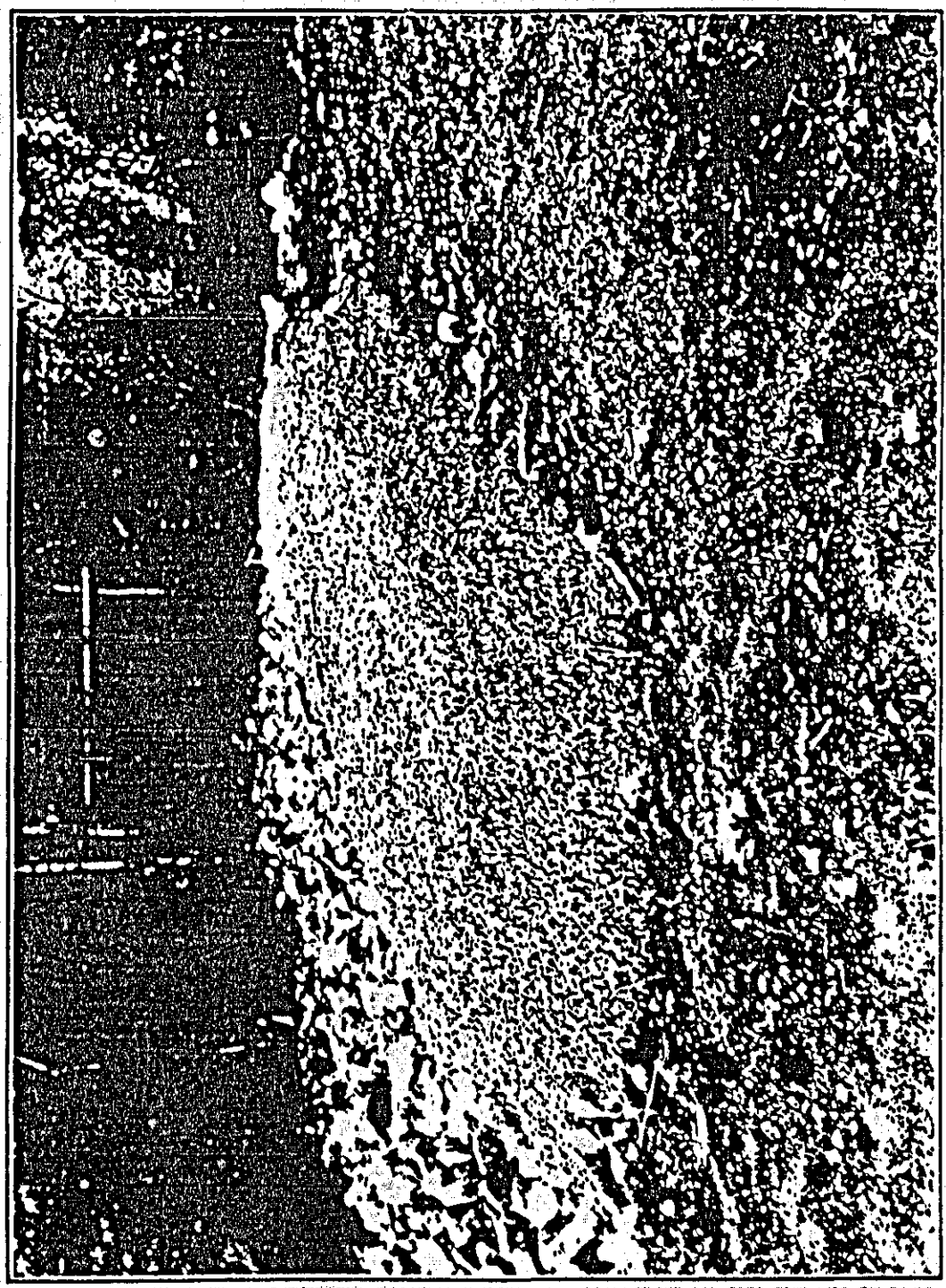

FIGURE 2-15 SEDIMENT BARRIER IN WESTERN DRAINAGE SWALE

was utilized throughout much of the site as the initial backfill material. The fill was transported on-site in a tandem axle dump truck and placed using a hydraulic excavator. The structural fill was covered with select fill imported from a nearby borrow source. Geotechnical data on the select fill is provided in Appendix O. The rough grade was compacted using a vibratory roller and the degree of compaction was measured on each lift using a nuclear density gage. Difficulties were encountered in achieving the compaction specification in several grids (see Section 4.6.6).

2.3.6 Phase 6 - Final Grading

RES' site work was essentially completed with the placement of final backfill and long-term site management controls. The rough grade was covered with 18 inches of select fill (see Appendix O for geotechnical data) followed by a 6-inch layer of topsoil and mulch. The site was seeded by a hydroseeder.

Site management controls included improvements to the existing silt fencing and construction of two sediment barriers (one in each of the drainage swales). The sediment barriers were constructed of washed stone in accordance with the material specifications in the RFQ/P (see Figure 2-15).

2.3.7 Phase 7 - Demobilization

RES demobilized its personnel and equipment in mid-July 1987. The truck scales were disassembled and the ramps and footers were demolished and the footer excavations in Flower Street were returned to grade by patching with bituminous material. All of the utilities were disconnected and the temporary sewage holding tank was removed, crushed, and disposed off-site. The office and supply trailers were transported off-site and guard services were discontinued.

2.4 Reports

A number of reports were generated at various points and frequencies during the course of the remedial action. Several of these reports were Contractor submittals required by the specifications of the RFQ/P, whereas others were reports issued by WESTON or the DER. An overview of the various reports generated during the remedial actions at the Wade Site is provided in this section.

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WESTON

FIGURE 2-14 DISMANTLING OF THE RUBBER STORAGE SILOS

AR001323

FIGURE 2-13 REMOVAL OF GRINDING MACHINERY

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FIGURE 2-12 DEMOLITION OF PIPE TUNNEL

On March 5, 1987 RES and DER met at the site to discuss WESTON's comments. Tentative resolutions were reached on all but one issue: transportation costs for the tankers. It was agreed that WESTON and RES would independently research their records to justify their positions on this issue. WESTON's findings were transmitted to the DER via a letter from the Site Representative to the Contract Officer dated March 16, 1987.

The DER Contract Officer subsequently asked WESTON for its recommendations concerning the request for Change Order Nos. 1 and 2. WESTON provided its recommendations to the DER in a letter dated March 27, 1987 from WESTON's Project Manager to the Contract Officer. In that letter, WESTON recommended that the DER accept a price adjustment for Change Order No. 1, Items 2 and 3. However, the price adjustment WESTON calculated, based on its records, differed substantially from RES' cost estimate. The basis for the difference are described in the March 27 letter. The cost estimate comparison provided in the March 27 letter was summarized on a spreadsheet prepared by WESTON's Site Representative. This spreadsheet and other supporting information were provided to the DER on April 7, 1987 in a letter from the Site Representative to the Contract Officer.

Two meetings were held at the DER offices in Harrisburg, Pennsylvania on April 10, 1987 to discuss the requests for Change Order Nos. 1 and 2. The first meeting, attended by representatives of WESTON and the DER, was conducted to brief DER management on WESTON's findings and recommendations relative to the request for Change Order Nos. 1 and 2.

A second meeting was subsequently conducted with representatives of the DER, RES, and WESTON in attendance. The DER's position was communicated verbally to RES and was elaborated upon during the ensuing discussions. RES requested that the DER put its positions in writing and provide RES with an opportunity to respond. The DER's positions on these matters were specified in a letter from Mr. James Snyder, Assistant Director, Bureau of Waste Management, to Mr. Richard Jaffe of RES dated April 15, 1987. RES responded to this correspondence on April 23, 1987 in a letter from Mr. Jaffe to Mr. Snyder.

Two meetings were again held at the DER offices in Harrisburg, Pennsylvania on May 7, 1987. The first meeting, with representatives of DER and WESTON in attendance, addressed three issues:

- the requests for Change Order Nos. 1 and 2;

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- an administrative consent order issued to DER by the State of South Carolina (see Section 4); and

- problems with achieving the backfill compaction specification (see Section 4).

With respect to the first issue, a substantial amount of the meeting was devoted to reconstructing materials handling scenarios for the Grid 41 pile. This was the focus of much of the meeting because the differences in RES' and WESTON's quantity estimates for this material constituted the main contribution to the differences in their respective cost estimates.

A second meeting was subsequently convened with representatives of DER, RES, and WESTON in attendance wherein RES presented its position on each of the change order items. Videotapes of activities involving the handling of materials from the pile in Grid 41 were reviewed. Based on this meeting, resolutions were reached on each of the out-of-scope items contained in RES' requests for Change Order Nos. 1 and 2. Resolutions reached in this meeting included the following:

- For Change Order No. 1, Item 1, DER agreed that eight of the eleven electrical capacitors were not readily visible to bidders during the pre-bid site inspection and the cost for removing and disposing of the units was justifiable as out-of-scope work. RES would be responsible for the other three. It was agreed that RES would weigh the drums containing the capacitors in order to refine its cost estimate for this item. Additionally, RES agreed to provide DER with the name and qualifications of the disposal facility it proposes for the capacitors.

- For Change Order No. 1, Item 2, DER agreed that the cost for sorting the debris in Grid 41 and transporting and disposing of the material at an appropriate facility was justified as out-of-scope work. It was agreed that DER would accept the costs associated with transportation and disposal of nine loads of this material rather than the twenty-five loads originally claimed by RES. RES agreed to sample and analyze the pile to determine whether the soil was contaminated and should be disposed as hazardous waste.

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- For Change Order No. 1, Item 3, DER agreed that costs for removing residual solids from three tankers was justifiable as out-of-scope work, since the RFQ/P stated that these tankers were empty. Allowable charges for transportation and disposal, less than those originally requested by RES, were agreed upon.

