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REMEDIAL ACTION PLAN
PORTLAND CHEMICAL WORKS SITE

PREPARED FOR:
CITY OF MIDDLETOWN

AUGUST 1998

Prepared by:

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1.0 INTRODUCTION

The former Portland Chemical Works (PCW) site is located at 680 Newfield Street in Middletown, Connecticut. The property consists of 5.97 acres of land on which are located two primary buildings and a variety of smaller structures, including a ten-tank above-ground tank farm (see Figure 1). The property was formerly used as a chemical transfer facility and is currently unoccupied. There are on-site wetlands, and a small stream located at the rear of the property. The property is zoned Industrial/Commercial.

An environmental investigation was conducted at the site due to strong evidence of conditions which could lead to significant liability. The objective of the investigation was to identify environmental issues which require remediation prior to site development, to delineate areas of contamination, and to determine the cost of remediation. This information could then be used in designing and carrying out redevelopment plans for the property.

A phased approach was used to achieve this objective. The following is a brief description of the various phases.

Phase I was designed to identify Areas of Concern (AOCs) at the site which will be the subject of subsequent field investigation. The Phase I scope consisted of a site walkover inspection and a document/file review at state and local agencies. The Phase I resulted in the identification of nine (9) AOCs.

Phase II was designed to determine the presence or absence of contamination associated with the AOCs identified in the Phase I. The scope involved the installation of several new monitoring wells and borings, sampling both new and existing monitoring wells, and near-surface soil sampling. The result of the Phase II was that contamination warranting remediation was identified in only three of the original nine AOCs.

A **Phase III** investigation of the three contaminated AOCs was conducted in order to delineate the extent of contaminated material needing remediation. This information allowed for cost estimates for dealing with site contamination to be prepared for the subsequent Remedial Action Plan.

The **Remedial Action Plan (RAP)** presents a course of action for remediating all of the environmental issues at the site, and presents a cost estimate for this action. These cost figures are based on actual contractor quotes and are considered accurate enough for use in valuation calculations and site planning.

As noted above, this RAP presents a course of action for addressing remediation issues at the site. Details regarding the investigation on which the RAP is based can be found in the Phase I report (June 1998), and the Phase II and III Report (August 1998).

2.0 PROPERTY TRANSFER ACT STATUS

The PCW site is considered an "establishment" as defined under the Connecticut Transfer Act. This means that in the event of a property transfer the property owner would have to file the appropriate forms and certifications regarding the environmental status of the site with the CTDEP and with the buyer. It is likely that a Form 3 filing would be necessary, which states that there has been one or more spills or releases on the site, and presents a plan for remediation. A Form 3 filing essentially labels the property as impacted until such time as remediation has been carried out to the point that the CTDEP will approve filing a Form 2, which states that impacts to the site have been properly remediated. To achieve Form 2 status, the DEP would likely require up to two years of post-remediation groundwater monitoring to make sure all potential sources of contamination have been removed.

3.0 REMEDIATION ISSUES

The Environmental Assessment resulted in the identification of six (6) remediation issues at the PCW site. Table 1 lists the original nine AOCs, the three AOCs that were shown to have contamination requiring a Phase III investigation, and the six AOCs which are considered remediation issues to be addressed in this RAP.

TABLE 1
AOC ASSESSMENT STATUS

Phase I Areas of Concern	Phase II	Phase III (contaminated AOCs)	Remediation Issues
1. Tank Farm	X		X
2. Loading Rack	X	X	X
3. Heating Oil Underground Storage Tank (UST)	X		X
4. Gasoline and Diesel USTs	X		X
5. Chemical Manhole	X	X	X
6. Aboveground Fuel-Oil Storage Tanks	X	X	X
7. Debris Area on North Side of Stream	X		
8. Area behind Warehouse #1	X		
9. Area behind Warehouse #2	X		

As shown, AOCs 1-6 have remediation issues which need to be addressed prior to or in conjunction with site development. The location of the six AOCs are shown in Figure 2. The remediation issues are discussed by AOC below, along with a recommended course of action for addressing each of them.

