FIELD SAMPLING PLAN ADDENDUM REVISION 1
PHASE II EDITION
REMEDIAL INVESTIGATION
AT THE
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY, NEW YORK

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1.0 INTRODUCTION

This Phase II Field Sampling Plan (FSP) Addendum summarizes the activities that were conducted in Phase I of the Remedial Investigation (RI) performed at the Niagara Falls Storage Site (NFSS). It provides a basic review of the results of the Phase I RI and summarizes sampling activities planned for the Phase II of the RI. Information regarding the site history is provided in the November 1999 Final *Field Sampling Plan – Phase I Edition Remedial Investigation*.

Phases I and II of this program are being conducted under guidance developed through the Technical Project Planning Process (TPP). The TPP is a management process that involves stakeholders to reach a consensus and move environmental projects toward completion. Phase II field sampling activities described in this document were formulated after incorporation of the results of discussions at the TPP Meeting held in Buffalo, New York on May 3-4, 2000; discussions with and guidance received from the U.S. Army Corps of Engineers (USACE) – Buffalo District; and recommendations made by Scientific Applications International Corporation (SAIC), Maxim Technologies, Incorporated's (Maxim's) radiological subcontractor. The planned activities are based on the best available guidance documents, review of the Phase I results, and professional judgment. This plan incorporates activities (noted in the individual task descriptions in Section 3) that currently are not a part of the current contract and will be addressed by separate Scope of Work documents that will be issued by USACE.

This document is supplemented by Appendix A, the "NFSS-TPP Meeting Phase II Information Related to the Phase I Investigation and Planning of the Phase II, May 3, 2000". This document was distributed to TPP participants on May 3, 2000 and contains detailed compilations of Phase I analytical results and comparisons with screening values. This Phase II FSP Addendum contains sections that generally describe Phase II objectives and planned activities designed to achieve these objectives. Tables are included that justify planned sample locations and types of analytes. Figures were developed to summarize Phase I screening comparisons, and a large-scale figure was developed to present planned sample locations. The Phase I and II project objectives discussed during the May 3-4, 2000 TPP meeting and the activities planned to accomplish those objectives are shown in bullet form in Appendix B. SAIC provided recommendations that are presented in Appendix C regarding radiological issues. SAIC's recommendations were used to develop the planned activities further addressing radionuclides to be included in the Phase II analytical program. The planned approach for collection of surface soil samples that are to be analyzed for radiological constituents is provided in Appendix D. Appendices E through H include new procedures for the Phase II RI. Comments, responses, and concurrence to the first draft of this document are provided in Appendix I.

Field procedures developed in the Phase I Field Sampling Plan and subsequent addenda will be followed for the Phase II activities unless otherwise specified. Modifications to the list of analytes specified for radiological analyses is documented in this plan and in an abbreviated Quality Assurance Project Plan (QAPP) Addendum, which will be submitted under separate cover. Radiation Protection Plan (RPP) and Site Safety and Health Plan (SSHP) Addenda will be submitted separately in order to address field activities not included during Phase I.

2.0 ACTIVITIES ACCOMPLISHED IN PHASE I

Phase I RI activities, as described in the approved *Final Field Sampling Plan – Phase I Edition Remedial Investigation at the Niagara Falls Storage Site, Niagara County, New York*, were initiated November 2, 1999 and were completed January 11, 2000. Samples were collected from eight Areas of Investigation (AOIs), including 1) Interim Waste Containment Structure (IWCS); 2) Building 401 Area; 3) Former Shop Area; 4) Former Acidification Area; 5) Baker Smith Area; 6) Former Radioactive Residue Storage Area; 7) On-Site Ditches; and 8) Previously Uninvestigated Area. Further information about each AOI is presented in the Phase I FSP. No intrusive activities were conducted during Phase I in one of the eight areas, the IWCS. The following samples were collected during Phase I:

- 69 Surface Soil Samples (collected from the top 6 inches of the soil);
- 78 Subsurface Soil Samples (typically collected at the Brown Clay / Gray Clay interface at a depth of 7 to 25 feet (at an average depth of 14 feet) below the ground surface or near the top of the first saturated zone [Note: Nine of the 78 samples were supplemental, unplanned samples collected to confirm presence and nature of contamination in areas that exhibited staining or elevated field instrument readings]);
- 56 Groundwater Samples from Temporary Wellpoints (collected from the upper water-bearing zone [Note: 13 of the temporary wellpoints installed were dry]);
- 35 Groundwater Samples from Existing Permanent Wells (nine from the upper water-bearing zone, 20 from the lower water-bearing zone, and six from the bedrock zone);
- 39 Sediment Samples (collected from the top six inches of the sediment); and
- 40 Surface Water Samples (39 were collected as co-located samples with the sediment samples after a 24-hour rainfall event that exceeded four inches).

Sample locations and analytes were based on known or suspected past activities at the site and previous analytical results, evidence of contamination, and possible sources that correspond to each individual sample location, as discussed in the Phase I Field Sampling Plan. Consequently, analytes for some samples were “focused” rather than “full-scan.” Analytes included some combination of the following: total uranium, specific radiological isotopes, gross alpha/beta, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), nitroaromatics, metals, total organic carbon, and cation exchange capacity.

Gamma walkover surveys were performed on 100 square meter (m^2) areas at all boring locations prior to drilling activities. Borings were generally installed at the location exhibiting the highest gamma reading within that area. However, if elevated gamma readings were observed at a location different than an original staked location and a specific subsurface target (i.e., a potential underground storage tank (UST)) was being investigated, the surface sample was collected from the location with the highest gamma reading while the subsurface boring was advanced at the original sample location. After each borehole installation, downhole gamma scanning from the surface to the total depth of drilling was performed through the temporary wellpoint casing.

Gamma walkover surveys were also performed at sediment sampling locations prior to selection of sediment sampling points. These surveys included scanning of the area surrounding the surface water sample location (both upstream and downstream) and on both ditch banks. The sediment samples were collected in the ditches immediately downslope from the highest gamma reading.

Additional gamma walkover surveys were completed along Campbell Street and “O” Street (north of the IWCS). Locations with elevated gamma readings were staked. No samples for analysis of specific radionuclides were collected at these elevated gamma locations during the Phase I RI. However, these staked locations were surveyed for future sampling.

Approximately 10,000 gallons of well development water, well purge water, and equipment decontamination water were disposed at the City of Niagara Falls Wastewater Treatment Plant in January, 2000. The disposal was in accordance with all New York State and Federal rules and regulations.

Additional activities completed during Phase I included clearing of trees and brush to access drilling locations, surveying of all sampling locations and wells located on-site, and collection of soil samples for geotechnical analyses.

Samples collected during Phase I RI activities, were sent to General Engineering Laboratories (GEL) in Charleston, South Carolina for chemical and radiological analyses. Samples for geotechnical analyses were sent to the Maxim Technologies laboratory in St. Louis, Missouri.

2.1 NFSS Physical Features

As noted in the Phase I FSP, the site is relatively flat with the relief coming from the IWCS and the onsite ditches. Five low-lying “swampy” areas are located at the NFSS. These are located: south of Building 401, east of the Baker Smith area (east of the West Ditch), in the west central portion of the Shops area, north of “O” Street in the panhandle, south of “N” Street in the panhandle, and in the northeast portion of the panhandle (north of “N” Street). Approximately half of the site is covered with scrub- to well-developed forest.

Several debris piles, areas with disturbed soil (in areas previously considered to be remediated by U.S. Department of Energy [DOE]), process sewers, sanitary sewers, steam and water lines, and potential underground storage tanks (USTs) were noted during the Phase I activities. Geophysical surveys, excavation of potential subsurface sources of contamination, sampling, and analysis are planned during Phase II. Four structures (Buildings 401, 429, and 403 and a garage) are the only permanent, above-ground structures remaining intact on the property. Numerous foundations of former Lake Ontario Ordnance Works (LOOW) buildings and tank cradles are located in the central section of the NFSS and in the former Baker Smith area. Former rail lines cross the site at several locations. Several asphalt and gravel roads are also located on the site.

2.2 Geology, Hydrogeology, and Geotechnical Testing Results

The Phase I FSP describes previously available information concerning site geology. Phase I intrusive activities were designed to investigate the uppermost (Brown Clay Layer) geologic unit. Borings were terminated upon encountering either the underlying Gray Clay Layer or a significant water-bearing stratum, whichever was first encountered. The Gray Clay Layer was encountered in 58 of the 69 borings, typically at a depth between seven and 23 feet below the ground surface. Eleven borings were terminated in a wet to saturated brown, silty, gravelly, clay or fine to coarse sand with gravel material where the Gray Clay Layer was not encountered. The approximate termination depth of these borings was 10 to 25 feet. The borings where the Gray Clay Layer was not encountered are listed below:

- Southern and western portions of the acidification area (AOI 4): BH404, BH405, BH407, BH409, BH412, BH415, BH420, and BH810 (Note: these locations are shown on Figure 27);

- Western part of the shops area (AOI 3): BH 311, BH312

- Northwestern part of the Building 401 area (AOI 2): BH215

Hydrogeology of the region is discussed in the Phase I RI FSP. Water levels were measured in all permanent wells located on site on November 4, 1999. Analysis of the piezometric surfaces defined through these water level readings yields the following:

- The bedrock water-bearing zone is a semi-confined unit with water levels ranging 304.63 to 309.79 feet above the datum of 1988 (datum) and flows toward the northwest.

- The lower water-bearing zone is a semi-confined unit with water levels ranging from 304.34 to 316.14 feet above the datum and flows toward the northwest with a localized high water level reading from well OW11A (located on the east-southeast side of the IWCS).

- The upper water-bearing zone is a discontinuous, unconfined unit with water levels ranging from 303.21 to 317.84 feet above the datum. There is insufficient information to determine flow direction. A low water level reading was observed in well OW09B (located on the east-northeast side of the IWCS), and this low level is a source of uncertainty. However, water levels from the wells surrounding OW09B indicate potential discharge to the Central ditch.

Due to its typical shallow depth (sometimes as high as two feet below the ground surface), the upper water-bearing zone has been reported by the NYSDEC to discharge as surface water to some of the ditches. It has also been reported by the NYSDEC that the upper and lower water-bearing zones are interconnected.

The samples collected for geotechnical testing were analyzed for grain size, moisture content and Atterberg Limits. The majority of the samples tested were given the USCS classification of Clay with Low Plasticity (CL), indicating contaminant mobility may be limited.

2.3 Gamma Walkover Surveys and Resulting Phase II Data Needs

During Phase I, gamma walkover surveys were used to screen the areas surrounding each planned surface soil and sediment sample collection location to identify local "hotspots," where samples were collected. The edges of ditches and nearby areas were similarly screened prior to collection of each sediment sample. Gamma readings ranged from 7,000 counts per minute (cpm) to 126,000 cpm. There does not appear to be a good correlation between the walkover survey results and the results of radiological analyses of corresponding samples.

The correlation fails in two ways. The first failure is that a single reading from the gamma walkover survey exhibits multiple concentrations from an individual constituent, some of which exceed the screening value. As an example, for the 11,000 cpm gamma survey reading, radium-226 concentrations ranged from 0.734 picocuries per gram (pCi/g) to 9.49 pCi/g. Some of these concentrations are above the 2.7 pCi/g screening value. The second failure is that some gamma walkover values exhibit a reverse correlation (i.e., at 9,000 cpm uranium-238 has a value of 120 pCi/g and at 126,000 cpm the uranium-238 value is 1.8 pCi/g). This is probably due to the alpha particle disintegration of some of the isotopes (i.e., uranium-238) instead of gamma ray emissions. In a walkover survey, detection of alpha particles would be reduced by shielding effects (e.g., distance, soil, water, and vegetation), whereas the gamma radiation penetrates the ground cover and would be more readily detected.

Gamma surveys are considered to be an essential component of the Phase II investigation. Gamma walkovers will be conducted throughout the NFSS. The extent of coverage is dependent on The Multi-Agency Radiation Survey & Site Investigation Manual (MARSSIM) classification of each unit and the specific potential sources of contamination within each unit. If hotspots are identified during walkover surveys, additional samples not identified in this FSP may be collected at the direction of the contractor Site Manager and concurrence with the USACE in order to further define the nature and extent of contamination. Further information concerning planned gamma walkover surveys is contained in Appendix C. The gamma surveys will be authorized through a separate USACE Delivery Order.

During Phase I, gamma walkover survey results along Campbell and "O" streets and Building 401 indicated elevated readings ranging from 20,000 to 110,000 cpm. These locations were reserved for sampling during Phase II.

During the gamma walkover surveys conducted to select boring locations near former rail lines, the railroad ballast exhibited gamma readings ranging from 2,000 to 4,000 cpm above the values of the surrounding soil. Background gamma readings were variable across the NFSS, but an approximate background value was calculated to be 10,000 cpm.

Phase I gamma survey activities determined that elevated gamma readings were found on roadways that may have been overlain with additional layers of asphalt over time. Roadway core sampling is planned to further evaluate radiological contamination below the surface of the roads

2.4 Screening Comparisons, Analytical Results, and Associated Phase II Data Needs

Data was compared to screening criteria (described below) to identify contaminants that would most likely influence risks and identify areas where additional sampling would be necessary to define the extent of those risks. These screening comparisons were made assuming background concentrations would be negligible, since background data was not available during these comparison and the Phase II planning. Plans for collection of background surface soil, subsurface soil, and groundwater samples and associated analyses are included in this document. The background data will be collected at 15 locations in conjunction with the Phase II being conducted for the USACE at the former LOOW. That background data will be used to screen Phase I and II results.

Detailed information concerning results of screening Phase I results versus evaluation criteria is presented in Appendix A. (This information was submitted May 3, 2000 at the TPP meeting and was also transmitted electronically to TPP participants prior to the meeting). Comparisons of analytical results vs. screening values are presented geospatially in Figures 1 through 26. Soil, sediment, groundwater, surface water, and specialized sampling locations planned for Phase II are all presented on the large foldout map, Figure 27. Phase I findings and planned follow-up sampling to be performed in Phase II are summarized below.

2.4.1 Soil and Sediment

Two screening criteria were used for chemical data. 1) Analytical results of the soil and sediment samples were screened against USEPA Region 9 *Preliminary Remediation Goals* (PRGs). The PRGs are residential risk-based values that could be used to indicate areas posing unacceptable risk to human health. These were excerpted from the World Wide Web at *www.epa.gov* during January, 2000. 2) The data from the soil and sediment samples were screened against New York State Department of Environmental Conservation (NYSDEC) *Technical and Administrative Guidance Memorandum* (TAGM) 4046 allowable soil concentration and soil cleanup objective values.

The screening values for the radionuclides in soil and sediments were developed by the U.S. Department of Energy (USDOE) Oak Ridge National Laboratory (ORNL) Risk Assessment Information System database at *http://risk.lsd.ornl.gov/rap_hp.shtml*. Phase I data were screened using 2.7 pCi/g for radium-226 (the ingestion only pathway with a one in a million excess cancer risk). Additionally, the data from the additional radionuclides of interest (thorium-228, thorium-230, thorium-232, uranium-233/234, uranium-235/236, and uranium-238) and total uranium was screened against 5.0 pCi/g (based on the 5/15 rule from 40 CFR 192.12). Additional total pathway analysis may be performed on the data after acquisition of background values for the radiological constituents.

2.4.1.1 Surface Soil Screening Results and Phase II Data Needs

Concentrations of radionuclide, VOC, SVOC, metal, and PCB constituents in some surface soil samples exceeded screening criteria during Phase I. Nitroaromatics and pesticides in surface soil samples were not reported above the screening criteria.

Radionuclides were detected above screening values in 14 samples. The maximum radionuclide concentration detected in the surface soil samples was radium-226 (1,140 pCi/g from location 201). All of the exceedances of radionuclide screening values were found in AOIs 2, 3, 4, and 5. Comparison of the analytical data to screening values for radionuclides is shown on Figure 1.

Phase I analytical results appear to support the premise that the majority of the NFSS has been remediated by the DOE during its site cleanup.

MARSSIM was used in planning the activities for Phase II. This document provides guidance for planning, conducting, evaluating, and documenting environmental radiological surveys of surface soil and building surfaces for demonstrating compliance with regulations. MARSSIM is a multi-agency consensus information document, which was developed collaboratively over the past three years by the following Federal agencies having authority for control of radioactive material: Department of Defense, Department of Energy, Environmental Protection Agency, and Nuclear Regulatory Commission.

The majority of the site has been preliminarily designated as Class 2 and Class 3 MARSSIM units for purpose of planning samples to define the nature and extent of radionuclide sampling in this Phase II FSP Addendum. Approximately 28 Class 2 and 3 units are identified on Figure 27. The rationale for the determination of the MARSSIM class designation, and areas of each proposed MARSSIM unit that corresponds to Figure 27 is shown in Table 1. In those relatively isolated portions of AOIs 2, 3, 4, and 5 where radionuclide concentrations defined in Phase I have been found to exceed cleanup criteria used by the DOE and/or screening criteria used in this document, Class 1 MARSSIM units have been preliminarily designated in this FSP.

In total, approximately 270 surficial soil samples are included in the Phase II Plan for radiological analysis. The sampling scheme for these samples is discussed in Section 3.0. Results of radiological analyses will be the basis of assessment of the nature and extent of radiological contamination at the NFSS. The size of each MARSSIM unit and the number of samples required within each unit to evaluate extent of contamination is based on published MARSSIM guidance, as described in detail in Appendix C. The approach for the collection of surface soil samples for radiological parameters is provided in Appendix D.

VOCs did not exceed the Region 9 PRG screening values in surface soils during Phase I. This suggests no significant volatile organic contamination is present in surface soils at the NFSS. Comparison of the analytical data to NYSDEC TAGM 4046 allowable soil concentrations for VOCs is shown on Figure 2. Other than potential laboratory artifacts (i.e., acetone and methylene chloride), benzene was the only VOC detected. Benzene was detected in 11 surface soil samples from AOI's 3, 4, 5, 6, and 8 at levels ranging from 1.2 to 2.6 micrograms per kilogram (ug/kg). When compared to the TAGM level of 0.6 ug/kg and the PRG of 670 ug/kg, the TAGM allowable soil concentration seems to be very conservative. NYSDEC representatives at the May 2000, TPP meeting expressed the opinion that these TAGM exceedances cannot be dismissed due to their potential of being an indicator of higher concentrations at adjacent areas of the site.

This Phase II Plan includes limited surface soil sampling for VOCs, at six locations in the AOIs cited above to investigate new areas where VOCs might be present based on site history.

SVOCs, consisting of polycyclic aromatic hydrocarbon (PAH) compounds, (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno

(1,2,3-cd)pyrene), exceeded the Region 9 PRG screening values in 12 samples. As shown in Figure 3, these exceedances were confined to AOIs 2, 3, and 4. Based on site history these exceedances may be attributable to coal storage (in AOI 2), and potential presence of former burning grounds (in AOI 3 and 4). As shown in Figure 2, results exceeded the NYSDEC TAGM 4046 allowable soil concentration screening values in 17 samples in AOIs 2, 3, 4, and 7. Figure 4 indicates results exceeded the NYSDEC TAGM 4046 soil cleanup objective screening values in 11 samples in AOIs 2, 3, and 4. The maximum individual SVOC concentration detected in the surface soil samples was fluoranthene from location 308 at 81,500 ug/kg.

The Phase II Plan includes SVOC analyses at 55 locations. Forty-five of these locations have been selected in order to further evaluate the extent of contamination detected during Phase I and 10 locations were placed to investigate at areas (such as USTs, sewers, underground piping) where sampling did not take place.

Metals, including arsenic, iron, lead, and manganese exceeded the Region 9 PRG screening values in 17 samples, and exceeded the NYSDEC TAGM 4046 soil cleanup objective screening values in all 58 samples analyzed. Comparison of the analytical data to the screening values for metals is shown on Figures 4 and 5. Interpretation of Phase I results is tempered by the lack of background data for metals (and other analytes). There was general agreement among the participants of the May 2000, TPP meeting, including NYSDEC representatives, that after background is defined for the site, metals currently considered Contaminants of Potential Concern (COPCs) because they exceed risk-based screening criteria may potentially be eliminated from further consideration. Many of the metals, which exceed screening criteria, are not considered highly toxic at normal background levels (e.g. iron, manganese, and others).

During Phase II, sampling for metals at 24 locations is planned. Twelve of these locations have been chosen in order to investigate areas which were not included in Phase I, and 12 sample locations to define the extent of contamination where metals were detected above screening levels during Phase I.

Polychlorinated biphenyl (PCB Aroclor 1260) concentrations exceeded the Region 9 PRG screening values in three samples and exceeded the NYSDEC TAGM 4046 soil cleanup objective screening values in two samples. Comparison of the analytical data to the screening values for PCBs is shown geospatially in Figures 4 and 6. PCBs in the surface soil samples that exceeded the screening values were found only in AOI 4, with the highest value detected (2,030 ug/kg from location 413) being located in close proximity to a former pole-mounted transformer.

Of the 15planned surface soil samples, 11 are planned to delineate the extent of PCBs found during Phase I. The 4 remaining samples are located in areas that were not addressed in Phase I. Two of these surface soil samples are located on the northern boundary of the site (at the northwest and northeast corners of the site) and one is located downgradient (from surface water runoff) of the decontamination pad.

No nitroaromatics were found above screening levels in surface soils during Phase I. However, nitroaromatics were detected in scattered surface water samples, and site history suggests nitroaromatic contamination is possible in sections of the NFSS. During Phase II, limited sampling for nitroaromatics is planned. Eight surface soil samples will be collected, in areas not previously investigated.

2.4.1.2 Subsurface Soil

Concentrations of radionuclide, VOC, SVOC, and metal constituents in the subsurface soil samples exceeded the screening criteria during Phase I. Specific information concerning these results is provided below. Nitroaromatics, pesticides, and PCBs in subsurface soil samples were not found above the screening criteria.

Radionuclides were detected above screening values in only one sample, collected in AOI 4, at a depth of 1.4 feet below the ground surface. Comparison of the analytical data to screening values for radionuclides is shown geospatially in Figure 7. The location, where the elevated radionuclide concentrations were detected, is vertically bounded by a sample from four feet below the ground surface with radionuclide concentrations below screening values. The maximum radionuclide concentration detected in the subsurface soil samples was thorium-230 at 8.12 pCi/g from location 404 at 1.4 feet below the ground surface. Although Phase I results suggest an absence of subsurface radiological contamination at NFSS, there are considerable spatial data gaps. (Areal coverage during Phase I was approximately 1 sample/2.4 acres.) Additional subsurface sampling is planned for Phase II, at 75 locations throughout the site, in order to 1) fill data gaps in areas where subsurface sampling was not performed during Phase I, and 2) in order to delineate the extent of potential contaminated areas found during Phase I.

