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CLEANUP PLAN IMPLEMENTATION REPORT
C&D CHARTER POWER SYSTEMS
FORMER SALES OFFICE
BUFFALO, NEW YORK

MARCH 1989

PREPARED FOR:

C&D CHARTER POWER SYSTEMS
PLYMOUTH MEETING, PA

AND

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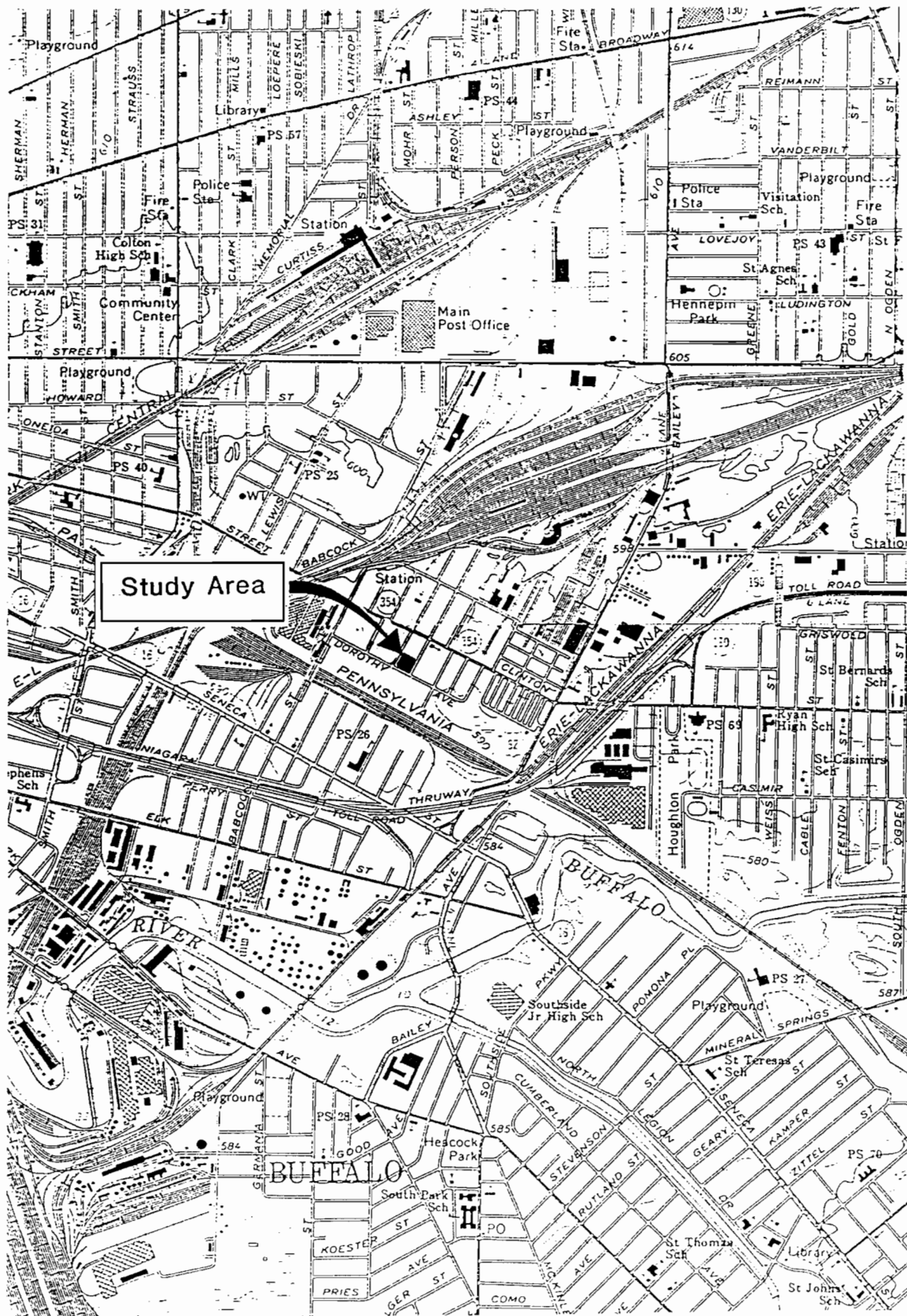
1.0 SITE HISTORY

Allied/C&D Charter Power Systems formerly operated (until 1985) an industrial battery sales and maintenance office (Buffalo Sales Office) at 45 Scoville Avenue in Buffalo, New York (Figure 1-1). The industrial batteries that were stored and refurbished at the site by C&D Charter Power System consisted of lead plates suspended in sulfuric acid. From July 1985 to January 1988 the site was leased to J and M Schaefer Company, an independent battery manufacturer. The building is presently leased to Star-Lite Manufacturing Company, with sale pending.

