PARCEL O-1
REMEDIAL ACTION COMPLETION REPORT

Northrop Grumman Corporation
Bethpage, New York

Volume I of II

April 20, 2000

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1.0 INTRODUCTION

Roux Associates, Inc. (Roux Associates) and our associated engineering firm, Remedial Engineering, P.C. (Remedial Engineering), have prepared this document entitled, "Parcel O-1 Remedial Action Completion Report," (RACR) to document the remediation activities performed at the Northrop Grumman Corporation (Northrop Grumman) New York Facility (Figure 1) from November 16, 2000 to February 18, 2000. As stated in the "Parcel O-1 Remedial Action Work Plan," (RAWP), Roux Associates, October 1999, Northrop Grumman Corporation is planning to remediate and sell the Parcel 0-1 property as part of its overall consolidation program. Therefore, Northrop Grumman performed the environmental remediation detailed in this RACR pursuant to the Resource Conservation Recovery Act (RCRA) Corrective Action Program.

The main objective of the (RAWP) was to outline activities that will be taken to remediate contaminated areas within the Northrop Grumman Facility Parcel O-1 property (Site). The tasks described in the RAWP were developed based on the results from the Phase I, Phase II and Supplemental Phase II investigations performed at the Site. Specifically, the results from the above investigations were compared to the Site-specific soil cleanup criteria established to delineate areas requiring remediation. Remedial activities implemented included, but were not limited to:

- waste excavation and stockpiling;
- waste characterization; and
- transportation, and disposal of soils contaminated above the specified cleanup criteria.

2.0 BACKGROUND INFORMATION

Parcel O-1 is located at the Northrop Grumman Bethpage, New York Facility (Figure 1) and is surrounded by industrial/commercial properties. An overview of the Site is provided below including a Site description and a review of the Site history.

2.1 Site Description

Parcel O-1 (the Site) is presently a 16.6-acre parcel (which includes an additional 4.6 acres added to the tax property by Northrop Grumman) consisting of a former runway and adjacent land occupied by a former sanitary wastewater leaching system (see Drawing 1). The Site boundary begins at approximately Northrop Grumman 1,750 feet southeast of the intersection of South Oyster Bay Road Extension and the Long Island Railroad and runs northeast toward the former Northrop Grumman Plant 2 manufacturing building.

The southern portion of Parcel O-1 runs from northwest to southeast and consists of a former runway constructed of concrete and bituminous materials, running from northwest to southeast. Within the boundaries of the Site property and northeast of the former runway lies a grassy area that slopes gently away from the former runway to facilitate drainage. Within this grassy area existed a former imhoff tank, six distribution boxes and an estimated 140 backfilled former leaching pools. Adjacent to the leaching pool area in the north central portion of the Site is a series of four former sludge drying beds and a portion of the former blast fence. Parallel to the former runway, there was a series of storm water drywells.

The leaching pools and sludge drying beds were associated with the Plant 2 sanitary septic system until the late 1960s when Plant 2 sanitary wastewater discharge was connected to the Northrop Grumman sanitary wastewater treatment plant. Northrop Grumman personnel have reported that the leaching pools and sludge drying beds were closed during the late 1960s. At some later date, the wastewater discharge from Plant 2 was connected to the Nassau County sewer system.

Other structures located within the Site grassy area and crossing beneath the former runway included a number of buried utility cables and pipelines (e.g., telephone, electrical, water, and sanitary wastewater.) Associated with the buried utility cables and pipelines were several access manholes and concrete block chambers with metal tops.

2.2 Site History

An ASTM Phase I Environmental Assessment (ERM-Northeast, May 1997) (Phase I EA) at Parcel O-1 was performed during the spring of 1997. The ASTM Phase I Site Assessment was conducted to document environmental conditions in support of future real estate transactions. Based on a review of available information, site visits, and interviews with Northrop Grumman personnel, several areas of concern (AOCs) at the Site (Drawing 1) were identified. The AOCs identified in the Phase I EA final report included the following:

- former imhoff tank;
- abandoned distribution boxes;
- abandoned septic system/ leaching pools;
- former sludge drying beds;
- stormwater drywells; and
- former blast fence area.

A Supplemental Phase I EA was also conducted to cover the additional 4.6 acres added to the tax property by Northrop Grumman.