As shown in Figure 8, VOCs (tetrachloroethylene and trichloroethylene) exceeded the Region 9 PRG screening values in two samples, including one each in AOI 2 and 4. These exceedances may be attributable to nearby above ground or underground tanks, piping, or sewers. As shown in Figure 9, the NYSDEC TAGM 4046 allowable soil concentration screening value was exceeded in 14 samples in all of the AOIs where subsurface samples were collected. Figure 10 demonstrates that the NYSDEC TAGM 4046 soil cleanup objective screening values were exceeded in two samples. The maximum individual concentration detected in the subsurface soil samples was tetrachloroethylene at a concentration of 63,000 ug/kg at location 415. Phase II plans include collection of subsurface soil samples at 27 locations, 16 of which are placed in order to investigate areas which were not included in Phase I, and 11 are placed to define the extent of contamination where VOCs were detected above screening levels during Phase I.

As shown in Figure 11, benzo(a)pyrene, a SVOC, exceeded the Region 9 PRG screening values in one sample collected in AOI 2, and this is believed to be attributable to presence of a former coal storage area. Figure 10 indicates the NYSDEC TAGM 4046 soil cleanup objective screening values were exceeded in the same sample collected in AOI 2. Figure 9 shows that NYSDEC TAGM 4046 allowable soil concentrations exceeded screening values in three samples, including two locations in AOI 2 where coal had been stored, and one location in AOI 4, possibly attributable to a former burning area. The maximum individual SVOC concentration detected in the subsurface soil samples was benzo(a)pyrene, at 87.9 ug/kg at location 204. Collection of 37 subsurface soil samples and analysis for SVOCs is planned for Phase II, seven locations are in order to evaluate the extent of contamination at locations which exceeded screening criteria, and 30 locations are in order to investigate areas that had not been evaluated during Phase I.

Iron exceeded the Region 9 PRG in 25 subsurface samples collected in all AOIs where subsurface samples were collected. (See Figure 12.) Metals exceeded TAGM soil cleanup objectives throughout the site. (Figure 10.) However, background levels have not been defined, and there was agreement during the TPP meeting that after background is defined, metal COPCs may be eliminated. During Phase II, sampling for metals is planned at 24 locations in areas that have not been previously investigated.

No nitroaromatics were found above screening levels in subsurface soils during Phase I. However, nitroaromatics were detected in scattered surface water samples, and site history suggests nitroaromatic contamination is possible in sections of the NFSS. During Phase II, limited subsurface sampling for nitroaromatics is planned. Eight subsurface soil samples for nitroaromatics will be collected in areas not previously investigated.

2.4.2 Groundwater

Results of groundwater analyses were screened against EPA Region 9 PRGs and NYSDEC TAGM 4046 values, as well as the USEPA Maximum Contaminant Levels (MCL). The screening values for the radionuclides in the groundwater were also developed from the ORNL database. The screening values were based on one in one million excess cancer risk and the default exposure pathways used by ORNL.

Concentrations of gross alpha, radionuclide, VOC, SVOC, and metal constituents in the groundwater samples exceeded the screening criteria in samples collected during Phase I. Results are presented in detail below. Nitroaromatics, pesticides, and PCBs were not found above the screening criteria in any groundwater samples.

Gross alpha concentrations were detected above the MCL screening value (15 picocuries per liter [pCi/L]) in 42 of 56 samples collected from temporary wellpoints in all AOIs, and in eight of 35 samples collected from the permanent monitoring wells. No PRG was available for gross alpha, so the MCL was used as the PRG. It is likely that elevated gross alpha levels are related to background and/or presence of suspended solids in groundwater samples. Comparison of the analytical data to screening values for radionuclides is shown on Figure 13. The maximum gross alpha concentration detected from the temporary wellpoint samples was 140 pCi/L from temporary wellpoint 215 and the maximum detected in existing monitoring well samples was 72 pCi/L from well A42.

Radium-226 concentrations exceeded 10-times the screening value (one in one hundred thousand excess cancer risk) in 16 samples from the temporary wellpoints in AOIs 2, 3, 4, 6, and 8 and in two samples from the existing monitoring wells in AOIs 3 and 6. (The screening criteria was relaxed to reduce the number of exceedances in order to assess spatial variation of contamination.) Additionally, radium-226 concentrations exceeded the screening value (one in one million excess cancer risk) in 20 samples from the temporary wellpoints and in seven samples from the existing monitoring wells. Comparison of the analytical data to screening values for radium-226 is shown on Figure 14. The maximum radium-226 concentration detected from the temporary wellpoint samples was 7.98 pCi/L from temporary wellpoint 212 and the maximum detected in existing monitoring well samples was 3.11 pCi/L from well WO19D.

Thorium-228 concentrations exceeded the screening value (one in one million excess cancer risk) in 11 samples from the temporary wellpoints (AOIs 2, 3, 4, and 8) and in one sample from the existing monitoring wells, in AOI 1. Comparison of the analytical data to the screening value for thorium-228 is shown on Figure 15. The maximum thorium-228 concentration detected from the temporary wellpoint samples was 5.33 pCi/L from temporary wellpoint 312 and the maximum detected in existing monitoring well samples was 1.24 pCi/L from well OW10A.

Thorium-230 concentrations exceeded the screening value (one in one million excess cancer risk) in three samples from temporary wellpoints in AOIs 3, 4, and 8. Comparison of the analytical data to the screening value for thorium-230 is shown on Figure 16. No sample from existing wells exceeded the screening value. The maximum thorium-230 concentration detected from the temporary wellpoint samples was 4.37 pCi/L from temporary wellpoint 312.

Thorium-232 concentrations exceeded the screening value (one in one million excess cancer risk) in two samples from temporary wellpoints in AOIs 3 and 4. No sample from existing wells exceeded the screening value. Comparison of the analytical data to the screening value for thorium-232 is shown on Figure 17. The maximum thorium-232 concentration detected from the temporary wellpoint samples was 3.37 pCi/L from temporary wellpoint 312.

Uranium-233/234 concentrations exceeded 10-times the screening value (one in one hundred thousand excess cancer risk) in 20 samples from the temporary wellpoints in AOIs 2, 3, 4, 5, and 8 and in nine samples from existing monitoring wells in AOI 1 and 4. Additionally, uranium-233/234 concentrations exceeded the screening value (one in one million excess cancer risk) in 34 samples collected from temporary wellpoints in AOIs 2, 3, 4, 5, 6, and 8; and in four samples from existing monitoring wells in AOI 1. Comparison of the analytical data to screening values for uranium-233/234 is shown on Figure 18. The maximum uranium-233/234 concentration detected from the temporary wellpoint samples was 48.8 pCi/L from temporary wellpoint 215 and the maximum detected in existing monitoring well samples was 30.5 pCi/L from well A42.

Uranium-235/236 concentrations were detected above the screening value (one in one million excess cancer risk) in four samples from temporary wellpoints in AOIs 2, 3, 4, and 5, and in one sample from an existing monitoring well in AOI 1. Comparison of the analytical data to screening values for uranium-235/236 is shown on Figure 19. The maximum uranium-235/236 concentration detected in the temporary wellpoint samples was 2.12 pCi/L from temporary wellpoint 215, and the maximum detected in the existing monitoring well samples was 1.23 pCi/L from well A42.

Uranium-238 concentrations exceeded 10-times the screening value (one in one hundred thousand excess cancer risk) in 14 samples from temporary wellpoints in AOIs 2, 3, 4, 5, and 8, and in five samples from existing monitoring wells in AOI 1. Additionally, uranium-238 concentrations exceeded the screening value (one in one million excess cancer risk) in 40 samples collected from temporary wellpoints in AOIs 2, 3, 4, 5, 6, and 8, and in seven samples collected from existing monitoring wells in AOIs 1, 4, and 8. Comparison of the analytical data to screening values for uranium-238 is shown on Figure 20. The maximum uranium-238 concentration detected from the temporary wellpoint samples was 41.2 pCi/L from temporary wellpoint 215 and the existing monitoring well samples was 25.7 pCi/L from well A42.

Based on the Phase I radiological groundwater monitoring results summarized above, installation of 15 permanent groundwater monitoring wells is planned at locations throughout the site in order to 1) determine if exceedances of the MCL for gross alpha is attributable to presence of turbidity; 2) investigate extent of contamination in areas where specific radionuclides exceed screening criteria, and 3) define background values. Samples for total and dissolved radionuclides will be collected at each well and temporary wellpoint if sufficient water exists in the well or wellpoint. The total samples will be analyzed. The dissolved sample will be held. Where the radionuclide risk-based screening level is exceeded in the total samples, the corresponding dissolved sample will be analyzed

Other than the potential laboratory artifacts (i.e., acetone and methylene chloride), VOCs exceeded the Region 9 PRG screening values in four temporary wellpoint samples collected in AOIs 2, 4, and 8 and in three existing well samples collected in AOIs 1, 5, and 8. Results exceeded NYSDEC TAGM 4046 screening values in two temporary wellpoint samples collected in AOIs 2 and 4. Concentrations of the following VOCs exceeded screening values: cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,1-dichloroethene, 1,2-dichloroethane, chloromethane, tetrachloroethylene, trichloroethylene, and vinyl chloride. The elevated concentrations of the organic compounds found in samples collected from the temporary wellpoints may, in part, be attributable to solids in the samples. Comparisons of the analytical data to Region 9 PRG and NYSDEC TAGM 4046 screening values for VOCs are presented in Figures 21 and 22, respectively. The maximum individual VOC concentration exceeding the screening criteria detected in the groundwater samples was tetrachloroethylene at 14,800 ug/L from temporary wellpoint 415. Collection of groundwater samples from 18 wells is planned to further evaluate extent of groundwater VOC contamination in AOIs 2, 3, 4, 5, and 8. Eight additional sampling locations are planned to evaluate potential sources of contamination not previously investigated.

SVOCs (bis-2-ethylhexylphthalate, tetrahydrofuran, and pentachlorophenol) exceeded the Region 9 PRG screening values in one temporary wellpoint sample in AOI 2 and in two existing well samples in AOIs 1 and 8. Comparison of the analytical data to the screening values for SVOCs is shown on Figure 23. (Tetrahydrofuran is not shown in Figure 23 because it was a tentatively identified compound [TIC]). The maximum individual SVOC concentration exceeding the screening criteria detected in the groundwater samples was bis(2-ethylhexyl)phthalate at 37.6 ug/L from well BH50. Collection of SVOC samples from 7 wells is planned in order to evaluate potential sources of contamination not previously investigated, and 6 locations to define extent of contamination detected during Phase I, and to define background.

Metals (aluminum, antimony, barium, boron, copper, iron, lead, manganese, nickel, thallium, vanadium, and lithium) exceeded the Region 9 PRG screening values in 30 temporary wellpoint samples in AOIs 2, 3 4, 5, 6, and 8, and in 10 existing well samples in AOIs 1, 3, 5, 6, and 8. Comparison of the analytical data to the screening values for metals is shown on Figure 24. Filtered and non-filtered data were used in this comparison as a conservative measure. Twenty groundwater samples will be analyzed for both total and dissolved metals in Phase II. Samples will be collected in 14 locations to investigate areas not previously evaluated and in six locations to assess extent of contamination in areas where exceedances were observed.

Some screening value exceedances could be at levels below site-specific background levels. Determination of background levels is planned as part of the Phase II Addendum to the FSP. It is likely that determination of background concentrations will decrease the number of metals that exceeded the screening values. Additionally, data validation will potentially indicate that many of the VOCs may be laboratory contaminants.

No nitroaromatics were found above screening levels in groundwater samples during Phase I. However, nitroaromatics were detected in scattered surface water samples, and site history suggests nitroaromatic contamination is possible in sections of the NFSS. During Phase II, limited groundwater sampling for nitroaromatics is planned. Nine groundwater samples will be collected for nitroaromatics.

2.4.3 Sediment

As previously discussed, sediment concentrations were compared to soil screening values, assuming sediment exposure would occur during dry periods and the conditions would be similar to soil.

Concentrations of radionuclide, VOC, SVOC, metal, and pesticide constituents in the sediment samples exceeded the screening criteria during Phase I. Details are described below. Nitroaromatics and PCBs in sediment samples were not found above the screening criteria.

Radionuclides exceeded screening values in four samples, at locations scattered throughout the site. Comparison of the analytical data to screening values for radionuclides is shown on Figure 25. The maximum radionuclide concentration detected in the sediment samples was radium-226 at 16 pCi/g from location 711. Nine sediment samples are planned for Phase II. Sediment samples will be collected from four locations in order to evaluate potential off-site migration west of the IWCS and from five locations to evaluate the extent of contamination above screening criteria found during Phase I.

VOCs did not exceed the Region 9 PRG screening values. Comparison of the analytical data to NYSDEC TAGM 4046 allowable soil concentrations for VOCs is shown on Figure 2. Other than the potential laboratory artifacts (i.e., acetone and methylene chloride), 1,1,2,2-tetrachloroethane was detected in one sample at 352 ug/kg from location 707 (note: this parameter was detected in the SVOC scan as a tentatively identified compound [TIC]; VOCs were not analyzed at this location). No additional VOC testing of sediments is planned for Phase II.

SVOCs did not exceed the Region 9 PRG screening values. Comparison of the analytical data to NYSDEC TAGM 4046 allowable soil concentrations for SVOCs is shown on Figure 2. One sediment sample exhibited benzo(k)fluoranthene at a concentration of 280 ug/kg from location 731. No Phase II sediment sampling for SVOCs is planned, based on the low concentration found and the low frequency of occurrence.

Comparison of the analytical data to the screening values for metals is shown on Figures 4 and 26. Metals (arsenic, iron, and manganese) exceeded the Region 9 PRG screening values in 15 samples and exceeded the NYSDEC TAGM 4046 soil cleanup objective screening values in 35 samples (all samples analyzed). However, Phase I results indicate concentrations of metals in sediments are similar to metals concentrations in soils. Therefore, no further evaluation of metals in sediments is planned during Phase II.

Pesticides did not exceed the Region 9 PRG screening values. Comparison of the analytical data to NYSDEC TAGM 4046 allowable soil concentrations for pesticides is shown on Figure 2. Heptachlor was detected in one sediment sample at a concentration of 1.7 ug/kg from location 704. No Phase II sediment sampling for pesticides is planned, based on the low concentration found and the low frequency of occurrence.

2.4.4 Surface Water

Analyte concentrations in surface water samples were screened against values from *USEPA Region 4 Waste Management Division Freshwater Surface Water Screening Values for Hazardous Waste Sites* and *USDOE Preliminary Remediation Goals for Ecological Endpoints*. With the exception of total uranium, radionuclides are not included in the aforementioned lists and therefore are not included in the screening process.

Total uranium, SVOC, metal, and PCB constituent concentrations in the surface water samples exceeded the screening criteria during Phase I. VOC, nitroaromatics, and pesticides in sediment samples were not found above the screening criteria.

Total uranium concentrations exceeded the screening values in 27 samples. The maximum total uranium concentration detected in the surface water samples was 14.5 pCi/L from location 704. Nine surface water samples are planned for radiological analysis for Phase II. They will be co-located with the sediment samples previously described.

SVOCs exceeded the screening values in one sample. The only surface water sample that exceeded the screening criteria exhibited benzo(a)anthracene at a concentration of 0.54 ug/L at location 730. No SVOC surface water samples are planned for Phase II, due to the low concentration found above criteria in only a single sample.

Metals exceeded the screening values in 36 surface water samples. The screening values used to assess Phase I results would be protective of ecological receptors. The need for an ecological assessment is currently under evaluation by USACE. Surface water concentrations are transient and the metal concentrations in flowing streams can vary greatly over time. With these conditions, it is unlikely that long term human exposures would occur. Further sampling of surface water for the delineation of the samples where metal concentrations exceeded screening values is not planned at this time, pending results of the ecological survey.

The PCB Aroclor 1260 concentration exceeded the screening values in one sample. The maximum PCB concentration detected in the surface water was 0.086 ug/L from location 732. This result was J flagged by the laboratory and the sample result may overstate the actual

Aroclor 1260 concentration in the sample. No PCB surface water samples are planned for Phase II, due to the low concentration found in only a single sample.

Surface water delineation samples will not be collected for the metals, SVOC, or the PCB constituents that were detected.

2.5 Synopsis

This document is a flexible plan, written to meet the goals outlined in Appendix B. SAIC, Maxim's radiological subcontractor for this task, provided input and advice for several specific items. Their input and advice was incorporated, as appropriate, into our plan. Situations encountered in the field will require professional judgement, and these decisions will be documented in subsequent reports.

Background samples are discussed in this plan, which will be used to further define chemical and radionuclide contamination at NFSS. Each sample location that is not simply a grid-based sample for radionuclides is detailed in this plan, including planned analytes, media, and corresponding justification.

Radionuclide contamination at NFSS was reportedly remediated by the U.S. Department of Energy, but confirmation data was not available when Maxim reviewed historical documnets. Most samples for radionuclides are included in this plan using MARSSIM as a guide to statistically verify the absence of radionuclide contamination or to identify the presence of contamination. This method also results in classification of different areas, or units, where a number of samples are collected based on the site history and the Phase I findings.

Chemical contaminants were also identified through sampling results from the Phase I. Results reflect historical use of the property, but at some locations no known source of contamination is evident from historical documentation. Screening comparisons were made using USEPA, NYSDEC, and DOE screening values to identify contaminants and areas that would most likely drive risks and possibly risk management decisions. The screening comparisons are based on certain assumptions, such as residential land use and an excess cancer risk of one in one million. Although it is unlikely the site would be developed as residential areas, this was determined by the USACE to be the most appropriate comparison at this time. Planned future sampling for nonradionuclides is generally biased to find contamination or to delineate areas where chemicals were identified as a potential concern.

Planned Phase II activities are described in Section 3.0.

3.0 PLANNED PHASE II ACTIVITES

Phase II Objectives are presented in Appendix B. Sampling locations are shown on Figure 27. Table 2 provides a summary of samples to be collected during Phase II activities.

The following is a listing of the tasks to be performed during the Phase II RI field activities. Some of these tasks are based on findings of Phase I activities. These findings are summarized in Section 2.0. Tasks will be performed in accordance with the procedures developed in the Final Phase I FSP and subsequent addenda or as described in procedures included in the Appendices of this FSP.

Procedural note: Groundwater samples for total and dissolved radionuclides will be collected at each well and temporary wellpoint if sufficient water exists in the well or wellpoint. The total samples will be analyzed. The dissolved sample will be held. Where the radionuclide risk-based screening level is exceeded in the total samples, the corresponding dissolved sample will be analyzed.

1. Collection of Surface and Subsurface Soil Samples from Areas where Elevated Gamma Readings (found during Phase I) for Analysis of Specific Radioisotopes

    - Surface soil samples will be collected from nine locations with gamma readings greater than 20,000 cpm. (20,000 cpm is approximately two times background as determined from the Phase I walkover surveys.) These locations were found during gamma walkover activities during the Phase I RI activities, but were not sampled at that time.

    - Subsurface soil samples will also be collected from these nine locations. It is estimated that these samples will be collected from a depth interval from 1.5 to 2.0 feet below the ground surface. If field instruments indicate elevated gamma readings from these subsurface soil samples, deeper samples will be collected.

    Justification for these surface soil sample locations is shown in Table 3 and Specific analytes, QA/QC samples, and MS/MSD samples, for each location is shown in Table 4.

2. Collection of Surface Soil Samples from Stratified Random Sample Locations in Pre-Designated MARSSIM units for Radiological Constituents

    - No soil samples will be collected from the eight MARSSIM Class 1 units. The lack of sampling in Phase II in the Class 1 units (with the exception of the surface soil samples exhibiting elevated gamma readings) is the presumption that remediation is necessary prior to release. These areas will be further addressed in the Feasibility Study or during Remedial Actions

- Approximately 3-4 surface soil samples will be collected from locations in the 25 MARSSIM Class 2 units. These samples will be collected at stratified random locations and will be accomplished after the gamma walkover survey.

- Approximately 3-4 surface soil samples will be collected from locations in the five MARSSIM Class 3 units. These samples will be collected at stratified random locations and will be accomplished after the gamma walkover survey.

A total of 100 samples will be collected for this task.

The revised approach to the gamma walkover survey and the collection of surface soil samples for radiological parameters is attached as Appendix D. Specific analytes, QA/QC samples, and MS/MSD samples, for each stratified random MARSSIM surface soil location, are shown in Table 5.

3. Collection of Surface Soil, Subsurface Soil, and Groundwater Samples from Borings (as necessary) to Bound Constituents found in Samples that Exceed Screening Values for Chemical and Radiological Constituents

- Surface soil samples will be collected at 104 locations. Ninety of these locations have been place to surround eight hot spots of elevated radiological constituents and two MARSSIM Class 1 units.

- Subsurface soil samples will be collected at 14 locations.

- Groundwater samples will be collected from temporary wellpoints at 11 locations.

The revised approach to the gamma walkover survey and the collection of surface soil samples for radiological parameters is attached as Appendix D. Specific analytes, QA/QC samples, and MS/MSD samples, for each location is shown in Tables 6, 7, and 8.

4. Collection of Co-located Sediment and Surface Water Samples to Bound Constituents Found in Samples that Exceed Screening Values for Radiological Constituents

- Sediment and surface water samples will be collected from five locations.

Specific analytes, QA/QC samples, and MS/MSD samples, for each location is shown in Table 9.

5. Collection of Surface Soil, Subsurface Soil, and Groundwater from Borings at Previously Uninvestigated Areas to Provide Data for the Risk Assessment and a specific exposure area (i.e., similar to a MARSSIM unit)

- Surface soil and subsurface soil samples will be collected in 27 locations that have the potential for contamination due to various processes and activities that occurred or that are needed to develop the 95th percentile Upper Confidence Level on the Mean for the assumed exposure areas.

- Groundwater samples from 24 of these locations will be collected from temporary wellpoints. Permanent wells will be installed in three of these locations.

Justification for these sample locations is shown in Table 3 and specific analytes, QA/QC samples, and MS/MSD samples, for each location is shown in Table 10.

6. Installation of Permanent Monitoring Wells in the Upper Water-Bearing Zone and Collection of Samples for Chemical and Radiological Constituents

- Permanent monitoring wells will be installed in the upper water-bearing zone at 15 locations. These wells will be installed, developed, purged (using low flow purging techniques), and sampled (using low flow sampling techniques). After sampling and allowing complete recharge, slug testing of each of these wells will be completed. Total depth of each well is not anticipated to exceed 25 feet below ground surface.

Procedures and methods for the installation of monitoring wells, development, and slug testing are provided in Appendix E. Justification for these groundwater sample locations is shown in Table 11 and specific analytes, QA/QC samples, and MS/MSD samples, for each location is shown in Table 12.

7. Collection of Groundwater Samples from Existing Wells for Chemical and Radiological Constituents

- Samples from 15 existing permanent monitoring well locations that were not sampled in the Phase I RI will be developed, purged (using low flow purging techniques), and sampled (using low flow sampling techniques).

Justification for these groundwater sample locations is shown in Table 13 and specific analytes, QA/QC samples, and MS/MSD samples, for each location is shown in Table 14.