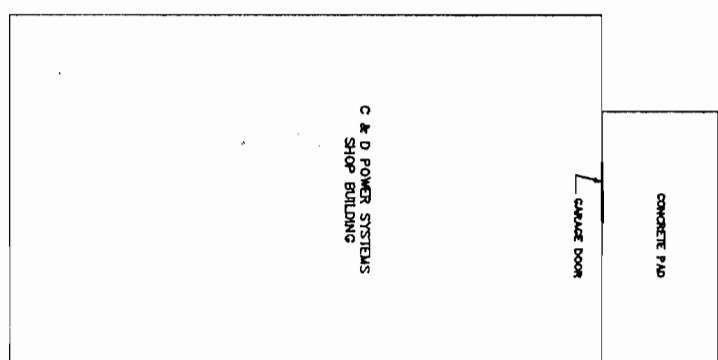
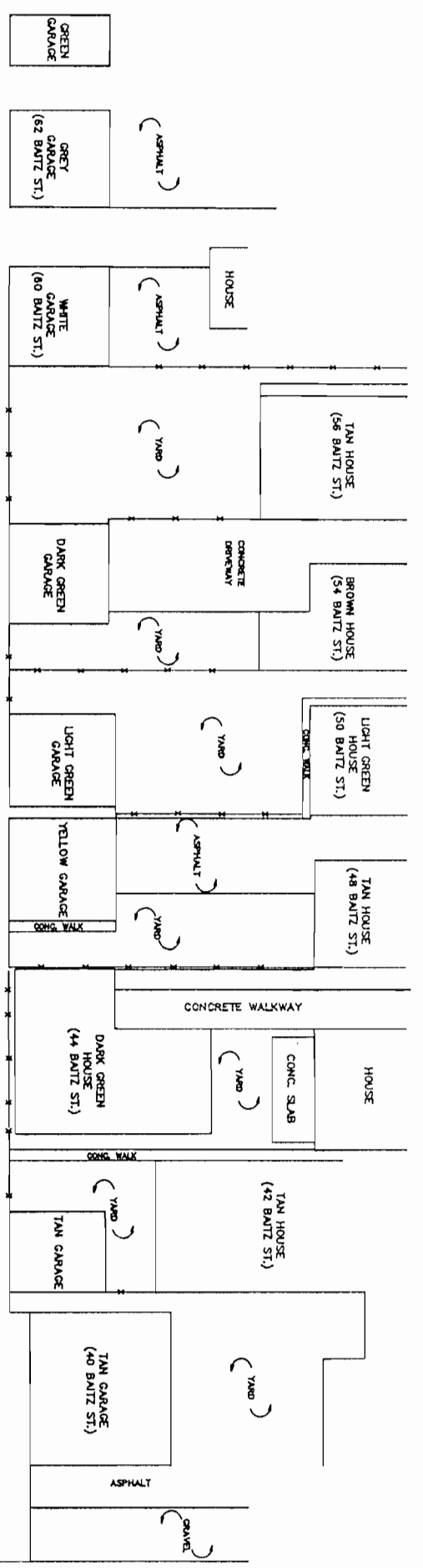
Past operating practices at the Buffalo Sales office included the occasional storage and washing of lead batteries on a 20 foot by 40 foot outdoor concrete pad at the rear of the facility (Figure 1-2). The outermost edge of the pad is approximately six feet from the rear property line which adjoins residential backyards and garages. In approximately 1983, the washing of batteries was discontinued, while the outdoor storage of batteries continued until approximately June 1985.

FIGURE 1-1

Site Location Map - C & D Power Systems

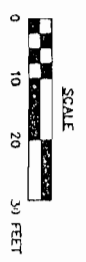
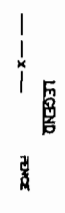


H G F E D C B A



SCOVILLE AVENUE

DOROTHY STREET



TITLE

FACILITY MAP

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SCALE: 1" = 30' DATE: 1-2

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2.0 PREVIOUS INVESTIGATIONS

2.1 Introduction

Based on operational practices, preliminary investigations of the soil quality (with respect to concentrations of lead) around the pad were conducted by C&D personnel in early 1985, and by ERM-Northeast in late 1985. The data from these two investigations were compiled into a report entitled, "SOIL QUALITY INVESTIGATION, C&D POWER SYSTEMS" which was submitted to NYSDEC by C&D Power Systems in December, 1985. This report served as notice to the NYSDEC that soils at the facility and around the facility contained elevated levels of lead. Also included with the report were recommendations for further soil sampling and a proposed remedial action plan.

During March, 1987 C&D Charter Power Systems received NYSDEC comments on the previously submitted report. C&D submitted to NYSDEC a draft "ENVIRONMENTAL SAMPLING PLAN" in June 1987, and met with the NYSDEC on June 24 in the NYSDEC's regional office in Buffalo. In July 1987, a revised and final "ENVIRONMENTAL SAMPLING PLAN" was submitted to NYSDEC. The NYSDEC formally approved the work plan in September, 1987, and the additional soil sampling was conducted on October 6 and 7, 1987.