The results of the Phase I EA were used to develop a scope of work for the subsequent Phase II Environmental Assessment (ERM-Northeast, June 1999) (Phase II EA). The purpose of the Phase II EA was to evaluate, in an expedited manner, what structures within each AOC could cause impacts to soil and ground water quality. As part of the scope of work performed during the Phase II EA, two monitoring wells were installed and soil borings were installed at various structures within each AOC at Parcel O-1. The results of the Phase II EA were provided in a report dated June 12, 1999. Based on the results of the Phase II EA, it was determined that several structures within each AOC revealed exceedances of the initial screening level

(NYSDEC Technical Administrative Guidance Memorandum [TAGM] 4046 Recommended Cleanup Criteria) utilized. However, since full characterization within each AOC was not performed as part of the original investigation, a Supplemental Phase II EA (Roux Associates, August 1999) was performed, based on recommendations in the Phase II EA, to determine whether the soil within the Site's unsampled structures was impacted. Also, the Phase II EA suggested the presence of polychlorinated biphenyls (PCBs) in several structures. Specifically, evidence of PCBs in several samples was found based on the presence of biphenyl isomers reported as SVOC tentatively identified compounds (TICs). Therefore, prior to initiating any remediation, the presence or absence of PCBs in these structures was confirmed as part of the analytical protocol of the Supplemental Phase II EA.

The combined analytical results of the Supplemental Phase II EA and initial Phase II EA were screened against the Site-specific soil cleanup-criteria (Table 1) recommendations discussed in Section 3.0 of this report. The soil quality data from each investigation, showing only the data that exceeded the proposed Site-specific soil clean-up criteria, are summarized in Table 2. This screening process provided a basis for identifying structures within each AOC which required remediation (Drawing 1). The proposed and actual horizontal and vertical limits of remediation for each of these AOCs is summarized in Table 3.

3.0 REMEDIAL CLEANUP CRITERIA SELECTION

The Parcel O-1 Site has been zoned for industrial use since the land was subdivided in approximately 1944. According to Northrop Grumman real estate representatives, the company is pursuing only potential buyers who will commit to maintain an industrial use at the Parcel O-1 Site. Therefore, Northrop Grumman's goal is to restore this property to maintain and support existing industrial land use.

As summarized in the initial Phase II EA and subsequent Supplemental Phase II EA for Parcel O-1, for purposes of initial screening, analytical results of soil samples exhibiting exceedances of the TAGM criteria were used to identify AOCs. Since that time, a number of additional considerations have come to light, most importantly, that Northrop Grumman has made a corporate decision to market the property only to potential buyers who would continue to maintain the industrial zoning of the property. This information gave cause for Northrop Grumman to revisit the initial screening process while considering an alternate, site-specific evaluation of existing standards. Accordingly, site-specific soil cleanup levels were selected based on the rationale which has been used and approved for the previous NYSDEC approved remediation of Plant 5. This rationale was discussed in the Remedial Action Work Plan (Roux Associates, October 1999) and is also discussed briefly in the following section.

3.1 Site-Specific Criteria

The analytical results from the two Phase II Site Assessments were initially compared to the values summarized in TAGM 4046. However, it was determined that many of these values were developed from health-based risk analysis scenarios that were not directly applicable to a majority of AOCs due to either the concentration and mass of constituents detected, or the relative location of the AOC and/or depth of impacted soil and the industrial land use. As a result, each AOC was re-evaluated on an individual basis to identify additional factors, such as exposure routes and the ultimate potential fate and transport of the constituents of concern, that should be considered to determine whether remediation is warranted. Such additional factors

used to develop site-specific cleanup levels included the following major technical, environmental and land use considerations:

- ***Industrial Land Use*** – The property is currently zoned industrial, has been utilized as such since approximately 1944. Northrop Grumman is aggressively marketing Parcel O-1 for continued industrial use.

- ***Depth of Areas of Concern*** – An evaluation of the presence of specific constituents of concern indicates that, in general, the concentrations decrease dramatically with depth and are typically located at depths no greater than approximately 25 feet below grade.

- ***Immobility of Constituents of Concern*** – As mentioned above, the concentration of constituents of concern are generally limited to soil horizons to a depth of 25 feet below ground surface. These soils appear to have a high affinity to bind these constituents and there appears to be no direct evidence that migration has been occurring over approximately the last 50 years.

- ***Depth to Ground-Water Pathway*** – The depth to ground water is approximately 50 to 55 feet below ground surface. Given the fact that the concentrations of existing constituents of concern are generally located no greater than 25 feet below grade and do not appear to have migrated vertically over the last 50 years, the ground-water pathway does not appear to be a concern.

After each AOC was re-evaluated, Northrop Grumman reviewed a number of sources of guidance related to assigning cleanup levels at residential, commercial and industrial sites. This evaluation was discussed in the Remedial Action Work Plan. In addition to the USEPA Soil Screening Levels (SSLs) and the TAGM 4046 criteria, information was compiled from the States of New Jersey, Massachusetts, Connecticut and New York (Risk-Based Corrective Action), as well as USEPA – Region III and ASTM.

While New York State does not currently have specific "look-up" tables addressing residential and nonresidential (or commercial) remediation scenarios, there is wealth of information published by the USEPA and NYSDEC that is available; however, not all the cleanup levels have given consideration to, or are indexed to a specific land use, such as commercial or industrial scenarios. In addition, and perhaps more important than these published numerical "cleanup objectives" and "screening levels," is the collective knowledge accumulated through years of remedial practice. With this information in mind, site specific levels were selected. A tabulated summary of the site-specific soil cleanup levels selected for each constituent of concern is presented in Table 1.