AOC-1: Tank Farm

No contamination warranting remediation was identified within the tank farm dike. W&C assumes that any development plans will require the removal of these tanks and associated structures such as the slabs and the walkway. The tanks appear to be clean and empty. Based on our discussions with contractors, the tanks could be removed intact using a crane or large excavator. The tanks would be scrapped, the slabs and walkway removed and disposed as demolition waste. It is assumed that there is no need to preserve or restore the tank farm dike, which may be damaged during the demolition. The only anticipated waste material issue is the presence of paint chips that have flaked off of the sides of the tanks: these chips probably contain lead and would have to be handled as a lead-containing waste. W&C estimates a total of 2-3 drums of paint chip waste.

AOC 2: Loading Rack

The loading rack area has Total Petroleum Hydrocarbon (TPH) contamination requiring remediation. In addition, piping may contain residue requiring special handling, and the piping and support structures should be removed. The best means of remediating this area is to remove the piping and excavate and remove the contaminated soil. The first step would be to clean, dismantle, and remove all of the piping and support structures and dispose as demolition waste. Any contaminated wash water generated in flushing the pipes would be drummed, analyzed, and disposed of properly. Piping would be removed all the way to the drum filling shed, and from the shed itself.

TPH-contaminated soil would be excavated and removed from the area between the toe of the tank farm dike and the railroad bed, as shown in Figure 3. The depth of excavation is estimated at two feet; this results in a total volume of approximately 185 cubic yards (280 tons) of material. The excavated soil would be loaded onto trucks staged on the asphalt drive adjacent to the loading rack area, and transported to an appropriate disposal facility. This particular material should be a good candidate for thermal desorption, a treatment technique which could prove cost-effective. Clean backfill would be placed in the excavation to grade.

AOC 3: Fuel Oil Underground Storage Tank

The exact location of the fuel oil underground storage tank (UST) was never confirmed during the investigation. The presence of this tank is strongly indicated in the documentation, and for the purpose of this RAP is assumed to present, accessible and empty in the location shown in Figure 2.

There is no evidence of any contamination associated with this UST. There is some evidence that the tank was abandoned in place at some point in the past, in which case the tank would not have to be removed unless desired by the site owner/developer. This RAP assumes the removal of the tank with no contamination encountered and no residual fuel to be disposed of, and backfilling with clean soil. In practice, the status of the tank, including its exact location, is currently unknown and would be investigated at the time of excavation and removal of the gasoline/diesel USTs (see below).

AOC 4: Gasoline/Diesel Underground Storage Tanks

These USTs are considered "inactive" and require removal under Connecticut regulation. There was no evidence of subsurface contamination identified during the Phase I and Phase II investigations. The removal should be straightforward. This RAP assumes that the tanks, pump island, and associated piping will be removed and disposed as scrap, and the resulting excavation backfilled with clean soil. The RAP does not assume encountering any contaminated soil, although that is a possibility. It is considered highly unlikely that extensive soil contamination having a significant impact on the remediation cost estimates presented in this RAP would be encountered.

AOC 5: Chemical Manhole

The chemical manhole was determine to consist of a leachfield unit which is connected to a floor drain located in the drum filling shed. The leachfield consists of gravel material extending approximately eight feet below ground surface over an area estimated at 400 square feet centered around the manhole labeled "chemical" (see Figure 4). Although no contamination exceeding applicable Connecticut Remediation Standard Regulation (RSR) criteria were identified, this unit is suspected of being the source of the low-level solvent contamination identified in groundwater immediately downgradient of the unit.

W&C believes that this unit warrants remediation. Remediation would be most effectively accomplished by excavation and disposal of the leachfield and the pipe leading to the Drum Filling Shed. The volume of material to be removed is calculated to be 120 cubic yards (180 tons). The resulting excavation would be backfilled with clean soil. The removed material would be transported off-site for proper disposal.

AOC 6: Heating Oil 275-gallon Aboveground Storage Tanks (ASTs)

The three 275-gallon heating oil aboveground storage tanks (ASTs) located adjacent to the northwest corner of Warehouse Building No. 2 should be removed and disposed of. At least one of the tanks contains oil which would be removed prior to moving the tanks and disposed of separately. In addition, soil in the immediate area of the tanks is contaminated with TPH at levels exceeding the CT RSR criteria, and thus requires remediation. Remediation would be most effectively accomplished by excavation and disposal of the soil and backfilling with clean soil. The volume of soil to be removed is calculated to be 45 cubic yards (67 tons). This material would also be amenable to thermal desorption, which may be the most cost-effective means of disposal.