8. Collection of Background Data for Surface Soil, Subsurface Soil, and Groundwater (from Upper, Lower, and Bedrock Water-Bearing Zones) Samples for Chemical and Radiological Constituents

- To adequately assess background concentrations 15 surface soil samples will be collected and analyzed for SVOCs, metals, and radiological parameters; 10 subsurface soil samples will be collected and analyzed for metals and radiological parameters; five groundwater samples from the upper water-bearing zone, three groundwater samples from the lower water-bearing zone, and two groundwater samples from the bedrock water-bearing zone will be collected and analyzed for metals and radiological parameters. This background sampling will be conducted with the Phase II sampling of the former LOOW.

Specific analytes, QA/QC samples, and MS/MSD samples, for each location is shown in Table 15.

9. Collection of Off-Site Surface Samples for Chemical and Radiological Constituents

- 20 surface soil, four surface water, and four sediment samples will be collected from the Niagara-Mohawk property (located to the west of the NFSS). Additionally, the area will receive a MARSSIM Class 2 gamma walkover survey and confirmatory sampling as specified in Appendix C.

Justification for these surface soil sample locations is shown in Table 3 and specific analytes, QA/QC samples, and MS/MSD samples, for each location is shown in Table 16.

Off-site sampling is to be conducted as a separate scope of work, but is included as a planned task due to the findings in Phase I of the elevated gamma readings near the western fence line of the NFSS property. The USACE will obtain all rights of entry for this project.

10. Performance of Gamma Walkover Surveys and Collection of Surface Soil Samples for Radiological Constituents to Determine the Presence of Hot Spots and Bound Locations of Elevated Readings

- The MARSSIM Class 1 designated areas will receive up to 100 % coverage.
- The MARSSIM Class 2 designated areas will receive approximately 10 % coverage.
- The MARSSIM Class 3 designated areas will receive approximately 10 % coverage.
- Roadways will receive 100 % coverage
- Ditches will receive 100 % coverage
- Structures (e.g., former building foundations) within the Class 2 and 3 areas will receive 100 % coverage.

Methods for the gamma walkover survey, hot spot sampling, and horizontal extent of contamination sampling are specified in Appendix C. The revised approach to the gamma walkover survey and the collection of surface soil samples for radiological parameters is attached as Appendix D.

Eighty samples are reserved to accommodate this task (actual numbers and locations and/or depths of samples will be resolved in a meeting with the USACE subsequent to the performance of the gamma walkover survey). Specific analytes, QA/QC samples, and MS/MSD samples, for these reserved samples are shown in Table 17.

This item is to be conducted as a separate scope of work, but is included as a planned task due to the necessity of this information to complete the remedial investigation.

The extent of walkover coverage in each unit is flexible based on site conditions, such as presence of potentially sensitive environmental receptors and access limitations of trees, brush, water, etc. A survey will be performed by USACE to determine the absence or presence of sensitive environmental receptors.

11. Collection of Samples for Radiological Constituents from Cores of the Pavement

- Samples will be collected at 14 locations across the NFSS to provide an analysis of the potential radiological material contained in the underlying layers of pavement. Large diameter cores of the roadways will be taken and the layers of asphalt will be separated. Samples from the layer with the highest measured gamma readings will be submitted to the analytical laboratory.

These samples are being collected in response to USACE comments after being informed that elevated gamma readings were measured from Castle Garden Road near its intersection with "O" Street. It appears that portions of the roadway have been overlain with additional layers of asphalt. Where that top layer was cracked, elevated gamma readings were measured during walkover surveys near the intersection.

The procedure for the collection of the road core samples is provided in Appendix F. Justification for each roadway core sample location is shown in Table 18. Specific analytes, QA/QC samples, and MS/MSD samples are shown in Table 19.

12. Collection of Composite Railroad Ballast Samples for Radiological Constituents

- Five samples of ballast rock will be collected. Each composite sample will be comprised of rocks from the ballast material (minimum of 10) collected at locations shown on Figure 27. These samples will be sent to

Maxim's geotechnical laboratory for crushing and homogenizing prior to being sent to the analytical laboratory.

These samples are being collected in response to USACE comments after being informed that gamma readings from walkover surveys of the railroad ballast exhibited elevated levels in comparison to the surrounding soil. The results of this sampling will be compared to the results of similar ballast materials from the LOOW.

It is not currently evident to Maxim when the similar ballast material samples were collected or what the results were for those samples. The information on the similar ballast material may also be included in some of the reports that were examined for the document review. If the information is not found, Maxim will request that the USACE provide it.

The procedure for the railroad ballast sample collection is provided in Appendix G. Justification for each railroad ballast sample location is shown in Table 20. Specific analytes, QA/QC samples, and MS/MSD samples are shown in Table 21.

13. Installation of Trenches and Collection of Subsurface Soil Samples for Chemical and Radiological Constituents

- Twenty-five trenches will be installed to investigate site physical features: four to investigate potential USTs and associated piping; three to investigate storm sewer inlets and piping; nine to investigate underground pipelines that include; sewers, water lines, and steam lines; five to investigate debris piles; and four to investigate the disturbed area (that was reported to be remediated) in the western acidification area

This item is to be conducted as a separate scope of work, but is included as a task due to the necessity of this information to complete the risk assessment.

Trenching and soil collection procedures are provided in Appendix H. Justification for each trench sample location is shown in Table 3. Specific analytes, QA/QC samples, and MS/MSD samples are shown in Table 22.

14. Collection of Pipeline Samples for Chemical and Radiological Constituents

- Twenty samples are assumed to be collected during this task. These samples will be collected from material (sludge and/or water) located within the pipelines (sanitary sewers, storm sewers, process sewers, and other locations).

This item is to be conducted as a separate scope of work, but is included as a task due to the necessity of this information to complete the risk assessment.

Specific analytes, QA/QC samples, and MS/MSD samples are shown in Table 23.

15. Survey of Offsite Wells at the Modern Landfill and CWM Chemical Services properties

- A topographic survey of 10 of the 77 wells and groundwater measuring points at the Modern Landfill will be conducted.
- A topographic survey of 20 of the 316 wells at the CWM Chemical Services property will be conducted.

These surveys are being completed to incorporate the groundwater readings from wells located on the adjacent properties into a complete regional water level map. This information may be used for future fate and transport modeling efforts.

16. Survey of the Borings, Wells, and Other Sample Points From the Phase II Activities

- A topographic survey of all the locations sampled during the Phase II activities will be completed after the collection of the samples.

4.0 PLANNED ANALYTES, METHODS, AND LABORATORIES FOR PHASE II

4.1 Samples for Chemical and Radiological Analysis

Samples will be analyzed for:

- volatile organics (by USEPA SW846 Methods 5035/8260B);
- semi-volatile organics (by USEPA SW846 Methods 3550B/8270C);
- pesticides and PCBs (by USEPA SW846 Methods 3550B/8081A/8082);
- TAL metals (by USEPA SW846 Methods 3050B/6010B/7000);
- Mercury (by USEPA SW846 Method 7471A);
- Total Organic Carbon (TOC) (by USEPA SW846 Method 9060);
- cation exchange capacity (by USEPA SW846 Method 9081);
- radiological speciation:
  - actinium-227, americium-241, cobalt-60, cesium-137, protoatinium-231, radium-226, radium-228, thorium-228, uranium-235, and uranium-238 (by HASL 300 – gamma spectroscopy, note: radium-226 in water samples will be analyzed by radon emanation);
  - thorium-228, thorium-230, thorium-232, and uranium-234, uranium-235, and uranium-238 (by HASL 300 – alpha spectroscopy);
- total alpha and beta radiation (by Method 900);
- total uranium (by ASTM D5174); and
- nitroaromatics (by USEPA SW846 Method 8330).

The primary and Quality Control (QC) samples will be shipped to General Engineering Laboratories' laboratory at the following address:

General Engineering Laboratories
Attn: Sample Custodian
3040 Savage Road
Charleston, SC 29407
Telephone: (843) 556-8171
Fax: (843) 766-1178

4.2 Geotechnical Samples

Samples for geotechnical testing will be sent to Maxim's St. Louis Laboratory at the following address:

Maxim Technologies Inc.
Attn: Sample Custodian
1908 Innerbelt Business Center Drive
St. Louis, MO 63114-5700
Telephone: (314) 426-0880
Fax: (314) 426-4212

4.3 Quality Assurance (QA) Split Samples

A systems audit for this project will consist of collection and shipment of split samples for each analytical parameter to Nuclear Technology Services. Non-primary parameters (gross alpha and total uranium) will not be analyzed in the QA samples. Unless otherwise instructed, split samples will be shipped to:

Nuclear Technology Services
Attn: Dr. Rao
635 Hembree PRWY
Roswell, GA 30076
Telephone: (770) 663-0711
Fax: (770) 663-0547

TABLES

TABLE 1

UNIT DESIGNATIONS, SIZE, AND RATIONALE FOR DESIGNATION
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

MARSSIM Unit	Class	Area (m^2)	Rationale for MARSSIM Designation
1A	2	6,760	This unit has been shown on historical maps as being contaminated. It has been documented as remediated but no confirmatory sampling results have been found to substantiate that statement. No samples were collected in this unit during Phase I.
1B	2	7,575	This unit has been shown on historical maps as being contaminated. It has been documented as remediated but no confirmatory sampling results have been found to substantiate that statement.
1C	1	90,468	This unit includes the IWCS, in which several hundred thousand cubic yards of radioactive residues had been stored on open ground since the 1940's and covered with a temporary cap since 1986. No intrusive sampling of the IWCS will be conducted in the Remedial Investigation.
2A	2	18,370	This unit contains some buildings that were not used for processing TNT for the LOOW. Roadways through this unit potentially were used for the transportation route for radioactive material. A limited number of samples collected in this unit during Phase I did not exceed the screening values, although an elevated gamma reading of 70,000 cpm was determined.
2B	2	9,990	This unit contains former railroad line and roadway locations that potentially were used for the transportation route for radioactive material. Concentrations reported for BH202, a surface soil sample collected in this unit during Phase I, slightly exceeded the total uranium screening criteria. Concentrations of 1.93 pCi/g, 0.14 pCi/g and 1.91 pCi/g were reported for U-233/234, U-235, and U-238, respectively. BH202 total uranium was reported as 6.34 ug/g.
2C	2	14,751	This unit abuts several of the class 1 units surrounding Building 401 and has an unimproved roadway that potentially was a transport route for radioactive materials. No samples were collected in this unit during Phase I, although an elevated gamma reading was measured at 20,000 cpm in the northwest portion of this area.
2D	2	18,668	This unit contains former railroad line and roadway locations that potentially were used for the transportation route for radioactive material. Radium-226 reported (7.87 pCi/g) in the surface soil sample collected at BH205 during Phase I exceeded the screening criteria.
2E	1	1,710	This unit is located to the north and adjacent to Building 401. This building and surrounding soils have known radiological contamination and was formerly used to store various radioactive materials. Phase I sample results indicated no elevated radionuclides, although an elevated gamma reading of 30,000 cpm was observed in this unit.
2F	1	1,586	This unit is located to the northeast and adjacent to Building 401. This building and surrounding soils have known radiological contamination and was formerly used to store various radioactive materials. Phase I sample results indicated elevated radionuclides in this unit at BH211, where radium-226 and thorium-230 were reported at 3.92 pCi/g and 7.39 pCi/g, respectively.

TABLE 1

UNIT DESIGNATIONS, SIZE, AND RATIONALE FOR DESIGNATION
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

MARSSIM Unit	Class	Area (m^2)	Rationale for MARSSIM Designation
2G	1	1,278	This unit is located to the east and adjacent to Building 401. This building and surrounding soils have known radiological contamination and was formerly used to store various radioactive materials. No samples were collected in this unit during Phase I, although an elevated gamma reading of 40,000 cpm was reported.
2H	1	1,432	This unit is located to the east and adjacent to Building 401. This building and surrounding soils have known radiological contamination and was formerly used to store various radioactive materials. Phase I sample results indicated no elevated radionuclides, although an elevated gamma reading of 110,000 cpm was reported in this unit.
2I	1	1,278	This unit is located to the southeast and adjacent to Building 401. This building and surrounding soils have known radiological contamination and was formerly used to store various radioactive materials. No samples or gamma readings were collected in this unit during Phase I.
2J	1	1,529	This unit is located to the south and adjacent to Building 401. This building and surrounding soils have known radiological contamination and was used to store various radioactive materials. In sample BH203, radium-226, thorium-230, and total uranium were reported at concentrations exceeding the corresponding screening levels in Phase I samples. Radium-226, thorium-230, uranium-233/234, uranium-235, and uranium-238 were reported at 1,140 pCi/g, 6.48 pCi/g, 1.49 pCi/g, 0.079 pCi/g, and 1.8 pCi/g, respectively. BH203 total uranium was reported as 5.06 ug/g. In addition, a gamma reading of 126,000 cpm was reported in this unit.
2K	1	1,415	This unit is located to the west and adjacent to Building 401. This building and surrounding soils have known radiological contamination and was formerly used to store various radioactive materials. Phase I sample results did not indicate elevated radionuclides in this unit.
3A	2	19,880	This unit includes several buildings that have been documented as storage areas for radioactive residues. The unit also includes several roadways that potentially were used to transport radioactive materials. Phase I sample results indicated elevated radionuclides in this unit. In sample BH311, radium-226 (6.58 pCi/g), thorium-230 (15.6 pCi/g), and total uranium (U-233/234=1.9 pCi/g; U-235=0.086 pCi/g; U-238=1.75 pCi/g) were reported at concentrations exceeding the corresponding screening levels in Phase I samples. BH311 total uranium was reported as 5.33 ug/g. Radium-226 (7.49 pCi/g) and thorium-230 (10.3 pCi/g) were reported at concentrations exceeding the corresponding screening levels in sample BH312.
3B	2	17,531	This unit includes several buildings that have been documented as storage areas for radioactive residues. The unit also includes several roadways that potentially were used to transport radioactive materials. Phase I sample results indicated elevated radionuclides in this unit. In sample BH303, radium-226 (3.84 pCi/g) was reported at concentrations exceeding the corresponding screening level in Phase I samples. In addition, a gamma reading of 25,000 cpm was reported in this unit.

TABLE 1

UNIT DESIGNATIONS, SIZE, AND RATIONALE FOR DESIGNATION
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

MARSSIM Unit	Class	Area (m^2)	Rationale for MARSSIM Designation
3C	2	17,531	This unit includes several buildings that have been documented as storage areas for radioactive residues. The unit also includes several roadways that potentially were used to transport radioactive materials. Phase I sample results indicated elevated radionuclides in this unit. In sample BH308, radium-226 (3.56 pCi/g), thorium-230 (14.2 pCi/g), and total uranium (U-233/234=3.66 pCi/g; U-235=0.102 pCi/g; U-238=3.42 pCi/g) were reported at concentrations exceeding the corresponding screening levels in Phase I samples. BH308 total uranium was reported as 10.4 ug/g. Thorium-230 (5.64 pCi/g) was also reported at concentrations exceeding the corresponding screening levels in sample BH309.
3D	2	17,437	This unit includes several buildings that have been documented as storage areas for radioactive residues. The unit also includes several roadways that potentially were used to transport radioactive materials. Phase I sample results indicated elevated radionuclides in this unit. A gamma reading of 34,000 cpm was reported in this unit.
4A	2	19,927	This unit has been shown on historical maps as being contaminated. It has been documented as remediated but no confirmatory sampling results have been found to substantiate that statement. Samples collected in this unit during Phase I exhibited elevated levels of radionuclides. In sample BH402, radium-226 (9.49 pCi/g), thorium-230 (10.8 pCi/g), and uranium radionuclides (U-233/234=10.1 pCi/g; U-235=0.302 pCi/g; U-238=10.1 pCi/g) were reported at concentrations exceeding the corresponding screening levels in Phase I samples. BH402 total uranium was reported as 33.1 ug/g. Radium-226 (4.5 pCi/g) and thorium-230 (9.54 pCi/g) were reported at concentrations exceeding the corresponding screening levels in sample BH404.
4B	2	19,928	This unit has been shown on historical maps as a pure metal (radium, thorium, and uranium bars and ingots) storage vault and as being contaminated. It has been documented as remediated but no confirmatory sampling results have been found to substantiate that statement. Samples collected in this unit during Phase I did not exhibit elevated levels of radionuclides.
4C	2	19,928	This unit has been shown on historical maps as a pure metal (radium, thorium, and uranium bars and ingots) storage vault and as being contaminated. It has been documented as remediated but no confirmatory sampling results have been found to substantiate that statement. Samples collected in this unit during Phase I did not exhibit elevated levels of radionuclides.
4D	2	19,928	This unit has a cut through gravel roadway, two paved roadways, and former railroad lines that potentially were used for transporting the radioactive material. Phase I sample results indicated elevated radionuclides in this unit. Radium-226 (4.45 pCi/g) was reported at concentrations exceeding the corresponding screening levels in sample BH417.
4E	2	11,220	This unit consists of "O" Street and former railroad lines. These may have been routes of transportation of radioactive material at the site. Samples collected in this unit during Phase I did not exhibit elevated levels of radionuclides.

TABLE 1

UNIT DESIGNATIONS, SIZE, AND RATIONALE FOR DESIGNATION
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

MARSSIM Unit	Class	Area (m^2)	Rationale for MARSSIM Designation
4F	3	38,069	This unit consists of some tank cradles and an ammonia processing plant for the former LOOW. No storage of radioactive material was documented in this area. Phase I samples from this unit did not exhibit elevated levels of radionuclides.
4G	2	12,886	This unit consists of "N" Street and former railroad lines. These may have been routes of transportation of radioactive material at the site. Sampling was not conducted in this unit during Phase I.
5A	2	25,787	This unit surrounds Unit 5B and the former buildings located within this unit have been historically documented as used for storage of radioactive residues. Limited Phase I sampling did not indicate elevated radionuclide concentrations. Gamma readings of 11,000 cpm and 14,500 cpm were reported in this unit.
5B	1	1,999	Former buildings in this unit have been used for storage of several different types of radioactive materials. Sampling of this unit during the Phase I indicated significant levels of radionuclides. Concentrations of uranium were reported in samples BH502 and BH503 exceeding the corresponding screening levels. In sample BH502, uranium-233/234 (7.39 pCi/g) and uranium 238 (7.59 pCi/g) was reported. BH502 total uranium was reported as 27.1ug/g. In sample BH503, uranium 233/234, uranium-235, uranium-238, and total uranium concentrations of 119 pCi/g, 6.15 pCi/g, 120 pCi/g, and 366 ug/g were reported, respectively.
6A	2	17,342	This unit is located west of and adjacent to the former K-65 residue storage location. Drums were reportedly stored on "O" Street, south of the former tower location in this unit. The tower was emptied and dismantled in the mid 1980's. Limited surface soil samples from the Phase I investigation did not indicate elevated radionuclide concentrations.
6B	2	17,396	This unit contained the former water tower where the K-65 residues were stored and the thaw house where radioactive residues were transferred from drums to the tower. Drums were reportedly stored on "O" Street, south of the former tower location. The tower was emptied and dismantled in the mid 1980's. Surface soil samples from the Phase I investigation did not indicate elevated radionuclide concentrations.
6C	2	16,237	This unit is located east of and adjacent to the former K-65 residue storage location. Drums were reportedly stored on "O" Street, south of the former tower location in this unit. The tower was emptied and dismantled in the mid 1980's. No surface soil samples were collected in the Phase I investigation.
8A	3	51,957	This unit contains the firehouse for the LOOW but has had no known radioactive material storage. Reports indicate the firehouse has minimal interior radioactive contamination and will be demolished soon. Surface soil sampling in 3 locations in this unit did not show elevated radionuclides. A gamma reading of 23,000 cpm was reported in this unit.
8B	3	58,347	Although surrounded by roads, this unit did not have any LOOW process buildings or known radioactive material storage. This area is a little lower topographically from the surrounding land. Surface soil sampling in 2 locations within this unit did not show elevated radionuclides.

TABLE 1

UNIT DESIGNATIONS, SIZE, AND RATIONALE FOR DESIGNATION
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

MARSSIM Unit	Class	Area (m^2)	Rationale for MARSSIM Designation
8C	2	20,135	This unit is located downwind of the formerly open pile of radioactive residues and current IWCS. Historical maps show a burial area to the north of this location. No samples were collected in this unit in Phase I.
8D	2	20,001	This unit is located downwind of the formerly open pile of radioactive residues and current IWCS. Historical maps show a burial area east of this unit. Sediment and surface soil sampling in this unit did not show elevated radionuclides. Gamma readings of 20,000 cpm and 18,000 cpm were reported in this unit.
8E	2	20,001	This unit is located downwind of the formerly open pile of radioactive residues and current IWCS. Historical maps show a burial area in this unit. Sediment and surface soil sampling in this unit did not show elevated radionuclides. Gamma readings of 19,000 cpm, 16,000 cpm, and 33,000 cpm were reported in this unit.
8F	3	40,003	This unit did not have any LOOW process buildings or known radioactive material storage. Most of the land in this unit is a little lower topographically from the surrounding land. Surface soil sampling in 3 locations did not show elevated radionuclides.
8G	3	23,275	This unit is located in the northern portion of the panhandle. One sediment sample exhibited total uranium at the screening level at the northern boundary of the site in this unit but all other samples collected were below screening values. No LOOW process buildings or known radioactive material storage have been located in this unit.
8H	2	3,588	This unit is comprised of the southern section of Campbell Street at the NFSS entrance. Sampling has not been done in this unit although 2 areas of elevated gamma readings were found during the Phase I of the Remedial Investigation. Gamma readings of 20,000 cpm and 50,000 cpm were reported in this unit.
9A	2	20,714	This unit is the off-site property to the west of the NFSS that is owned by the Niagara-Mohawk Power Corporation. The West Ditch contained within this unit has been shown on historical maps as being contaminated and remediated, but no confirmatory sampling results have been found to substantiate the cleanup.
Building 401	1	1,483	This unit is comprised of Building 401 and its contents. This building has known radiological contamination and was used to store various radioactive materials. No samples will be collected from within Building 401 during the Remedial Investigation.

Note: Background data is not currently available and was not used in the designation of each unit.

TABLE 2 SUMMARY OF SAMPLES TO BE COLLECTED DURING THE PHASE II NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION LEWISTON, NEW YORK	
Number of Samples	**Sample Type**
5	Surface Water Samples
5	Sediment Samples
78	Groundwater Samples (15 existing wells, 15 installed wells, 10 background wells, 38 temporary wellpoints)
60	Subsurface Soil Samples (10 background)
155	Surface Soil Samples (15 background)
5	Railroad Ballast Samples
14	Road Core Samples
80	Gamma Walkover Placed Sample Locations (estimated)
100	Stratified Random Placed Sample Locations
20	Offsite Surface Soil Samples
4	Offsite Sediment Samples
4	Offsite Surface Water Samples
25	Subsurface Soil Samples from Trenching Activities
20	Pipeline Samples

TABLE 3

JUSTIFICATION FOR COLLECTION OF ADDITIONAL SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

The Phase I of the Remedial Investigation at the NFSS was limited to areas that were suspected to be contaminated based upon historical site operations and the limited data from previous reports. With the time constraints of the Phase I and little definitive data on the potential contaminants of potential concern (COPCs) prior to the investigatory activities, only 69 borings (collecting surface soil, subsurface soil, and groundwater [where possible]samples) and 39 co-located sediment and surface water samples (an additional surface water sample was collected) were collected. Several additional features and areas that were not scheduled for the Phase I RI still need to be investigated prior to performing a baseline risk assessment to provide a complete profile of the NFSS. The following table provides the justification for these additional samples.