It should be noted, the cleanup level for PCBs was revised from the proposed cleanup level of 25 ppm in the RAWP to a reduced cleanup level of 10 ppm as requested in the NYSDEC letter dated January 24, 2000 to Northrop Grumman provided in Appendix A.

4.0 SUMMARY OF PHASE II ENVIRONMENTAL ASSESSMENTS

As discussed in Section 2.2, the purpose of the initial Phase II EA was to evaluate, in an expedited manner, what structures within each AOC had the potential to impact soil and ground-water quality. However, since full characterization of each AOC was not performed as part of the original investigation, a Supplemental Phase II EA was performed in August 1999 and the results were provided in a report dated October 1999. The combined analytical results of each EA were screened against the site-specific cleanup levels, as discussed in the RAWP, to determine which structures within each AOC required remediation. Each structure, which exhibited contamination exceeding site-specific cleanup levels was remediated in accordance with the requirements of the RAWP. The activities performed as part of these remediation efforts are discussed in Section 5.0. Analytical data which exceeded site-specific cleanup levels are summarized on Table 2 and are discussed below.

Former Imhoff Tank

The first stage side of the former imhoff tank contained soils with levels of VOCs (trichloroethene) and metals (cadmium) that exceeded site-specific cleanup levels. The second stage side of the former imhoff tank did not contain contamination levels above the cleanup level.

Abandoned Distribution Boxes

Two of the six distribution boxes sampled exhibited contamination which exceeded site-specific cleanup levels. Specifically, distribution box DB-1 contained soils that exceeded cleanup levels for SVOCs (benzo(a)anthracene, benzo(b)fluoranthene and benzo(a)pyrene) and metals (cadmium, arsenic and lead). In addition, distribution box DB-3 exceeded cleanup levels for SVOCs (benzo(a)pyrene).

Abandoned Septic System/ Leaching Pools

31 of the 139 leaching pools sampled contained soils that exhibited contamination. which exceeded site-specific cleanup level. The 31 leaching pools are shown on Drawing 1. A summary of these exceedances is provided below:

- Three leaching pools based on the presence of VOCs (trichloroethene and 1,4 dichlorobenzene);

- Eight leaching pools were found to exceed cleanup levels based on the presence SVOC (benzo(a)pyrene); and
- 26 leaching pools were found to exceed cleanup levels based on the presence of metals (cadmium, copper and chromium).

Former Sludge Drying Beds

Two of the four former sludge drying beds sampled exhibited contamination which exceeded site-specific cleanup levels. Specifically, former sludge drying bed SDB-2 contained materials that exceeded cleanup levels for SVOCs (benzo(a) pyrene) and PCBs. In addition, former sludge drying bed SDB-3 contained materials that exceeded cleanup levels for metals (cadmium and copper).

Storm Water Drywells

Two of the three storm water drywells sampled exhibited contamination, which exceeded site-specific cleanup levels. Specifically, storm water drywells SWDW-1 and SWDW-3 contained soils that exceeded cleanup levels for SVOCs (benzo(a)pyrene).

Former Blast Fence Area

All four areas within the former blast fence area exhibited contamination which exceeded site-specific cleanup levels. Specifically, soils within blast fence area BF-1 exceeded cleanup levels for SVOCs (benzo(a)pyrene). In addition, soils within blast fence areas BF-2, BF-3 and BF-4 exceeded cleanup levels for metals (arsenic).

5.0 SUMMARY OF REMEDIAL ACTION

A total of 6 areas of concern as shown on Drawing 1 required remediation in accordance with the RAWP. Remediation activities were conducted from November 16, 1999 to February 18, 1999. Approximately 5,700 cubic yards of material were excavated and disposed off-site as part of the remediation action. The construction tasks performed as part of the remediation action are identified below, and are detailed in the following sections. These tasks include:

- mobilization and Site setup;
- implementation and management of a Site Specific Health and Safety Plan;
- excavation and stockpiling:
  - former imhoff tank;
  - abandoned distribution boxes;
  - abandoned septic system leaching pools;
  - former sludge drying beds;
  - storm water dry wells; and
  - former blast fence area;
- implementation of a Site Specific Sampling and Analysis Plan:
  - sampling and analysis of post-excavation soil samples;
  - sampling and analysis of excavated materials for off-site disposal
  - sampling and analysis of excavated materials for on-site reuse; and
  - sampling and analysis of construction wastewater;
- transportation and disposal:
  - non-hazardous solid waste;
  - hazardous solid waste; and
  - non-hazardous construction wastewater;
- backfill; and
- site restoration.

5.1 Mobilization and Site Setup

Prior to mobilizing, the areas to be remediated were surveyed and marked-out by a licensed surveyor based on the layout and dimensions provided in the RAWP. A project kick-off meeting was conducted prior to the commencement of any intrusive activities. Concurrently, all on-site utilities within the work zone were verified.