4.0 POST-REMEDIATION GROUNDWATER MONITORING

The CTDEP typically requires groundwater monitoring following remediation of a site. Following the completion of remediation, groundwater would be monitored in up to five of the existing monitoring wells on a quarterly basis for a minimum of one year. Monitoring will continue until all applicable RSR criteria have been met for the Site (or any shorter period acceptable to CTDEP). The program will be evaluated and recommendations would be made to CTDEP regarding modification or discontinuation of the monitoring program following each sampling event. The data will also be evaluated after each quarterly sampling round to determine if any modifications to the analytical parameters are necessary. Any modifications will be contingent on CTDEP approval.

Based on the soil sample and groundwater sample analytical results completed during the Phase II and III investigations, it is anticipated that the following parameters would be analyzed for each well, pursuant to SW-846:

- VOCs via EPA Method 8260
- TPH via EPA Method 418.1 or other approved CTDEP methods
- Total Cyanide via EPA Method 9010B

Cost to complete the post-remediation monitoring would range from $2,500 to $3,500 per quarterly sampling event. This would constitute a worst case scenario since the length of time for monitoring and the number of wells to be monitored is negotiable, and could be changed based upon observations made following each event. Thus, annual costs for groundwater monitoring could range from $10,000 to $14,000, and would be considerably less beginning in the third year if monitoring is required to continue.

5.0 REMEDIATION COSTS

Woodard & Curran estimates the cost of the recommended remedial actions to be approximately $103,000. The cost of two years of post-remediation monitoring is estimated to range from $20,000 to $28,000. This estimate is based on quotes obtained from several remediation contractors who inspected the site and applied the findings and assumptions presented in this RAP. It is our opinion that these prices can be considered accurate to within ± 15 percent for planning purposes.

A breakdown of the remediation cost by Area of Concern is presented in Table 2 below.

TABLE 2
REMEDIATION COST ESTIMATE

		ESTIMATED COST
Task 1:	**AOC #1 – Tank Farm**	
1)	Dismantle / Remove the ten aboveground storage tanks (approximate dimensions are 10 ft. diameter and 20 ft. height). Assume tanks are empty and clean.	$ 5,000
2)	Dismantle / Remove the tank farm concrete slabs.	15,000
3)	Dismantle / Remove catwalk leading into tank farm area.	500
4)	Containerize paint chips from tanks for future characterization for lead. Assume 2 drums will be required.	1,500
TASK 1 TOTAL ESTIMATE		**$ 22,000**
Task 2:	**AOC #2 – Loading Rack**	
1)	Dismantle / Remove Loading Rack structures on either side of railroad.	$ 1,000
2)	Dismantle / Remove pipe runs and racks (with foundation slabs) from drum filling building to loading rack and loading rack to tank farm. Clean out and dispose of any residue in pipes.	6,000
3)	Remove approximately 185 cubic yards (280 tons) of TPH-contaminated soil from between the tank farm dike and the railroad bed, and from just west of the loading rack slab to approximately 20 feet east of the catwalk.	21,000
4)	Confirmation sampling and analysis	1,000
5)	Backfill with clean soil	3,700
TASK 2 TOTAL ESTIMATE		**$ 32,700**