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
Surface and Subsurface Soil Samples from Areas with Elevated Gamma Readings					
SS218 SB218	Building 401 Area	70,000 cpm gamma screening location	Surface Soil Subsurface Soil	This sample point is located in a shallow ditch next to Campbell Street west of Building 429. This sample point will investigate the elevated gamma reading found during the walkover survey conducted by the radiation technicians.	Radiological Parameters
SS219 SB218	Building 401 Area	20,000 cpm gamma screening location	Surface Soil Subsurface Soil	This sample point is located north of Building 401 at the South 16 ditch east of Campbell Street. This sample point will investigate the elevated gamma reading found during the walkover survey conducted by the radiation technicians.	Radiological Parameters
SS220 SB220	Building 401 Area	40,000 cpm gamma screening location	Surface Soil Subsurface Soil	This sample point is located east and adjacent to Building 401. This sample point will investigate the elevated gamma reading found during the walkover survey conducted by the radiation technicians.	Radiological Parameters
SS221 SB221	Building 401 Area	110,000 cpm gamma screening location	Surface Soil Subsurface Soil	This sample point is located southeast of Building 401. This sample point will investigate the elevated gamma reading found during the walkover survey conducted by the radiation technicians.	Radiological Parameters
SS314 SB314	Shops Area	34,000 cpm gamma screening location	Surface Soil Subsurface Soil	This sample point is located west of Sixth Street near the "O" Street south ditch. This sample point will investigate the elevated gamma reading found during the walkover survey conducted by the radiation technicians.	Radiological Parameters
SS826 SB826	Uninvestigated Area	23,000 cpm gamma screening location	Surface Soil Subsurface Soil	This sample point is located at the southern property line at the Central ditch. This sample point will investigate the elevated gamma reading found during the walkover survey conducted by the radiation technicians.	Radiological Parameters
SS827 SB827	Uninvestigated Area	25,000 cpm gamma screening location	Surface Soil Subsurface Soil	This sample point is located near a foundation of an old guard shack adjacent to Campbell Street south of Building 401. This sample point will investigate the elevated gamma reading found during the walkover survey conducted by the radiation technicians.	Radiological Parameters
SS828 SB828	Uninvestigated Area	20,000 cpm gamma screening location	Surface Soil Subsurface Soil	This sample point is located near Campbell Street southwest of the parking lot and southwest of Building 401. This sample point will investigate the elevated gamma reading found during the walkover survey conducted by the radiation technicians.	Radiological Parameters

TABLE 3

JUSTIFICATION FOR COLLECTION OF ADDITIONAL SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
SS829 SB829	Uninvestigated Area	33,000 cpm gamma screening location	Surface Soil Subsurface Soil	This sample point is located south of "O" Street east of the Central ditch. This sample point will investigate the elevated gamma reading found during the walkover survey conducted by the radiation technicians.	Radiological Parameters
Surface Soil, Subsurface Soil, and Groundwater from Borings at Previously Uninvestigated Areas					
SS101 SB101 GW101	IWCS	West Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located on the western property line, west of and at the southern end of the IWCS. This sample is north of the sediment sample collected in Phase I exhibiting elevated radiological activity. The soil or groundwater in this area has not been investigated in the RI to date. Additionally, this area was indicated in historical documents to be radiologically contaminated. Cleanup was documented but confirmatory sampling results were not found by Maxim. During walkover surveys of the ditches near the western property line the radiation technicians indicated that the gamma readings increased toward the property line. No chemical samples have been taken by Maxim west of the IWCS in the soils or groundwater at the property line.	Radiological Parameters
SS102 SB102 GW102	IWCS	West Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located on the western property line, west of the IWCS. The soil or groundwater in this area has not been investigated in the RI to date. Additionally, this area was indicated in historical documents to be radiologically contaminated. Cleanup was documented but confirmatory sampling results were not found by Maxim. During walkover surveys of the ditches near the western property line the radiation technicians indicated that the gamma readings increased toward the property line. No chemical samples have been taken by Maxim west of the IWCS in the soils or groundwater at the property line.	Radiological Parameters SVOCs Metals
SS103 SB103 GW103	IWCS	West Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located on the western property line, west of and at the northern end of the IWCS. The soil or groundwater in this area has not been investigated in the RI to date. Additionally, this area was indicated in historical documents to be radiologically contaminated. Cleanup was documented but confirmatory sampling results were not found by Maxim. During walkover surveys of the ditches near the western property line the radiation technicians indicated that the gamma readings increased toward the property line. No chemical samples have been taken by Maxim west of the IWCS in the soils or groundwater at the property line.	Radiological Parameters Metals

TABLE 3

JUSTIFICATION FOR COLLECTION OF ADDITIONAL SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
SS313 SB313 GW313	Shops Area	SE corner of "O" and Campbell Streets	Surface Soil Subsurface Soil Groundwater	This sample point is located near the area suspected to have had buried drums that exploded and burned at former LOOW. This event was reported in the historical documents but was not very well defined in the records. This location is also north of the former locomotive repair area. This area is also south of the locations from Phase I with elevated PCB concentrations.	Radiological Parameters VOCs SVOCs PCBs
SS422 SB422 GW422	Acidification Area	Panhandle South Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located slightly to the east of the area suspected to have had buried drums that exploded and burned at former LOOW. This event was reported in the historical documents but was not very well defined in the records. This location is also northeast of the former locomotive repair area. The proposed location also borders Modern Landfill.	Radiological Parameters
SS423 SB423 GW423	Acidification Area	Panhandle South Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located near the intersection of "O" street and the former Vine Street. This area was documented to be an area where drums were stored and handled before being placed into the former K-65 tower. Railroad tracks are evident in the pavement and are shown on historical documents to go to the combined shops area. The proposed location also borders Modern Landfill.	Radiological Parameters SVOCs Metals
SS424 SB424 GW424	Acidification Area	North Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located adjacent to the CWM Chemical Services, Inc. property line. This location is needed to bound the variability in sample data and will be used in the Upper Confidence Level mean calculation. This calculation estimates exposure in an exposure unit in the risk assessment.	Radiological Parameters
SS425 SB425 GW425	Acidification Area	North Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located adjacent to the CWM Chemical Services, Inc. property line. This location is needed to bound the variability in sample data and will be used in the Upper Confidence Level mean calculation. This calculation estimates exposure in an exposure unit in the risk assessment. This area is several hundred yards directly south of the nitrification houses of the former LOOW.	Radiological Parameters VOCs Nitroaromatics
SS504 SB504 GW504	Baker Smith Area	Southeast Corner of Baker Smith Area	Surface Soil Subsurface Soil Groundwater	This sample point is south-southeast of the buildings in which radioactive residues were stored. Additionally, this point coincides with the former rail lines in this vicinity that were unloaded north of the Baker Smith area.	Radiological Parameters SVOCs Metals
SS505 SB505	Baker Smith Area	Northwest Corner of Baker Smith Area	Surface Soil Subsurface Soil	This sample point is located in the northwestern corner of the Baker Smith area immediately south of the property line of the Town of Lewiston wastewater treatment plant (WWTP). The WWTP formerly was constructed and operated for the LOOW. This location is northwest of the buildings in which radioactive residues were stored. This area is several hundred yards southwest of the nitrification houses of the former LOOW.	Radiological Parameters VOCs SVOCs Pesticides and PCBs Metals Nitroaromatics
SS506 SB506 GW506	Baker Smith Area	Northeast Corner of Baker Smith Area	Surface Soil Subsurface Soil Groundwater	This sample point is located near the West ditch northeast of the former storage buildings. Samples collected from the former storage locations exhibited elevated radiological activity.	Radiological Parameters

TABLE 3

JUSTIFICATION FOR COLLECTION OF ADDITIONAL SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
SS605 SB605 GW605	Former Storage Area	Panhandle South Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located near the Modern Landfill property line south of the former radiological residue storage tower location. This general area is also south of the former "thaw house" where drums of residue were offloaded from rail cars and may have been placed on the edges of the roadway.	Radiological Parameters Metals
SS606 SB606	Former Storage Area	Panhandle South Property Line	Surface Soil Subsurface Soil	This sample point is located near the Modern Landfill property line southeast of the former radiological residue storage tower location at the southeastern corner of the panhandle. This general area is also southeast of the former "thaw house" where drums of residue were offloaded from rail cars and may have been placed on the edges of the roadway.	Radiological Parameters
SS607 SB607 GW607	Former Storage Area	Panhandle East Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located southwest of the extraction wells for the CWM Chemical Services property at the eastern property line. The area just to the east of this sample location has previously been reported to be the location of possible contamination.	Radiological Parameters VOCs SVOCs Metals
SS813 SB813 GW813	Uninvestigated Area	South Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located south of the former water treatment plant (WTP) for the LOOW and west of the Central ditch at the southern property line. The area is also south of former sludge ponds that reportedly had stored radioactive residues and scrap metal.	Radiological Parameters Metals
SS814 SB814 GW814	Uninvestigated Area	South Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located at the main entrance to the NFSS site at the southern property line. This area is south of an elevated gamma area found during the radiation technician's walkover survey.	Radiological Parameters
SS815 SB815 GW815	Uninvestigated Area	South Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located at the southern property boundary near well BH-48 north of the Modern Landfill leachate collection system and storage tanks. No radiological data has been collected by Maxim in this area.	Radiological Parameters
SS816 SB816	Uninvestigated Area	South Property Line	Surface Soil Subsurface Soil	This sample point is located at the southeastern property corner of the NFSS northeast of the Modern Landfill leachate collection system and storage tanks. No radiological data has been collected by Maxim in this area. This area may be a potential background location for the NFSS. This location is needed to bound the variability in sample data and will be used in the Upper Confidence Level mean calculation. This calculation estimates exposure in an exposure unit in the risk assessment.	Radiological Parameters SVOCs Metals
SS817 SB817 GW817	Uninvestigated Area	East Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located south of sample 205, which exhibited elevated radiological activity.	Radiological Parameters
SS818 SB818 GW818	Uninvestigated Area	Southeast of Building 401	Surface Soil Subsurface Soil Groundwater	This sample point is located southeast of Building 401. This location is needed to bound the variability in sample data and will be used in the Upper Confidence Level mean calculation. This calculation estimates exposure in an exposure unit in the risk assessment.	Radiological Parameters

TABLE 3

JUSTIFICATION FOR COLLECTION OF ADDITIONAL SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
SS819 SB819 GW819	Uninvestigated Area	Southeast of Decon Pad	Surface Soil Subsurface Soil Groundwater	This sample point is located southeast of the decontamination pad. The ground surface gently slopes in this direction from the decontamination pad and overspray could have migrated this direction. A potential catch basin is reportedly located north of this position. Machinery and equipment have been decontaminated in this area for several sampling and remediation events. The sample point is also located east of the IWCS.	Radiological Parameters VOCs SVOCs Pesticides and PCBs Metals Nitroaromatics
SS820 SB820 GW820	Uninvestigated Area	North of the IWCS	Surface Soil Subsurface Soil Groundwater	This sample point is located north of the IWCS in an area that has reportedly been remediated.	Radiological Parameters
SS821 SB821 GW821	Uninvestigated Area	West Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located at the western property line northwest of the IWCS. This area has reportedly been marked on previous maps as radiologically contaminated and potentially has undergone remedial activities.	Radiological Parameters
SS822 SB822 GW822	Uninvestigated Area	Northwest of "O" and Campbell Street Intersection	Surface Soil Subsurface Soil Groundwater	This sample point is located northwest of the intersection of “O” Street and Campbell Street in an area that has reportedly never been impacted by site activities. The sample is also located west of the Central ditch. This location is needed to bound the variability in sample data and will be used in the Upper Confidence Level mean calculation. This calculation estimates exposure in an exposure unit in the risk assessment.	Radiological Parameters SVOCs Metals
SS823 SB823 GW823	Uninvestigated Area	North Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located at the northern property line adjacent to the CWM Chemical Services property just west of Campbell Street. This location is needed to bound the variability in sample data and will be used in the Upper Confidence Level mean calculation. This calculation estimates exposure in an exposure unit in the risk assessment.	Radiological Parameters
SS824 SB824 GW824	Uninvestigated Area	North Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located at the northern property line adjacent to the CWM Chemical Services property north of the forested lowland marshy area. This location is needed to bound the variability in sample data and will be used in the Upper Confidence Level mean calculation. This calculation estimates exposure in an exposure unit in the risk assessment.	Radiological Parameters
SS825 SB825 GW825	Uninvestigated Area	North Property Line	Surface Soil Subsurface Soil Groundwater	This sample point is located at the northeastern property line adjacent to the CWM Chemical Services property. This area is north-northwest of the extraction wells for the CWM Chemical Services property at the eastern property line. The area just to the southeast of this sample location has previously been reported to be the location of possible contamination. In addition, this location is needed to bound the variability in sample data and will be used in the Upper Confidence Level mean calculation. This calculation estimates exposure in an exposure unit in the risk assessment.	Radiological Parameters VOCs SVOCs Pesticides and PCBs Metals Nitroaromatics

TABLE 3

JUSTIFICATION FOR COLLECTION OF ADDITIONAL SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
Onsite Sediment and Surface Water Samples from Locations to Bound Constituents Found in Samples that Exceed Screening Values fo r Radiological Constituents					
SD741 SW741	Onsite Ditches	IWCS South Ditch	Sediment Surface Water	This sample is located in the southernmost ditch near the IWCS. This sample is placed to bound the SD703 sample location which exhibited elevated radiological activity.	Radiological Parameters
SD742 SW742	Onsite Ditches	IWCS Northwest Ditch	Sediment Surface Water	This sample is located in the fourth ditch (counting from south to north) that drains water from the IWCS. No sample was collected from this ditch in Phase I.	Radiological Parameters
SD743 SW743	Onsite Ditches	South "O" Street Ditch	Sediment Surface Water	This sample is located in the "O" Street south ditch near the gravel roadway (the former Lutts Road) that leads to the IWCS. This sample is placed to bound the 711 sample location which exhibited elevated radiological activity.	Radiological Parameters
SD744 SW744	Onsite Ditches	South "O" Street Ditch	Sediment Surface Water	This sample is located in the "O" Street south ditch near the gravel roadway (the former Lutts Road) that leads to the IWCS. This sample is placed to bound the 711 sample location which exhibited elevated radiological activity.	Radiological Parameters
SD745 SW745	Onsite Ditches	South "O" Street Ditch	Sediment Surface Water	This sample is located in the "O" Street south ditch near the gravel roadway (the former Lutts Road) that leads to the IWCS. This sample is placed to bound the 711 sample location which exhibited elevated radiological activity.	Radiological Parameters
Offsite Sediment and Surface Water Samples from Locations					
SD901 SW901	Offsite	West Ditch	Sediment Surface Water	This sample point is located offsite, west of the western property line and the IWCS. This area was indicated in historical documents as radiologically contaminated. Cleanup was documented but confirmatory sampling results were not found by Maxim. During walkover surveys of the ditches near the western property line the radiation technicians indicated that the gamma readings increased toward the property line.	Radiological Parameters
SD902 SW902	Offsite	West Ditch	Sediment Surface Water	This sample point is located offsite, west of the western property line and the IWCS. This area was indicated in historical documents as radiologically contaminated. Cleanup was documented but confirmatory sampling results were not found by Maxim. During walkover surveys of the ditches near the western property line the radiation technicians indicated that the gamma readings increased toward the property line.	Radiological Parameters
SD903 SW903	Offsite	West Ditch	Sediment Surface Water	This sample point is located offsite, west of the western property line and the IWCS. This area was indicated in historical documents as radiologically contaminated. Cleanup was documented but confirmatory sampling results were not found by Maxim. During walkover surveys of the ditches near the western property line the radiation technicians indicated that the gamma readings increased toward the property line.	Radiological Parameters

TABLE 3

JUSTIFICATION FOR COLLECTION OF ADDITIONAL SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
SD904 SW904	Offsite	West Ditch	Sediment Surface Water	This sample point is located offsite, west of the western property line and the IWCS. This area was indicated in historical documents as radiologically contaminated. Cleanup was documented but confirmatory sampling results were not found by Maxim. During walkover surveys of the ditches near the western property line the radiation technicians indicated that the gamma readings increased toward the property line.	Radiological Parameters
Trenches and Collection of Subsurface Soil Samples for Chemical and Radiological Constituents					
T201	Building 401 Area	Suspect UST West of Building 401	Subsurface Soil	This trench is located to investigate a potential tank located adjacent to the west side of Building 401. A boring was installed in this location but may not have completely defined the contamination potential for the tank. Constituents that will be analyzed for include those of petroleum storage tanks and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters VOCs SVOCs Pesticides and PCBs
T202	Building 401 Area	Storm Sewer Inlet	Subsurface Soil	A storm sewer grated inlet was observed on the south side of Building 401. This trench is located to investigate the inlet and associated piping. Constituents that will be analyzed for include those that persist in the environment and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters SVOCs Pesticides and PCBs Metals
T203	Building 401 Area	Suspect UST	Subsurface Soil	This trench is located to investigate a potential tank located north of Building 401. A boring was installed in this location but may not have completely defined the contamination potential for the tank. Constituents that will be analyzed for include those of petroleum storage tanks and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters VOCs SVOCs
T204	Building 401 Area	Vault and Water Line	Subsurface Soil	This trench is located to investigate the vault and water lines northwest of Building 401 east of Campbell Street. During Phase I activities SVOCs were detected in a boring close to the vault. Constituents that will be analyzed for include SVOCs and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters SVOCs
T205	Building 401 Area	Steam Line	Subsurface Soil	This trench is located to investigate the steam lines east of Building 401 that eventually lead to the nitration houses of the LOOW that were located north of the NFSS. Due to the potential for migration of the SVOCs included in the coal fragments found south of this location and the elevated samples from Phase I, constituents that will be analyzed for include SVOCs, metals, and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters SVOCs Metals

TABLE 3

JUSTIFICATION FOR COLLECTION OF ADDITIONAL SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
T301	Shops Area	Pipeline and Suspect UST	Subsurface Soil	A pipeline is visible from a former rail line on the property south of "Z" Street. Approximately halfway from the rail line to the street the pipeline becomes buried and is suspected to end at a UST. This trench is located to investigate the pipeline and suspect UST. Constituents that will be analyzed for include VOCs, SVOCs, metals, and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters VOCs SVOCs Metals
T302	Shops Area	Debris Pile	Subsurface Soil	This trench will investigate the debris pile south of "Z" Street and west of Castle Garden Road. The debris pile includes large blocks of concrete. Due to the unknown nature of the materials in and under the pile, all constituents will be analyzed.	Radiological Parameters VOCs SVOCs Pesticides and PCBs Metals Nitroaromatics
T303	Shops Area	Suspect UST	Subsurface Soil	This trench is located to investigate a potential tank located north of a building foundation. This area was not investigated during the Phase I. Constituents that will be analyzed for include those of petroleum storage tanks and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters VOCs SVOCs
T304	Shops Area	Open Concrete Basin	Subsurface Soil	This trench is located to investigate an open concrete basin and potential underground piping in the former garage/maintenance area of the former LOOW. This area was not investigated during the Phase I. Constituents that will be analyzed for include SVOCs and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters SVOCs
T401	Acidification Area	Storm Sewer and Sulfur Location	Subsurface Soil	A storm sewer grated inlet was observed on the south side of a former building foundation located north of "O" Street and east of Campbell Street. This trench is located to investigate the inlet and associated piping as well as some sulfur pieces visible on the ground surface. Constituents that will be analyzed for include SVOCs, metals, and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters SVOCs Metals
T402	Acidification Area	Tank Cradle and Process Sewer	Subsurface Soil	This trench is located to investigate the tank cradle and process sewer underground piping in the former acidification area of the former LOOW. This area was not investigated during the Phase I. Constituents that will be analyzed for include SVOCs, metals, and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters SVOCs Metals

TABLE 3

JUSTIFICATION FOR COLLECTION OF ADDITIONAL SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
T403	Acidification Area	Rubble Filled Depression	Subsurface Soil	This trench will investigated the rubble filled depression in the former acidification area between "O" Street and "N" Street. The debris pile includes sheet metal and rubble. Due to the unknown nature of the materials in and under the pile, all constituents will be analyzed.	Radiological Parameters VOCs SVOCs Pesticides and PCBs Metals Nitroaromatics
T404	Acidification Area	Sewer Line	Subsurface Soil	This trench is located to investigate the sewer and underground piping in the former acidification area of the former LOOW just south of "N" Street. Constituents that will be analyzed for include SVOCs, pesticides and PCBs, and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters SVOCs Pesticides and PCBs
T405	Acidification Area	Tank Cradle and Process Sewer	Subsurface Soil	This trench is located to investigate the tank cradle and process sewer underground piping in the central area of the former acidification area of the former LOOW. Constituents that will be analyzed for include SVOCs, metals, and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters SVOCs Metals
T406	Acidification Area	Rubble Filled Depression	Subsurface Soil	This trench will investigated the debris pile south of "N" Street and west of Castle Garden Road cut-through in the former acidification area. The debris pile includes PVC and steel pipes, rubble, and gray foam products. Due to the unknown nature of the materials in and under the pile, all constituents will be analyzed.	Radiological Parameters VOCs SVOCs Pesticides and PCBs Metals Nitroaromatics
T407	Acidification Area	Sewer Line	Subsurface Soil	This trench is located to investigate the sewer and underground piping in the central area of the former acidification area of the former LOOW. This area is immediately west of the contaminated boring 415. Constituents that will be analyzed for include VOCs, SVOCs, and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters VOCs SVOCs
T408	Acidification Area	Debris Pile	Subsurface Soil	This trench will investigated the debris pile south of "N" Street and east of Castle Garden Road cut-through in the former acidification area. The debris pile includes rubble and asphalt roofing materials. Due to the unknown nature of the materials in and under the pile, all constituents will be analyzed.	Radiological Parameters VOCs SVOCs Pesticides and PCBs Metals Nitroaromatics