The personnel, equipment, materials and contractors for remedial construction activities were mobilized to Parcel O-1 on November 16, 1999. Remedial Engineering and Roux Associates provided construction oversight for all remediation activities. Oversight included shop drawing review, daily inspection to ensure conformance to the specification, health and safety monitoring, post-excavation soil sample collection, fill and water disposal tracking, and photo documentation.

Environmental Closures, Inc. (ECI), New Hyde Park, New York performed the majority of the construction tasks including site preparation, excavation, stockpiling, waste characterization, liquid pumpout, equipment decontamination, backfill and Site restoration.

ECI subcontracted Allied Waste Services, Inc. (Allied), Merrick, New York to coordinate the disposal of non-hazardous solid waste, hazardous solid waste and non-hazardous construction wastewater generated during remedial construction activities. Several licensed haulers subcontracted to Allied transported the non-hazardous and hazardous solid waste and non-hazardous construction wastewater for disposal.

The elements of site preparation included:

- installation of approximately 2,000 feet of construction fencing to delineate the work zone and act as a work site security measure;
- installation of a support area to accommodate all equipment so that the project proceeded safely and efficiently;
- installation of a decontamination area; and
- preparation and designation of soil stockpiling areas.

5.2 Implementation and Management of a Site Specific Health and Safety Plan

All remediation activities were performed in a manner consistent with 29 CFR 1910 and 1926. Moreover, all remediation activities were performed in accordance with the Site Specific remediation oversight and remediation HASPs.

5.3 Excavation and Stockpiling

As discussed in Section 5.1, temporary construction fencing to delineate the work zone prior to the commencement of soil excavation within each AOC was constructed. All of the following AOCs (Drawing 1) within Parcel O-1 required varying degrees of remediation:

- Former Imhoff Tank;
- Abandoned Distribution Boxes;
- Abandoned Septic System Leaching Pools;
- Former Sludge Drying Beds;
- Storm Water Dry Wells; and
- Former Blast Fence Area.

All excavation of contaminated materials within each AOC delineated in the RAWP was performed in strict accordance with all federal, state and local laws and regulations. A summary of the final horizontal and vertical limits of excavation for each remediated AOC is provided in Table 4 and Drawing 1.

All excavated material was staged in stockpiles until waste characterization was performed prior to off-site disposal. A soil excavation and stockpiling tracking summary for remediated structures within each AOC is provided in Table 3.

As shown in Table 3 a total of eight stockpiles were generated from the excavation of soil above site-specific cleanup levels contained within and around the six AOCs. The stockpile waste characterization sampling results discussed in Section 5.4.2 revealed that each of the eight stockpiles were contaminated. Subsequent to the waste characterization of each of the eight stockpiles, the soil was transported and disposed off-site.

Also as shown in Table 3, two additional stockpiles were respectively generated from the excavation of soil in the vicinity of the sludge drying beds and the imhoff tank; however, these stockpiles consisted of excavated soil that had the potential to be reused on-site because the soil was excavated from areas outside the defined limits of contamination. These two stockpiles were generated from soil excavated from the sludge drying bed overburden and from soil excavated adjacent to the imhoff tank. Since the soil from each of these two areas area was not sampled during the performance of the Phase II EA and Supplemental Phase II EA field programs, the soil from each stockpile was sampled and compared to site specific cleanup criteria to determine if the material could be reused on-site. The stockpile soil characterization sampling results discussed in Section 5.4.3 revealed the soil from both stockpiles could be reused on-site.

The following subsections summarize the excavation and stockpiling activities performed for each individual AOC.

5.3.1 Imhoff Tank

Excavation of the imhoff tank was performed using a backhoe to remove material within the imhoff tank structure from the top of the structure to a depth of approximately 25 feet (below land surface) bls. This depth was approximately seven feet beyond the vertical limits estimated in the RAWP as shown in Table 4. Prior to initiating excavation activities for contaminated soil within the imhoff tank structure, the overburden material was initially excavated zero to six feet bls., where the top of the imhoff tank structure was encountered. The overburden was stockpiled adjacent to the excavation. Additional benching material beyond the horizontal limits of contamination was also excavated and staged adjacent to the excavation to facilitate excavation of the soil at the deeper depths in the imhoff tank. As detailed in Table 3, the benching material was stockpiled prior to sampling to determine if the material could be beneficially reused as on-site backfill. The results of the soil characterization for this stockpile are discussed in Section 5.4.3. These results indicate that the benching material, approximately 2,925 cubic yards, could be beneficially reused to backfill the imhoff tank excavation. Contaminated fill material excavated from within the imhoff tank and the concrete associated with the abandoned structure was stockpiled as detailed in Table 3. In addition, once the bulk of the material was excavated from the imhoff tank, the residual sludge at the bottom of the imhoff tank was

removed and staged as detailed in Table 3; and the remaining concrete bottom was cleaned. After the completion of this process; it was determined, based on visual observation, to leave the remaining portions of the concrete structure from the imhoff tank in-place. Subsequently, waste characterization was completed on the stockpiled materials prior to off-site transportation and disposal.