TABLE 2 (CONT.)
REMEDIATION COST ESTIMATE

		ESTIMATED COST
Task 3: AOC #3 – Heating Oil UST		
1)	Removal of 7,000-gallon heating oil UST adjacent to Warehouse #2. Assume empty and accessible.	$ 4,000
2)	Confirmation sampling and analysis	1,000
3)	Backfill with clean soil	800
TASK 3 TOTAL ESTIMATE		**$ 5,800**
Task 4: AOC #4 – Gasoline and Diesel USTs		
1)	Removal and disposal of a 1,000-gallon unleaded gasoline UST and a 3,000 gallon diesel fuel UST. Assume empty.	$ 3,000
2)	Removal and disposal of all associated piping and venting, including the removal and disposal of a pump island and slab.	1,000
3)	Confirmation sampling and analysis	1,000
4)	Backfill with clean soil	800
TASK 4 TOTAL ESTIMATE		**$ 5,800**
Task 5: AOC #5 – Chemical Manhole		
1)	Removal and disposal of leach field materials and associated soil consisting of approximately 120 cubic yards (180 tons). Assume dispose as non-hazardous waste.	$ 13,500
2)	Removal and disposal of associated piping including drain piping from drum filling building to the leach field.	1000
3)	Confirmation sampling and analysis	1,000
4)	Backfill with clean soil	3,500
TASK 5 TOTAL ESTIMATE		**$ 19,000**

TABLE 2 (CONT.)
REMEDIATION COST ESTIMATE

		ESTIMATED COST
Task 6: AOC #6 – Three 275-Gallon Aboveground Storage Tanks		
1)	Removal and disposal of the three 275-gallon aboveground fuel-oil tanks (assume total of 100 gallons fuel for disposal).	$ 1,000
2)	Removal and disposal of approximately 50 cubic yards (75 tons) of TPH-contaminated soil.	5,600
3)	Confirmation sampling and analysis	1,000
4)	Backfill with clean soil	1,000
TASK 6 TOTAL		**$ 8,600**
OTHER COSTS		
1)	Mobilization/Demobilization	$ 6,000
2)	Permits/Manifesting	3,000
OTHER COSTS TOTAL		**$ 9,000**
ESTIMATED TOTAL REMEDIATION COST		**$102,900**
POST-REMEDIATION MONITORING		
1)	Sample 5 wells on quarterly basis and analyze for VOCs, TPH and Cyanide over a 2 year period	$20,000-$28,000
ADDITIONAL UNIT COSTS		
SOIL REMOVAL AND DISPOSAL		$75 per ton
CLEAN BACKFILL		$15 per cubic yard
CLEAN / EMPTY TANKS (TANK FARM)		$1,500 per tank
SLUDGE HANDLING		$200-$500 per drum

The course of action presented in this RAP should result in the property being ready for normal site preparation activities associated with industrial/commercial development. In addition, completion of the RAP activities as documented in a formal Remedial Action Report should lead to the eventual sign-off by the state on a Form 2 filing, essentially giving the property a "clean bill of health."

It should be noted that the site investigation and RAP were focussed on site conditions which did not include issues such as building interiors and sub-slab conditions. Also, as noted in this report, there is the possibility that conditions will be encountered during remediation activities which deviate from the conclusions presented in this RAP and the investigation reports. However, W&C considers the risk of significant deviations to be low, and the conclusions presented reasonable and accurate within the bounds of a normal standard of practice.