TABLE 3

JUSTIFICATION FOR COLLECTION OF ADDITIONAL SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
T409	Acidification Area	Process Sewer	Subsurface Soil	This trench is located to investigate the process sewer underground piping east of the central area of the former acidification area o f the former LOOW. This area is northeast of samples 417 and 418 that exhibited elevated PCBs. Constituents that will be analyzed for include SVOCs, pesticides and PCBs, and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters SVOCs Pesticides and PCBs
T410	Acidification Area	Suspect UST	Subsurface Soil	This trench is located to investigate a potential tank located northwest of a building foundation south of "N" Street. Constituents that will be analyzed for include those of petroleum storage tanks and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters VOCs SVOCs
T411	Acidification Area	Disturbed Ground in former Storage Area	Subsurface Soil	This trench is located to investigate the soils at the western end of the acidification area that have reportedly been remediated. Bars of pure radioactive material were located in a vault south of this area. It appears that the soil surrounding the trench location has been disturbed. No confirmatory sampling results were found in the site documentation. The location of the trench may be adjusted in the field.	Radiological Parameters
T412	Acidification Area	Disturbed Ground in former Storage Area	Subsurface Soil	This trench is located to investigate the soils at the western end of the acidification area that have reportedly been remediated. Bars of pure radioactive material were located in a vault southeast of this area. It appears that the soil surrounding the trench location has been disturbed. No confirmatory sampling results were found in the site documentation. The location of the trench may be adjusted in the field.	Radiological Parameters
T413	Acidification Area	Disturbed Ground in former Storage Area	Subsurface Soil	This trench is located to investigate the soils where bars of pure radioactive material were stored in a vault at the western end of the acidification area. It appears that the soil surrounding the trench location has been disturbed and/or previously remediated. No confirmatory sampling results were found in the site documentation. The location of the trench may be adjusted in the field.	Radiological Parameters
T414	Acidification Area	Near Large Concrete Foundation near former Storage Area	Subsurface Soil	This trench is located to investigate piles of debris on the west side of a concrete foundation at the western end of the acidification area. Bars of pure radioactive material were located in a vault west of this area. It appears that the soil surrounding the trench location has been disturbed and/or previously remediated. No confirmatory sampling results were found in the site documentation. The location of the trench may be adjusted in the field.	Radiological Parameters
T601	Former Storage Area	Water and Steam Line Locations	Subsurface Soil	This trench is located to investigate the water and steam line underground piping south of the former residue storage tower. Constituents that will be analyzed for include SVOCs, metals, and radiological parameters. The location of the trench may be adjusted after the geophysical investigation of the area.	Radiological Parameters SVOCs Metals

TABLE 3

JUSTIFICATION FOR COLLECTION OF ADDITIONAL SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
T801	Uninvestigated Area	Series of Small Depressions	Subsurface Soil	This trench is located to investigate a series of small depressions southwest of the IWCS and the sludge ponds for the former LOOW WTP. Scrap metal and radioactive residues were stored in the ponds. In this general area is the two large water lines that brought water to the LOOW. Constituents that will be analyzed for include metals and radiological parameters	Radiological Parameters Metals

TABLE 4

SURFACE AND SUBSURFACE SOIL SAMPLE LOCATIONS FROM AREAS WITH ELEVATED GAMMA READINGS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters								
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SS218-400	Building 401 Area	70,000 cps rad screening location	Surface Soil						X	X	X	
NFSS00SS219-401	Building 401 Area	20,000 cps rad screening location	Surface Soil						X	X	X	
NFSS00SS220-402	Building 401 Area	40,000 cps rad screening location	Surface Soil	QA					X	X	X	
NFSS00SS221-403	Building 401 Area	110,000 cps rad screening location	Surface Soil						X	X	X	
NFSS00SS314-404	Shops Area	34,000 cps rad screening location	Surface Soil	MS/MSD					X	X	X	
NFSS00SS826-405	Uninvestigated Area	23,000 cps rad screening location	Surface Soil						X	X	X	
NFSS00SS827-406	Uninvestigated Area	25,000 cps rad screening location	Surface Soil						X	X	X	
NFSS00SS828-407	Uninvestigated Area	20,000 cps rad screening location	Surface Soil	QC-408					X	X	X	
NFSS00SS829-409	Uninvestigated Area	33,000 cps rad screening location	Surface Soil						X	X	X	
NFSS00SB218-X-410	Building 401 Area	70,000 cps rad screening location	Subsurface Soil	MS/MSD					X	X	X	
NFSS00SB219-X-411	Building 401 Area	20,000 cps rad screening location	Subsurface Soil						X	X	X	
NFSS00SB220-X-412	Building 401 Area	40,000 cps rad screening location	Subsurface Soil						X	X	X	
NFSS00SB221-X-413	Building 401 Area	110,000 cps rad screening location	Subsurface Soil	QC-414					X	X	X	
NFSS00SB314-X-415	Shops Area	34,000 cps rad screening location	Subsurface Soil						X	X	X	
NFSS00SB826-X-416	Uninvestigated Area	23,000 cps rad screening location	Subsurface Soil						X	X	X	
NFSS00SB827-X-417	Uninvestigated Area	25,000 cps rad screening location	Subsurface Soil	QA					X	X	X	
NFSS00SB828-X-418	Uninvestigated Area	20,000 cps rad screening location	Subsurface Soil						X	X	X	

TABLE 4

SURFACE AND SUBSURFACE SOIL SAMPLE LOCATIONS FROM AREAS WITH ELEVATED GAMMA READINGS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SB829-X-419	Uninvestigated Area	33,000 cps rad screening location	Subsurface Soil						X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 5

STRATIFIED RANDOM SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SSXXXXX-420	TBD	TBD	Surface Soil	QA, MS/MSD, QC-421					X	X	X	
NFSS00SSXXXXX-422	TBD	TBD	Surface Soil	QA, MS/MSD, QC-423					X	X	X	
NFSS00SSXXXXX-424	TBD	TBD	Surface Soil	QA, MS/MSD, QC-425					X	X	X	
NFSS00SSXXXXX-426	TBD	TBD	Surface Soil	QA, MS/MSD, QC-427					X	X	X	
NFSS00SSXXXXX-428	TBD	TBD	Surface Soil	QA, MS/MSD, QC-429					X	X	X	
NFSS00SSXXXXX-430	TBD	TBD	Surface Soil	QC-431					X	X	X	
NFSS00SSXXXXX-432	TBD	TBD	Surface Soil	QC-433					X	X	X	
NFSS00SSXXXXX-434	TBD	TBD	Surface Soil	QC-435					X	X	X	
NFSS00SSXXXXX-436	TBD	TBD	Surface Soil	QC-437					X	X	X	
NFSS00SSXXXXX-438	TBD	TBD	Surface Soil	QC-439					X	X	X	
NFSS00SSXXXXX-440	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-441	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-442	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-443	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-444	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-445	TBD	TBD	Surface Soil						X	X	X	

TABLE 5

STRATIFIED RANDOM SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SSXXXXX-446	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-447	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-448	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-449	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-450	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-451	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-452	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-453	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-454	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-455	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-456	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-457	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-458	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-459	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-460	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-461	TBD	TBD	Surface Soil						X	X	X	

TABLE 5

STRATIFIED RANDOM SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SSXXXXX-462	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-463	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-464	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-465	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-466	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-467	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-468	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-469	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-470	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-471	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-472	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-473	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-474	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-475	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-476	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-477	TBD	TBD	Surface Soil						X	X	X	

TABLE 5

STRATIFIED RANDOM SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					**Parameters**								
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SSXXXXX-478	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-479	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-480	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-481	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-482	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-483	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-484	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-485	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-486	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-487	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-488	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-489	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-490	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-491	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-492	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-493	TBD	TBD	Surface Soil						X	X	X	

TABLE 5

STRATIFIED RANDOM SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					**Parameters**								
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SSXXXXX-494	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-495	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-496	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-497	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-498	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-499	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-500	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-501	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-502	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-503	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-504	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-505	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-506	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-507	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-508	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-509	TBD	TBD	Surface Soil						X	X	X	

TABLE 5

STRATIFIED RANDOM SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SSXXXXX-510	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-511	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-512	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-513	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-514	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-515	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-516	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-517	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-518	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-519	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-520	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-521	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-522	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-523	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-524	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-525	TBD	TBD	Surface Soil						X	X	X	

TABLE 5

STRATIFIED RANDOM SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SSXXXXX-526	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-527	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-528	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-529	TBD	TBD	Surface Soil						X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 6

SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED TO BOUND PHASE I FINDINGS
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters								
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SS2A002-530	Building 401 Area	MARSSIM Unit 2A	Surface Soil			X			X	X		
NFSS00SS2A003-531	Building 401 Area	MARSSIM Unit 2A	Surface Soil	QA		X			X	X		
NFSS00SS2B001-532	Building 401 Area	MARSSIM Unit 2B	Surface Soil	QC-533		X		X	X	X		
NFSS00SS2B002-534	Building 401 Area	MARSSIM Unit 2B	Surface Soil			X		X	X	X		
NFSS00SS2B003-535	Building 401 Area	MARSSIM Unit 2B	Surface Soil	MS/MSD		X		X	X	X		
NFSS00SS2B004-536	Building 401 Area	MARSSIM Unit 2B	Surface Soil						X	X		
NFSS00SS2B005-537	Building 401 Area	MARSSIM Unit 2B	Surface Soil	QC-538		X			X	X		
NFSS00SS2B006-539	Building 401 Area	MARSSIM Unit 2B	Surface Soil	MS/MSD		X			X	X		
NFSS00SS2B007-540	Building 401 Area	MARSSIM Unit 2B	Surface Soil						X	X		
NFSS00SS2B008-541	Building 401 Area	MARSSIM Unit 2B	Surface Soil	QA		X			X	X		
NFSS00SS2B009-542	Building 401 Area	MARSSIM Unit 2B	Surface Soil						X	X		
NFSS00SS2B010-543	Building 401 Area	MARSSIM Unit 2B	Surface Soil						X	X		
NFSS00SS2B011-544	Building 401 Area	MARSSIM Unit 2B	Surface Soil						X	X		
NFSS00SS2B012-545	Building 401 Area	MARSSIM Unit 2B	Surface Soil						X	X		
NFSS00SS2B013-546	Building 401 Area	MARSSIM Unit 2B	Surface Soil						X	X		
NFSS00SS2D001-547	Building 401 Area	MARSSIM Unit 2D	Surface Soil						X	X		
NFSS00SS2D002-548	Building 401 Area	MARSSIM Unit 2D	Surface Soil						X	X		

TABLE 6

SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED TO BOUND PHASE I FINDINGS
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SS2D003-549	Building 401 Area	MARSSIM Unit 2D	Surface Soil						X	X		
NFSS00SS2D004-550	Building 401 Area	MARSSIM Unit 2D	Surface Soil						X	X		
NFSS00SS2D005-551	Building 401 Area	MARSSIM Unit 2D	Surface Soil						X	X		
NFSS00SS2D006-552	Building 401 Area	MARSSIM Unit 2D	Surface Soil						X	X		
NFSS00SS2D007-553	Building 401 Area	MARSSIM Unit 2D	Surface Soil						X	X		
NFSS00SS2D008-554	Building 401 Area	MARSSIM Unit 2D	Surface Soil						X	X		
NFSS00SS3A001-555	Shops Area	MARSSIM Unit 3A	Surface Soil			X			X	X		
NFSS00SS3A002-556	Shops Area	MARSSIM Unit 3A	Surface Soil						X	X		
NFSS00SS3A003-557	Shops Area	MARSSIM Unit 3A	Surface Soil	QC-558		X			X	X		
NFSS00SS3A004-559	Shops Area	MARSSIM Unit 3A	Surface Soil						X	X		
NFSS00SS3A005-560	Shops Area	MARSSIM Unit 3A	Surface Soil						X	X		
NFSS00SS3A006-561	Shops Area	MARSSIM Unit 3A	Surface Soil			X			X	X		
NFSS00SS3A007-562	Shops Area	MARSSIM Unit 3A	Surface Soil						X	X		
NFSS00SS3A008-563	Shops Area	MARSSIM Unit 3A	Surface Soil	QA, QC-564		X			X	X		
NFSS00SS3A009-565	Shops Area	MARSSIM Unit 3A	Surface Soil						X	X		
NFSS00SS3A010-566	Shops Area	MARSSIM Unit 3A	Surface Soil						X	X		
NFSS00SS3A011-567	Shops Area	MARSSIM Unit 3A	Surface Soil						X	X		

TABLE 6

SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED TO BOUND PHASE I FINDINGS
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SS3A012-568	Shops Area	MARSSIM Unit 3A	Surface Soil						X	X		
NFSS00SS3A013-569	Shops Area	MARSSIM Unit 3A	Surface Soil						X	X		
NFSS00SS3A014-570	Shops Area	MARSSIM Unit 3A	Surface Soil						X	X		
NFSS00SS3A015-571	Shops Area	MARSSIM Unit 3A	Surface Soil						X	X		
NFSS00SS3A016-572	Shops Area	MARSSIM Unit 3A	Surface Soil						X	X		
NFSS00SS3B001-573	Shops Area	MARSSIM Unit 3B	Surface Soil	QC-574		X			X	X		
NFSS00SS3B002-575	Shops Area	MARSSIM Unit 3B	Surface Soil	MS/MSD		X			X	X		
NFSS00SS3B003-576	Shops Area	MARSSIM Unit 3B	Surface Soil						X	X		
NFSS00SS3B004-577	Shops Area	MARSSIM Unit 3B	Surface Soil						X	X		
NFSS00SS3B005-578	Shops Area	MARSSIM Unit 3B	Surface Soil						X	X		
NFSS00SS3B006-579	Shops Area	MARSSIM Unit 3B	Surface Soil						X	X		
NFSS00SS3B007-580	Shops Area	MARSSIM Unit 3B	Surface Soil						X	X		
NFSS00SS3B008-581	Shops Area	MARSSIM Unit 3B	Surface Soil						X	X		
NFSS00SS3B009-582	Shops Area	MARSSIM Unit 3B	Surface Soil						X	X		
NFSS00SS3B010-583	Shops Area	MARSSIM Unit 3B	Surface Soil						X	X		
NFSS00SS3C001-584	Shops Area	MARSSIM Unit 3C	Surface Soil			X			X	X		
NFSS00SS3C002-585	Shops Area	MARSSIM Unit 3C	Surface Soil			X			X	X		

TABLE 6

SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED TO BOUND PHASE I FINDINGS
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					**Parameters**							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SS3C003-586	Shops Area	MARSSIM Unit 3C	Surface Soil			X			X	X		
NFSS00SS3C004-587	Shops Area	MARSSIM Unit 3C	Surface Soil			X			X	X		
NFSS00SS3C005-588	Shops Area	MARSSIM Unit 3C	Surface Soil	QA		X			X	X		
NFSS00SS3C006-589	Shops Area	MARSSIM Unit 3C	Surface Soil			X			X	X		
NFSS00SS3C007-590	Shops Area	MARSSIM Unit 3C	Surface Soil			X			X	X		
NFSS00SS3C008-591	Shops Area	MARSSIM Unit 3C	Surface Soil			X			X	X		
NFSS00SS3C009-592	Shops Area	MARSSIM Unit 3C	Surface Soil			X			X	X		
NFSS00SS3C010-593	Shops Area	MARSSIM Unit 3C	Surface Soil			X			X	X		
NFSS00SS3C011-594	Shops Area	MARSSIM Unit 3C	Surface Soil	QC-595		X			X	X		
NFSS00SS3C012-596	Shops Area	MARSSIM Unit 3C	Surface Soil			X			X	X		
NFSS00SS3C013-597	Shops Area	MARSSIM Unit 3C	Surface Soil			X			X	X		
NFSS00SS4A001-598	Acidification Area	MARSSIM Unit 4A	Surface Soil	QC-599		X			X	X		
NFSS00SS4A002-600	Acidification Area	MARSSIM Unit 4A	Surface Soil			X			X	X		
NFSS00SS4A003-601	Acidification Area	MARSSIM Unit 4A	Surface Soil			X			X	X		
NFSS00SS4A004-602	Acidification Area	MARSSIM Unit 4A	Surface Soil			X			X	X		
NFSS00SS4A005-603	Acidification Area	MARSSIM Unit 4A	Surface Soil						X	X		
NFSS00SS4A006-604	Acidification Area	MARSSIM Unit 4A	Surface Soil			X			X	X		

TABLE 6

SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED TO BOUND PHASE I FINDINGS
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SS4A007-605	Acidification Area	MARSSIM Unit 4A	Surface Soil			X			X	X		
NFSS00SS4A008-606	Acidification Area	MARSSIM Unit 4A	Surface Soil	QA				X	X	X		
NFSS00SS4A009-607	Acidification Area	MARSSIM Unit 4A	Surface Soil						X	X		
NFSS00SS4A010-608	Acidification Area	MARSSIM Unit 4A	Surface Soil	QC-609				X	X	X		
NFSS00SS4A011-610	Acidification Area	MARSSIM Unit 4A	Surface Soil						X	X		
NFSS00SS4A012-611	Acidification Area	MARSSIM Unit 4A	Surface Soil					X	X	X		
NFSS00SS4B001-612	Acidification Area	MARSSIM Unit 4B	Surface Soil			X			X	X		
NFSS00SS4B002-613	Acidification Area	MARSSIM Unit 4B	Surface Soil						X	X		
NFSS00SS4B003-614	Acidification Area	MARSSIM Unit 4B	Surface Soil	MS/MSD		X		X	X	X		
NFSS00SS4B004-615	Acidification Area	MARSSIM Unit 4B	Surface Soil			X			X	X		
NFSS00SS4B005-616	Acidification Area	MARSSIM Unit 4B	Surface Soil			X		X	X	X		
NFSS00SS4B006-617	Acidification Area	MARSSIM Unit 4B	Surface Soil			X			X	X		
NFSS00SS4C001-618	Acidification Area	MARSSIM Unit 4C	Surface Soil	MS/MSD		X	X	X	X	X		
NFSS00SS4D005-619	Acidification Area	MARSSIM Unit 4D	Surface Soil	QA		X	X	X	X	X		
NFSS00SS4D006-620	Acidification Area	MARSSIM Unit 4D	Surface Soil						X	X		
NFSS00SS4D007-621	Acidification Area	MARSSIM Unit 4D	Surface Soil	QC-622		X	X	X	X	X		
NFSS00SS4D008-623	Acidification Area	MARSSIM Unit 4D	Surface Soil	QC-624		X	X	X	X	X		

TABLE 6

SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED TO BOUND PHASE I FINDINGS
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters								
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SS4D009-625	Acidification Area	MARSSIM Unit 4D	Surface Soil						X	X		
NFSS00SS4D010-626	Acidification Area	MARSSIM Unit 4D	Surface Soil			X	X		X	X		
NFSS00SS4D011-627	Acidification Area	MARSSIM Unit 4D	Surface Soil						X	X		
NFSS00SS4D012-628	Acidification Area	MARSSIM Unit 4D	Surface Soil						X	X		
NFSS00SS4D013-629	Acidification Area	MARSSIM Unit 4D	Surface Soil			X	X		X	X		
NFSS00SS4D014-630	Acidification Area	MARSSIM Unit 4D	Surface Soil						X	X		
NFSS00SS4D015-631	Acidification Area	MARSSIM Unit 4F	Surface Soil	QC-632		X	X		X	X		
NFSS00SS4F001-633	Acidification Area	MARSSIM Unit 4F	Surface Soil				X		X	X		
NFSS00SS4F002-634	Acidification Area	MARSSIM Unit 4F	Surface Soil				X		X	X		
NFSS00SS4F003-635	Acidification Area	MARSSIM Unit 4F	Surface Soil				X		X	X		
NFSS00SS4F004-636	Acidification Area	MARSSIM Unit 4F	Surface Soil	MS/MSD			X		X	X		
NFSS00SS5A001-637	Acidification Area	MARSSIM Unit 4F	Surface Soil						X	X		
NFSS00SS5A002-638	Acidification Area	MARSSIM Unit 4F	Surface Soil						X	X		
NFSS00SS5A003-639	Acidification Area	MARSSIM Unit 4F	Surface Soil						X	X		
NFSS00SS5A004-640	Acidification Area	MARSSIM Unit 4F	Surface Soil						X	X		
NFSS00SS5A005-641	Acidification Area	MARSSIM Unit 4F	Surface Soil						X	X		
NFSS00SS5A006-642	Acidification Area	MARSSIM Unit 4F	Surface Soil						X	X		

TABLE 6

SURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED TO BOUND PHASE I FINDINGS
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters								
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SS5A007-643	Acidification Area	MARSSIM Unit 4F	Surface Soil						X	X		
NFSS00SS5A008-644	Acidification Area	MARSSIM Unit 4F	Surface Soil						X	X		

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 7

SUBSURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED TO BOUND PHASE I FINDINGS
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	Area of Investigation	Sample Location	Matrix	Field QC Duplicate, QA Split, or MS/MSD Samples	VOCs	SVOCs	Pesticides & PCBs	Metals	Radiological Isotopes	Total U	Gross a/b	Nitroaromatics
NFSS00SB2A001-X-645	Building 401 Area	MARSSIM Unit 2A	Subsurface Soil		X				X	X		
NFSS00SB2A002-X-646	Building 401 Area	MARSSIM Unit 2A	Subsurface Soil		X				X	X		
NFSS00SB2A003-X-647	Building 401 Area	MARSSIM Unit 2A	Subsurface Soil		X				X	X		
NFSS00SB2B001-X-648	Building 401 Area	MARSSIM Unit 2B	Subsurface Soil			X			X	X		
NFSS00SB2B002-X-649	Building 401 Area	MARSSIM Unit 2B	Subsurface Soil			X			X	X		
NFSS00SB2B003-X-650	Building 401 Area	MARSSIM Unit 2B	Subsurface Soil	QA		X			X	X		
NFSS00SB2B006-X-651	Building 401 Area	MARSSIM Unit 2B	Subsurface Soil		X				X	X		
NFSS00SB2C001-X-652	Building 401 Area	MARSSIM Unit 2C	Subsurface Soil		X				X	X		
NFSS00SB4D001-X-653	Acidification Area	MARSSIM Unit 4D	Subsurface Soil	QC-654	X	X			X	X		X
NFSS00SB4D002-X-655	Acidification Area	MARSSIM Unit 4D	Subsurface Soil		X	X			X	X		X
NFSS00SB4D003-X-656	Acidification Area	MARSSIM Unit 4D	Subsurface Soil		X	X			X	X		X
NFSS00SB4D004-X-657	Acidification Area	MARSSIM Unit 4D	Subsurface Soil		X				X	X		
NFSS00SB4D005-X-658	Acidification Area	MARSSIM Unit 4D	Subsurface Soil		X				X	X		
NFSS00SB4D006-X-659	Acidification Area	MARSSIM Unit 4D	Subsurface Soil	MS/MSD	X	X			X	X		