- For Change Order No. 2, Item 1, DER agreed to bear the costs for testing the electrical panels for the presence of PCB.

- For Change Order No. 2, Item 2, DER agreed to bear the costs for testing the dielectric fluid, disposing of the transformer, and to attempt to recover these costs from PECO (whose name was stencilled on the unit, but who has claimed to RES that the unit is not theirs).

- For Change Order No. 2, Item 3, a cost proposal and technical approach had not been submitted as of this meeting.

Also during the May 7, 1987 meeting in the DER offices the cost estimate spreadsheets developed by WESTON and RES were independently revised to further ensure that all of the parties were in concurrence with the resolutions described above. It was agreed that WESTON and RES would revise their respective spreadsheets and submit their findings to the DER. WESTON's revised cost estimate spreadsheet was transmitted to the DER Contract Office via a letter dated May 11, 1987.

On October 13, 1987, RES submitted its final cost summary for Change Orders Nos. 1 and 2. Costs were provided for those items which had not previously been estimated, including:

- Change Order No. 1, Item 1 - Disposal of PCB Capacitors; and

- Change Order No. 2, Item 3 - Removal and disposal of compressed gas cylinders.

RES' costs for all of the change order items were submitted in spreadsheet format.

On November 30, 1987, Ms. Kim DeKona, of the DER, notified WESTON of the labor and equipment rates recommended to the DER by the Comptroller's Office. These rates were

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used to revise the cost evaluation spreadsheets previously prepared by WESTON. The revised spreadsheets were transmitted to the DER on December 1, 1987.

On December 17, 1987, a meeting was held at the DER offices to finalize negotiations on all of the change order requests submitted by RES for its work at the Wade Site. Minutes of that meeting are provided in Appendix F.

Based on the resolutions described above, the DER agreed to bear the cost of $28,065.40 out-of-scope work for Change Order Nos. 1 and 2. This is $166,737.20 less than the $194,802.60 originally requested by RES.

3.3 Change Order No. 3

Section 5.5 of the RFQ/P required the contractor to sample, analyze, remove, and dispose of the contents of an underground tank (located in front of the former boiler house) and to backfill the tank with clean sand. Furthermore, Section 2.4 of the RFQ/P stipulates that for bidding purposes, the volume of the tank was assumed to be 1,000 gallons and the tank was completely full of an oil/water suspension. The RFQ/P recognized closure of the underground tank as an aspect of the work for which a change order would be considered if the actual quantity or contents differed from the specified assumptions.

Subsequent measurements by RES (and verified by WESTON) revealed that the volume of the tank was approximately 10,000 gallons. Additionally, it was determined that the tank contained two distinct layers. The top layer appeared to be aqueous and exhibited a light petroleum-type sheen. The bottom layer resembled a heavy oily sludge. Removal and disposal of the wastewater and sludge layer are described in Section 2.3.3.

RES submitted a request for Change Order No. 3 to cover the extra costs it anticipated for closure of the underground tank. The request, dated April 9, 1987 (see Appendix G) totalled $28,524.71.

The DER directed WESTON to evaluate the justification for and costs associated with this change order request. WESTON evaluated the request for Change Order No. 3 in a manner similar to that used for Change Order Nos. 1 and 2. Based on a review of its field notes, photographs, and videotapes of the underground tank closure, WESTON expressed its comments and recommendations to the DER in a letter to

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Section 4

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SECTION 4

OTHER ISSUES

A number of issues were raised or encountered during various stages of the remedial action at the Wade Site. These ranged from difficulties in obtaining permission to use certain abutting properties and facilities to alleged violations of South Carolina laws regarding hazardous waste packaging and transportation. Several of these issues encountered necessitated field modifications to the specifications described in the RFQ/P. These issues and their respective resolutions are described in this section.

4.1 Sanitary Discharge Permitting

One of the problems encountered early in the project was obtaining permission to dispose of on-site generated sanitary wastewaters in the Delaware County Regional Water Quality Control Authority (DELCORA) sewers. On January 21, 1987 a DELCORA inspector visited the site to investigate a report of an unauthorized discharge to the sanitary manhole at Flower and Delaware Streets. The RES Site Supervisor told the DELCORA inspector that sanitary wastes from the support area of the site were being accumulated in a dedicated holding tank and were pumped to the DELCORA manhole as was approved by DELCORA for previous cleanup activities at the Wade Site. Separate holding tanks were used for the accumulation of other wastewaters, including decontamination rinsates, generated at the site and these were disposed of elsewhere, as described in Section 1.

Later that day, a DELCORA crew was observed preparing to work on the manhole in front of the site. When RES' Site Supervisor inquired as to the nature of their work, he was told the crew was preparing to grout the manhole shut to prevent these discharges. The crew was asked to postpone this work until DELCORA's approvals for wastewater discharges to the manhole during the previous cleanup activities at the site were retrieved.

WESTON researched its files from previous phases of the work and located a letter from Mr. Raymond Chesnut of DELCORA to Mr. Stuart Rosenthal, the DER Site Representative, dated January 15, 1980. In that letter, DELCORA granted permission to "pump domestic wastes collected at the Wade...Site into a nearby manhole." A copy of this letter was provided to RES and in turn to DELCORA (Appendix H).

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Subsequently, on January 30, 1987, DELCORA requested that RES sample and analyze the contents of the sanitary wastewater holding tank. Analyses requested included total organic halogen and priority pollutant metals. Discussions with RES' Site Supervisor led to an agreement that WESTON would sample the contents of the tank and analyze those samples on a rapid turnaround time basis. It was also agreed that RES would pay for the analyses, as the Contractor was responsible for obtaining any permits necessary for executing the work.

Samples from the holding tank were collected on February 3, 1987. A representative from DELCORA was present and split samples were provided to him in glassware provided by DELCORA. It was mentioned that, in addition to the parameters previously mentioned, DELCORA intended to analyze the samples for cyanide, phenols, and volatile organics.

Verbal results were received on February 10, 1987 and showed that the wastewater exhibited the following characteristics:

Total Organic Halide	130 ug/L
Cyanide	< 0.01 mg/L
Silver	< 10 ug/L
Arsenic	14 ug/L
Beryllium	< 5 ug/L
Cadmium	< 5 ug/L
Chromium	47 ug/L
Copper	152 ug/L
Mercury	< 0.2 ug/L
Nickel	40 ug/L
Lead	133 ug/L
Antimony	< 60 ug/L
Selenium	10 ug/L
Thallium	< 10 ug/L
Zinc	779 ug/L

The data was transmitted to DELCORA on February 19, 1987. Based on this information, permission to continue discharging to the manhole was granted.

4.2 Alternate Subcontractors

During the initial phases of its activities, RES submitted requests to use the services of various subcontractors not included in RES' proposal (Appendix I). These subcontractors included transporters, disposal sites, laboratories, and consultants for geotechnical testing and

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health and safety support. RES submitted requests to use the following subcontractors for the services described:

• Wayne Disposal, Inc.	Disposal of Hazardous Waste Solids
• Michigan Disposal, Inc.	Disposal of Hazardous Waste Solids
• MDS Laboratories	Analysis of Air Samples for Volatile Organics
• Waste Conversion, Inc.	Wastewater Disposal
• Chem-Clear, Inc.	Wastewater Disposal
• Jack Gray Transport, Inc.	Transportation of Hazardous Waste Solids.

RES' requests to use alternate subcontractors were reviewed by WESTON and the DER. These reviews included consideration of qualifications information submitted by RES and, in the case of disposal facilities, inquiries to the appropriate regulatory agencies to determine the compliance status of the facilities. All of the firms listed above were approved for use on the project with the exception of Wayne Disposal, Inc. and Michigan Disposal. These two firms were not approved because they were not in compliance with USEPA's CERCLA off-site disposal policy.

4.3 Activities on DRPA Property

During a January 8, 1987 meeting with officials from the City of Chester, RES requested the City's permission to place fill over Flower Street as shown in the design drawings of the RFQ/P. It was subsequently learned from the City's right of way records that the Delaware River Port Authority (DRPA) was the current owner of record for portions of the Wade Site, including the right of way for the portion of Flower Street that extends inside the site fence and a triangular area in the southern corner of the site. RES contacted the DRPA in an effort to secure the Authority's permission to conduct the work required on DRPA property (letter from M. Mellinger of RES to J. Yeomans of the DRPA, dated January 12, 1987). The DRPA designated Mr. Charles Odgers and Mr. John Zagorski as contacts on this Project.

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A meeting was held on-site on the morning of February 11, 1987 to brief the DRPA personnel on the nature of the work impacting the DRPA's property. The DRPA requested copies of the design drawings and relevant sections of the RFQ/P for its review. WESTON provided the information requested to Mr. Odgers in a February 11, 1987 letter from the Site Representative (Appendix J).

A second issue arose in early March involving property owned by the DRPA and leased by the City of Chester for use as a boat launch and park area. This property, located on the southwest side of the Commodore Barry Bridge, was used as a truck staging area as directed by the City's Police Department in the January 8, 1987 meeting with the City. On March 3, 1987, Mr. Stephen Merriken, Deputy Director of City Planning, wrote to the DER Cleanup Director regarding damage caused by trucks operating on the property. The DER Cleanup Director notified Mr. Merriken that the Contractor would be required to repair any damage caused by the trucks.

A representative of the Pennsylvania Fish Commission visited the City's boat launch property and observed several empty cardboard boxes in the immediate vicinity of several trucks. The Fish Commission representative visited the Wade Site in response to his observation that littering was occurring in the truck staging area. A discussion with the DER Cleanup Director failed to resolve this issue.

On the following day, Mr. Merriken and a representative of the City's Police Department visited the site and issued an order to the DER to cease use of the boat launch property as a truck staging area. After a discussion with RES, WESTON, and the City officials, it was decided that the unimproved portion of Delaware Avenue located south of the boat launch property would be acceptable as a truck staging area. This area was used for truck staging during the remainder of the project without further difficulties.