Prior to and during the course of excavation of fill material from within the imhoff tank, approximately 6,000 gallons of existing water in the imhoff tank were pumped and containerized on-site until waste characterization sampling was collected prior to off-site transportation and disposal. The majority of this collected water was generated during rainfall events that occurred during remedial construction activities. The results of the construction wastewater characterization samples collected is discussed in Sections 5.4.4.

Once all excavation and pumpout activities were completed, post-excavation soil samples were collected from beneath the concrete floor and from the three sidewalls, that were partially or totally demolished to confirm remediation activities were completed. The results of the post-excavation and waste characterization samples collected are discussed in sections 5.4.1.1 and 5.4.2, respectively. Once post-excavation samples revealed that remediation activities were completed, the excavation for the imhoff tank was backfilled with the on-site overburden material, on-site benching material and off-site certified clean fill as discussed in Section 5.6. The final vertical and horizontal extents of the excavation for the imhoff tank are summarized in Table 4 and Drawing 1. A total of approximately 1,465 cubic yards of contaminated material was excavated from the imhoff tank.

5.3.2 Distribution Boxes

Excavation of each distribution box was performed using a backhoe to remove material from grade to a depth of approximately 10 feet below land surface (bls) as detailed in Table 4. Excavated soil from distribution boxes DB-1 and DB-3 was stockpiled as detailed in Table 3 until waste characterization was complete prior to off-site transportation and disposal. In addition, a post-excavation material sample was collected from the bottom of each structure to confirm remediation activities were completed. The results of the post-excavation and waste characterization samples collected are discussed in sections 5.4.1.2 and 5.4.2 respectively. Once

post-excavation samples revealed that remediation activities were complete, the excavations for each structure were backfilled with off-site certified clean fill as discussed in Section 5.6. The final vertical and horizontal extents of the excavation for each structure are summarized in Table 4 and Drawing 1. A total of approximately 145 cubic yards of contaminated soil was excavated from the distribution boxes.

5.3.3 Leaching Pools

Excavation of each leaching pool was performed using a backhoe to remove material from grade to a depth of approximately 5 feet beyond the vertical limits of each structure (approximately 17 to 24 feet bls) as detailed in Table 4. Excavated soil and respective concrete blocks from each leaching pool was stockpiled as detailed in Table 3 until waste characterization was completed prior to off-site transportation and disposal. In addition, post-excavation soil samples were collected from the bottom of each structure to confirm remediation activities were completed. As an additional confirmatory check on the remediation efforts at the leaching pools, sidewall samples were also collected from selected leachpools. The results of the post-excavation and waste characterization samples collected are discussed in sections 5.4.1.3 and 5.4.2 respectively. Once post-excavation samples revealed remediation activities were completed, the excavations for each structure were backfilled with off-site certified clean fill as discussed in Section 5.6. The final vertical and horizontal extents of the excavation for each structure are summarized in Table 3 and Drawing 1. A total of approximately 2,460 cubic yards of contaminated soil was excavated from the leaching pools.

5.3.4 Sludge Drying Beds

Excavation of each sludge drying bed was performed using a backhoe to remove material from grade to a depth of approximately 5 feet beyond the vertical limits of each structure (approximately 15 feet bls) as detailed in Table 4. Prior to initiating excavation activities for contaminated soil, the overburden soil was initially excavated 0 to 6 feet below land surface (bls) and stockpiled adjacent to the excavation as detailed in Table 3 prior to sampling to determine if it could be reused on-site. The results of the soil characterization for the overburden are discussed in section 5.4.3. These results indicate that the stockpiled soil, approximately 370 cubic yards, could be beneficially reused to backfill the sludge drying bed excavation.

Excavated contaminated soil from each sludge drying bed was stockpiled as detailed in Table 3 until waste characterization was completed prior to off-site transportation and disposal. In addition, post-excavation soil samples were collected from the bottom and sidewalls of each structure to confirm remediation activities were completed. The results of the post-excavation and waste characterization samples collected are discussed in sections 5.4.1.4 and 5.4.2, respectively. Initial post-excavation samples collected from the east wall of subarea 2 and the east and south walls of subarea 3 were above the site-specific cleanup criteria which resulted in an additional 5 feet of excavation in these directions. The subsequent second round of post-excavation soil samples collected from the east wall of subarea 3 were still above the site-specific cleanup criteria which resulted in an additional five feet of excavation in this direction. Once post-excavation soil samples, collected during the third round of post-excavation soil samples, revealed that remediation activities were complete, the excavations for each structure were backfilled with off-site certified clean fill as discussed in Section 5.6. The final vertical and horizontal extents of the excavation for each structure are summarized in Table 4 and Drawing 1. A total of approximately 1,120 cubic yards of contaminated soil was excavated from the sludge drying beds.