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 8

GROUNDWATER SAMPLE LOCATIONS AND ANALYSES REQUIRED TO BOUND PHASE I FINDINGS
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00GW2A001-X-660	Building 401 Area	MARSSIM Unit 2A	Groundwater	QA	X			X	X	X	X	
NFSS00GW2A002-X-661	Building 401 Area	MARSSIM Unit 2I	Groundwater		X				X	X	X	
NFSS00GW2A003-X-662	Building 401 Area	MARSSIM Unit 2A	Groundwater		X				X	X	X	
NFSS00GW2B006-X-663	Building 401 Area	MARSSIM Unit 2H	Groundwater		X				X	X	X	
NFSS00GW2C001-X-664	Building 401 Area	MARSSIM Unit 2H	Groundwater		X			X	X	X	X	
NFSS00GW4D001-X-665	Acidification Area	MARSSIM Unit 4C	Groundwater	QC-666	X	X		X	X	X	X	X
NFSS00GW4D002-X-667	Acidification Area	MARSSIM Unit 4D	Groundwater		X	X		X	X	X	X	X
NFSS00GW4D003-X-668	Acidification Area	MARSSIM Unit 4D	Groundwater		X	X		X	X	X	X	X
NFSS00GW4D004-X-669	Acidification Area	MARSSIM Unit 4D	Groundwater	MS/MSD	X	X			X	X	X	
NFSS00GW4D005-X-670	Acidification Area	MARSSIM Unit 4D	Groundwater		X	X			X	X	X	
NFSS00GW4D006-X-671	Acidification Area	MARSSIM Unit 4D	Groundwater		X	X		X	X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 9

SEDIMENT AND SURFACE WATER SAMPLE LOCATIONS AND ANALYSES REQUIRED TO BOUND PHASE I FINDINGS
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SD741-672	Onsite Ditches	South "O" Street Ditch	Sediment	QA, QC-673					X	X	X	
NFSS00SD742-674	Onsite Ditches	South "O" Street Ditch	Sediment	MS/MSD					X	X	X	
NFSS00SD743-675	Onsite Ditches	South "O" Street Ditch	Sediment						X	X	X	
NFSS00SD744-676	Onsite Ditches	South "O" Street Ditch	Sediment						X	X	X	
NFSS00SD745-677	Onsite Ditches	South "O" Street Ditch	Sediment						X	X	X	
NFSS00SW741-678	Onsite Ditches	South "O" Street Ditch	Surface Water	MS/MSD					X	X	X	
NFSS00SW742-679	Onsite Ditches	South "O" Street Ditch	Surface Water	QA					X	X	X	
NFSS00SW743-680	Onsite Ditches	South "O" Street Ditch	Surface Water						X	X	X	
NFSS00SW744-681	Onsite Ditches	South "O" Street Ditch	Surface Water	QC-682					X	X	X	
NFSS00SW745-683	Onsite Ditches	South "O" Street Ditch	Surface Water						X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 10

ADDITIONAL SURFACE SOIL, SUBSURFACE SOIL, AND GROUNDWATER SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					**Parameters**							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SS101-684	IWCS	West Property Line	Surface Soil						X	X		
NFSS00SS102-685	IWCS	West Property Line	Surface Soil			X		X	X	X		
NFSS00SS103-686	IWCS	West Property Line	Surface Soil					X	X	X		
NFSS00SS313-687	Shops Area	SE corner of "O" and Campbell Streets	Surface Soil	QA	X	X	X		X	X		
NFSS00SS422-688	Acidification Area	Panhandle South Property Line	Surface Soil						X	X		
NFSS00SS423-689	Acidification Area	Panhandle South Property Line	Surface Soil			X		X	X	X		
NFSS00SS424-690	Acidification Area	North Property Line	Surface Soil						X	X		
NFSS00SS425-691	Acidification Area	North Property Line	Surface Soil		X				X	X		X
NFSS00SS504-692	Baker Smith Area	Southeast Corner of Baker Smith Area	Surface Soil	QC-693		X		X	X	X		
NFSS00SS505-694	Baker Smith Area	Northwest Corner of Baker Smith Area	Surface Soil	QC-695,MS/MSD	X	X	X	X	X	X		X
NFSS00SS506-696	Baker Smith Area	Northeast Corner of Baker Smith Area	Surface Soil						X	X		
NFSS00SS605-697	Former Storage Area	Panhandle South Property Line	Surface Soil					X	X	X		
NFSS00SS606-698	Former Storage Area	Panhandle South Property Line	Surface Soil						X	X		
NFSS00SS607-699	Former Storage Area	Panhandle East Property Line	Surface Soil		X	X		X	X	X		
NFSS00SS813-700	Uninvestigated Area	South Property Line	Surface Soil					X	X	X		
NFSS00SS814-701	Uninvestigated Area	South Property Line	Surface Soil						X	X		
NFSS00SS815-702	Uninvestigated Area	South Property Line	Surface Soil						X	X		

TABLE 10

ADDITIONAL SURFACE SOIL, SUBSURFACE SOIL, AND GROUNDWATER SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters								
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SS816-703	Uninvestigated Area	South Property Line	Surface Soil			X		X	X	X		
NFSS00SS817-704	Uninvestigated Area	East Property Line	Surface Soil						X	X		
NFSS00SS818-705	Uninvestigated Area	Southeast of Building 401	Surface Soil						X	X		
NFSS00SS819-706	Uninvestigated Area	Southeast of Decon Pad	Surface Soil	QC-707, MS/MSD	X	X	X	X	X	X		X
NFSS00SS820-708	Uninvestigated Area	North of the IWCS	Surface Soil						X	X		
NFSS00SS821-709	Uninvestigated Area	West Property Line	Surface Soil						X	X		
NFSS00SS822-710	Uninvestigated Area	Northwest of "O" and Campbell Street Int	Surface Soil			X		X	X	X		
NFSS00SS823-711	Uninvestigated Area	North Property Line	Surface Soil						X	X		
NFSS00SS824-712	Uninvestigated Area	North Property Line	Surface Soil						X	X		
NFSS00SS825-713	Uninvestigated Area	North Property Line	Surface Soil	QA	X	X	X	X	X	X		X
NFSS00SB101-714	IWCS	West Property Line	Subsurface Soil						X	X		
NFSS00SB102-715	IWCS	West Property Line	Subsurface Soil			X		X	X	X		
NFSS00SB103-716	IWCS	West Property Line	Subsurface Soil					X	X	X		
NFSS00SB313-717	Shops Area	SE corner of "O" and Campbell Streets	Subsurface Soil	QA	X	X	X		X	X		
NFSS00SB422-718	Acidification Area	Panhandle South Property Line	Subsurface Soil						X	X		
NFSS00SB423-719	Acidification Area	Panhandle South Property Line	Subsurface Soil			X		X	X	X		
NFSS00SB424-720	Acidification Area	North Property Line	Subsurface Soil						X	X		

TABLE 10

ADDITIONAL SURFACE SOIL, SUBSURFACE SOIL, AND GROUNDWATER SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SB425-721	Acidification Area	North Property Line	Subsurface Soil		X				X	X		X
NFSS00SB504-722	Baker Smith Area	Southeast Corner of Baker Smith Area	Subsurface Soil	MS/MSD		X		X	X	X		
NFSS00SB505-723	Baker Smith Area	Northwest Corner of Baker Smith Area	Subsurface Soil	QC-724	X	X	X	X	X	X		X
NFSS00SB506-725	Baker Smith Area	Northeast Corner of Baker Smith Area	Subsurface Soil						X	X		
NFSS00SB605-726	Former Storage Area	Panhandle South Property Line	Subsurface Soil					X	X	X		
NFSS00SB606-727	Former Storage Area	Panhandle South Property Line	Subsurface Soil						X	X		
NFSS00SB607-728	Former Storage Area	Panhandle East Property Line	Subsurface Soil	QC-729	X	X		X	X	X		
NFSS00SB813-730	Uninvestigated Area	South Property Line	Subsurface Soil					X	X	X		
NFSS00SB814-731	Uninvestigated Area	South Property Line	Subsurface Soil						X	X		
NFSS00SB815-732	Uninvestigated Area	South Property Line	Subsurface Soil						X	X		
NFSS00SB816-733	Uninvestigated Area	South Property Line	Subsurface Soil	MS/MSD		X		X	X	X		
NFSS00SB817-734	Uninvestigated Area	East Property Line	Subsurface Soil						X	X		
NFSS00SB818-735	Uninvestigated Area	Southeast of Building 401	Subsurface Soil						X	X		
NFSS00SB819-736	Uninvestigated Area	Southeast of Decon Pad	Subsurface Soil	QA	X	X	X	X	X	X		X
NFSS00SB820-737	Uninvestigated Area	North of the IWCS	Subsurface Soil						X	X		
NFSS00SB821-738	Uninvestigated Area	West Property Line	Subsurface Soil						X	X		
NFSS00SB822-739	Uninvestigated Area	Northwest of "O" and Campbell Street Int	Subsurface Soil	MS/MSD		X		X	X	X		

TABLE 10

ADDITIONAL SURFACE SOIL, SUBSURFACE SOIL, AND GROUNDWATER SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SB823-740	Uninvestigated Area	North Property Line	Subsurface Soil						X	X		
NFSS00SB824-741	Uninvestigated Area	North Property Line	Subsurface Soil						X	X		
NFSS00SB825-742	Uninvestigated Area	North Property Line	Subsurface Soil	QC-743	X	X	X	X	X	X		X
NFSS00GW101-744	IWCS	West Property Line	Groundwater						X	X	X	
NFSS00GW102-745	IWCS	West Property Line	Groundwater			X		X	X	X	X	
NFSS00GW103-746	IWCS	West Property Line	Groundwater					X	X	X	X	
NFSS00GW313-747	Shops Area	SE corner of "O" and Campbell Streets	Groundwater	QA	X	X	X		X	X	X	
NFSS00GW422-748	Acidification Area	Panhandle South Property Line	Groundwater						X	X	X	
NFSS00GW423-749	Acidification Area	Panhandle South Property Line	Groundwater			X		X	X	X	X	
NFSS00GW424-750	Acidification Area	North Property Line	Groundwater						X	X	X	
NFSS00GW425-751	Acidification Area	North Property Line	Groundwater		X				X	X	X	X
NFSS00GW504-752	Baker Smith Area	Southeast Corner of Baker Smith Area	Groundwater	MS/MSD		X		X	X	X	X	
NFSS00GW506-753	Baker Smith Area	Northeast Corner of Baker Smith Area	Groundwater						X	X	X	
NFSS00GW605-754	Former Storage Area	Panhandle South Property Line	Groundwater					X	X	X	X	
NFSS00GW607-755	Former Storage Area	Panhandle East Property Line	Groundwater	QA	X	X		X	X	X	X	
NFSS00GW813-756	Uninvestigated Area	South Property Line	Groundwater					X	X	X	X	
NFSS00GW814-757	Uninvestigated Area	South Property Line	Groundwater						X	X	X	

TABLE 10

ADDITIONAL SURFACE SOIL, SUBSURFACE SOIL, AND GROUNDWATER SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters								
Sample Number	Area of Investigation	Sample Location	Matrix	Field QC Duplicate, QA Split, or MS/MSD Samples	VOCs	SVOCs	Pesticides & PCBs	Metals	Radiological Isotopes	Total U	Gross a/b	Nitroaromatics
NFSS00GW815-758	Uninvestigated Area	South Property Line	Groundwater						X	X	X	
NFSS00GW817-759	Uninvestigated Area	East Property Line	Groundwater						X	X	X	
NFSS00GW818-760	Uninvestigated Area	Southeast of Building 401	Groundwater						X	X	X	
NFSS00GW819-761	Uninvestigated Area	Southeast of Decon Pad	Groundwater	QC-762	X	X	X	X	X	X	X	X
NFSS00GW820-763	Uninvestigated Area	North of the IWCS	Groundwater						X	X	X	
NFSS00GW821-764	Uninvestigated Area	West Property Line	Groundwater						X	X	X	
NFSS00GW822-765	Uninvestigated Area	Northwest of "O" and Campbell Street Int	Groundwater	MS/MSD		X		X	X	X	X	
NFSS00GW823-766	Uninvestigated Area	North Property Line	Groundwater						X	X	X	
NFSS00GW824-767	Uninvestigated Area	North Property Line	Groundwater						X	X	X	
NFSS00GW825-768	Uninvestigated Area	North Property Line	Groundwater	QC-769	X	X	X	X	X	X	X	X

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 11

JUSTIFICATION FOR COLLECTION OF GROUNDWATER SAMPLES FROM INSTALLED WELLS
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Wells to be installed:

With the exceptions of well WO20S (located on the southern property line of the panhandle north of Modern Landfill) and the OW "B" series wells (located around the IWCS), there are no widely distributed upper water-bearing zone monitoring wells at the NFSS. The following table provides justification for placement of 15 wells in this water-bearing zone.

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
GW201A	Building 401 Area	Installed Upper Zone Well 201A	Groundwater	This proposed well is located southwest of Building 401. Phase I results of the temporary wellpoint installed in this location indicated VOCs exceeded the PRGs; gross alpha exceeded the MCL; radium-226 exceeded the one in one-hundred thousand (10^5) risk value for the radionuclides; and uranium-233/234 and uranium-238 exceeded the one in a million (10^6) risk values for the radionuclides in groundwater. This well will be installed and developed to determine if the constituents were in the groundwater or if they were in the turbid silt -laden fraction of the temporary wellpoint sample. The well will be installed within 10 feet to the northwest of the previous boring location.	Radiological Parameters VOCs
GW203A	Building 401 Area	Installed Upper Zone Well 203A	Groundwater	This proposed well is located south of Building 401. Phase I results of the temporary wellpoint installed in this location indicated VOCs exceeded the PRGs; gross alpha exceeded the MCL; radium-226, uranium-233/234, and uranium-238 exceeded the one in one-hundred thousand (10^5) risk values for the radionuclides in groundwater. This well will be installed and developed to determine if the constituents were in the groundwater or if they were in the turbid silt -laden fraction of the temporary wellpoint sample. The well will be installed within 10 feet to the northwest of the previous boring location.	Radiological Parameters VOCs
GW213A	Building 401 Area	Installed Upper Zone Well 213A	Groundwater	This proposed well is located north of Building 401 north of a former UST location. Phase I results of the temporary wellpoint installed in this location indicated VOCs and metals exceeded the PRGs; gross alpha exceeded the MCL; radium-226 and uranium-233/234 exceeded the one in one-hundred thousand (10^5) risk values for the radionuclides; and uranium-238 exceeded the one in million (10^6) risk values for the radionuclides in groundwater. This well will be installed and developed to determine if the constituents were in the groundwater or if they were in the turbid silt -laden fraction of the temporary wellpoint sample. The well will be installed within 10 feet to the northwest of the previous boring location.	Radiological Parameters VOCs Metals

TABLE 11

JUSTIFICATION FOR COLLECTION OF GROUNDWATER SAMPLES FROM INSTALLED WELLS
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
GW215A	Building 401 Area	Installed Upper Zone Well 215A	Groundwater	This proposed well is located northwest of Building 401 at the vault area. Phase I results of the temporary wellpoint installed in this location indicated VOCs and SVOCs exceeded the PRGs; gross alpha exceeded the MCL; and radium-226, uranium-233/234, uranium-235/236, and uranium-238 exceeded the one in million (10^6) risk values for the radionuclides in groundwater. This well will be installed and developed to determine if the constituents were in the groundwater or if they were in the turbid silt-laden fraction of the temporary wellpoint sample. The well will be installed within 10 feet to the northwest of the previous boring location.	Radiological Parameters SVOCs VOCs
GW302A	Shops Area	Installed Upper Zone Well 302A	Groundwater	This proposed well is located near the east property line west of Modern Landfill. Phase I results of the temporary wellpoint installed in this location indicated gross alpha exceeded the MCL; uranium-233/234and uranium-238 exceeded the one in one-hundred thousand (10^5) risk values for the radionuclides; and radium-226 and uranium-235 exceeded the one in million (10^6) risk values for the radionuclides in groundwater. This well will be installed and developed to determine if the constituents were in the groundwater or if they were in the turbid silt-laden fraction of the temporary wellpoint sample. The well will be installed within 10 feet to the northwest of the previous boring location.	Radiological Parameters
GW303A	Shops Area	Installed Upper Zone Well 303A	Groundwater	This proposed well is located south of “Z” Street near an area where the end of the fuel pipeline and potential UST are located. Phase I results of the temporary wellpoint installed in this location indicated VOCs exceeded the PRGs; gross alpha exceeded the MCL; uranium-233/234 and uranium-238 exceeded the one in one-hundred thousand (10^5) risk values for the radionuclides; and radium-226 exceeded the one in million (10^6) risk values for the radionuclides in groundwater. This well will be installed and developed to determine if the constituents were in the groundwater or if they were in the turbid silt-laden fraction of the temporary wellpoint sample. The well will be installed within 10 feet to the northwest of the previous boring location.	Radiological Parameters VOCs
GW404A	Acidification Area	Installed Upper Zone Well 404A	Groundwater	This proposed well is located on the west end of the acidification area east of Campbell Street and north of “O” Street. Phase I results of the temporary wellpoint installed in this location indicated gross alpha exceeded the MCL; uranium-233/234 and uranium-238 exceeded the one in one-hundred thousand (10^5) risk values for the radionuclides; and radium-226 and uranium-235/236 exceeded the one in million (10^6) risk values for the radionuclides in groundwater. This well will be installed and developed to determine if the constituents were in the groundwater or if they were in the turbid silt-laden fraction of the temporary wellpoint sample. The well will be installed within 10 feet to the northwest of the previous boring location.	Radiological Parameters

TABLE 11

JUSTIFICATION FOR COLLECTION OF GROUNDWATER SAMPLES FROM INSTALLED WELLS
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
GW411A	Acidification Area	Installed Upper Zone Well 411A	Groundwater	This proposed well is located north of the central acidification area north of "N" Street and west of Castle Garden Road. Phase I results of the temporary wellpoint installed in this location indicated metals exceeded the PRGs; gross alpha exceeded the MCL; radium-226 exceeded the one in one-hundred thousand (10^5) risk values for the radionuclides; and thorium-228, thorium-230, thorium-232, uranium-233/234, and uranium-238 exceeded the one in million (10^6) risk values for the radionuclides in groundwater. This well will be installed and developed to determine if the constituents were in the groundwater or if they were in the turbid silt-laden fraction of the temporary wellpoint sample. The well will be installed within 10 feet to the north of the previous boring location.	Radiological Parameters Metals
GW415A	Acidification Area	Installed Upper Zone Well 415A	Groundwater	This proposed well is located in the central acidification area east of the Castle Garden Road cut through. Phase I results of the temporary wellpoint installed in this location indicated VOCs, SVOCs, and metals exceeded the PRGs; gross alpha exceeded the MCL; uranium-233/234 exceeded the one in one-hundred thousand (10^5) risk values for the radionuclides; and radium-226 and uranium-238 exceeded the one in million (10^6) risk values for the radionuclides in groundwater. This well will be installed and developed to determine if the constituents were in the groundwater or if they were in the turbid silt-laden fraction of the temporary wellpoint sample. The well will be installed within 10 feet of the previous boring location. Due to the large dilutions of the samples from Phase I, all parameters will be recollected and reanalyzed.	Radiological Parameters VOCs SVOCs Pesticides and PCBs Metals Nitroaromatics
GW505	Baker Smith Area	Installed Upper Zone Well 505	Groundwater	This proposed well is located in the northwestern corner of the Baker Smith area immediately south of the property line with the Town of Lewiston wastewater treatment plant (WWTP). The WWTP formerly was constructed and operated for the LOOW. This location is northwest of the buildings in which radioactive residues were stored. This area is several hundred yards southwest of the nitrification houses of the former LOOW. Samples of groundwater from the permanent wells located in the lower and bedrock zones indicated elevated VOCs and metals. Samples from the upper temporary wellpoints (502 and 503) located southeast of the proposed location exhibited elevated gross alpha and radionuclides. The WWTP collected all the wastewater from sanitary and process sewers form the LOOW.	Radiological Parameters VOCs Metals

TABLE 11

JUSTIFICATION FOR COLLECTION OF GROUNDWATER SAMPLES FROM INSTALLED WELLS
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
GW603A	Former Storage Area	Installed Upper Zone Well 603A	Groundwater	This proposed well is located in the northeast portion of the site at the location of the former residue storage tower. Phase I results of the temporary wellpoint installed in this location indicated gross alpha exceeded the MCL; radium-226 exceeded the one in one-hundred thousand (10^5) risk values for the radionuclides; and uranium-233/234 and uranium-238 exceeded the one in million (10^6) risk values for the radionuclides in groundwater. This well will be installed and developed to determine if the constituents were in the groundwater or if they were in the turbid silt-laden fraction of the temporary wellpoint sample. The well will be installed within 10 feet to the northwest of the previous boring location.	Radiological Parameters
GW606	Former Storage Area	Installed Upper Zone Well 606	Groundwater	This proposed well is located near the Modern Landfill property line southeast of the former radiological residue storage tower location at the southeastern corner of the panhandle. This general area is also southeast of the former "thaw house" where drums of residue were offloaded from rail cars and may have been placed on the edges of the roadway.	Radiological Parameters
GW808A	Uninvestigated Area	Installed Upper Zone Well 808A	Groundwater	This proposed well is located in the north central portion of the site east of Lutts Road between "O" and "N" Streets. Phase I results of the temporary wellpoint installed in this location indicated gross alpha exceeded the MCL; uranium-233/234 and uranium-238 exceeded the one in one-hundred thousand (10^5) risk values for the radionuclides; and radium-226 exceeded the one in million (10^6) risk values for the radionuclides in groundwater. This well will be installed and developed to determine if the constituents were in the groundwater or if they were in the turbid silt-laden fraction of the temporary wellpoint sample. The well will be installed approximately 75 feet to the west-northwest of the previous boring location.	Radiological Parameters
GW810A	Uninvestigated Area	Installed Upper Zone Well 810A	Groundwater	This proposed well is located south of "N" Street east of the Central ditch. Phase I results of the temporary wellpoint installed in this location indicated VOCs exceeded the PRGs and radium-226 exceeded the one in one-hundred thousand (10^5) risk values for the radionuclides in groundwater. This well will be installed and developed to determine if the constituents were in the groundwater or if they were in the turbid silt-laden fraction of the temporary wellpoint sample. The well will be installed within 30 feet to the north of the previous boring location. Additionally, this location is southeast of BH50 (in the lower zone) where samples indicated VOCs, SVOCs, and metals were found in concentrations over the PRGs.	Radiological Parameters VOCs SVOCs Metals

TABLE 11

JUSTIFICATION FOR COLLECTION OF GROUNDWATER SAMPLES FROM INSTALLED WELLS
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
GW816	Uninvestigated Area	Installed Upper Zone Well 816	Groundwater	This proposed well is located at the southeastern property corner of the NFSS northeast of the Modern Landfill leachate collection system and storage tanks. No radiological data was collected in this area during the Phase I RI. This area may be a potential background location for the NFSS. This location is needed to bound the variability in sample data and will be used in the Upper Confidence Level mean calculation. This calculation estimates exposure in an exposure unit in the risk assessment.	Radiological Parameters SVOCs Metals

TABLE 12

INSTALLED WELL GROUNDWATER SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	Area of Investigation	Sample Location	Matrix	Field QC Duplicate, QA Split, or MS/MSD Samples	VOCs	SVOCs	Pesticides & PCBs	Metals	Radiological Isotopes	Total U	Gross a/b	Nitroaromatics
NFSS00GW201A-773	Building 401 Area	Installed Upper Zone Well 201A	Groundwater		X				X	X	X	
NFSS00GW203A-774	Building 401 Area	Installed Upper Zone Well 203A	Groundwater		X				X	X	X	
NFSS00GW213A-775	Building 401 Area	Installed Upper Zone Well 213A	Groundwater	QA	X			X	X	X	X	
NFSS00GW215A-776	Building 401 Area	Installed Upper Zone Well 215A	Groundwater			X			X	X	X	
NFSS00GW302A-777	Shops Area	Installed Upper Zone Well 302A	Groundwater						X	X	X	
NFSS00GW303A-778	Shops Area	Installed Upper Zone Well 303A	Groundwater		X				X	X	X	
NFSS00GW404A-779	Acidification Area	Installed Upper Zone Well 404A	Groundwater						X	X	X	
NFSS00GW411A-780	Acidification Area	Installed Upper Zone Well 411A	Groundwater						X	X	X	
NFSS00GW415A-781	Acidification Area	Installed Upper Zone Well 415A	Groundwater	QC-782,MS/MSD	X	X	X	X	X	X	X	X
NFSS00GW505-783	Baker Smith Area	Installed Upper Zone Well 505	Groundwater	QC-784	X	X	X	X	X	X	X	X
NFSS00GW603A-785	Former Storage Area	Installed Upper Zone Well 603A	Groundwater						X	X	X	
NFSS00GW606-786	Former Storage Area	Installed Upper Zone Well 606	Groundwater						X	X	X	
NFSS00GW808A-787	Uninvestigated Area	Installed Upper Zone Well 808A	Groundwater						X	X	X	
NFSS00GW810A-788	Uninvestigated Area	Installed Upper Zone Well 810A	Groundwater		X				X	X	X	
NFSS00GW816-789	Uninvestigated Area	Installed Upper Zone Well 816	Groundwater	QA		X		X	X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 13

JUSTIFICATION FOR COLLECTION OF GROUNDWATER SAMPLES FROM EXISTING WELLS
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Existing wells to be sampled:

One of the project objectives is to determine if contaminants are migrating in or out of the IWCS. During Phase I of the RI at the NFSS, seven upper water-bearing zone wells, ten lower water-bearing zone wells, and two bedrock zone wells around the IWCS were sampled. Phenomenon such as the groundwater profiles and the results of the Phase I sampling indicate that additional existing wells should be sampled to further define the presence or absence and the extent of some of the contaminants found. The following table provides justification for sampling of 15 additional existing wells surrounding the IWCS.