4.4 Disposal Site Difficulties

Transportation of hazardous waste shipments to GSX Services in Pinewood, South Carolina was initiated on February 23, 1987 when 23 loads, totalling 999,720 pounds of waste, were shipped off-site. On the morning of February 24, 1987, RES was notified by GSX that 20 loads were lacking a certification statement on the shipping papers and that five loads were found to be "leaking from the bottom of the tailgates." The finding that some of the loads were leaking conflicts with RES' statements that all loads were inspected

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Asbestos-suspect insulation in the grinding room was handled by cold cutting the pipe lengths in question at joints not covered by insulation. The pipe lengths removed in this manner were wrapped in several layers of plastic, secured with duct tape and staged on-site pending disposal. This approach was employed to minimize disturbance of the insulation and release of asbestos fibers to the atmosphere.

The asbestos-suspect piping in the office building necessitated a somewhat different method of removal. This was due to the fact that:

- the pipe and insulation was immediately adjacent to the walls, and;
- the pipe passed through structural members that could not be removed at that point in the project.

Removal of the insulation in this area proceeded by wetting the suspect insulation with water to minimize release of airborne fibers. The insulation was removed using hand tools and placed in a plastic bag. At the completion of the removal, the bag was closed and was placed inside a second plastic bag which was in turn closed. The material was staged on-site until June 19, 1987. At that time,disposal was accomplished at the Waste Management landfill in Pottstown, Pennsylvania.

4.6 Field Modifications

Several unforeseen conditions encountered during the remedial action necessitated modifications to the specifications in the RFQ/P. In certain instances, these modifications were initiated and/or approved directly by the WESTON Site Representative. The DER Cleanup Director and the Contract Officer were notified of all modifications approved by WESTON. In other cases (particularly those that could have involved extra cost to the Contractor), WESTON provided technical assistance and recommendations to the DER. The DER then used this information in considering approval of a design modification. Areas where field modifications were considered included:

- revisions to the demolition approach described in the Contractor's proposal;
- revisions to the required depth of removal for specific grids;

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- redesign of the southwestern drainage swale;
- removal of concrete machinery pedestals;
- extension of monitoring well casings and bumper guards; and
- revisions to the compaction requirement for select fill.

Each of these field modifications is described in this subsection. It should be noted that none of these field modifications resulted in a change order request by the Contractor. Unforeseen conditions resulting in submittal of change order requests are described in Section 3.

4.6.1 Revised Demolition Approach

RES submitted a request on January 31, 1987 to execute Phase 5 demolition activities during Phases 2 through 5, inclusive (Appendix C). The request for "progressive sequencing" of Phase 5 demolition work provided several reasons for this approach, including:

- several severe, early snow falls, which could have effected the Project schedule (demolition activities were reportedly not as sensitive to severe weather as other activities were);
- clearing the site would provide more space for facilities and staging areas for non-hazardous materials; and
- non-productive time during Phases 2 through 4 could be utilized productively.

WESTON's initial review of RES' progressive sequencing request revealed the need for a detailed technical proposal. The DER was apprised of this need and a request for additional information was made to RES' Site Supervisor in a February 9, 1987 letter from the Site Representative (Appendix C). Information requested by the Site Representative included:

- listing of equipment to be used for the demolition work;
- sequence of tasks;

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- detailed description of personnel control to keep unnecessary individuals clear and accounted for; and

- delineation of rubble staging areas.

It was also mentioned that demolition around electrical panels suspected of being PCB contaminated would not be permitted until the presence or absence of PCB had been determined.

RES' technical approach for progressive sequencing of the demolition work was submitted on February 11, 1987 (Appendix C). DER and WESTON evaluated RES' request and approach for progressive sequencing of Phase 5 demolition work as well as the Phase 5 safety plan. It was determined that the sequence of tasks and the heavy equipment proposed for the progressive sequencing approach were adequate. RES' plan for controlling personnel in the vicinity of demolition work included:

- performing demolition work when only RES personnel were on-site;

- discussing demolition work planned for a given day at the daily safety meeting; and

- inspection of the area by the foreman prior to knocking down masonry walls or roofs.

These controls were also found to be adequate, however it was suggested that the foreman should have immediate access to an air horn or other means of stopping work.

Conditional approval to proceed with progressive sequencing of Phase 5 demolition work was given to RES on February 23, 1987 via a letter from the Site Representative (Appendix C). Conditions specified in the approval letter included five health and safety plan items. RES revised the Phase 5 safety plan accordingly and proceeded with progressive demolition. Safety-related problems associated with this approach are discussed in Section 5.

4.6.2 Excavation Depths

Excavation activities in the southern third of the site closest to the Delaware River revealed the presence of a large concrete mass at a depth of one to two feet. Large, irregular slab-like masses of concrete were also observed

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on the river bank and are believed to be related to the mass underlying the site. The mass underlying the site was very irregular in shape and appeared to be up to two feet thick, as evidenced by a portion of the mass removed by RES. Site workers who were familiar with the history of the area set forth two hypotheses for the origin of the concrete mass. It was thought that the mass originated from washout of concrete trucks during construction of either the roadbed to the old ferry house or the Commodore Barry Bridge (or both).

The discovery of the concrete necessitated some modification to the excavation plan (Drawing 102 in the RFQ/P). WESTON confirmed the presence, extent, and thickness of the concrete reported by RES and evaluated potential means of addressing this finding. Upon review of the RFQ/P, it was learned that the presence of the concrete was previously known.

Based on discussions with WESTON and RES, the DER determined that the most appropriate course of action was to excavate only until the soils overlying the concrete had been removed. Further removal was not warranted and was not consistent with the fact that the concrete floor slabs in the former buildings would be left in-place and covered with backfill.

4.6.3 Drainage Swale Redesign

The RFQ/P included specifications and drawings for rough and final grading of the Wade Site. Rough grading was a Phase 5 activity and a major component of Phase 6 was final grading. During the course of the work, it became apparent to the Site Representative that certain modifications to the grading plans would be necessary due to the following site features:

- previously unknown concrete retaining wall on the western side of the underground storage tank and the southern portion of the tank, both of which were located above rough grade elevations;
- concrete pads (building floors) near the eastern fence would both protrude above rough grade and interfere with the positioning of the eastern swale;

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- the northern part of the western drainage swale was located in the Flower Street roadbed, which was crowned both axially and across its width; and

- several machinery pedestals would protrude above rough and final grades.

These items were not located during pre-design surveys because it is not customary to employ a highly detailed design for most drainage swales, as field modifications are expected for their construction. The machinery pedestal issue is addressed in Section 4.9.4. Modifications associated with the other three site features are described herein.

At the request of the Site Representative, on March 12, 1987 a WESTON civil engineer visited the site to evaluate the location of the drainage swale along the western flank of the site. The principal recommendation resulting from this visit was that the swale should be relocated to the northeast and out of the roadbed. Certain recommendations regarding curbing modifications south of the axial crest in the road were also developed (see WESTON memo of March 16, 1987; Appendix N), Revisions were made to the RFQ/P Drawing Numbers 104, 105, and 106 to reflect these changes. Copies of the revised drawings were transmitted to the RES' Site Supervisor by the Site Representative in a letter dated April 24, 1987 (Appendix N).

RES subsequently notified the DER that additional modifications to the western drainage swale were necessary due to the presence of a formerly unknown concrete mass in the southern third of the property. Through discussions between the Acting Site Representative and RES' Site Supervisor, it was agreed that construction of the western drainage swale could be accomplished by relocating the centerline of the swale approximately five to ten feet to the east in Grids 56 and 57. Additionally, the centerline of the swale would be moved to the west (off the edge of the concrete mass) in Grids 58, 59, 60, 61, 62, and 46. RES' plans to complete the construction of the western drainage swale in this manner was communicated to the DER in a letter form the Site Supervisor dated May 17, 1987 (Appendix N).

DER approved modifications in the drainage swale construction via two letters to RES' Contract Administrator. The first letter from the DER Contract Officer, dated May 12, 1987 Appendix N) approved certain modifications to the eastern swale along the PECO fence line. Concrete pads

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(building floors) in close proximity to the fence necessitated shifting the centerline of the swale closer to the fence line. Additionally, minimal cover would be present over certain parts of the concrete pads between stations E-1275 and E-1340. The second letter, dated May 15, 1987 (Appendix N) from Ms. Frances L. Costanzi, an engineer for the DER, approved the modifications to the western swale described in RES' letter of May 12, 1987. The completed eastern drainage swale is shown in Figure 4-1.

4.6.4 Removal of Concrete Pedestals

During the course of the Phase 5 demolition work, a number of large concrete pedestals and machinery mounts were found inside the buildings. These pedestals were inspected by WESTON on April 9, 1987 and the following observations were made:

- Pedestal No. 1 - located 43 feet from the PECO fence line on gridline E-1285 (see Figure 4-2). This pedestal measured approximately 25 feet wide by 8.3 feet long and 3.4 feet high on the first level and 4.1 feet high on the second level. One-inch steel plates covered the pedestal and heavy steel reinforcing was observed protruding from several sides.

- Pedestal No. 2 - located 43 feet from the PECO fence line on gridline E-1334. This structure measured 9 feet long by 7.5 feet wide by 3.5 feet high and also appeared to be heavily reinforced.

- Pedestal No. 3 - located 33 feet from the PECO fence line on gridline E-1450. This structure measured 3 feet wide by 9.5 feet long. Previous attempts to demolish this structure using the ramhoe had exposed heavy steel reinforcing (1/2 and 3/4-inch bar).

- Pedestal No. 4 - located 49 feet from the PECO fence line on gridline E-1450. This structure was of the same size and reinforcing as Pedestal No. 3.

- Pedestal No. 5 - located at N-970, E-1500, measuring 5.4 feet long by 4.7 feet wide. Heavy reinforcing including 3/4-inch bars and 1-inch diameter bolts protruded from the sides.