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Analytical results obtained from the additional soil sampling were submitted, along with a remedial action plan, to the NYSDEC in a January, 1988 report entitled "PHASE II SOIL QUALITY INVESTIGATION". The NYSDEC presented to C&D (February 1988) their comments concerning the supplemental sampling results. On March 22, 1988 a project meeting took place involving NYSDEC Region 9; NYSDEC Central Office; NYSDOH; Allied-Signal Inc.; C&D Charter Power Systems and ERM-Northeast. At this time NYSDEC requested a third round of soil sampling, mainly to further map the off-site levels of lead. Consequently, a work plan (Final Supplemental Sampling Plan, April 1988) was drafted by ERM-Northeast and was subsequently approved by the NYSDEC.

The results from this third round (May 1988) of sampling were reported to the NYSDEC in a July, 1988 report entitled "SUPPLEMENTAL SOIL QUALITY INVESTIGATION". A revised report was submitted in October, 1988 that included a small fourth round of soil sampling. The main items contained within this report were: 1) the spacial delineation of soil containing elevated levels of lead; 2) the establishment of background concentrations of lead within the local area's soil; and 3) the conclusion that the water-table aquifer did not contain elevated levels of lead. Overall, the analytical data that was presented revealed that the only environmental problem at the site was that the shallow soil

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contained elevated levels of lead. Consequently, excavation and off-site disposal of the affected soil was chosen to be the most efficient and expeditious method of site remediation. A more detailed discussion of the findings and interpretations within each report is presented below.

2.2 1985 Report: "Soil Quality Investigation"

The 1985 site investigation conducted by ERM consisted of four major elements: 1) continuous sampling of soil to bedrock (approximately 8.5 feet below grade) in four borings; 2) continuous sampling of soil in eight borings to a depth of 5 feet; 3) the collection of 14 samples of surficial soil (0-6 feet in depth); and 4) the installation of a monitoring well for ground water sampling. Most of the above mentioned soil samples were analyzed for total lead with the exception being four samples of surface soil which were analyzed for lead EP Toxicity.

Analytical results from this initial program revealed that elevated levels of lead existed in the on-site surficial soils (0 - 6 feet) around the perimeter of the concrete pad but, for the most part, these elevated levels did not extend underneath the pad. Surficial soil adjacent to the northeast side of the pad had the most elevated lead levels laterally (15 feet versus 5 feet) and in

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magnitude (6,100 ppm versus 2,800 ppm) than the surficial soil which was adjacent to the pad's south side. This indicated that surface runoff from precipitation and battery washing on the concrete pad flowed predominately towards the northeast.

Off-site sampling of soil revealed that elevated levels of lead existed within some surface soil in the residential backyards and alleyways (between garages) adjacent to the concrete pad. In general, the lead concentrations in surface soil on neighboring residential properties were found to be greater to the northeast of the concrete pad, further supporting the assertion that surface water runoff from the pad was in this general direction. The off-site sampling also revealed that the concentration of lead within the local background soil was quite high. This 1985 report recommended that additional off-site sampling be conducted to complete the horizontal and vertical delineation of off-site elevated lead levels, and to establish the background concentrations of lead based on a larger group of samples.

The analytical data indicated that lead was being attenuated in the surficial unsaturated soil and had not been leached downward into the water-table aquifer (located approximately 4 feet below ground surface). Lead was not detected in a filtered sample of ground water collected from the on-site monitoring well (installed

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3-feet east of the pad), and secondly, the unsaturated soils which were collected immediately above the water table throughout the site (at four feet in depth) contained only low (below background) concentrations of lead. Furthermore, the ground water was found to have a pH of 7.62, indicating that no ground water quality impacts from sulfuric acid were present at the site.

2.3 January 1988 Report: Phase II Soil Quality Investigation

The data from soil sampling revealed that elevated lead levels in the surficial soil adjacent to the northeast side of the pad extends northward to the edge of the on-site building and northeasterly into the open field. To the east (off-site), elevated lead was present in the small area of soil between the garages on the premises of 48 and 50 Baitz Street. Two seemingly anomalous results from off-site were obtained from samples 26 and 28; these two samples had elevated concentrations of total lead, yet they were collected over 25 feet away from the concrete pad and separated from the pad by large garages and by soil samples with far lower concentrations of lead.

Results from the soil samples collected at greater depths indicated that elevated levels of lead extended to as much as three feet below the ground surface at several locations immediately

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adjacent to the pad. The highest concentration of lead at the 2.5 to 3.0 foot interval (3884 ppm) was present in the soil immediately adjacent to the concrete pad's north side. Radially outward from the pad, elevated lead was generally not present below one foot. The vertical distribution of lead suggests that it was being rapidly adsorbed and attenuated as lead bearing runoff infiltrated into the soil.