5.3.5 Storm Water Drywells

Excavation of each storm water dry well was performed using a backhoe to remove material from grade to a depth of approximately 5 feet beyond the vertical limits of each structure (approximately 25 to 26 feet bls) as detailed in Table 4. Excavated material from each storm water drywell was stockpiled as detailed in Table 3 until waste characterization was completed prior to off-site transportation and disposal. In addition, post-excavation soil samples were collected from the bottom of each structure to confirm remediation activities were completed. The results of the post-excavation and waste characterization samples collected are discussed in sections 5.4.1.5 and 5.4.2 respectively. Once post-excavation samples revealed that remediation activities were complete, the excavations for each structure were backfilled with off-site certified clean fill as discussed in Section 5.6. The final vertical and horizontal extents of the excavation for each structure are summarized in Table 4 and Drawing 1. A total of approximately 225 cubic yards of contaminated soil was excavated from the storm water drywells.

5.3.6 Blast Fence Area

Excavation of the former blast fence area was performed using a backhoe and hand digging to remove soil from 0 to 6 feet bls at blast fence subarea 1, 0 to 2 feet bls at the blast fence subarea 2, 0 to 2 feet bls at blast fence subarea 3, and from 0 to 7 feet bls at blast fence subarea 4 as detailed in Table 4. Excavated soil from each blast fence area was stockpiled as detailed in Table 3 until waste characterization was completed prior to off-site transportation and disposal. In addition, post-excavation soil samples were collected from the bottom and sidewalls of each area to confirm remediation activities were completed. The results of the post-excavation and waste characterization samples collected are discussed in section 5.4.1.6 and 5.4.2 respectively. Initial post-excavation soil samples collected from the east and west walls of subarea 2, the east wall of subarea 3 and the bottom of subarea 4 were above the site-specific cleanup criteria which resulted in additional 5 feet of excavation in these directions as shown in Drawing 1. Once post-excavation soil samples, collected the second round of post-excavation soil samples, revealed remediation activities complete, the excavations for each area were backfilled with off-site certified clean fill as discussed in Section 5.6. The final vertical and horizontal extents of the excavation for each structure are summarized in Table 4 and Drawing 1. A total of approximately 220 cubic yards of contaminated soil was excavated from the blast fence area.

5.4 Implementation of Sampling and Analysis Plan

All post-excavation, waste characterization and beneficial reuse sampling was performed in accordance with the Site-Specific Sampling and Analysis Plan (SAP) (Roux Associates, 1999) during the performance of remediation activities. The analytical results from these sampling efforts are discussed in the following subsections.

5.4.1 Sampling and Analysis of Post-Excavation Soil Samples

Post-excavation samples were collected from each structure and compared to the site-specific cleanup levels summarized in Table 1. Locations for each post-excavation soil sample collected are shown on Drawing 1. Each initial sample was analyzed for VOCs per USEPA Method 8260, SVOCs per USEPA Method 8270, Metals per USEPA Method 6010 and PCBs per USEPA Method 8082 in accordance with the requirements of the RAWP. Subsequent post excavation samples, after additional remediation was completed, were sampled for the parameters exceeded after additional excavation was completed. The respective VOC, SVOC, metal and PCB results

of the post-excavation soil sampling activities are summarized in Tables 5, 6, 7 and 8 and discussed in the following subsections.

5.4.1.1 Imhoff Tank

Post-excavation soil samples were collected from the three exterior sidewalls (three to four feet above the bottom of the excavation) and from the bottom of the excavation to confirm that remediation activities had been completed. Consequently, a total of five post-excavation soil samples were collected from the imhoff tank as follows: one form the east sidewall, two from the north sidewall, one from the west sidewall and one from the bottom. Each sidewall sample was collected after the three concrete walls were either partially or totally demolished during the course of excavation of soil from within the imhoff tank. In addition, to facilitate the collection of the bottom sample, the excavator broke through the bottom of the one foot thick concrete bottom of the imhoff tank exposing the underlying soil. The post-excavation analytical results for the imhoff tank excavation indicate that no VOCs, SVOCs, metals and PCBs were detected at concentrations that exceeded Site-specific cleanup levels.

5.4.1.2 Distribution Boxes

Post-excavation soil samples were collected from the bottom of each structure excavated. The post-excavation analytical results for the excavation of the Distribution Boxes indicate that no VOCs, SVOCs, metals and PCBs were detected at concentrations that exceeded Site-specific cleanup levels.

5.4.1.3 Leaching Pools

Post-excavation soil samples were collected from the bottom of each structure excavated. As an addition confirmatory check on the remediation efforts at the leaching pools, sidewall samples were also collected from selected leachpools. These samples were collected from leachpools 28, 80, and 101. The post-excavation analytical results for the excavation of the each leaching pool indicate that no VOCs, SVOCs, metals and PCBs were detected at concentrations that exceeded Site-specific cleanup levels.