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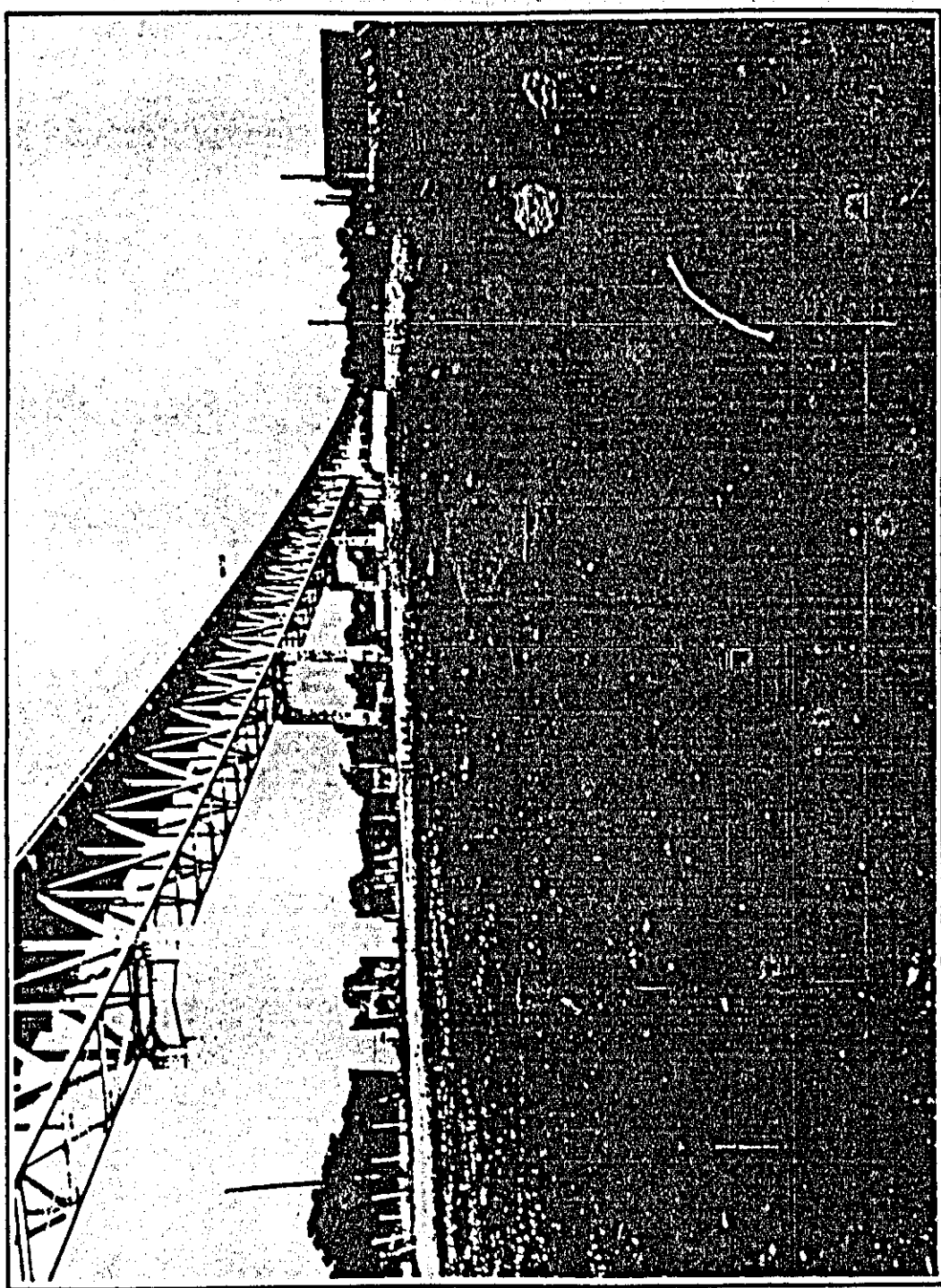

FIGURE 4-1 DRAINAGE SWALE ALONG PECO FENCELINE

FIGURE 4-2 MACHINERY PEDESTAL NO. 1

- Grinding Machine Mount - located 56 feet from the PECO fence line on the E-1408 gridline.

RES' Site Supervisor indicated to the Site Representative that, due to the very heavy reinforcing present in these structures, it was likely that a change order request would be submitted for this work. Based on WESTON's review of the pedestals and the design requirements, it was determined that removal of the pedestals would not be necessary. This was communicated to RES' Site Supervisor in a letter from the Site Representative dated April 10, 1987 (Appendix N).

Upon further consideration of this matter, RES determined that due to potential liabilities associated with leaving the pedestals in place, it would proceed with removal of the pedestals at no cost to the DER. The Site Representative was apprised of RES' plans to proceed with removal of the pedestals using a hydraulic ramhoe. Although progress on this activity was very slow due to the heavy reinforcing of the pedestals, removal of the pedestals was accomplished satisfactorily. Concrete rubble generated from this activity was used as structural fill in grids 1, 17, 33, and 49 (see Section 4.8.5).

4.6.5 Monitoring Well Modifications

The rough and final grading plans for the site called for substantial modifications to the existing topography of the site in order to promote stormwater runoff and drainage. Topographic modifications primarily involved raising the elevation of certain portions of the site by about four feet. Several of the monitoring wells located throughout the site would be partially or fully covered by fill materials where substantial changes in the topography was planned. Monitoring wells effected by these activities included:

- B2 and B2A located behind the former office building in grids 4 and 20;
- B8 and B8A located adjacent to the former concrete sump in grid 28; and
- B5 and B5A near the PECO fence line in grid 11.

Section 3.1 of the RFQ/P requires the Contractor to preserve, repair and, if necessary, replace fences and roads damaged during execution of the work. Through discussions with RES, the Cleanup Director, and the Site Representative,

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it was agreed that RES would extend the casings of monitoring wells impacted by backfilling activities and that improvements would be made to the protective bumper guards around the wells. An example of one monitoring well installation improved in this manner is shown in Figure 4-3.

Monitoring wells B3 and B3A in grid 66 were modified during construction of the ramps for the truck scales. The casing on both wells were cut to a height of approximately six to eight inches above the road surface and the protective bumper guards were removed. Concrete formwork for the scale ramps was constructed to isolate these wells. After removal of the scales at the completion of site work, the casing heights were left as is and new bumper guards were fashioned from welded angle iron.

4.6.6 Compaction Difficulties

One of the areas where RES identified a design problem and initiated a field modification concerned attaining the backfill compaction specifications described in the RFQ/P. Sections 8.6 and 9.6 of the RFQ/P required that rough and final backfill materials be compacted to a minimum uniform density of 90 percent of the maximum density determined by ASTM Method D-698. RES notified the DER via a letter to the Contract Officer dated March 14, 1987 (Appendix O) that the compaction specifications were not achievable in certain areas of the site due to the presence of an unsuitable sub-base. Areas where unsuitable sub-base was encountered included:

- the grids along the Delaware Avenue fence line where, "a saturated, highly organic material" was found to create a pumping action during compaction of the overlying fill; and
- areas of the site containing shredded rubber and rubber fragments.

In its March 14, 1987 letter, RES petitioned for relief from the 90 percent compaction specification for the entire site and proposed a compaction specification of 85 percent for the majority of the site. It also proposed that no compaction requirement be specified for the two areas described above.

At the direction of the DER Contract Officer, WESTON reviewed and evaluated RES' petition for relief from the compaction specifications. WESTON's evaluation included

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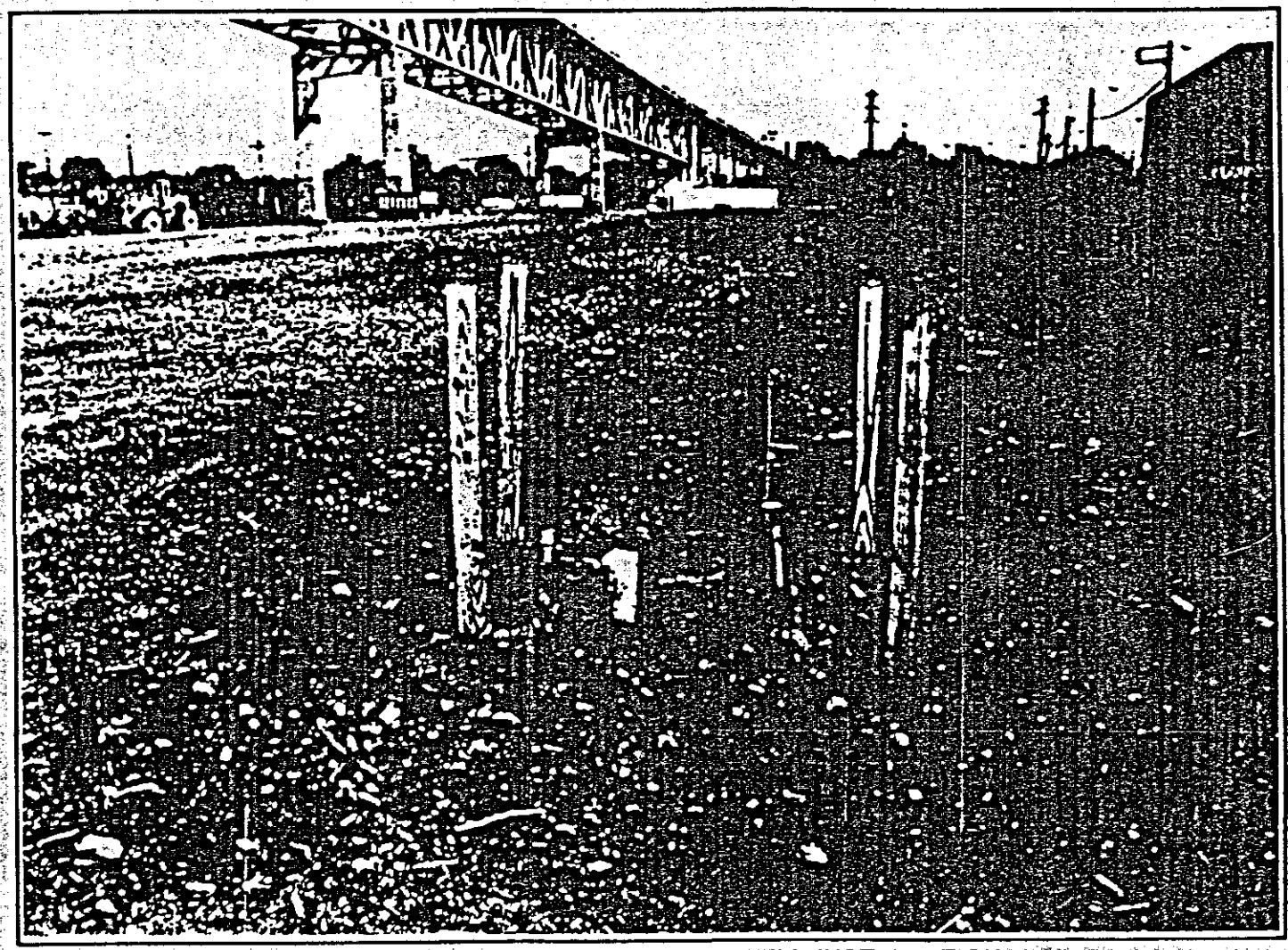