Newfield Street

Town & Country Auto Sales

Primary Steel, Inc. Facility

N

LEGEND

Existing Monitoring Well

Scale in Feet

0 100 200

DES.BY: GFF	DR.BY: CSW	CK.BY: GFF

FORMER PORTLAND CHEMICAL WORKS
MIDDLETOWN, CONNECTICUT

FIGURE 1

EXISTING CONDITIONS

SCALE: AS SHOWN	JOB NO.: 98053.03
DATE: 8/25/98	FILE NAME: SITEPLAN

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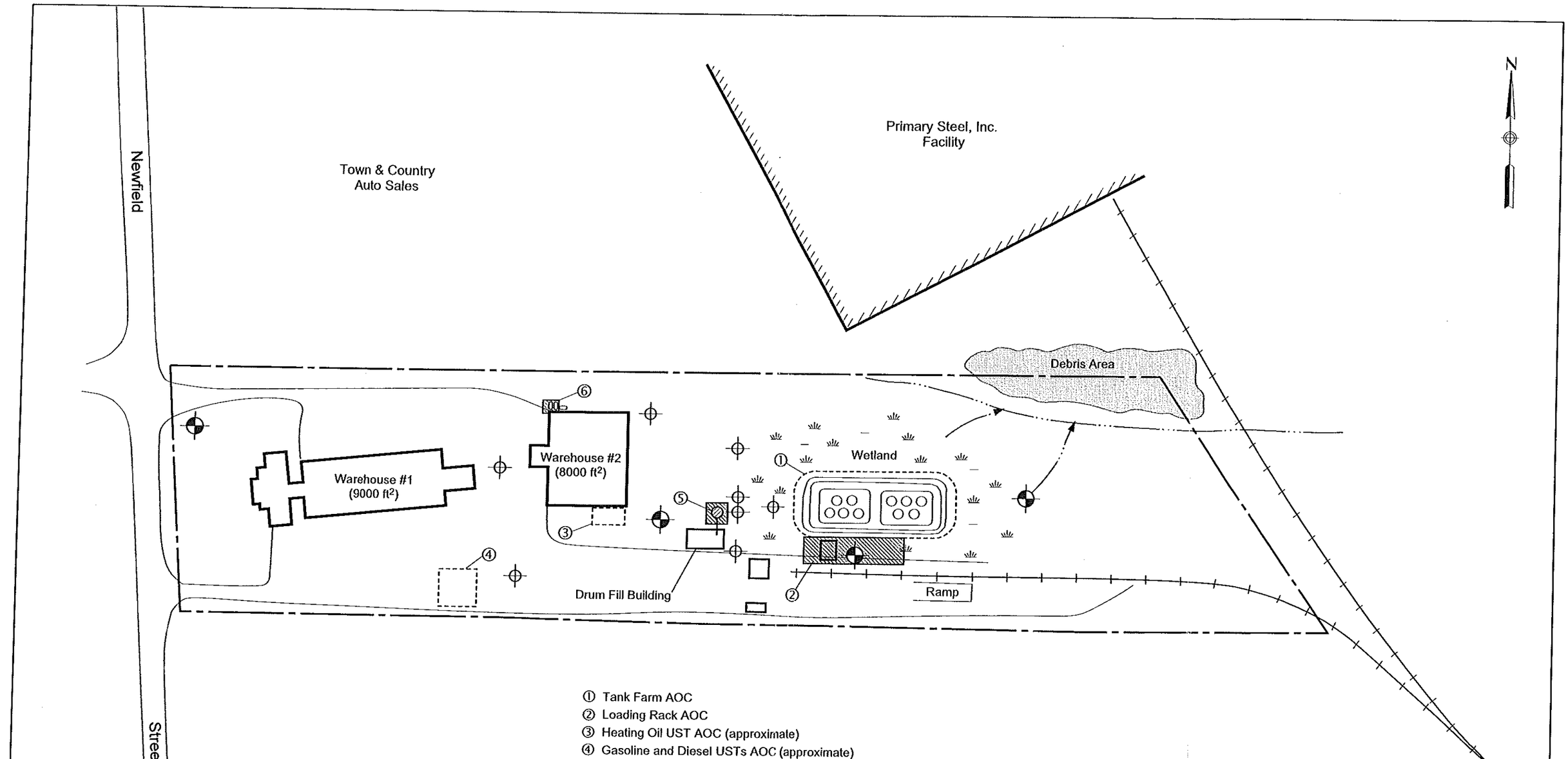

