New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Eastern Remedial Action, Room 242
50 Wolf Road, Albany, New York 12233-7010
Phone: (518) 457-4349 FAX: (518) 457-4198

John P. Cahil
Commissioner

FAX

TO: Hari Agrawal

FROM: Tom Gibbons

DATE: 5/29/98

No. of pages 10 + cover page

Any problems with receipt of this fax please call 7-1708

2.0 REMEDIAL INVESTIGATION

2.1 NAPL DELINEATION AROUND THE FORMER LAGOON

2.1.1 Purpose

The purpose of the task was to delineate the extent of NAPL on the ground water surface in the area of the former lagoon. Since NAPL was found in a number of monitoring wells around the lagoon, temporary wells were used to determine the areal extent of NAPL. The temporary well installation proceeded as an iterative program, extending to adjacent off-site areas when necessary, until the extent of NAPL in each area was fully delineated. In addition to the temporary wells, six test borings were installed at locations around the former lagoon to check whether NAPL was present in areas not previously investigated.

2.1.2 Procedures

2.1.2.1 Test Boring

Six test borings (TB-1 through TB-6) were advanced between 1 December 1994 and 7 December 1994 at the locations shown in Figure 2-1. The test borings were advanced to just below the ground water table. At each test boring, continuous split spoon sampling was conducted down to the capillary fringe (the subsurface soil interval immediately above the water table) utilizing a hollow stem auger drilling rig. Subsurface soil samples were collected with decontaminated standard two-inch split spoons driven in accordance with ASTM standards for penetration Test and Split-Barrel Sampling of Soils (ASTM D-1586-84). Upon retrieval and opening of the split spoons, ambient volatile organic measurements were collected with an organic vapor analyzer (OVA) or a photo-ionization detector

(PID). The physical characteristics of the soil samples were also recorded in a log. The logs included descriptions of volatile organic readings, odor, penetration resistance, recovery, grain size, color, staining or visible presence of NAPL and moisture content.

Samples of soil corresponding to the interval beginning at the capillary fringe and extending through the top of the water table were analyzed in the field for Total Petroleum Hydrocarbons (TPH) with an HNU Hanby Field Test Kit. Soil samples from these intervals in five of the six borings had indications of hydrocarbons.

The HNu-Hanby system for TPH analysis is a self-contained test kit. The Hanby Method was documented in an EPA report on field measurement techniques (USEPA, 1990) In this report, EPA found that the method provided quantitative results with high levels of precision and accuracy. Typical minimum detection limits are one part per million each for BTEX (benzene, toluene, ethylbenzene and xylene), unleaded gasoline, diesel fuel and crude oil. The on-site test was completed in approximately 10 minutes.

The test procedure is as follows: first, a five-gram soil sample (approximately two milliliters (ml)) is placed in a beaker. A 10-ml ampoule of solvent is added to the soil which is agitated for three minutes. After allowing the soil to settle, the solvent is poured into a screw-top test tube to the 4.2 ml mark. One 10-ml vial of color development catalyst is added and the test tube is vigorously shaken for three minutes. Lastly, the hue and intensity of the resulting product are compared to color standards to determine the contaminant type and concentration. If a mixture of components exist in the soil, the resulting color will reflect their presence. A mixture of aromatic compounds may interfere with one

another resulting in a color and intensity that are not expected. Weathered product components and high concentrations (greater than 800 ppm for No. 2 fuel oil) will also produce skewed results. Generally, the results are adequate to determine the most contaminated sample.

At five of the six test boring locations, both the physical characteristics and the Hanby Method indicated that hydrocarbons were present. As a result, a temporary well was installed at each of the five locations to determine if NAPL was present in sufficient volume to accumulate as a separate phase on the ground water surface.

2.1.2.2 *Temporary Well Installation*

The temporary well installation program of the OU-II RI was conducted in two phases. The first phase was conducted from 22 November 1994 through 18 January 1995 and involved on-site temporary well installations. The second phase, involving the off-site installation of temporary wells was conducted in February and April, 1996. Table 2-1 summarizes each on-site and off-site temporary well installation completed during the course of this RI. The table notes those temporary installations which were converted to permanent wells and those which were abandoned.

Temporary well installations were abandoned as part of the OU-I remedial action. Those temporary well installations which were not abandoned during implementation of the OU-I remedial action were backfilled with a bentonite cement grout in accordance with NYSDEC TAGM HWR 89-4032 regarding drill cuttings. Also, some temporary wells were fitted with protective casings to avoid damage during the OU-I remedial action.