FIGURE 4-3 IMPROVED MONITOR WELL INSTALLATION

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FIGURE 4-3 IMPROVED MONITOR WELL INSTALLATION

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consideration of native soil characteristics and the presence (or absence) of water in the subsoils as observed during the Phase 4 excavation activities, as well as geotechnical data submitted by RES for the proposed backfill soils. WESTON's findings and recommendations were transmitted to the DER Contract Officer via a letter from the Site Representative, dated April 24, 1987 (Appendix O).

Findings in that letter include concurrence with RES' position that the sub-base in grids 1, 2, 17, 18, 33, and 49 were unsuitable. However, the unsuitable sub-base conditions in grids 2 and 18 were believed to have resulted from the Contractor's method of placing structural fill (building rubble) in those grids. Various engineered approaches for addressing these compaction difficulties were considered, including:

- removal of the unsuitable materials until suitable native soils were encountered;
- use of imported structural fill (rip-rap, boulders, etc.) to bridge or stabilize the underlying sub-base;
- use of geotextiles to provide structural support for the overlying fill materials; and
- combined use of geotextiles and imported structural fill.

Based on these considerations, WESTON made the following recommendations to the DER:

- backfilling in grids 1, 17, 33, and 49 be preceded by placement of an 18 to 24 inch layer of large rip-rap stones. The rip-rap should be well graded to include large stones up to 12 inches in size as well as smaller rocks to fill the voids. The rip-rap should be placed using a hydraulic excavator without compaction. The subsequent lifts of imported gravel should be placed using the heavy equipment at the site. However, compaction of the gravel lifts should not be performed using vibrating compaction equipment. These backfilling methods should result in a stable sub-base for subsequent lifts of rough and final grade materials.
- unsuitable material in grids 2 and 18 should be removed until the naturally occurring sub-base

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soils are encountered. Backfilling with gravel should proceed in accordance with the requirements of the RFQ/P.

- DER should not grant an all encompassing waiver from the 90 percent compaction specification, as requested in RES' letter of March 14, 1987. Rather, a waiver specific only to grids 1, 17, 33, and 49 specifying a minimum backfill compaction of 85 percent of maximum dry density should be granted.

The DER considered WESTON's recommendations and advised RES that it was granting a waiver from the 90 percent compaction specification in specific grids in accordance with WESTON's recommendations. The DER's position on RES' petition for relief was communicated to the RES Contract Administrator in a May 4, 1987 letter from the DER Contract Officer (Appendix O).

RES performed the work in grids 1, 17, 33, and 49 in accordance with WESTON's recommendation that rip-rap be used to stabilize the sub-base. This was supplemented by removal of the oily sub-base soil, as described in Section 3.3. Materials used for stabilizing the sub-base included concrete rubble and sidewalk slabs obtained from continuing on-site work and 6 inch stone (specification PA-DOT 2B) remaining after construction of the drainage swale filter berms. These materials successfully stabilized the sub-base such that subsequent compaction of the overlying fill soils consistently achieved or exceeded the 90 percent compaction specification of the RFQ/P.

RES continued to place additional lifts of select fill in grids 2 and 18. Compaction testing of the fill layers in these grids showed a continual improvement in the degree of compaction. Additionally, the minimum 90 percent density specification was achieved or exceeded consistently in both grids.

4.7 Verification of Topographic Survey and Grades

RES was required to perform topographic surveys and to prepare cross-sections and topographic maps of the site at various points in the project. Topographic surveys associated with the remedial actions of the Wade Site were subcontracted to H. Gilroy Damon Associates, Inc. of Sharon Hill, Pennsylvania. One of the activities performed by WESTON in this regard was a review and verification of RES' survey-

related submittals. Field notes were checked for accuracy and elevations shown on drawings submitted by RES were checked for consistency with the field notes. Confirming elevation data was surveyed and used as a means of checking RES' survey data.

During the day-to-day execution of the work, WESTON provided assistance to RES in determining certain grades and elevation data. Specifically, the Site Representative located the two drainage swale berms, surveyed elevations of points where compaction tests had been conducted and elevations in the drainage swale at the northwestern corner of the site.

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Section 5

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SECTION 5

HEALTH AND SAFETY

5.1 Phase Specific Safety Plans

In the proposal it submitted in response to the RFQ/P, RES proposed to develop and implement phase specific safety plans for the seven distinct phases of work planned for final remediation of the Wade Site. These phase specific safety plans were in addition to the overall Project Safety Plan specified in the RFQ/P. As proposed, RES prepared both the overall Project Safety Plan and the individual phase specific safety plans. These plans were submitted to the DER for its review and concurrence. Copies of the safety plans are provided in Appendix P.

As discussed in Section 4, RES submitted a request to execute the Phase 5 demolition work during Phases 3 through 5, inclusive. Based on a review of this request by WESTON and the DER, several modifications to the Phase 5 safety plan were required as conditions to proceeding with the Phase 5 demolition work. The specific safety plan modifications included:

- asbestos and PCBs were to be added to the list of contaminants and hazards expected on-site, procedures for monitoring for these substances were to be described;
- respiratory protection in accordance with OSHA rules for asbestos removal were to be utilized; and
- procedures for clearing the work area prior to demolishing any high structures were to be included, provisions for supervisory observation and emergency alarms were to be described.

RES modified its Phase 5 safety plan to address these comments. Additionally, it submitted a "generic" safety plan for asbestos work. This asbestos safety plan was made an attachment to the Phase 5 safety plan and RES' personnel performing asbestos related work were subject to the provisions of the asbestos safety plan.

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5.2 Work Zones

The RFQ/P (and OSHA rules) required the establishment of distinct work zones as a means of controlling access and worker exposure at the Wade Site. RES established three work zones at the Wade Site, as illustrated in Figure 5-1. The support zone consisted of the office and supply trailers located on the portion of Flower Street and extended inside the site fence. Personnel protection was not required in the support zone and eating, drinking, and smoking were permitted in certain areas.

The contamination reduction zone (CRZ) served as the second work zone. The CRZ consisted of a wooden shelter built at the entrance to the former office building, in which tools and protective equipment were stored. This shelter also served as a dressing room wherein personnel protective equipment was donned. The second area within the CRZ was the first floor of the former office building. Personnel exiting the site were required to remove personnel protective equipment in this room. A triple bucket washing station was maintained for decontaminating workers' boots and reusable apparel. Boot racks were provided to maintain the boots in an orderly manner and to raise them off the floor to facilitate drying.

A separate CRZ, established near the terminus of Flower Street, was used for the decontamination of trucks, heavy equipment, and other vehicles which had entered the site. Initially, the vehicle CRZ consisted of a temporary wooden pad with a heavy synthetic liner for collection of decontamination rinsates. The temporary pad was replaced with a more durable one constructed of welded steel. Rinsates collected in the vehicle decontamination pad were pumped to the temporary water holding tanks in the former office building. Solids removed from the pad were placed on the contaminated soil pile and allowed to dry prior to off-site transport.

The third work zone established by RES was the exclusion zone (EZ). The EZ consisted of all of the remaining land area inside the fenced portion of the site. Throughout the majority of the site work, employees entering the EZ were required to utilize protective equipment, including air purifying or supplied air respirators. Access to the EZ was only to be gained via the CRZ and all individuals exiting the EZ were required to pass through the CRZ prior to entering the support zone.