It was recommended that 1000 ppm of total lead be used as a guideline to delineate the extent of soil requiring remedial measures. A general guideline of removing soils only when lead concentrations are in excess of 1000 ppm was considered to be appropriate based on the local background concentrations of lead. Similar clean-up guidelines (1000 ppm for total lead) have been recommended by regulatory agencies in other states.

Analytical results of two ground water samples obtained from the existing on-site well continued to indicate that ground water contamination has not occurred at the facility. The 0.02 ppm of lead detected in the unfiltered sample of ground water was well below the USEPA enforceable cleanup standards (MCL) of 0.05 ppm. Since lead was not detected in the filtered sample of ground water, the analytical results indicated that the low concentrations of lead were not dissolved ions, but were instead adsorbed on

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suspended particulates (probably carried downward by the augering during well installation). The NYSDEC's split of the unfiltered sample contained considerably higher concentrations of total lead (4.2 ppm). Consequently, it was proposed that the well be redeveloped and that a third round of ground water sampling be performed.

2.4 October 1988 Report: Supplemental Soil Quality Investigation

The supplemental soil sampling program, sampling-rounds three (5/17-19/88) and four (10/12/88), was conducted primarily to delineate the lateral extent of elevated lead. Additional background soil samples were also collected on the east side of Baitz Street to complement those previously collected on the street's west side (and nearer to the C&D building). A third task of this supplemental sampling program involved the redevelopment and resampling of the existing monitoring well to clarify past analytical discrepancies.

At fifty-four sampling locations, surficial soil (0 to 6 inches) was collected to refine the lateral delineation of soil containing elevated lead. One of these samples was collected from the dirt floor of a residential garage adjacent to the concrete pad, though none of the other garages bordering the C&D property

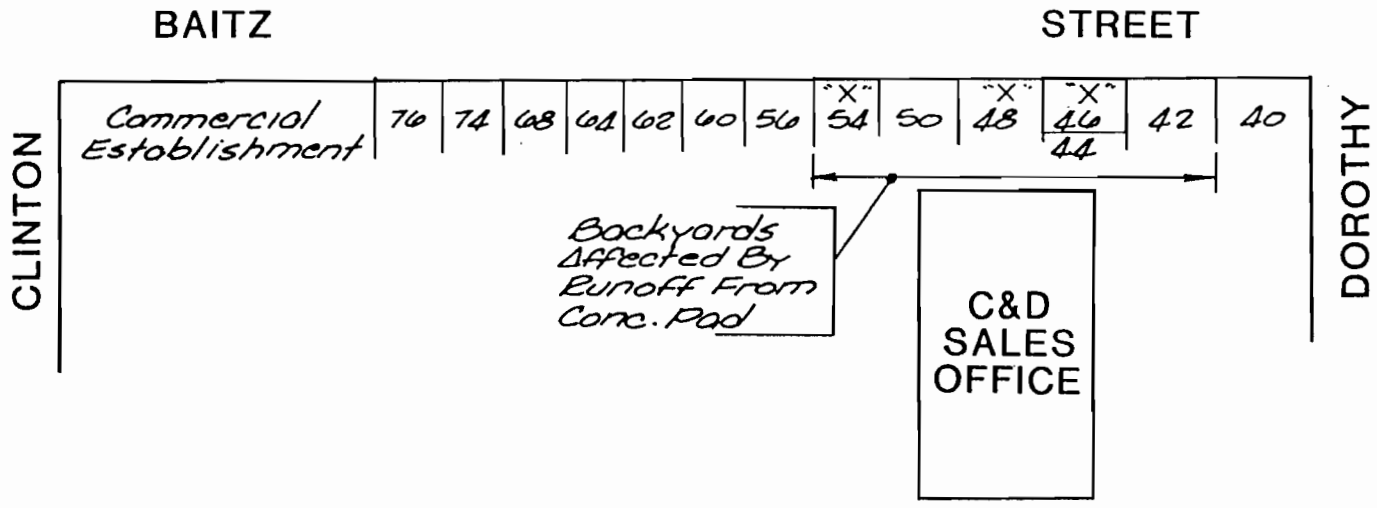
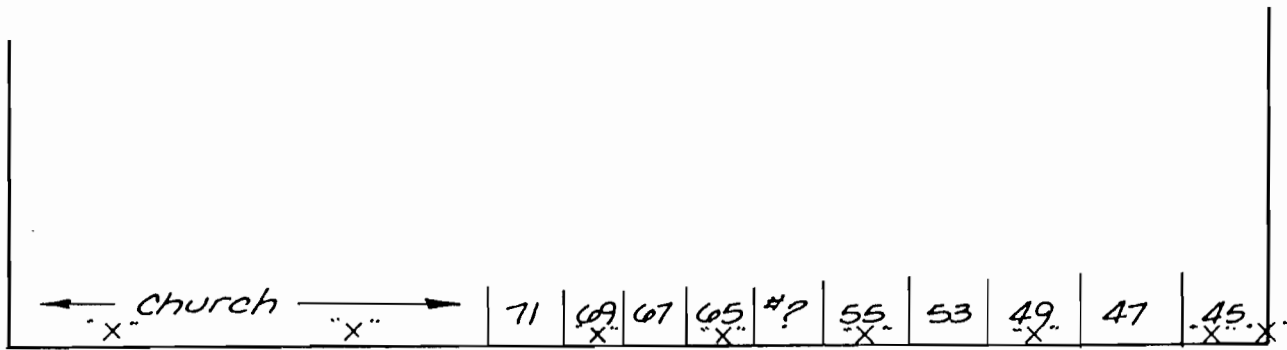
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were found to have dirt floors. At nineteen of these sampling locations, soil was collected from the depth interval of 1.0 to 1.5 feet, while soil at eleven of these locations was also collected from 2.5 to 3.0 feet below the ground surface.