DES.BY: GFF	DR.BY: CSW	CK.BY: GFF

FORMER PORTLAND CHEMICAL WORKS
MIDDLETOWN, CONNECTICUT

FIGURE 2

REMEDIATION ISSUES

SCALE: AS SHOWN	JOB NO.: 98053.03
DATE: 8/25/98	FILE NAME: SITEPLAN

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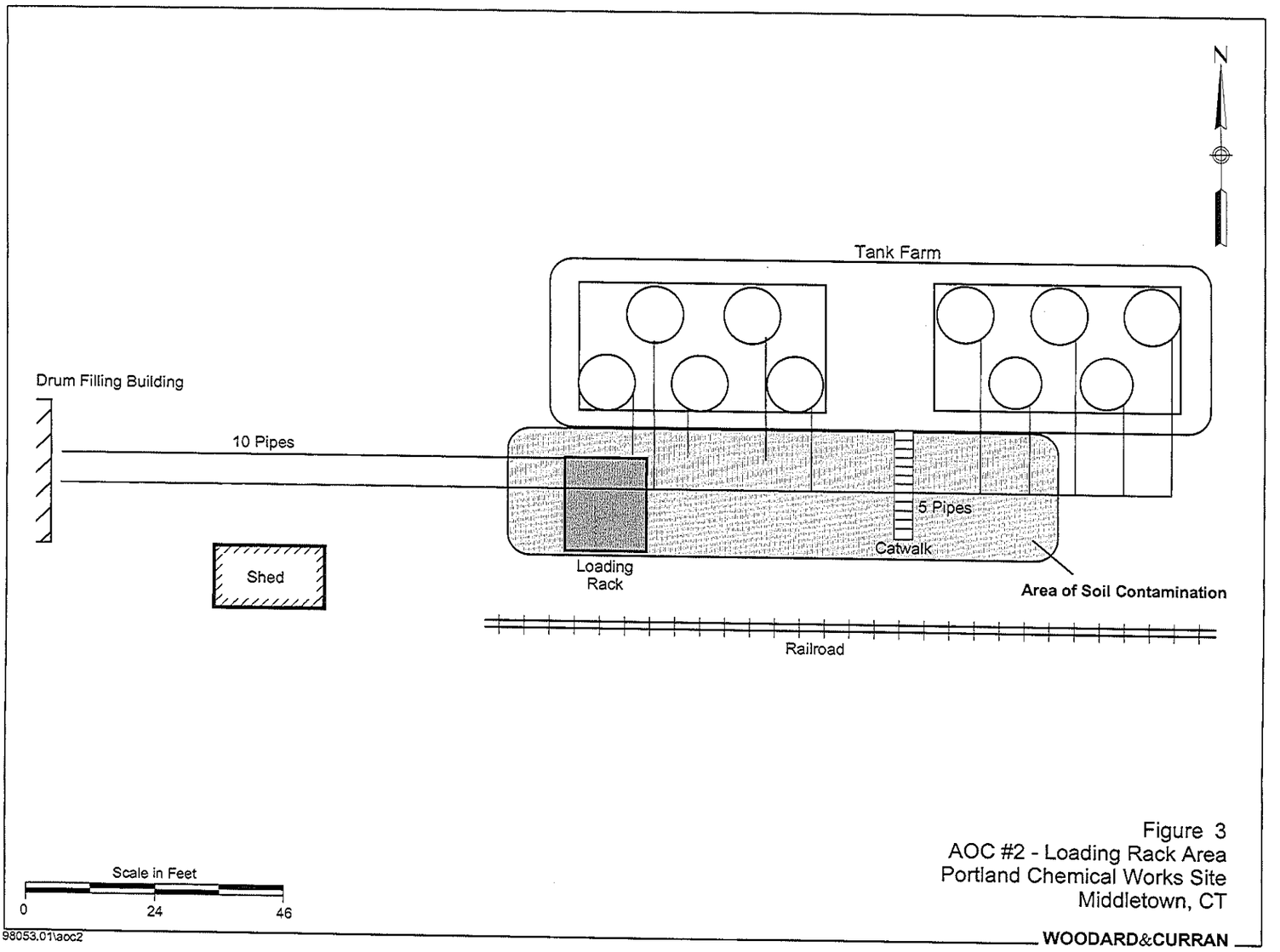