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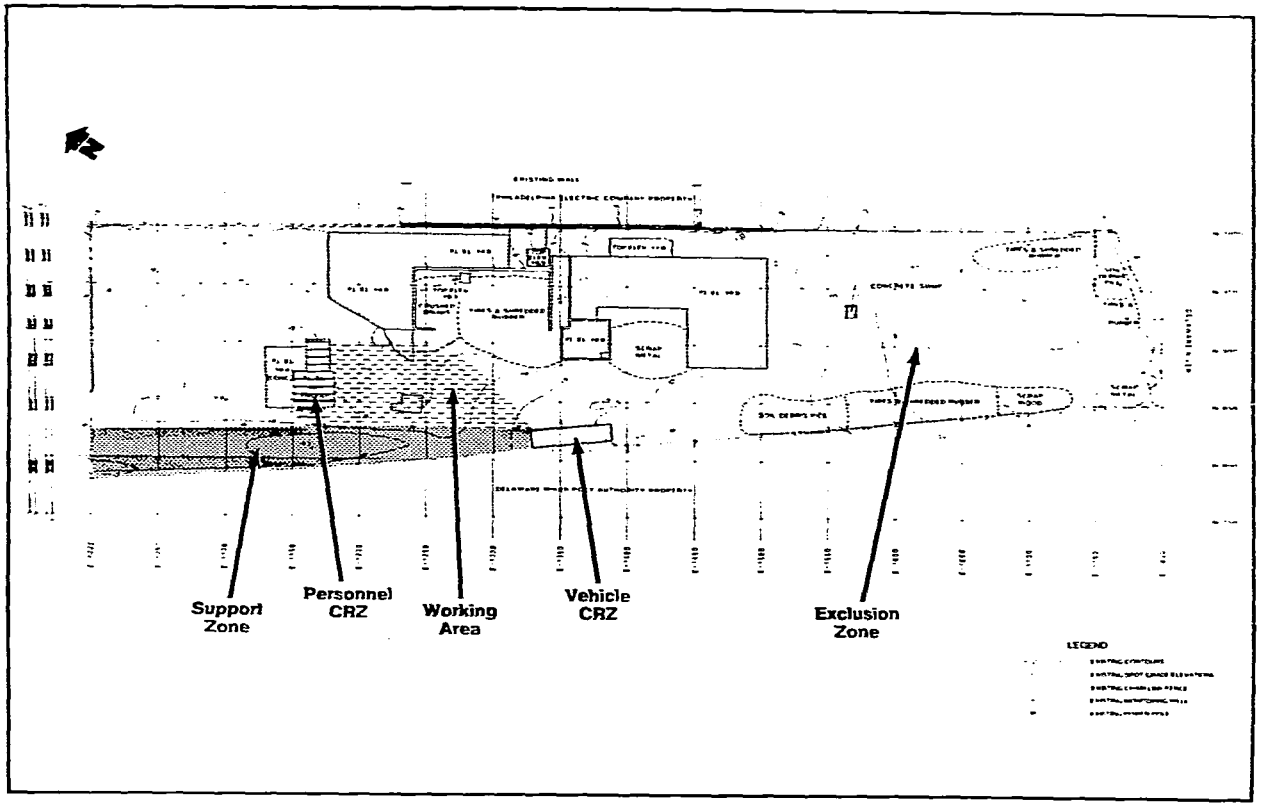

FIGURE 5-1 WORK ZONES

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As the work progressed through the seven phases, the work tasks and the nature of the associated hazards changed. Due to these changes, the extent of the various work zones also changed. As the work progressed from phases involving hazardous materials into phases involving only general construction, the extent of the exclusion zone was reduced. Additionally, after all of the hazardous material work specified in the RFQ/P had been completed, the use of a CRZ was terminated and the former office building housing the CRZ was demolished.

5.3 Personnel Protection

The specifications in the RFQ/P included requirements for the provision and utilization of personnel protective equipment by personnel entering the exclusion zone of the CRZ. RES provided various levels of personnel protective equipment for its employees. Utilization of a given level of personnel protection was dependent upon the work or tasks to be performed and the nature of the associated hazards. The levels of personnel protective equipment used by RES are summarized in Table 5-1.

As the work progressed and the nature of the associated hazards and extent of work zones changed, the levels of personnel protection employed by RES in a given area also changed. For example, RES utilized levels D and D+ during Phase 1 mobilization activities, whereas Levels D and C were used during Phase 2 removal work. Levels C and B were utilized during Phases 3 and 4 as well as during the demolition work in Phase 5. Levels D and D+ were then used during the remaining general site work in Phases 5, 6, and 7.

5.4 Decontamination

As described previously, separate contamination reduction zones were established for the decontamination of personnel and equipment. Personnel decontamination consisted of washing the workers' outer boots, gloves, and reusable apparel in a triple bucket wash/rinse station located at the entrance to the first floor of the former office building. The workers' removed these items and placed their boots on a rack to facilitate drying. Disposable garments were then removed and placed in bags for disposal.

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TABLE 5-1

LEVELS OF PERSONNEL PROTECTIVE EQUIPMENT

Designated Level of Protection	Work Zone or Tasks	Respiratory Protection	Safety Apparel
B	Exclusion Zone - drum opening and sampling; underground tank entry	Self Contained Breathing Apparatus	Chemically resistant coverall, rubber boots, neoprene or rubber outer gloves, latex (surgical type) under gloves, hard hat, steel toe boots, cotton work uniform.
C	Exclusion Zone - all other tasks during Phases 2, 3, 4, and most of 5	Air Purifying Respirator	Same as above.
D+	Contamination Reduction Zones	Not Required	Same as below with facial splash protection.
D	Support Zone (and entire site during Phases 6 and 7	Not Required	Hard hat, steel toe boots, cotton work uniform.

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Some problems were encountered in regard to the establishment, utilization, and maintenance of the triple bucket wash/rinse station. Establishment of the station lagged behind the utilization of personnel protective equipment. Personnel utilized reusable protective equipment on-site for approximately two weeks prior to establishment of the wash/rinse station. Thus, reusable apparel was not subjected to the decontamination procedure during this period. Maintenance of the wash/rinse station improved progressively throughout the remedial action. Two maintenance problems encountered were the occasional freezing of the wash and rinse solutions and failure to regularly replenish and replace the solutions. These problems were communicated to RES as they were encountered and RES generally addressed them within a short time.

Decontamination of trucks, heavy equipment, and other vehicles which had entered the exclusion zone consisted of pressure washing using a "steam jenny" while the subject vehicle was parked on a containment pad. This proved to be an adequate means of decontaminating vehicles with the occasional exception of when very muddy conditions existed on-site. Maintenance of the containment pad consisted of pumping collected rinsates to the temporary tanks in the former office building and using hand tools to remove accumulated solids. Operation and maintenance of the vehicle CRZ proceeded smoothly, as these tasks were performed regularly.

5.5 Air Monitoring

RES performed a substantial amount of time weighted and real time air monitoring during Phases 1 through 6, inclusive. This work was performed via a subcontract with Phoenix Safety Associates of Phoenixville, Pennsylvania and supplemented by RES' in-house health and safety staff.

5.5.1 Time Weighted Monitoring

The specifications in the RFQ/P required the Contractor to establish six perimeter air monitoring stations and to collect volatile organic and particulate air samples from each of those stations on a daily basis. Of the samples collected, three were to be analyzed by a qualified laboratory on a 24-hour turnaround basis.

RES established five perimeter air monitoring stations, illustrated in Figure 5-2, and collected samples from each

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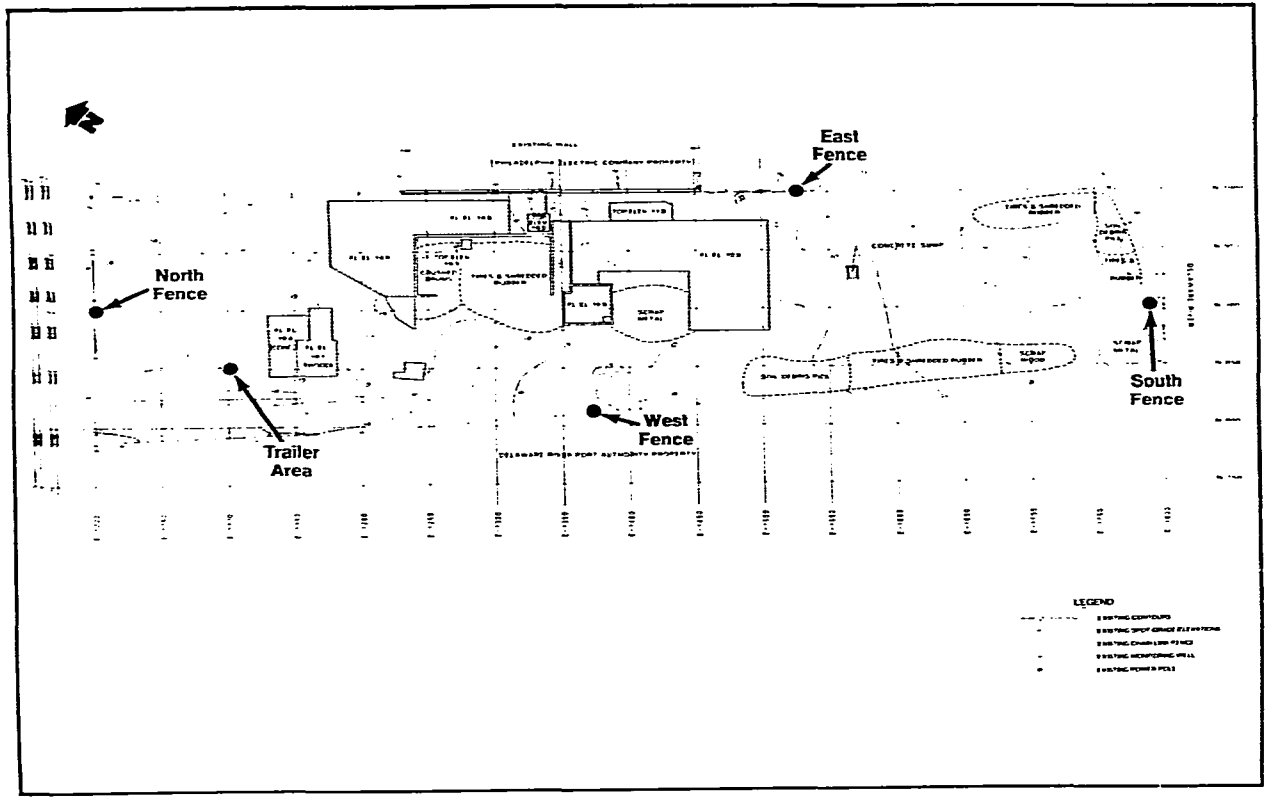

FIGURE 5-2 PERIMETER AIR MONITORING STATIONS

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of these stations on a daily basis. Detailed records regarding air sample collection (including pump calibration and operation data) were maintained. The samples were analyzed by an independent laboratory; however, a minor modification to the 24-hour turnaround time requirement was approved by WESTON. Specifically, due to the limited number of samples sent to the laboratory on a daily basis, it was believed that the quality and reliability of the air data could be improved by batching the samples on a bi-daily basis. Therefore, the turnaround time was 48 hours for the samples received on the first day and 24 hours for the samples received on the second day. Summaries of the air monitoring data are provided in Figures 5-3 through 5-5.