Seven additional background soil samples were collected and analyzed for total lead in accordance with CLP protocols. Five of these additional samples were collected from the front lawns of houses on the east side of Baitz Street (Street numbers 45, 49, 55, 65 and 69), across the street from those front yards sampled previously (Figure 2-1). The remaining two background samples were collected in the grass median between the sidewalk and curb on the east side of Baitz Street.

Elevated lead levels in the surface soils exists around the perimeter of the concrete pad and extends northeasterly into the adjacent grassy field. Eastward from the concrete pad, the elevated lead was found to be present in the backyards at nine residential properties at the following addresses: 40, 42, 46, 48, 50, 54, 56, 60, and 62 Baitz Street.


Elevated lead within subsurface soils was found not to be as laterally extensive as that of the overlying surface soils. Contamination to depths of 1.5 and/or 3.0 feet was present around



NOTES :

1. Figure Schematically Shows The Residences Along Baitz Street.
2. "X" Indicates That The Front yard Was Sampled For Background Concentration of Total Lead.

Figure is Schematic, Not To Any Scale.

TITLE		BACKGROUND SAMPLING LOCATIONS	
PREPARED FOR		C&D POWER SYSTEMS	
 ERM-Northeast Environmental Resources Management	SCALE	FIGURE	
	DATE	2-1	

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the perimeter of the concrete pad, and in small isolated portions of the backyards at 46, 48, 50 and 54 Baitz Street.

A clean-up level of 1000 ppm total lead was recommended for remediation of the soils adjacent to the C&D Sales Office. This level was considered appropriate based on the local background concentrations, published risk assessments, and soil cleanup guidelines recommended by regulatory agencies in other states. The background concentrations (Table 2-1) ranged from 330 ppm to 1090 ppm, with the average of these concentrations being approximately 775 ppm.

Though a clean-up level of 1000 ppm total lead was considered to be technically appropriate, the NYSDEC required a soil cleanup level of 500 ppm. Allied Signal and C&D Charter Power Systems agreed to this 500 ppm cleanup standard because of their desire to have the site remediated as soon as possible.

Ground water data collected after a two-day redevelopment of the on-site monitoring well continued to indicate that the water-table aquifer was not impacted with lead from the overlying soils, and that aquifer remediation was not necessary. The high concentration of lead detected in NYSDEC's split of the unfiltered sample during a previous sampling event was attributed to suspended

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TABLE 2-1
BACKGROUND SOIL SAMPLING RESULTS
C&D CHARTER POWER SYSTEMS
FORMER BUFFALO SALES OFFICE

<u>Soil Sample</u>	<u>Collection Date</u>	<u>Sampling Location</u>	<u>Total Lead (ppm)</u>
BG-1	6 October 1987	46 Baitz St. Center of Front Lawn	620
BG-2	6 October 1987	48 Baitz St. Center of Front Lawn	740
BG-3	6 October 1987	54 Baitz St. Center of Front Lawn	1090
BG-4	6 October 1987	Baitz-Clinton Intersection East Side, Side Lawn	620
BG-5	6 October 1987	Baitz-Clinton Intersection East Side, Side Lawn	340
BG-6	6 October 1987	Baitz-Dorothy Intersection East Side, Curb	1040
BG-45	18 May 1988	45 Baitz St. Center of Front Lawn	1040
BG-49	18 May 1988	49 Baitz St. Center of Front Lawn	860
BG-49 Dup.	18 May 1988	49 Baitz St. Center of Front Lawn	770
BG-55	18 May 1988	55 Baitz St. Center of Front Lawn	700
BG-55C	19 May 1988	55 Baitz St. Between Sidewalk & Curb	1030
BG-65	18 May 1988	65 Baitz St. Center of Front Lawn	900
BG-69	18 May 1988	69 Baitz St. Center of Front Lawn	770
BG-69C	19 May 1988	69 Baitz St. Between Sidewalk & Curb	330

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particulates -- probably carried downward by the augering during well installation. Redevelopment was successful in removing this artificially-loosened soil entrained within the well's filter pack.