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
BH49A	IWCS	Upper Zone Well BH49A	Groundwater	This well provides coverage of the upper water-bearing zone north-northwest of the IWCS. Samples from the lower water-bearing zone exhibited low levels of VOCs. Sampling of this well may help to confirm the reported connectivity of the two zones and will investigate if VOCs are present in the upper zone.	Radiological Parameters VOCs
OW01A	IWCS	Lower Zone Well OW01A	Groundwater	This well is located on the west side of the IWCS south of A42 (in the lower zone) and north of A43 (in the upper zone). Samples from A42 and A43 indicated elevated radiological activity (greater than the PRGs). Sampling of this well may determine the extent of radionuclides present in the lower zone and in conjunction with the upper zone well OW01B may help to confirm the reported connectivity of the two zones.	Radiological Parameters
OW01B	IWCS	Upper Zone Well OW01B	Groundwater	This well is located on the west side of the IWCS south of A42 (in the lower zone) and north of A43 (in the upper zone). Samples from A42 and A43 indicated elevated radiological activity (greater than the PRGs). Sampling of this well may determine the extent of radionuclides present in the upper zone and may in conjunction with the upper zone well OW01A help to confirm the reported connectivity of the two zones.	Radiological Parameters
OW02A	IWCS	Lower Zone Well OW02A	Groundwater	This well is located on the west side of the IWCS north of A42 (in the lower zone). Samples from A42 indicated elevated radiological activity (greater than the PRGs). Sampling of this well may determine the extent of radionuclides present in the lower zone and in conjunction with the upper zone well OW02B may help to confirm the reported connectivity of the two zones.	Radiological Parameters
OW02B	IWCS	Upper Zone Well OW02B	Groundwater	This well is located on the west side of the IWCS north of A42 (in the lower zone). Samples from A42 indicated elevated radiological activity (greater than the PRGs). Sampling of this well may determine the presence or absence of radionuclides present in the upper zone and in conjunction with the upper zone well OW02A may help to confirm the reported connectivity of the two zones.	Radiological Parameters

TABLE 13

JUSTIFICATION FOR COLLECTION OF GROUNDWATER SAMPLES FROM EXISTING WELLS
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
OW07A	IWCS	Lower Zone Well OW07A	Groundwater	This well is located on the south side of the IWCS in the lower zone. Sampling of this well may determine the presence or absence of radionuclides present in the lower zone.	Radiological Parameters
OW08A	IWCS	Lower Zone Well OW08A	Groundwater	This well is lo cated east of the IWCS. Sampling of this well may determine the presence or absence of radionuclides present in the lower zone and in conjunction with the upper zone well OW08B may help to confirm the reported connectivity of the two zones.	Radiological Parameters
OW08B	IWCS	Upper Zone Well OW08B	Groundwater	This well is located east of the IWCS. Sampling of this well may determine the presence or absence of radionuclides present in the upper zone and in conjunction with the upper zone well OW08A may help to confirm the reported connectivity of the two zones.	Radiological Parameters
OW09A	IWCS	Lower Zone Well OW09A	Groundwater	This well is located east of the IWCS. Sampling of this well may determine the presence or absence of radionuclides present in the lower zone and in conjunction with the lower zone well OW09B may help to confirm the reported connectivity of the two zones.	Radiological Parameters
OW09B	IWCS	Upper Zone Well OW09B	Groundwater	This well is located east of the IWCS. Groundwater maps from November of 1999 indicated that this well was a sink. This indication may suggest an interconnection with the surface water in the Central ditch. Sampling of this well may determine the presence or absence of radionuclides present in the upper zone and in conjunction with the upper zone well OW09A may help to confirm the reported connectivity of the two zones. Additionally, this well is located west of sample location GW215, which exhibited SVOCs over the screening values.	Radiological Parameters SVOCs
OW10B	IWCS	Upper Zone Well OW10B	Groundwater	This well is located east of the IWCS and northwest (probable downstream) of the decontamination pad. Sampling of this well may determine the presence or absence of radionuclides present in the upper zone and may determine if the washing of equipment and machinery from the decontamination pad has impacted the upper groundwater zone.	Radiological Parameters VOCs SVOCs Pesticides and PCBs Metals Nitroaromatics
OW11B	IWCS	Upper Zone Well OW11B	Groundwater	This well is located east of the IWCS and southwest of the decontamination pad. Sampling of this well may determine the presence or absence of radionuclides present in the upper zone.	Radiological Parameters
OW12B	IWCS	Upper Zone Well OW12B	Groundwater	This well is located east of the IWCS at its southern end. Sampling of this well may determine the presence or absence of radionuclides present in the upper zone.	Radiological Parameters
OW13A	IWCS	Lower Zone Well OW13A	Groundwater	This well is located on the south side of the IWCS in the lower zone. Sampling of this well may determine the presence or absence of radionuclides present in the lower zone.	Radiological Parameters

TABLE 13

JUSTIFICATION FOR COLLECTION OF GROUNDWATER SAMPLES FROM EXISTING WELLS
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
OW15B	IWCS	Upper Zone Well OW15B	Groundwater	This well is located west of the IWCS west of A42 (in the lower zone) and north of A43 (in the upper zone). Samples from A43 indicated elevated radiological activity (greater than the PRGs). Sampling of this well may determine the extent of radionuclides present in the upper zone.	Radiological Parameters

TABLE 14

EXISTING WELL GROUNDWATER SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					**Parameters**							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00BH49A-790	IWCS	Upper Zone Well BH49A	Groundwater	QC-791	X				X	X	X	
NFSS00OW01A-792	IWCS	Lower Zone Well OW01A	Groundwater						X	X	X	
NFSS00OW01B-793	IWCS	Upper Zone Well OW01B	Groundwater						X	X	X	
NFSS00OW02A-794	IWCS	Lower Zone Well OW02A	Groundwater						X	X	X	
NFSS00OW02B-795	IWCS	Upper Zone Well OW02B	Groundwater						X	X	X	
NFSS00OW07A-796	IWCS	Lower Zone Well OW07A	Groundwater						X	X	X	
NFSS00OW08A-797	IWCS	Lower Zone Well OW08A	Groundwater						X	X	X	
NFSS00OW08B-798	IWCS	Upper Zone Well OW08B	Groundwater						X	X	X	
NFSS00OW09A-799	IWCS	Lower Zone Well OW09A	Groundwater						X	X	X	
NFSS00OW09B-800	IWCS	Upper Zone Well OW09B	Groundwater			X			X	X	X	
NFSS00OW10B-801	IWCS	Upper Zone Well OW10B	Groundwater	QC - 802,MS/MSD	X	X	X	X	X	X	X	X
NFSS00OW11B-803	IWCS	Upper Zone Well OW10B	Groundwater						X	X	X	
NFSS00OW12B-804	IWCS	Upper Zone Well OW12B	Groundwater						X	X	X	
NFSS00OW13A-805	IWCS	Lower Zone Well OW13A	Groundwater						X	X	X	
NFSS00OW15B-806	IWCS	Upper Zone Well OW15B	Groundwater						X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 15

BACKGROUND SURFACE SOIL, SUBSURFACE SOIL, AND GROUNDWATER SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	Area of Investigation	Sample Location	Matrix	Field QC Duplicate, QA Split, or MS/MSD Samples	VOCs	SVOCs	Pesticides & PCBs	Metals	Radiological Isotopes	Total U	Gross a/b	Nitroaromatics
NFSS00SSB001-807	Background	TBD	Surface Soil			X		X	X	X	X	
NFSS00SSB002-808	Background	TBD	Surface Soil	QC-809		X		X	X	X	X	
NFSS00SSB003-810	Background	TBD	Surface Soil			X		X	X	X	X	
NFSS00SSB004-811	Background	TBD	Surface Soil			X		X	X	X	X	
NFSS00SSB005-812	Background	TBD	Surface Soil			X		X	X	X	X	
NFSS00SSB006-813	Background	TBD	Surface Soil			X		X	X	X	X	
NFSS00SSB007-814	Background	TBD	Surface Soil	QC-815		X		X	X	X	X	
NFSS00SSB008-816	Background	TBD	Surface Soil			X		X	X	X	X	
NFSS00SSB009-817	Background	TBD	Surface Soil			X		X	X	X	X	
NFSS00SSB010-818	Background	TBD	Surface Soil			X		X	X	X	X	
NFSS00SSB011-819	Background	TBD	Surface Soil			X		X	X	X	X	
NFSS00SSB012-820	Background	TBD	Surface Soil	QA		X		X	X	X	X	
NFSS00SSB013-821	Background	TBD	Surface Soil	MS/MSD		X		X	X	X	X	
NFSS00SSB014-822	Background	TBD	Surface Soil			X		X	X	X	X	
NFSS00SSB015-823	Background	TBD	Surface Soil			X		X	X	X	X	
NFSS00SBBW01-824	Background	TBD	Subsurface Soil	QA				X	X	X	X	
NFSS00SBBW02-825	Background	TBD	Subsurface Soil					X	X	X	X	

TABLE 15

BACKGROUND SURFACE SOIL, SUBSURFACE SOIL, AND GROUNDWATER SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	Area of Investigation	Sample Location	Matrix	Field QC Duplicate, QA Split, or MS/MSD Samples	VOCs	SVOCs	Pesticides & PCBs	Metals	Radiological Isotopes	Total U	Gross a/b	Nitroaromatics
NFSS00SBBW03-826	Background	TBD	Subsurface Soil	QC-826				X	X	X	X	
NFSS00SBBW04-828	Background	TBD	Subsurface Soil					X	X	X	X	
NFSS00SBBW05-829	Background	TBD	Subsurface Soil					X	X	X	X	
NFSS00SBBW06-830	Background	TBD	Subsurface Soil					X	X	X	X	
NFSS00SBBW07-831	Background	TBD	Subsurface Soil					X	X	X	X	
NFSS00SBBW08-832	Background	TBD	Subsurface Soil					X	X	X	X	
NFSS00SBBW09-833	Background	TBD	Subsurface Soil					X	X	X	X	
NFSS00SBBW010-834	Background	TBD	Subsurface Soil	MS/MSD				X	X	X	X	
NFSS00GWBW01-835	Background	TBD-Bedrock Well	Groundwater					X	X	X	X	
NFSS00GWBW02-836	Background	TBD-Bedrock Well	Groundwater					X	X	X	X	
NFSS00GWBW03-837	Background	TBD-Lower Zone Well	Groundwater					X	X	X	X	
NFSS00GWBW04-838	Background	TBD-Lower Zone Well	Groundwater	QA				X	X	X	X	
NFSS00GWBW05-839	Background	TBD-Lower Zone Well	Groundwater					X	X	X	X	
NFSS00GWBW06-840	Background	TBD-Upper Zone Well	Groundwater					X	X	X	X	
NFSS00GWBW07-841	Background	TBD-Upper Zone Well	Groundwater	QC-842				X	X	X	X	
NFSS00GWBW08-843	Background	TBD-Upper Zone Well	Groundwater					X	X	X	X	
NFSS00GWBW09-844	Background	TBD-Upper Zone Well	Groundwater	MS/MSD				X	X	X	X	

TABLE 15

BACKGROUND SURFACE SOIL, SUBSURFACE SOIL, AND GROUNDWATER SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00GWBW010-845	Background	TBD-Upper Zone Well	Groundwater					X	X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 16

OFFSITE SURFACE SOIL, SEDIMENT, AND SURFACE WATER SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					**Parameters**							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SS901-846	Offsite	Offsite property to the west of the NFSS	Surface Soil						X	X	X	
NFSS00SS902-847	Offsite	Offsite property to the west of the NFSS	Surface Soil			X		X	X	X	X	
NFSS00SS903-848	Offsite	Offsite property to the west of the NFSS	Surface Soil					X	X	X	X	
NFSS00SS904-849	Offsite	Offsite property to the west of the NFSS	Surface Soil						X	X	X	
NFSS00SS905-850	Offsite	Offsite property to the west of the NFSS	Surface Soil						X	X	X	
NFSS00SS906-851	Offsite	Offsite property to the west of the NFSS	Surface Soil						X	X	X	
NFSS00SS907-852	Offsite	Offsite property to the west of the NFSS	Surface Soil						X	X	X	
NFSS00SS908-853	Offsite	Offsite property to the west of the NFSS	Surface Soil	QA	X	X	X		X	X	X	
NFSS00SS909-854	Offsite	Offsite property to the west of the NFSS	Surface Soil						X	X	X	
NFSS00SS910-855	Offsite	Offsite property to the west of the NFSS	Surface Soil						X	X	X	
NFSS00SS911-856	Offsite	Offsite property to the west of the NFSS	Surface Soil			X		X	X	X	X	
NFSS00SS912-857	Offsite	Offsite property to the west of the NFSS	Surface Soil						X	X	X	
NFSS00SS913-858	Offsite	Offsite property to the west of the NFSS	Surface Soil		X				X	X	X	X
NFSS00SS914-859	Offsite	Offsite property to the west of the NFSS	Surface Soil	QC-860		X		X	X	X	X	
NFSS00SS915-861	Offsite	Offsite property to the west of the NFSS	Surface Soil	QC-862	X	X	X	X	X	X	X	X
NFSS00SS916-863	Offsite	Offsite property to the west of the NFSS	Surface Soil						X	X	X	
NFSS00SS917-864	Offsite	Offsite property to the west of the NFSS	Surface Soil					X	X	X	X	

TABLE 16

OFFSITE SURFACE SOIL, SEDIMENT, AND SURFACE WATER SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters								
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SS918-865	Offsite	Offsite property to the west of the NFSS	Surface Soil						X	X	X	
NFSS00SS919-866	Offsite	Offsite property to the west of the NFSS	Surface Soil	MS/MSD	X	X		X	X	X	X	
NFSS00SS920-867	Offsite	Offsite property to the west of the NFSS	Surface Soil					X	X	X	X	
NFSS00SD901-868	Offsite	West Ditch	Sediment						X	X	X	
NFSS00SD902-869	Offsite	West Ditch	Sediment						X	X	X	
NFSS00SD903-870	Offsite	West Ditch	Sediment						X	X	X	
NFSS00SD904-871	Offsite	West Ditch	Sediment						X	X	X	
NFSS00SW901-872	Offsite	West Ditch	Surface Water						X	X	X	
NFSS00SW902-873	Offsite	West Ditch	Surface Water						X	X	X	
NFSS00SW903-874	Offsite	West Ditch	Surface Water						X	X	X	
NFSS00SW904-875	Offsite	West Ditch	Surface Water						X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 17

SURFACE SOIL SAMPLE LOCATIONS PLACED BY THE GAMMA WALKOVER SURVEY AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					**Parameters**								
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SSXXXXX-876	TBD	TBD	Surface Soil	QC-877					X	X	X	
NFSS00SSXXXXX-878	TBD	TBD	Surface Soil	QC-879					X	X	X	
NFSS00SSXXXXX-880	TBD	TBD	Surface Soil	QC-881					X	X	X	
NFSS00SSXXXXX-882	TBD	TBD	Surface Soil	QC-883					X	X	X	
NFSS00SSXXXXX-884	TBD	TBD	Surface Soil	QC-885					X	X	X	
NFSS00SSXXXXX-886	TBD	TBD	Surface Soil	QC-887					X	X	X	
NFSS00SSXXXXX-888	TBD	TBD	Surface Soil	QC-889					X	X	X	
NFSS00SSXXXXX-890	TBD	TBD	Surface Soil	QC-891					X	X	X	
NFSS00SSXXXXX-892	TBD	TBD	Surface Soil	QA					X	X	X	
NFSS00SSXXXXX-893	TBD	TBD	Surface Soil	QA					X	X	X	
NFSS00SSXXXXX-894	TBD	TBD	Surface Soil	QA					X	X	X	
NFSS00SSXXXXX-895	TBD	TBD	Surface Soil	QA					X	X	X	
NFSS00SSXXXXX-896	TBD	TBD	Surface Soil	MS/MSD					X	X	X	
NFSS00SSXXXXX-897	TBD	TBD	Surface Soil	MS/MSD					X	X	X	
NFSS00SSXXXXX-898	TBD	TBD	Surface Soil	MS/MSD					X	X	X	
NFSS00SSXXXXX-899	TBD	TBD	Surface Soil	MS/MSD					X	X	X	
NFSS00SSXXXXX-900	TBD	TBD	Surface Soil						X	X	X	

TABLE 17

SURFACE SOIL SAMPLE LOCATIONS PLACED BY THE GAMMA WALKOVER SURVEY AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters								
Sample Number	Area of Investigation	Sample Location	Matrix	Field QC Duplicate, QA Split, or MS/MSD Samples	VOCs	SVOCs	Pesticides & PCBs	Metals	Radiological Isotopes	Total U	Gross a/b	Nitroaromatics
NFSS00SSXXXXX-901	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-902	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-903	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-904	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-905	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-906	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-907	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-908	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-909	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-910	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-911	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-912	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-913	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-914	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-915	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-916	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-917	TBD	TBD	Surface Soil						X	X	X	

TABLE 17

SURFACE SOIL SAMPLE LOCATIONS PLACED BY THE GAMMA WALKOVER SURVEY AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	Area of Investigation	Sample Location	Matrix	Field QC Duplicate, QA Split, or MS/MSD Samples	VOCs	SVOCs	Pesticides & PCBs	Metals	Radiological Isotopes	Total U	Gross a/b	Nitroaromatics
NFSS00SSXXXXX-918	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-919	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-920	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-921	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-922	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-923	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-924	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-925	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-926	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-927	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-928	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-929	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-930	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-931	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-932	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-933	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-934	TBD	TBD	Surface Soil						X	X	X	

TABLE 17

SURFACE SOIL SAMPLE LOCATIONS PLACED BY THE GAMMA WALKOVER SURVEY AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SSXXXXX-935	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-936	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-937	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-938	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-939	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-940	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-941	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-942	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-943	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-944	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-945	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-946	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-947	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-948	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-949	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-950	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-951	TBD	TBD	Surface Soil						X	X	X	

TABLE 17

SURFACE SOIL SAMPLE LOCATIONS PLACED BY THE GAMMA WALKOVER SURVEY AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters								
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00SSXXXXX-952	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-953	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-954	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-955	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-956	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-957	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-958	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-959	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-960	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-961	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-962	TBD	TBD	Surface Soil						X	X	X	
NFSS00SSXXXXX-963	TBD	TBD	Surface Soil						X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 18

JUSTIFICATION FOR COLLECTION OF ROADWAY CORE SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

<u>Cores of roadway material to be sampled:</u>

During Phase I activities it was discovered that many of the roadways at the NFSS seemed to have multiple layers of asphalt. As walkover surveys were done at the NFSS over the roads, it was brought to the USACE's attention that some of the lower asphalt layers seemed to have elevated gamma activity. In historical documents, it was reported that the roadways that were used as temporary storage areas had been "washed" to clean up any radioactivity. Cleanup activity and confirmatory sampling result documentation was not found in the historical documents. Also, in places where remedial activities have taken place, portions of the asphalt roadways were replaced with gravel roadways. In order to investigate the multiple layers of roadway, the following locations shown in the table below are chosen to be further investigated. These locations will be cored with a large diameter coring bit and samples will be collected for analyses for the radiological parameters. The following table provides justification for sampling of 14 roadway cores around the NFSS.