The installation of temporary wells began near the four known areas of NAPL around the former wastewater lagoon. The designation of these NAPL areas, along with the existing monitoring well which defines the area, are:

- L1 WB-9
- L2 WB-4
- L3 WB-2
- L4 WB-5

Temporary wells were installed at these four locations at increasing distances from the existing monitoring wells until NAPL associated with the former wastewater lagoon was not encountered.

The locations of the four NAPL areas and the temporary wells installed are shown on Figure 2-1. All the initial temporary well casings were installed in one area at one time. The intent was to install the temporary well casings in as short a time frame as possible so that the initial screening step could be completed relatively quickly. Continuous split spoon sampling was conducted utilizing the same procedures as previously described for the six test borings and for 13 of the temporary well installations. At the remaining locations, as noted in Table 2-1, the temporary wells were installed by drilling to a pre-determined depth and "dropping" the well casing into the borehole. This technique was employed for many of the off-site temporary wells, near the extent of the NAPL areas, where adequate subsurface information had already been obtained.

After soil sampling, a two-inch PVC temporary well casing was installed in the borehole. The temporary well casing was constructed of 10 feet of slotted PVC and five to 10 feet of riser pipe and was installed such that the screened interval straddled the water table. A sufficient amount of the

annular space surrounding the casing was backfilled with graded sand to ensure that the casing was stable inside the boring (Figure 2-2), and the drilling rig then moved to another location to install additional temporary wells/borings. The casings were left in place for a minimum of eight to 12 hours. The eight- to 12-hour time frame was based on NAPL recharge rates ranging from 0.003 gallons per hour to 0.06 gallons per hour as reported in the 1990 Fred C Hart Product Investigation Report. Based on these rates, eight to 12 hours was deemed adequate to establish the existence of NAPL in the temporary wells.

After approximately eight to 12 hours of equilibration, water level and NAPL thickness measurements were collected from each well. Water level and product thickness measurements in the temporary well casings were obtained with an electronic interface probe accurate to 0.01 feet. All water level measurements were taken from the top of each temporary casing and was recorded in a bound field notebook. All measuring equipment was decontaminated between wells using an Alconox and water solution and a tap water rinse.

Following the installation of the initial temporary wells, the NAPL thickness measurements from each temporary well was plotted on a map. In areas where NAPL was identified, another set of temporary well casings were installed at a distance of 10 to 100 feet radiating outward from the first set. The appropriate distance was selected based upon the thickness of the NAPL in the first set of wells. The precise spacing was determined in the field. When an NYSDEC field representative was present during installation of temporary wells, the representative was consulted in the selection of interval spacing. After installation of each round of temporary wells, water level and NAPL measurements were obtained.

This iterative process of temporary well installation was continued in each area until the extent of each NAPL plume was defined (i.e., no NAPL present). NAPL delineation concluded only after consultation with the NYSDEC project manager. At the conclusion of both phases of NAPL delineation, a map was prepared to show the location and extent of the NAPL plume in each defined area (see Section 3.1.1).

2.1.2.3 *NAPL Testing*

Representative samples of NAPL were collected from several select temporary wells. Samples were collected from eight on-site wells in March 1995 (WB-2, WB-2-1A, WB-4, WB-4-4A, WB-5, WB-9, TB-1-1A1A and TB-6-1B1B) , two off-site wells in March 1996 (OS-C and OS-F) and one off-site well (OS-O) and one on-site well (WB-9-3C2A).in May 1996. All samples were analyzed for PCBs.

12 well samples

Four of the samples collected in March 1995 (WB-2-1A, WB-4-4A, TB-1-1A1A and TB-6-1B1B) and the two samples collected in May 1996 (WB-9-3C2A and OS-O) were also submitted to Worldwide Geosciences, Inc. for fingerprint analysis via gas chromatography. The purpose of the fingerprint analysis was to ascertain signature characteristics regarding the type of petroleum hydrocarbons in each NAPL sample. These signature characteristics were then evaluated to determine the type of NAPL; NAPL similarities; and differences both within and between each NAPL plume. If, for example, NAPL from two different source areas merge, the composition of the NAPL would change accordingly. Similarly, two seemingly discrete areas of NAPL adjacent to one another which have the same signature characteristics could indicate a single plume and necessitate additional temporary well installations.

Each NAPL sample was collected utilizing a bottom loading disposable polyethylene bailer. The bailer was lowered into the temporary well with a dedicated polypropylene cord and the sample was retrieved. Each sample was then placed in its appropriate sample container, placed on ice and sent to Nytest Environmental, Inc. (NEI) via overnight courier for analysis with chain of custody documentation maintained throughout.