5.4.1.4 Sludge Drying Beds

Post-excavation soil samples were collected from the sidewalls (three to four feet above the bottom of the excavation) of the Sludge Drying Beds and at the bottom of each structure excavated. Initial post-excavation samples collected from the east wall of subarea 2 and the east and south walls of subarea 3 were above the site-specific cleanup criteria for SVOCs which resulted in an additional 5 feet of excavation in these directions. The subsequent second round of post-excavation samples were collected and analyzed for VOCs, SVOCs, metals and PCBs, which revealed remediation was completed at each location except along the east wall of subarea 3. The second round of post-excavation soil samples collected at this location exceeded site-specific cleanup criteria for SVOCs and PCBs. Therefore, 5-feet of additional excavation was required in the direction of the east wall of subarea 3. The third round of post-excavation soil samples were collected and analyzed for SVOCs and PCBs The final results of the third round of post-excavation sampling along the east wall of subarea 3 revealed no exceedances above site-specific cleanup levels.

5.4.1.5 Storm Drains

Post-excavation soil samples were collected from the bottom of each structure excavated. The post-excavation analytical results for the excavation of the each storm drain indicate that no VOCs, SVOCs, metals and PCBs were detected at concentrations that exceeded site-specific cleanup levels.

5.4.1.6 Blast Fence Area

Post-excavation soil samples were collected from the sidewalls (three feet to four feet above the bottom of the excavation) of the Blast Fence Area and at the bottom of each structure excavated. Initial post-excavation soil samples collected from the east and west walls of subarea subarea 2, the east wall of subarea subarea 3 and the bottom of subarea subarea 4 were above the site-specific cleanup criteria for SVOCs which resulted in 5 feet of additional excavation in these directions. The second round of subsequent post-excavation soil samples were collected and analyzed for SVOCs. The final results of post-excavation sampling at these locations revealed no exceedances above site-specific cleanup levels.

5.4.2 Sampling and Analysis of Excavated Materials for Off-Site Disposal

As shown in Table 4 a total of eight stockpiles (stockpile 1 - 5 and 7 - 9) were generated from the excavation of contaminated soil from various structures within each of the six AOCs. Each stockpile was sampled and analyzed for selected parameters in accordance with the requirements of the proposed disposal facilities. Some of these parameters included the following: Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, TCLP herbicides and pesticides, total VOCs, total SVOCs, total petroleum hydrocarbons (TPH), pH, reactive cyanide, and reactive sulfide. The stockpile waste characterization sampling results revealed that each of the eight stockpiles were contaminated above site-specific cleanup criteria and were transported and disposed off-site as either non-hazardous or hazardous waste.

The waste characterization results provided in appendix B for stockpiles 2, 3, 4, 5, 7 and 8 indicate the soil in those stockpiles was non-hazardous. Transportation and disposal of this soil characterized as non-hazardous solid waste is discussed in Section 5.5.1.

The waste characterization results provided in appendix C for stockpiles 1 and 9 indicate the soil in these stockpiles was hazardous. Transportation and disposal of this soil characterized as hazardous solid waste is discussed in Section 5.5.2.

5.4.3 Sampling and Analysis of Excavated Materials for On-Site Reuse

As shown in Table 4 a total of two stockpiles (stockpiles 6 and 10) were generated from excavated soil that had the potential to be reused on-site because the soil originated outside the defined limits of contamination. Each stockpile was analyzed, at a minimum for the following parameters: VOCs, SVOCs, metals and PCBs. The stockpile soil characterization sampling results provided in Appendix K revealed the soil from both stockpiles could be beneficially reused on-site. Specifically, the results indicate the soil exhibited no exceedance above TAGM 4046 cleanup objectives. On-site reuse of this soil as backfill material is discussed in Section 5.6.

5.4.4 Sampling and Analysis of Construction Wastewater

As discussed in section 5.3.1, approximately 6,000 gallons of water was generated prior and during excavation of contaminated soil within the imhoff tank. The containerized wastewater was analyzed for the following parameters: VOCs, SVOCs, RCRA metals and pH. The waste characterization sampling results provided in Appendix D indicated that the construction wastewater was non-hazardous. Transportation and disposal of the non-hazardous construction wastewater is discussed in Section 5.5.3.

5.5 Transportation and Disposal

Excavated soil and construction wastewaters were transported and disposed at appropriate treatment, storage and disposal facilities (TSDFs) as indicated by the waste-characterization results. All TSDFs are permitted, as applicable for the waste stream, under RCRA, TSCA, and/or by the State in which the TSDF is located. The haulers of all wastes were permitted and licensed to transport wastes in New York and all localities and states through which they transported the wastes. All transporters were permitted in accordance with RCRA, USDOT, state and local requirements, and possessed an EPA ID Number. All vehicles used for the transportation of the wastes were also in strict conformance with USDOT and USEPA requirements and the requirements of all states through which the wastes were transported. All applicable manifesting and placarding transportation requirements were implemented.