The Contractor was also required to monitor meteorological conditions on an hourly basis during active site work and air sample collection. This information was important in the selection of perimeter air samples for laboratory analyses. During the initial phases, RES monitored meteorological conditions as reported for the Philadelphia Airport. Subsequently, an on-site meteorological station was installed in RES' trailer and was used to monitor wind speed, wind direction, and temperature.

5.5.2 Real Time Air Monitoring

The RFQ/P required the Contractor to perform hourly rounds of the perimeter and active work zone and to monitor these areas for volatile organic emissions using real time instrumentation. RES assigned this task to the Phoenix Safety health and safety technician. An HNu model PI-101 photoionization detector was used for the real time monitoring. Results of the field observations and instrument calibration data were recorded in a bound logbook as required by the RFQ/P.

The real time air monitoring showed that little or no volatile organic emissions resulted from implementation of the remedial action. The only exception to this occurred during excavation in grids 1, 17, 33, and 49 along the fenceline bordering Delaware Avenue. A sweet aromatic odor was noted in the support zone during this work and the health and safety technician was asked to investigate using the HNu monitor. It was found that the odor apparently originated from grid 33 and, although a slight odor was noticeable immediately outside the fence, it was not measurable using the HNu past the site fence.

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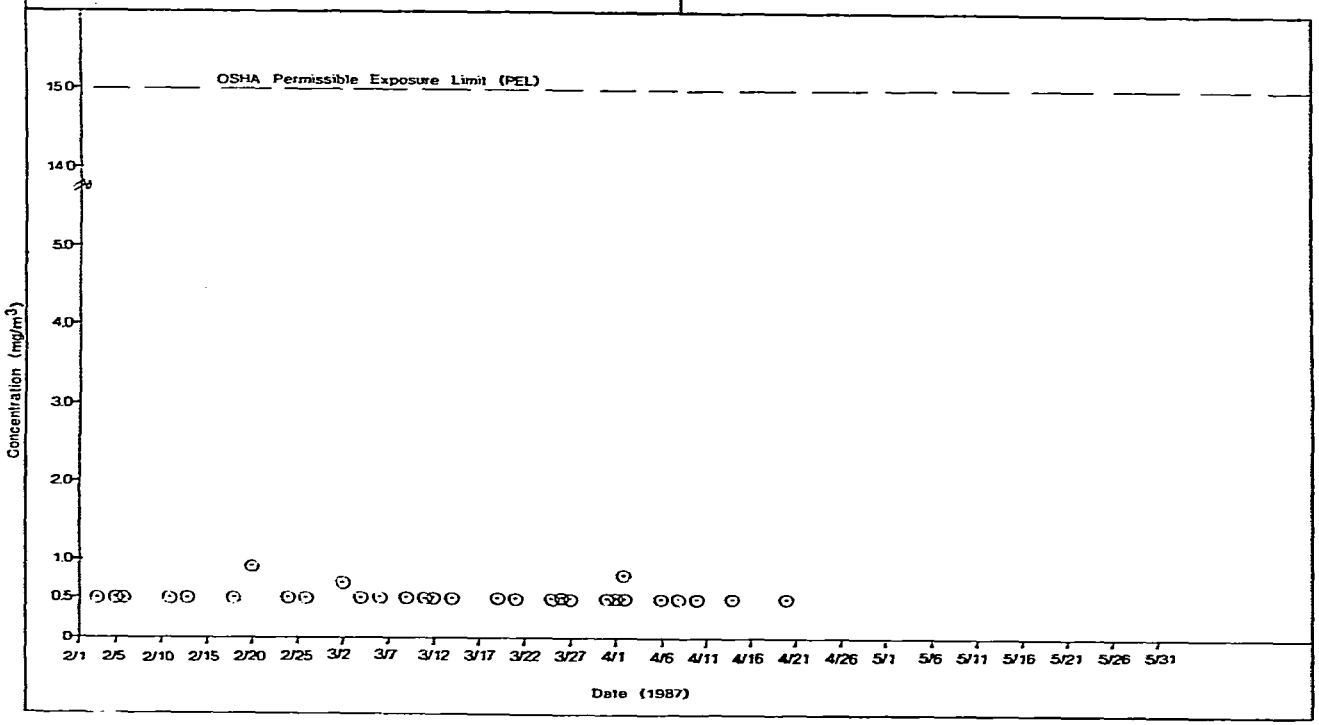
BY JEL	DATE 2-88	FIGURE 5—3	SHEET 1 OF 1 PAGE
CHK'D	DATE		
SUBJECT	PARTICULATE DATA FOR WADE SITE PERIMETER MONITORING - UPWIND		NO 07392603



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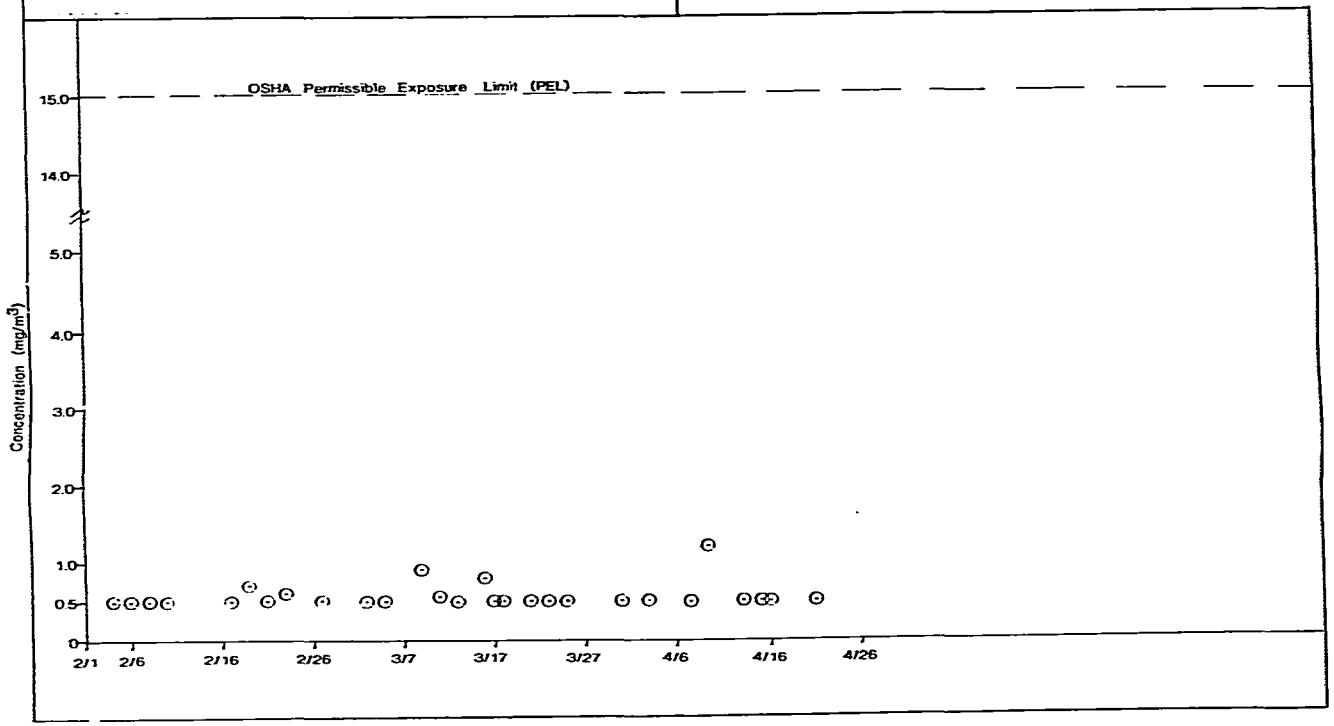
BY JLC DATE 2 96 | FIGURE 5-4 | SHEET DI | 1 PAGE