2.1.2.4 *Baildown Testing*

Baildown testing was conducted on the four monitoring well which have historically contained product (WB-2, WB-4, WB-5, and WB-9) as well as two other wells (MW-1 and WB-7) identified during monitoring activities at the Site. This involved the estimation of actual product thickness through the graphical evaluation of depth to product (DTP), depth to water (DTW), and apparent product thickness over time as measured during recovery of liquid in the monitoring well. Specifically, Gruszczenski's (1987) method was used where both product and water were bailed from the wells until no further reduction of apparent product thickness could be achieved, then the recovery of both DTW and DTP were measured over time. The time intervals were similar to those used during in-situ permeability tests and measurements were made until readings stabilized.

During recovery, the product level approached the original static level. However, the product/water interface initially rose then fell at some point during recovery. This fall represented the displacement of water by the over accumulation of product in the well. According to Gruszczenski the distance from this point where the depth to water changes from a positive to negative slope (inflection point) and the measured stabilized top of product is considered to be the actual mobile NAPL thickness in the

formation. The results of the bailidown test were used to determine if the NAPL could be easily removed from the formation, and provided an accurate indication of NAPL thickness within the formation.

2.1.3 *Results*

The test borings, temporary well installations and NAPL testing were conducted at various time intervals between 1 November 1994 and 24 June 1996. Extensive subsurface information was collected during this time. The subsurface geologic characteristics are contained in boring logs for test borings and temporary wells from which split-spoon samples were collected. The boring logs can be found in Appendix A.

The subsurface soils were also subjected to field testing for TPH using the Hanby kit. TPH results of a number of subsurface soil intervals at 20 boring or temporary well locations are provided in Table 2-2. These locations are representative of the four NAPL areas and sections in between these areas.

A summary of fluid level measurements collected from the on-site and off-site temporary well locations is provided in Table 2-3. This table reflects both ground water and NAPL elevations (when present) to yield a NAPL thickness for each period of measurement. NAPL thickness measurements for two selected time periods (18 January 1995 and 24 June 1996) are shown in Figures 2-3 and 2-3.5, respectively. The GC fingerprint signature exercise is also useful in evaluating differences or similarities between the NAPL in the four areas.

The reported PCB concentrations in the 12 NAPL samples are summarized in Table 2-4. The reported results range from non-detect to

23 milligrams per kilogram (mg/kg) (parts per million (ppm)). The laboratory data and data validation reports are provided in Appendix B.

Baildown tests were conducted on the six selected monitoring wells on January 11, 12 and 17, 1995. These data are used in the FS to determine NAPL percent recovery to illustrate the magnitude of recoverable NAPL. The data and analysis are discussed in Section 5.2.1. The associated data and data plots are included in Appendix C.

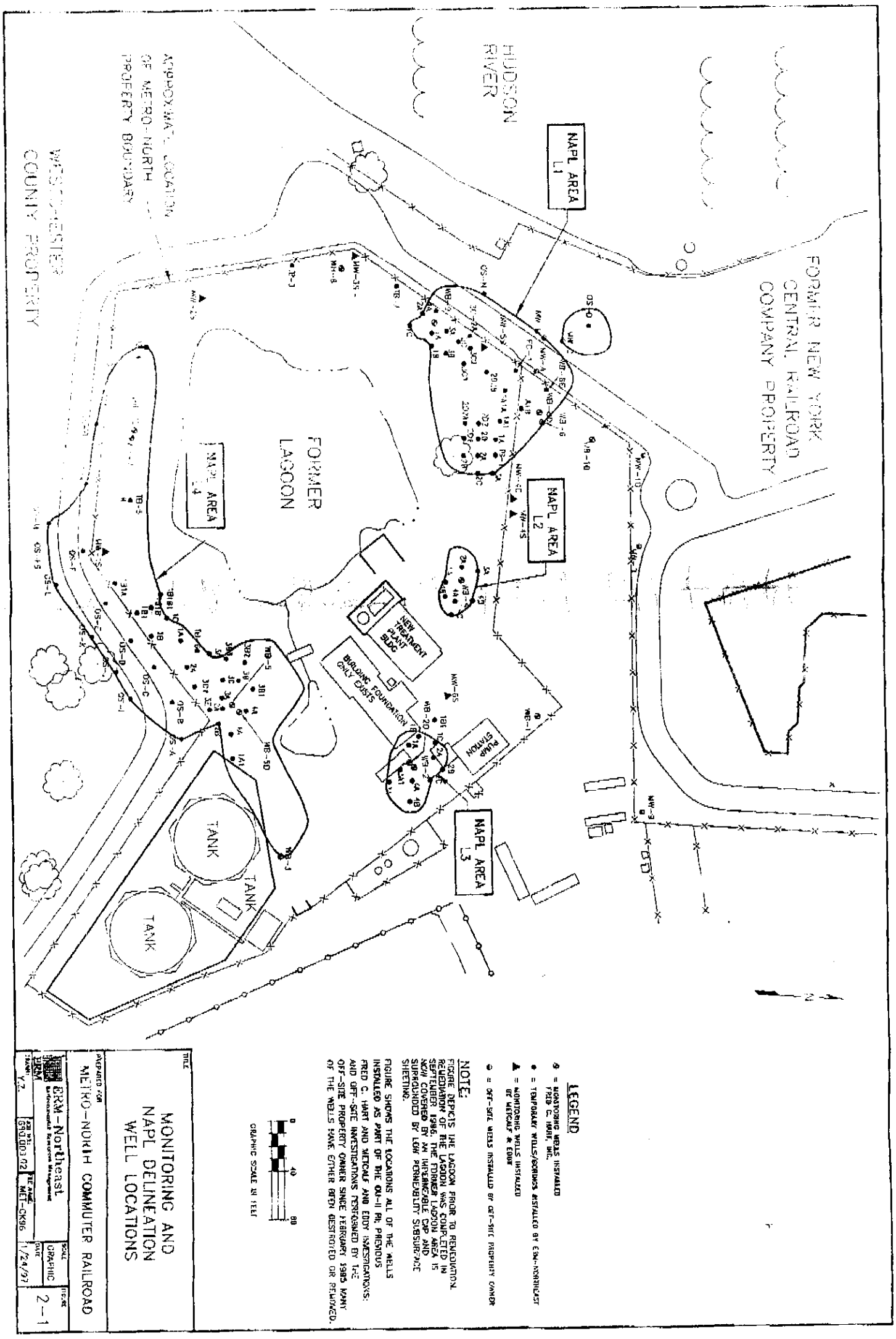
2.2 *SOIL INVESTIGATION ALONG FORMER DISCHARGE LINE*