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3.0 CLEANUP PLAN OVERVIEW

A remedial soil-excavation program was designed for C&D's former Buffalo Sales Office, and was based on the analytical results from the four preceding soil investigations. The remedial plan involved the excavation and disposal of all on-site and off-site soils adjacent to and beneath the concrete pad exceeding 500 ppm of lead. Generally, the lateral and vertical extent of the proposed excavation was believed to be known prior to excavating; however, in all regions of the proposed excavation the ultimate depth of excavation was to be determined only by post-excavation sampling. The lateral extent of excavation was determined based upon the soil sampling and assessment of drainage patterns. The overall scope of this soil excavation program was approved by the NYSDEC in November, 1988.

The implementation of the excavation program began on November 28, 1988. In order to minimize any potential exposure from airborne lead particles, Allied/C&D Power temporarily relocated several families to a local hotel. The details of the day to day remediation activities are contained in a separate report entitled "Construction Management Closeout Report".

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Using an excavation guideline concentration of 500 ppm, on-site soils beneath and surrounding the concrete pad were proposed to be removed to a depth of two to four feet. This on-site excavation was to extend outward from the pad, generally at shallower depths, towards the northeast. Off-site, the excavation program included the total backyards of the residences at 40, 42, 44, 46, 48, 50, 54, 60, and 62 Baitz Street. Most yard excavations were to an initial depth of one foot with subsequent additional removal if indicated by post-excavation sampling. However, previous sampling results indicated that the excavation depths in portions of the yards of 42, 48, 50, and 54 Baitz Street would go to greater depths.

An important component of the remedial program was the collection of endpoint samples to verify that the soils at the base of the excavation had concentrations of total lead that were below the cleanup guideline. These analyses for total lead were conducted on an expedited basis so that backfilling could begin as quickly as possible. The exact number and locations of endpoint samples were to be determined in the field (prior to excavating) based upon discussions with NYSDEC's on-site representative.

After completion of the soil-excavation program, three quarterly rounds of ground water samples are to be collected from

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the on-site monitoring well during January, 1989; March, 1989; and September, 1989. The samples will be split into filtered and unfiltered aliquots, with each being analyzed for total lead. Analyses will be performed in accordance with the Department's CLP protocols. Sampling results will be made available to the NYSDEC approximately 30 days after each sampling event.

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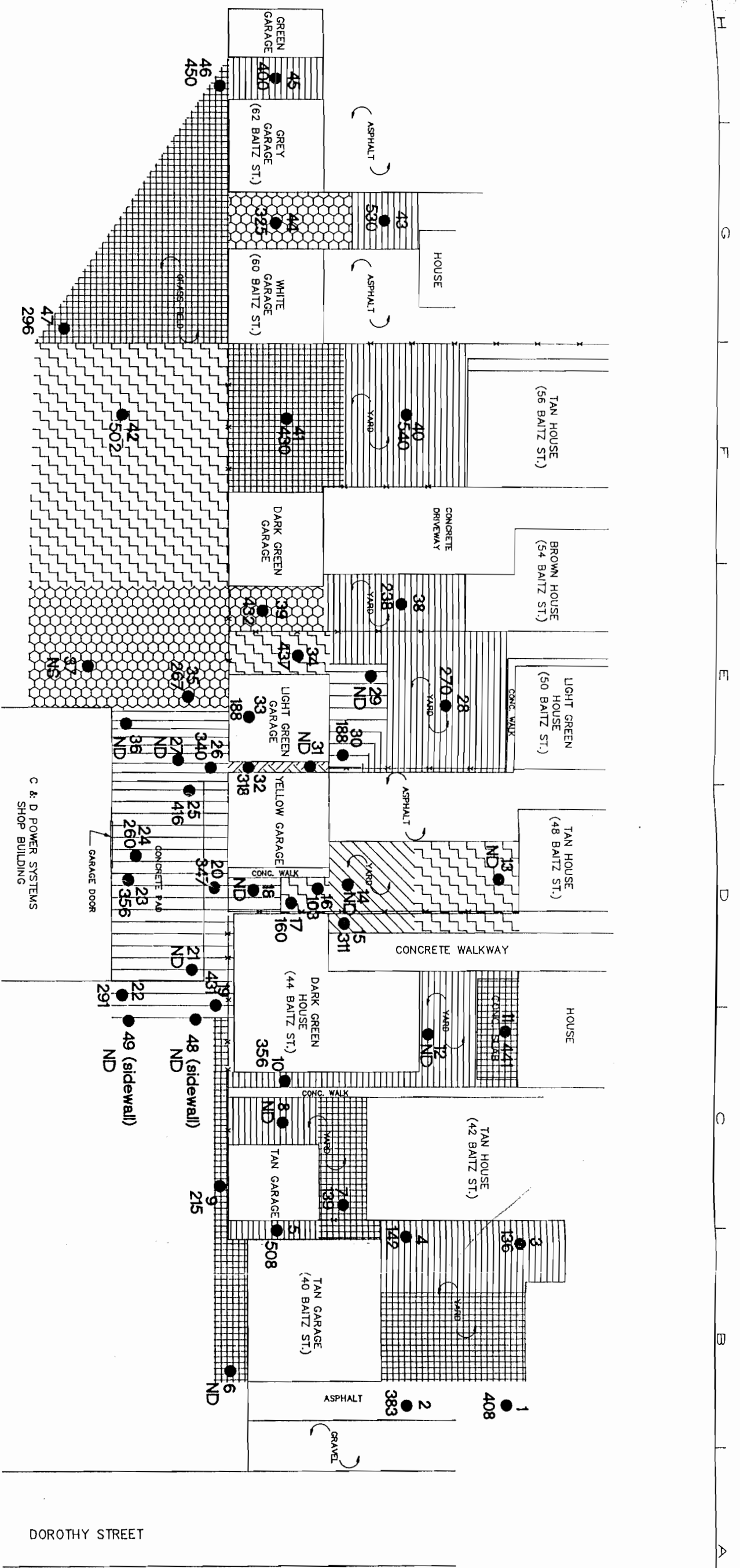
4.0 CLEANUP PLAN IMPLEMENTATION