All manifests and transporting documents were field checked for completeness and accuracy in the field by ECI prior to final review and confirmation by Roux Associates. The waste tracking summaries for the non-hazardous solid waste, hazardous solid waste, and non-hazardous construction wastewater are summarized in Tables 9, 10 and 11 respectively.

5.5.1 Non-hazardous Solid Waste

As discussed in Section 5.4.2, stockpiles 2, 3, 4, 5, 7, and 8 were characterized as non-hazardous. Approved haulers transported the excavated material with field coordination provided by Allied and ECI. The non-hazardous material excavated from Parcel O-1 was disposed at both Clean Earth of New Castle (Clean Earth), New Castle, Delaware and Soil Remediation of Philadelphia(SRP), Philadelphia, Pennsylvania. A total of 5,148.88 tons of non-hazardous, contaminated excavated material was transported and disposed to these disposal facilities.

Specifically, a total of 3,256.03 tons of non-hazardous material was transported to Clean Earth and 1,892.85 tons to SRP. The non-hazardous solid waste tracking summary is provided in Table 9. The non-hazardous solid waste manifest and certified weight scale tickets are provided in Appendices E and F respectively.

5.5.2 Hazardous Solid Waste

As discussed in Section 5.4.2, stockpiles 1 and 9 were characterized as hazardous. Approved haulers transported the excavated material with field coordination provided by Allied and ECI. The hazardous material excavated from Parcel O-1 was disposed at S&W Waste, Inc., South Kearny, New Jersey and Michigan Waste Disposal Treatment Plant, Belleville, Michigan. A total of 1,312.98 tons of hazardous, metals contaminated excavated material was transported and disposed to S&W Waste, Inc. In addition, a total of 355.88 tons of hazardous, VOC contaminated excavated material was transported and disposed to Michigan Waste Disposal Treatment Plant. The hazardous solid waste tracking summary is provided in Table 10. The hazardous solid waste manifests and certified weight scale tickets are provided in Appendices G and H respectively.

5.5.3 Non-hazardous Construction Wastewater

As discussed in Section 5.4.4 containerized construction wastewater was characterized as non-hazardous. Approved haulers transported the construction wastewater with field coordination provided by ECI. The non-hazardous construction wastewater from Parcel O-1 was disposed at the Cedar Creek Water Pollution Control Plant, Wantagh, New York. A total of 6,000 gallons of non-hazardous construction wastewater was transported and disposed at this disposal facility. The non-hazardous construction wastewater tracking summary is provided in Table 11. The non-hazardous construction wastewater bills of lading are provided in Appendix I.

5.6 Backfill

After reviewing each post-excavation sample for each AOC, each excavation was backfilled with fill from on-site and off-site sources. Approximately 2,925 cubic yards of benching and overburden material from the imhoff tank and 370 cubic yards of overburden material from the sludge drying beds were reused on-site. The analytical results for on-site sources of backfill are provided in Appendix J. In addition, approximately 3,815 cubic yards of off-site certified clean

fill from J&S Inter County Hauling, Inc. Materials Division, Medford, New York and 1,855 cubic yards of off-site certified clean fill from DBH Industries, Inc., Brookhaven, New York, were used to supplement on-site sources. Documentation certifying the off-site fill as clean is provided in Appendix K. In addition, off-site backfill certified scale tickets are provided in Appendix L.

5.7 Site Restoration

After backfilling activities were completed, the site was restored. All temporary facilities were dismantled and removed from Parcel O-1. Once the excavation and site restoration activities were completed, all temporary work zone barriers and equipment were removed. All equipment used during excavation activities (e.g., sawcut machine, backhoe, etc.) was decontaminated in the established on-site decontamination area prior to each piece being removed from the site.

6.0 SUMMARY OF FINDINGS

In accordance with the RAWP, each AOC within Parcel O-1 has been remediated. Remediation of contaminated soil at Parcel O-1 was initiated on November 16, 2000 and was completed on February 18, 2000. Approximately, 51488.88 tons of non-hazardous solid waste, 1668.86 tons of hazardous solid waste and 6,000 gallons of non-hazardous construction wastewater was generated, transported and disposed off-Site during remedial construction activities. In addition, analytical results for VOCs, SVOCs, metals and PCBs in each post-excavation confirmation sample collected prior to the initiation of site restoration activities verified that the Site-specific cleanup levels were achieved. Site restoration activities included the provision and placement of approximately 3,295 cubic yards of on-Site material and 5,670 cubic yards of off-Site certified clean fill to restore the Site to pre-construction grade conditions. Based on the successful completion of the remediation of contaminated soil at Parcel O-1, no further remediation is required at the Site.

Respectfully submitted,

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7.0 REFERENCES

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