2.2.1 *Purpose*

The purpose of the soil characterization task was to determine the quality of the soil in the area adjacent to the former discharge line which conveyed wastewater from the Old Treatment Plant to the outfall point at Croton Bay. These soil samples were collected from borings installed adjacent to the former discharge line.

2.2.2 ***Procedures***

Soil sampling adjacent to the former discharge line was conducted from January 26, 1995 through February 6, 1995. Soil borings were installed on either side of the discharge pipe and spaced at approximately 100 foot intervals (Figure 2-4). The soil borings were installed with a Geoprobe drive point sampling device. One soil sample was collected from just above the water table at the capillary fringe. The approximate depth to ground water along the alignment of the discharge line was ascertained from the existing monitoring wells in the Yard as well as any other relevant investigations that were completed at the time the OU-II RI was implemented.


FORMER NEW YORK CENTRAL RAILROAD COMPANY PROPERTY
HUDSON RIVER
NAPL AREA L1
NAPL AREA L2
NAPL AREA L3
NAPL AREA L4
FORMER LAGOON
NEW TREATMENT PLANT SLUDGE
BUILDING ONLY EXISTS FOUNDATION
PUMP STATION
TANK
TANK
TANK
APPROXIMATE LOCATION OF METRO-NORTH PROPERTY BOUNDARY
WESTCHESTER COUNTY PROPERTY
LEGEND
= MONITORING WELLS INSTALLED FRED C. HART, INC.
= TEMPORARY WELLS/BORINGS INSTALLED BY ERM-NORTHEAST
= MONITORING WELLS INSTALLED BY METCALF & EDDY
= OFF-SITE WELLS INSTALLED BY OFF-SITE PROPERTY OWNER
NOTE:
FIGURE DEPICTS THE LAGOON PRIOR TO REMEDIATION. REMEDIATION OF THE LAGOON WAS COMPLETED IN SEPTEMBER 1996. THE FORMER LAGOON AREA IS NOW COVERED BY AN IMPERMEABLE CAP AND SURROUNDED BY LOW PERMEABILITY SUBSURFACE SHEETING.
FIGURE SHOWS THE LOCATIONS ALL OF THE WELLS INSTALLED AS PART OF THE OU-II RI; PREVIOUS FRED C. HART AND METCALF AND EDDY INVESTIGATIONS; AND OFF-SITE INVESTIGATIONS PERFORMED BY THE OFF-SITE PROPERTY OWNER SINCE FEBRUARY 1995. MANY OF THE WELLS HAVE EITHER BEEN DESTROYED OR REMOVED.
0 40 80
GRAPHIC SCALE IN FEET
TITLE
MONITORING AND NAPL DELINEATION WELL LOCATIONS
PREPARED FOR
METRO-NORTH COMMUTER RAILROAD
ERM-Northeast
SCALE GRAPHIC
DATE 1/24/97
FILE NO. 6910003.02
FILE NAME MET-CK96
FIGURE 2-1