SUBJECT PARTICULATE DATA FOR WADE SITE. PERIMETER MONITORING - DOWNWIND SAMPLES JOB NO 07392603



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BY JEC DATE 2-88

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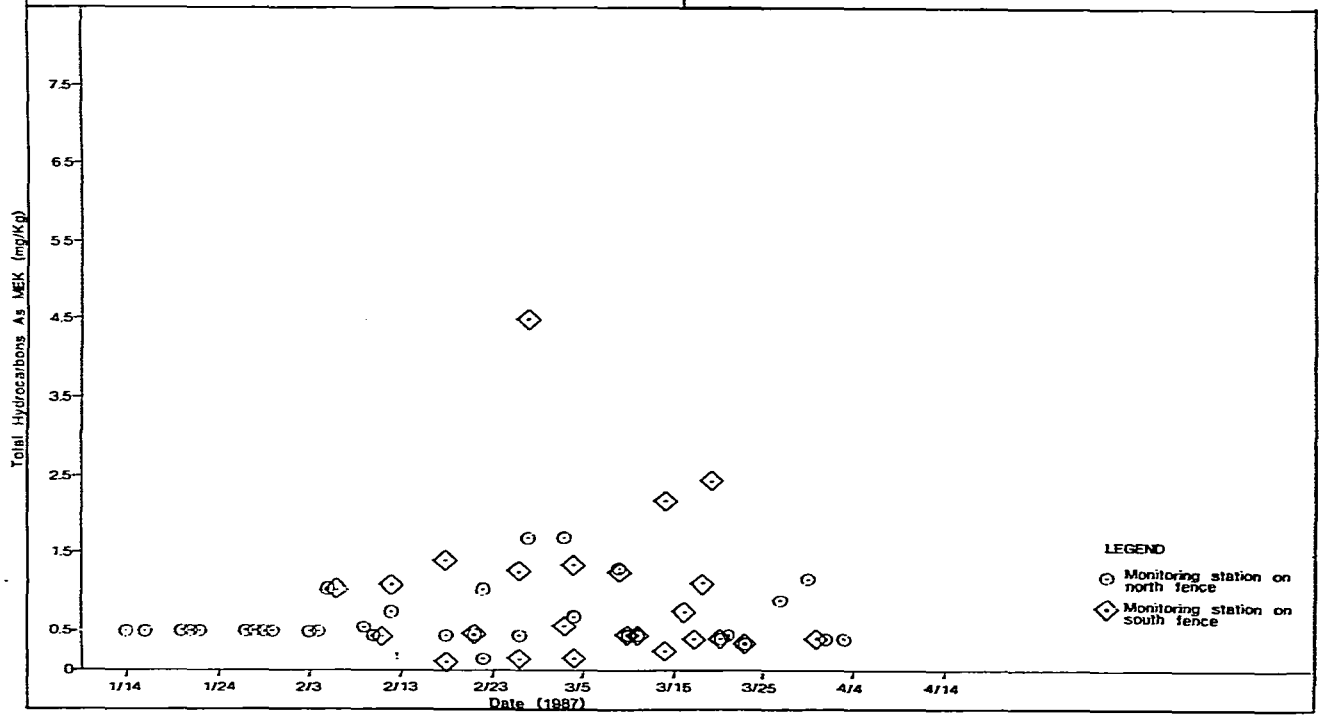
PAGE

FIGURE 5—5

SUBJECT TOTAL HYDROCARBON DATA FOR WADE SITE PERIMETER MONITORING STATIONS

JOB NO 07392603



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5.6 Health and Safety Issues

During the course of the site work, several health and safety related issues and problems were encountered. The nature of these issues and the resolutions reached and corrective actions taken are described in this section.

5.6.1 Establishment of Work Zones

Section 13.4.4 of the RFQ/P required the Contractor to establish three distinct work zones, including an exclusion zone (EZ), a contamination reduction zone (CRZ), and a support zone (SZ). The purpose of these zones was to control access and egress from contaminated areas and to prevent persons without proper protective equipment from unknowingly entering areas where such equipment was required. Site work was initiated on January 9, 1987 and the work zones were not delineated as required until January 16, 1987. During this period, the Site Representative repeatedly advised RES of the importance of delineating the work zones.

RES delineated the work zones as previously described in Section 5.2. A network of color-coded wooden posts was used to delineate the exclusion and contamination reduction zones from the support zone. Monitoring the Contractor's adherence to these work zones proved to be difficult due to the fact that many of the color-coded posts were removed by heavy equipment or were obscured by material stockpiles. Additionally, RES revised the extent of the work zones during Phases 4 and 5 without prior notification to the DER or the Site Representative. These difficulties were addressed by RES (as requested by the Site Representative) by posting maps of the work site illustrating the current work zone delineation.

5.6.2 Provision of Health and Safety Technician Support

Section 13.4.3 of the RFQ/P required the Contractor to provide an industrial hygiene technician responsible for the implementation and enforcement of the personnel protection program. The industrial hygiene technician was required to be on-site at all times when the work was in progress.

RES initiated site work without the required industrial hygiene technician support. The Site Representative advised RES of this non-conformance on January 14, 1987. RES

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provided in-house industrial hygiene support on January 16, 1987, when Mr. Paul Thomas of RES(DE), Inc., Corporate Health and Safety Director, was present on-site. RES subsequently subcontracted with Phoenix Safety Associates of Phoenixville, Pennsylvania to provide the required industrial hygiene technician. Phoenix Safety's coverage of the site continued from January 19, 1987 until March 21, 1987. Industrial hygiene support was not provided on March 23, 1987 and was provided for partial coverage on March 26, 1987. These deficiencies were communicated to RES' Site Supervisor and to the DER Contract Officer. Full time industrial hygiene support was provided from March 27, 1987 throughout the remainder of the site work.

5.6.3 Health and Safety Incidents

During the course of the site work, a number of health and safety incidents occurred. Copies of the incident reports prepared by RES and its health and safety subcontractor are provided in Appendix P. Most of the incidents were of minor consequence and only one resulted in a lost time injury.

One significant incident did occur during the demolition phase of the work. On April 9, 1987, RES was progressively demolishing the former office building using a backhoe. During this work, the southern wall of the office building collapsed onto the wooden equipment storage shed situated in front of the building. An employee working in the shed narrowly avoided injury as the shed was severely damaged. This incident led to submittal of an incident report and a memo to RES' Site Supervisor from the health and safety subcontractor.

RES notified the DER of the incident on April 13, 1987 in a letter from Mr. Karl Shuler to Mr. James Snyder. Based on a review of the notification, WESTON recommended to the Contracting Officer that RES work at the Wade Site be suspended until certain safety issues (including notification and demolition procedures) could be resolved. Through continued correspondence and discussions, DER allowed the site work to continue concurrently with RES' corporate level investigation of the incident.

5.6.4 Hot Work Control

During the pre-construction conference held on-site on January 9, 1987, RES advised the DER and the Site Representative of a potential need to use hot work during the

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demolition activities to cut through large steel members. Hot work was expressly prohibited by the RFQ/P and RES was reminded of this fact.

During the removal of tankers from the site during Phase 2, RES' Site Supervisor requested that hot work be allowed so that the tankers could be cut prior to off-site transport. RES was again advised that on-site hot work was prohibited by the RFQ/P. Consequently, RES elected to transport the tankers to a nearby yard where hot work could be used for tanker cutting.

Limited use of hot work was permitted on-site during the demolition activities. Torches were used to cut steel machinery mounts and bolts in excess of two inches in diameter, the steel bases of the rubber storage silos and the duct work leading to the overlying cyclones. Hot work permits were required for these tasks. The use of hot work for these tasks occasionally resulted in ignition of rubber tires or oily residues on surfaces adjacent to that being cut. In one instance, slag from the torch cutting ignited a small patch of grass outside the site fence adjacent to the storage silos. All of these events were easily controlled using hand-held fire extinguishers.

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Section 6

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SECTION 6

OTHER INFORMATION

6.1 WESTON Level of Effort

During the course of the site work, WESTON utilized the experience of many individuals and expended a significant amount of effort in monitoring the performance of the Contractor and the acceptability of the work. WESTON's staffing for this Project consisted of a project engineer on-site full time supplemented with personnel from other disciplines as necessary. This full-time coverage was provided throughout the entire duration of the Project with the exception of three weeks during which time WESTON's contract with the DER had concluded and the DER was not able to determine with confidence that a budgetary increase would be authorized for WESTON's continued work. This budgetary increase was authorized and WESTON was able to continue its monitoring of the remedial action. Some of the other disciplines which were called upon for special expertise regarding specific aspects of the Project include:

- Civil Engineers: visited the site to evaluate the adequacy of sediment/erosion control measures; evaluated construction difficulties associated with installation of the two drainage swales; redesigned the drainage swales.

- Geotechnical Engineers: reviewed geotechnical data submitted by the Contractor; evaluated RES' petition for relief from the compaction specifications; evaluated RES' methods of placing and compacting backfill.

- Health and Safety Specialists: reviewed RES' phase specific health and safety plans; evaluated RES' request for progressive sequencing of demolition work; inspected RES' health and safety facilities.

- Air Quality Specialist: provided technical assistance regarding asbestos removal during demolition work.

- Draftsmen: revised site drawings to design changes made by the Civil Engineers.

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- Field Technicians: investigated areas of the site posing compaction difficulties by collecting soil samples from certain grids.

Another important resource called upon for support during the Project was WESTON's laboratory. The laboratory was contracted by RES to perform analyses of the site's sanitary wastewater as requested by DELCORA. Additionally, the laboratory performed analyses of samples collected from PCB suspect areas and surfaces. This work was accomplished on a standing contract between WESTON and the DER.

WESTON's activities necessitated the use of several secretarial and other support personnel. The substantial volume of WESTON correspondence directed to both RES and the DER, and the need for rapid dissemination of information pertinent to site operations necessitated a great deal of short lead time effort on the part of the support staff. Computer support was employed extensively in the review and evaluation of the change order requests submitted by RES.

6.2 Items Transmitted to the DER

The following Wade Site Project documents and records maintained by WESTON were transmitted to Mr. Donald Becker of the DER:

1. Logbooks

   - Wade Site Inspection Log #1 - January 1987
   - Wade Site Inspection Log #2 - February 2, 1987 through March 2, 1987
   - Wade Site Inspection Log #3 - March 3, 1987 through March 18, 1987
   - Wade Site Inspection Log #4 - March 18, 1987 through April 11, 1987
   - Wade Site Inspection Log #5 - April 11, 1987 through June 2, 1987
   - Wade Site Inspection Log #6 - June 3, 1987 through July 9, 1987

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2. Videotapes

- Wade Site Cleanup #1 (January 12, 1987 through undated)
- Wade Site Final Cleanup Tape #3 (March 6, 1987 through undated)
- Wade Site Final Cleanup Tape #4 (March 9, 1987)
- Wade Site Final Cleanup Tape #5 (undated)
- Wade Site Final Cleanup Tape #6 (April 2, 1987)

A videotape labelled Tape #2 is missing and therefore has not been transmitted to the DER.

3. Photographs

One print of all photographs taken by WESTON documenting the site work. Each of the photographs was numbered and labelled with the site name, location, date, and a description of the photograph. Selected photographs appear throughout this report.

4. Drawings

Two full size copies of the design drawings utilized by WESTON personnel on-site as working drawings.

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