Figure 3
AOC #2 - Loading Rack Area
Portland Chemical Works Site
Middletown, CT

98053.01\aoc2

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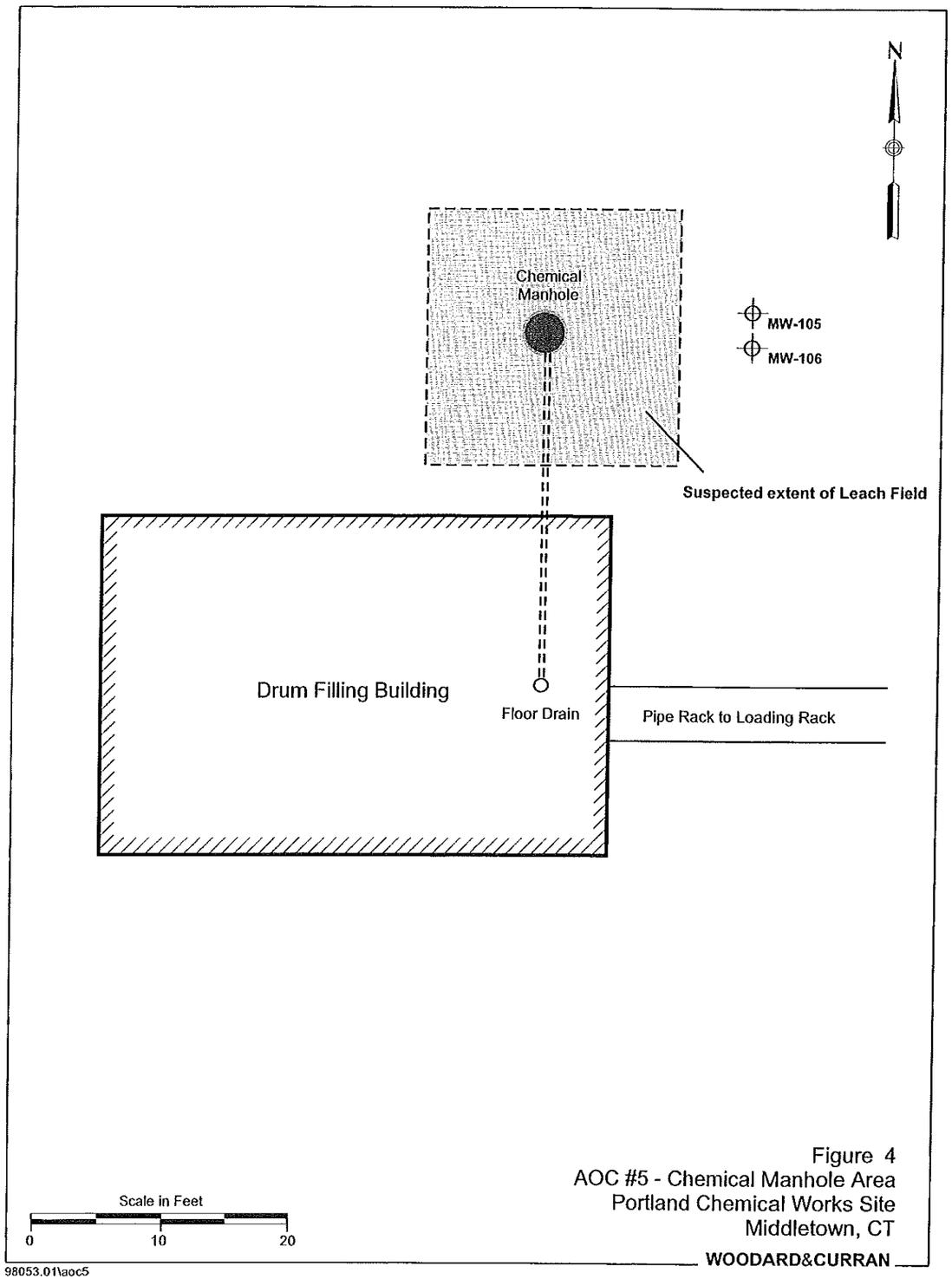

Figure 4
AOC #5 - Chemical Manhole Area
Portland Chemical Works Site
Middletown, CT

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98053.01\aoc5

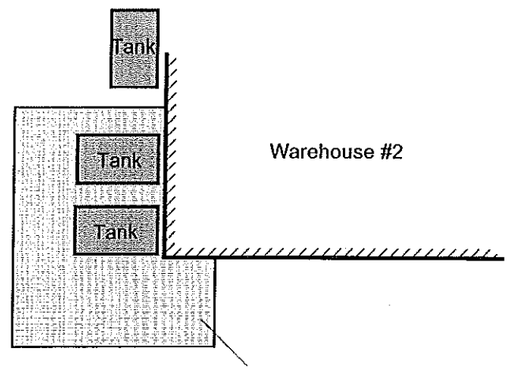

Figure 5
AOC #6 - Aboveground Storage Tanks Area
Portland Chemical Works Site
Middletown, CT

Scale in Feet
0 10 20

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98053.01\aoc6