4.1 Excavation Program

All non-RCRA hazardous soil was stockpiled in the vacant field to the northwest of the building prior to off-site disposal. The nonhazardous soil was not stockpiled on a liner because of its large volume and nonleachable nature. However, at the request of the NYSDEC, two feet of soil beneath the nonhazardous pile was excavated as an extra precaution and disposed of during loading of the stockpiled soil for off-site disposal.

The soil that was previously identified as being potentially RCRA hazardous (based on EP toxicity analyses) was temporarily stockpiled separately in the parking lot adjacent to the building. The potentially hazardous soil was excavated and stockpiled upon a polyethylene liner. Upon the completion of excavating hazardous soil, the stockpile was covered, secured with a polyethylene liner and a berm was placed around the perimeter of the stockpile prior to its disposal.

The final depths in each excavation area are shown on Figure 4-1. In general, the area around the former concrete pad was excavated to the greatest depth (approximately four feet) and the areas radially outward from the pad were excavated to lesser



LEGEND

—X—X— FENCE

● 23 DENOTES SAMPLE NUMBER

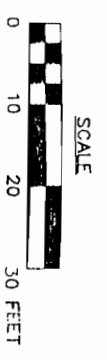
● 396 DENOTES LEAD CONCENTRATION IN PPM

ND DENOTES NOT DETECTED

NS DENOTES EXCAVATION BOTTOM NOT SAMPLED

FINAL EXCAVATION DEPTHS

[Pattern]	1.0'
[Pattern]	1.5'
[Pattern]	2.0'
[Pattern]	2.5'
[Pattern]	3.0'
[Pattern]	3.5'
[Pattern]	4.0'



TITLE

SOIL SAMPLING RESULTS

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C/D POWER SYSTEMS

ERMA Environmental Remediation Management

ERM—Northeast

SCALE DATE PROJECT

4-1

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depths. Several of the excavation areas had to be extended to depths greater than initially proposed because of the post-excavation sampling results.

Overall, 1,980 tons of soil (or 1084 cubic yards) were excavated from the site. Disposed of as potentially hazardous soil were 270 tons: 150 tons at CECOS' hazardous cell at Niagara Falls and 120 tons at Chem Waste's hazardous cell at Model City. The remaining 1710 tons were disposed of at BFI's Sanitary Landfill in Niagara Falls. All material disposed of was approved for disposal by the state and was sent to a state permitted landfill.

Upon completion of the entire excavation, the excavation areas were then backfilled with bank-run soil and regraded to the surface. At the request of the NYSDEC, the backfill soil was analyzed for metals and volatile organics, and was determined to be clean by the NYSDEC (Appendix B). The excavation area to the southeast of the building was resurfaced with gravel, while the placement of sod and shrubs for the remainder of the site is scheduled to begin May 1, 1989. Property-boundary fences were installed around the individual backyards, and all efforts were made to use fencing material similar to that removed from the property boundaries prior to excavating.

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4.2 Post-Excavation Sampling Results

Prior to the onset of excavating, a site walkthrough was conducted with the NYSDEC field representative to predetermine the locations for post-excavation sampling. Forty-nine sampling locations were chosen to be representative of the site. Nineteen samples were to be collected on-site, while the remaining thirty samples were collected off-site, within the residential backyards.

Post-excavation sampling results indicate that the excavation program was successful in removing the soil with lead concentrations above 500 ppm. The laboratory data is summarized in Table 4-1, and is shown on Figure 4-1 at the actual locations of sampling. Laboratory reports for the post-excavation samples are contained in Appendix A, while the report for the backfill soil is contained in Appendix B. Personnel from NYSDEC's Region 9 office were on-site to direct and observe the sampling procedures, and to obtain sampling splits. As shown on Table 4-1, when post-excavation samples exceeded 500 ppm, an additional 0.5' of soil was removed from the floor of the excavation and the excavation area was resampled at this greater depth.

At all but five of the 49 post-excavation sampling locations the analytical results for total lead were below the 500 ppm

TABLE 4-1
 POST EXCAVATION SAMPLING RESULTS
 C&D CHARTER POWER SYSTEMS
 FORMER BUFFALO SALES OFFICE

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Sample Number	Sampling Depths								
	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
1	408								
2	383								
3			589	136					
4			1307	142					
5			635	508					
6			ND						
7			139						
8			1056	ND					
9			215						
10			803	356					
11				441					
12				702	ND				
13						ND			
14						761	ND		
15							311		
16						103			
17						160			
18									ND
19									431
20									347
21									ND
22									291
23									356
24									260
25									416
26									340
27									ND
28				270					
29									ND
30									188
31							828	ND	
32							631	318	
33									188
34					605	437			
35					267				
36									ND
37			1600		886		NS		
38				238					
39					432				
40			720	540					
41			430						
42			930			502			
43			990	530					
44			970		325				
45			570	400					
46			450						
47			1100		1237	296			
48			ND						
49			ND						

ND - denotes not detected

NS - denotes excavation bottom not sampled

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cleanup level. These five exceptions include Sample 5 (508 ppm), Sample 40 (540 ppm), Sample 42 (502 ppm), Sample 43 (530 ppm) and Sample 37 (not sampled). The four samples in which lead was detected slightly above the 500 ppm level were well below the surface (1.5 feet or greater) and were so close to the cleanup level that a field decision was made (based upon discussions with NYSDEC) to cease excavating in these areas. The one location which was not resampled (Sample 37) was an oversight that occurred during the field program, and was not recognized until after backfilling was completed.

4.3 Quarterly Ground Water Sampling Results (January 1989)

Filtered and unfiltered samples of ground water were collected for total lead analyses from the existing monitoring well. Filtering of the one sample was performed in the field by pouring ground water from a bailer through a vacuum-drawn 0.45 micron Nalgene filter unit. Both ground water samples were delivered on the same day of sampling (January 31, 1989) to Advanced Environmental Services in Niagara Falls, New York. Personnel from NYSDEC's Region 9 office were on-site to direct and observe the sampling procedures, and to obtain sampling splits.

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On the day prior to ground water sampling the monitoring well was twice bailed dry. Sampling was performed the morning of the following day so as to allow the aquifer to recharge into the well. This procedure was the only way in which enough volume of ground water could be obtained for ERM's analyses and for the NYSDEC sample split.

Laboratory data from the two ground water samples collected during this latest round of sampling continue to indicate that the water-table aquifer has not been impacted with lead from the former Buffalo Sales Office. Lead was not detected in the filtered sample of the ground water, but was detected in the unfiltered sample at a concentration of 104 ppb (Table 4-2, and Appendix C). Published background concentrations of total lead were found to range from 120 ppb to 490 ppb in the unconsolidated aquifer (See Table 4-2). Consequently, though the concentrations of lead detected in unfiltered water were above the recently enacted 25 ppb limit for drinking water, the concentration of lead was still below the entire set of published background concentrations.

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TABLE 4-2
GROUND WATER SAMPLING RESULTS
C&D CHARTER POWER SYSTEMS
FORMER BUFFALO SALES OFFICE

<u>Sample Identification</u>	<u>Collection Date</u>	<u>Total Lead (ppb)</u>
Field Blank (Water)	1/31/89	<5 ppb
MW (Unfiltered)	1/31/89	104 ppb
MW (Filtered)	1/31/89	<5 ppb

Background Data*

<u>Sample ID</u>	<u>Sampling Location</u>	<u>Total Lead</u>
SA-4	Whitmer Road	180 ppb
SA-5	Gratwick Road	220 ppb
SA-6	Niagara Falls Blvd.	120 ppb
SA-7	Shawnee Road	290 ppb
SA-8	D.O.T.	210 ppb
SA-9	Seneca Street	490 ppb

*Ground Water samples collected from the surficial water table aquifer and published in a March 1985 USGS report entitled "Preliminary Evaluation of Chemical Migration to Ground Water and the Niagara River from Selected Waste Disposal Sites".

5.0 CONCLUSIONS

Soil containing elevated levels of lead has been successfully removed from around and beneath the concrete storage pad, and the resulting excavations have been backfilled with clean fill and reseeded. All exhumed soil has been disposed of at a permitted disposal facility.

Ground water samples continue to show that the water quality of the shallow water table aquifer beneath the site has not been negatively impacted by the elevated lead formerly contained within the unsaturated soil. In keeping with the schedule outlined in the ACO, additional rounds of ground water sampling will be conducted in March, 1989, and in September, 1989. If both rounds continue to indicate that the on-site concentrations of lead are below background concentrations, it is recommended that the well be sealed and removed.