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
RC-01	Uninvestigated Area	Near 50,000 cps screening location	Asphalt Road / Gravel Underlayment	This sample point is located in the center of Campbell Street near the entrance to the NFSS. This area is located near the former guard shack where the walkover survey exhibited elevated gamma readings.	Radiological Parameters
RC-02	Building 401 Area	Near 70,000 cps screening location	Asphalt Road / Gravel Underlayment	This sample point is located in the center of Campbell Street between Building 429 and Building 403. This area is located near the ditch where the walkover survey exhibited elevated gamma readings.	Radiological Parameters
RC-03	Building 401 Area	East property line near Modern Landfill	Asphalt Road / Gravel Underlayment	This sample point is located in the center of Castle Garden Road at the former intersection of Vine Street at the east property line. This area was the location of a former railroad crossing and was reported to have been used as temporary storage of drummed radiological residues.	Radiological Parameters
RC-04	Shops Area	In the central area of the NFSS	Asphalt Road / Gravel Underlayment	This sample point is located in the center of Campbell Street at one of the numerous "speed bumps" (potential locations of underground utility crossings) north of "Z" street. This location is a potential haul route from some of the reported various remedial activities that have taken place at the NFSS.	Radiological Parameters
RC-05	Baker Smith Area	South east corner of the Baker Smith area	Asphalt Road / Gravel Underlayment	This sample point is located in the center of the West Patrol Road at the probable driveway entrance to the Baker-Smith area. The Baker Smith area was a former radioactive residue storage location. This area was a potential haul road for radioactive residues that were unloaded from platforms located north to the Baker Smith area. A former rail line was located north of the proposed sample location.	Radiological Parameters
RC-06	Uninvestigated Area	East of the Baker Smith area	Asphalt Road / Gravel Underlayment	This sample point is located in the center of Lutts Road at the former railroad crossing north of "O" street. This rail line was connected to the unloading platforms north of the Baker Smith area where radioactive residues were offloaded prior to storage. This area could have been a potential haul road for the radioactive residues.	Radiological Parameters

TABLE 18

JUSTIFICATION FOR COLLECTION OF ROADWAY CORE SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
RC-07	Acidification Area	In the central area of the NFSS	Asphalt Road / Gravel Underlayment	This sample point is located in the center of the crossroads of Campbell Street and "O" Street. This location is a potential haul route from some of the reported various remedial activities that have taken place at the NFSS.	Radiological Parameters
RC-08	Shops Area	East property line near the panhandle	Asphalt Road / Gravel Underlayment	This sample point is located in the center of Castle Garden Road south of "O" Street at the former railroad crossing. The rail line carried radioactive residue for storage in the combined shops building located to the west of the sample point. Additionally, gamma walkover surveys indicated elevated readings over the roadway in this area of the NFSS.	Radiological Parameters
RC-09	Former Storage Area	Southern property line on the panhandle	Asphalt Road / Gravel Underlayment	This sample point is located in the center of "O" Street at the former intersection of Vine Street at the south property line. This area was the location of a former railroad crossing and was reported to have been used as temporary storage of drummed radiological residues.	Radiological Parameters
RC-10	Former Storage Area	Southeast corner of the panhandle	Asphalt Road / Gravel Underlayment	This sample point is located in the center of MacArthur Street north of "O" Street where a former railroad crossing was located. This area was reported to have been used as temporary storage of drummed radiological residues. The former tower location where the K-65 radioactive residue was stored was located to the northwest of this sample point.	Radiological Parameters
RC-11	Acidification Area	In the north central area of the NFSS	Asphalt Road / Gravel Underlayment	This sample point is located in the center of "N" Street at the intersection of the driveway that led to the former radium vault. This roadway could have been used as a haul route for radioactive materials from some of the reported various remedial activities that have taken place at the NFSS.	Radiological Parameters
RC-12	Former Storage Area	North central area of the panhandle	Asphalt Road / Gravel Underlayment	This sample point is located in the center of "N" Street northwest of the former tower location where the K-65 radioactive residue was stored where the asphalt roadway has been replaced with a gravel roadway. This area has reportedly been remediated but no confirmatory sampling documentation has been found.	Radiological Parameters
RC-13	Former Storage Area	North central area of the panhandle	Asphalt Road / Gravel Underlayment	This sample point is located in the center of "N" Street northeast of the former tower location where the K-65 radioactive residue was stored where the asphalt roadway has been replaced with a gravel roadway. This area has reportedly been remediated but no confirmatory sampling documentation has been found.	Radiological Parameters
RC-14	Former Storage Area	East property line in the panhandle	Asphalt Road / Gravel Underlayment	This sample point is located in the center of MacArthur Street south of "N" Street where a former railroad crossing was located. This area was reported to have been used as temporary storage of drummed radiological residues. The former tower location where the K-65 radioactive residue was stored was located to the southwest of this sample point.	Radiological Parameters

TABLE 19

ROADWAY CORE SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters								
Sample Number	Area of Investigation	Sample Location	Matrix	Field QC Duplicate, QA Split, or MS/MSD Samples	VOCs	SVOCs	Pesticides & PCBs	Metals	Radiological Isotopes	Total U	Gross a/b	Nitroaromatics
NFSS00RC01-964	Uninvestigated Area	Near 50,000 cps screening location	Asphalt Road / Underlayment						X	X	X	
NFSS00RC02-965	Building 401 Area	Near 70,000 cps screening location	Asphalt Road / Underlayment						X	X	X	
NFSS00RC03-966	Building 401 Area	East property line near Modern Landfill	Asphalt Road / Underlayment	QC-967					X	X	X	
NFSS00RC04-968	Shops Area	In the central area of the NFSS	Asphalt Road / Underlayment	QA					X	X	X	
NFSS00RC05-969	Baker Smith Area	South east corner of the Baker Smith area	Asphalt Road / Underlayment						X	X	X	
NFSS00RC06-970	Uninvestigated Area	East of the Baker Smith area	Asphalt Road / Underlayment						X	X	X	
NFSS00RC07-971	Acidification Area	In the central area of the NFSS	Asphalt Road / Underlayment						X	X	X	
NFSS00RC08-972	Shops Area	East property line near the panhandle	Asphalt Road / Underlayment						X	X	X	
NFSS00RC09-973	Former Storage Area	Southern property line on the panhandle	Asphalt Road / Underlayment	MS/MSD					X	X	X	
NFSS00RC10-974	Former Storage Area	Southeast corner of the panhandle	Asphalt Road / Underlayment	QC-975					X	X	X	
NFSS00RC11-976	Acidification Area	In the north central area of the NFSS	Asphalt Road / Underlayment						X	X	X	
NFSS00RC12-977	Former Storage Area	North central area of the panhandle	Asphalt Road / Underlayment						X	X	X	
NFSS00RC13-978	Former Storage Area	North central area of the panhandle	Asphalt Road / Underlayment						X	X	X	
NFSS00RC14-979	Former Storage Area	East property line in the panhandle	Asphalt Road / Underlayment						X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 20

JUSTIFICATION FOR RAILROAD BALLAST SAMPLES
NIAGARA FALLS STORAGE SITE – PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

<u>Railroad ballast materials to be sampled:</u>

During Phase I RI gamma walkover surveys for some boring locations, areas of ballast along former railroad beds at the NFSS exhibited elevated gamma activity. The areas found and two additional locations will be investigated during Phase II activities. Composite samples of the railroad ballast will be collected for analyses for the radiological parameters. The following table provides justification for sampling of 5 railroad ballast locations around the NFSS.

Sample Number	Area of Investigation	Sample Location	Matrix	Justification for Sample point	Parameters to be collected
RB-01	Acidification area	South of Boring 417	Railroad Ballast	This sample point is located in the south central acidification area at a fomer railroad bed. The rails and a significant amount of the ballast have been removed from this location. During the walkover survey for boring location BH 417, the remnants of the former railroad ballast exhibited higher gamma readings than the surrounding soil. A composite sample of the ballast rock from the area will be collected.	Radiological Parameters
RB-02	Shops Area	South of Boring 306	Railroad Ballast	This sample point is located in the northeast corner of the shops area at a former railroad bed. The rails have been removed from this location, but a significant amount of the ballast remains. During the walkover survey for boring location BH 306, the remnants of the former railroad ballast exhibited higher gamma readings than the surrounding soil. A composite sample of the ballast rock from this area will be collected.	Radiological Parameters
RB-03	Building 401 Area	West of Boring 204	Railroad Ballast	This sample point is located southeast of Building 401 at a former railroad bed. The rails and a significant amount of the ballast have been removed from this location. A composite sample of the ballast rock from this area will be collected.	Radiological Parameters
RB-04	Building 401 Area	South of Boring 202 Adjacent to the former Tressel	Railroad Ballast	This sample point is located south of Building 401 at a former railroad tressel where coal was unloaded from rail cars and transferred into the silos of the building. The rails and a significant amount of the ballast have been removed from this location. A composite sample of the ballast rock from this area will be collected.	Radiological Parameters
RB-05	Shops Area	Southeast of Boring 304	Railroad Ballast	This sample point is located in the east central shops area at a former railroad bed. The rails have been removed from this location, but a significant amount of the ballast remains. During the walkover survey from boring location BH 304, the remnants of the former railroad ballast exhibited higher gamma readings than the surrounding soil. A composite sample of the ballast rock from this area will be collected.	Radiological Parameters

TABLE 21

RAILROAD BALLAST SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters								
Sample Number	Area of Investigation	Sample Location	Matrix	Field QC Duplicate, QA Split, or MS/MSD Samples	VOCs	SVOCs	Pesticides & PCBs	Metals	Radiological Isotopes	Total U	Gross a/b	Nitroaromatics
NFSS00RB01-980	Acidification area	South of Boring 417	Railroad Ballast						X	X	X	
NFSS00RB02-981	Shops Area	South of Boring 306	Railroad Ballast	QC-982					X	X	X	
NFSS00RB03-983	Building 401 Area	North of Boring 204	Railroad Ballast						X	X	X	
NFSS00RB04-984	Building 401 Area	South of Boring 202 at the former Tressel	Railroad Ballast	QA					X	X	X	
NFSS00RB05-985	Shops Area	Southeast of Boring 304	Railroad Ballast	MS/MSD					X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 22

TRENCH SUBSURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00T201-X-986	Building 401 Area	Suspect UST West of Building 401	Subsurface Soil		X	X			X	X	X	
NFSS00T202-X-987	Building 401 Area	Storm Sewer Inlet	Subsurface Soil	QA		X	X	X	X	X	X	
NFSS00T203-X-988	Building 401 Area	Suspect UST	Subsurface Soil		X	X			X	X	X	
NFSS00T204-X-989	Building 401 Area	Vault and Water Line	Subsurface Soil			X			X	X	X	
NFSS00T205-X-990	Building 401 Area	Steam Line	Subsurface Soil			X		X	X	X	X	
NFSS00T301-X-991	Shops Area	Pipeline and Suspect UST	Subsurface Soil		X	X		X	X	X	X	
NFSS00T302-X-992	Shops Area	Debris Pile	Subsurface Soil	QC-993,MS/MSD	X	X	X	X	X	X	X	X
NFSS00T303-X-994	Shops Area	Suspect UST	Subsurface Soil		X	X			X	X	X	
NFSS00T304-X-995	Shops Area	Open Concrete Basin	Subsurface Soil			X			X	X	X	
NFSS00T401-X-996	Acidification Area	Storm Sewer and Sulfur Location	Subsurface Soil			X		X	X	X	X	
NFSS00T402-X-997	Acidification Area	Tank Cradle and Process Sewer	Subsurface Soil			X		X	X	X	X	
NFSS00T403-X-998	Acidification Area	Rubble Filled Depression	Subsurface Soil	QC-999	X	X	X	X	X	X	X	X
NFSS00T404-X-1000	Acidification Area	Sewer Line	Subsurface Soil			X	X		X	X	X	
NFSS00T405-X-1001	Acidification Area	Tank Cradle and Process Sewer	Subsurface Soil			X		X	X	X	X	
NFSS00T406-X-1002	Acidification Area	Rubble Filled Depression	Subsurface Soil	QC-1001	X	X	X	X	X	X	X	X
NFSS00T407-X-1004	Acidification Area	Sewer Line	Subsurface Soil	MS/MSD	X	X			X	X	X	
NFSS00T408-X-1005	Acidification Area	Debris Pile	Subsurface Soil	QA	X	X	X	X	X	X	X	X
NFSS00T409-X-1006	Acidification Area	Process Sewer	Subsurface Soil			X	X		X	X	X	
NFSS00T410-X-1007	Acidification Area	Suspect UST	Subsurface Soil		X	X			X	X	X	
NFSS00T411-X-1008	Acidification Area	Disturbed Soil	Subsurface Soil						X	X	X	

TABLE 22

TRENCH SUBSURFACE SOIL SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					**Parameters**								
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00T412-X-1009	Acidification Area	Disturbed Soil	Subsurface Soil						X	X	X	
NFSS00T413-X-1010	Acidification Area	Disturbed Soil	Subsurface Soil						X	X	X	
NFSS00T414-X-1011	Acidification Area	Disturbed Soil	Subsurface Soil						X	X	X	
NFSS00T601-X-1012	Former Storage Area	Water and Steam Line Locations	Subsurface Soil			X		X	X	X	X	
NFSS00T801-X-1013	Uninvestigated Area	Series of Small Depressions	Subsurface Soil					X	X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

TABLE 23

PIPELINE SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					**Parameters**							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00PL01-1014	TBD	TBD	Pipeline Material	QC-1015	X	X			X	X	X	
NFSS00PL02-1016	TBD	TBD	Pipeline Material	QC-1017		X	X	X	X	X	X	
NFSS00PL03-1018	TBD	TBD	Pipeline Material	QA	X	X			X	X	X	X
NFSS00PL04-1019	TBD	TBD	Pipeline Material	MS/MSD		X			X	X	X	
NFSS00PL05-1020	TBD	TBD	Pipeline Material			X		X	X	X	X	
NFSS00PL06-1021	TBD	TBD	Pipeline Material		X	X		X	X	X	X	
NFSS00PL07-1022	TBD	TBD	Pipeline Material		X	X	X	X	X	X	X	X
NFSS00PL08-1023	TBD	TBD	Pipeline Material		X	X			X	X	X	
NFSS00PL09-1024	TBD	TBD	Pipeline Material			X			X	X	X	
NFSS00PL10-1025	TBD	TBD	Pipeline Material			X		X	X	X	X	
NFSS00PL11-1026	TBD	TBD	Pipeline Material			X		X	X	X	X	
NFSS00PL12-1027	TBD	TBD	Pipeline Material		X	X	X	X	X	X	X	X
NFSS00PL13-1028	TBD	TBD	Pipeline Material			X	X		X	X	X	
NFSS00PL14-1029	TBD	TBD	Pipeline Material			X		X	X	X	X	
NFSS00PL15-1030	TBD	TBD	Pipeline Material		X	X	X	X	X	X	X	X
NFSS00PL16-1031	TBD	TBD	Pipeline Material		X	X			X	X	X	
NFSS00PL17-1032	TBD	TBD	Pipeline Material		X	X	X	X	X	X	X	X

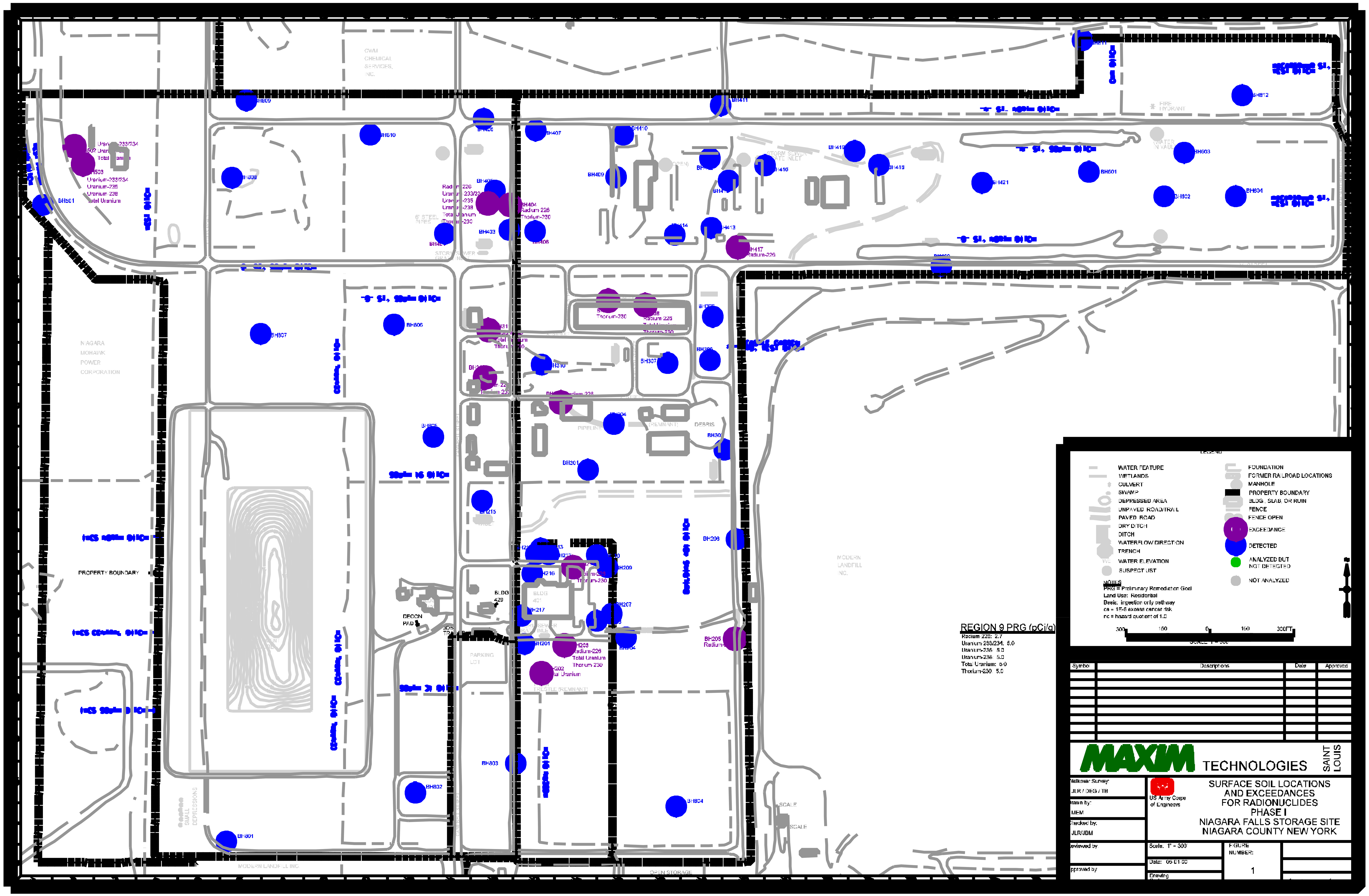
TABLE 23

PIPELINE SAMPLE LOCATIONS AND ANALYSES REQUIRED
NIAGARA FALLS STORAGE SITE - PHASE II REMEDIAL INVESTIGATION
LEWISTON, NEW YORK

Identification					Parameters							
Sample Number	**Area of Investigation**	**Sample Location**	**Matrix**	**Field QC Duplicate, QA Split, or MS/MSD Samples**	**VOCs**	**SVOCs**	**Pesticides & PCBs**	**Metals**	**Radiological Isotopes**	**Total U**	**Gross a/b**	**Nitroaromatics**
NFSS00PL18-1033	TBD	TBD	Pipeline Material			X	X		X	X	X	X
NFSS00PL19-1034	TBD	TBD	Pipeline Material		X	X			X	X	X	
NFSS00PL20-1035	TBD	TBD	Pipeline Material						X	X	X	

Note: See Section 4.0 of the Final Phase II FSP for methods and specific analytes

FIGURES



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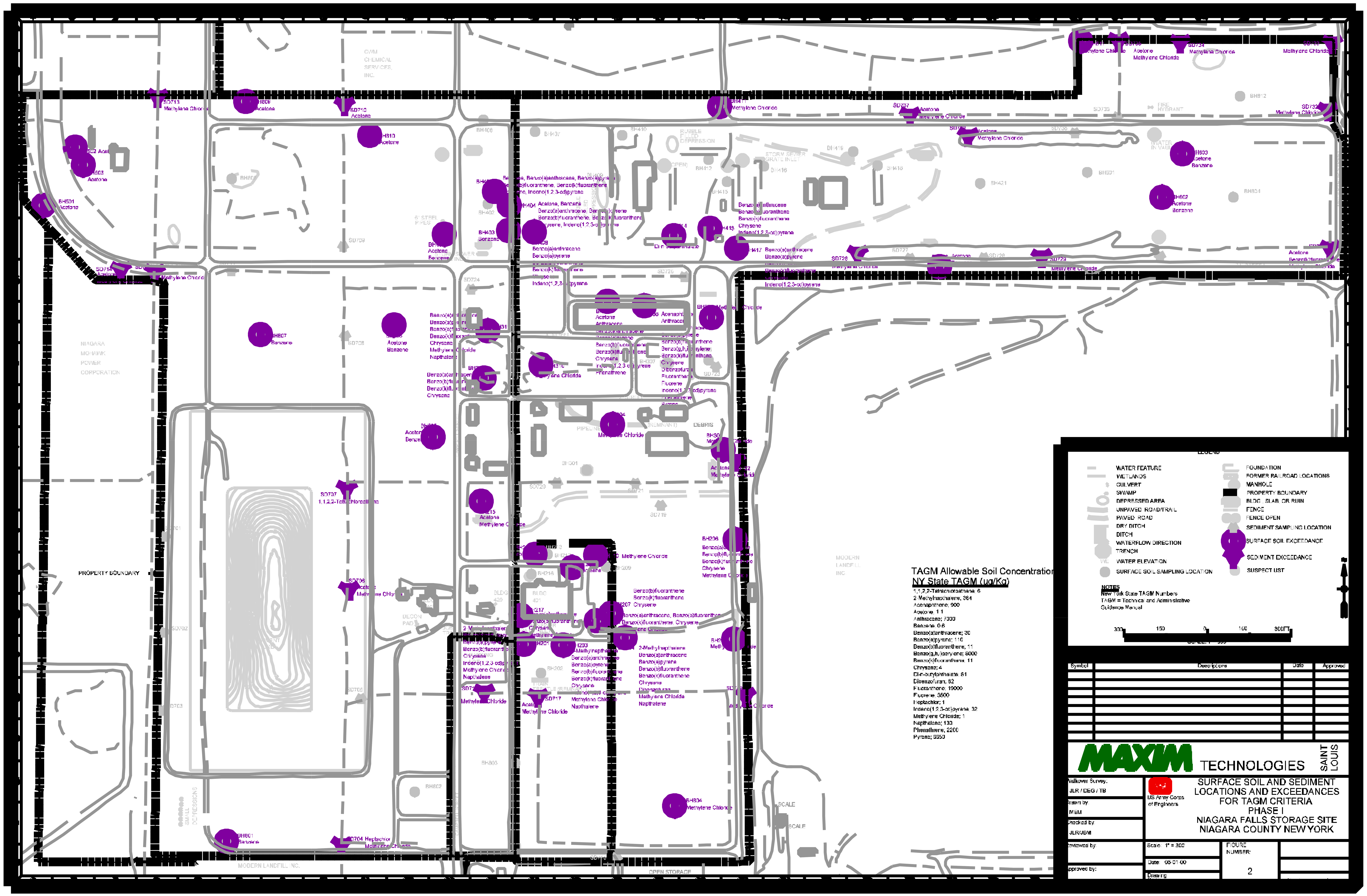

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REGION 9 PRG (ug/L
Benzo(a)anthracene: 621.48; ca
Benzo(a)pyrene: 62.15; ca
Benzo(b)fluoranthene: 621.48; ca
Benzo(k)fluoranthene: 6214.8; ca
Dibenz(a,h)anthracene: 62.15; ca
Indeno(1,2,3-cd)pyrene: 621.48; ca
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
DITCH
WATERFLOW DIRECTION
TRENCH
WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
PROPERTY BOUNDARY
BLDG, SLAB, OR RUIN
FENCE
FENCE OPEN
EXCEEDANCE
DETECTED
ANALYZED BUT NOT DETECTED
NOT ANALYZED
NOTES
PRG = Preliminary Remediation Goal
Land Use: Residential
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0
300 150 0 150 300FT
SCALE: 1" = 300'
PROPERTY BOUNDARY
NIAGARA MOHAWK POWER CORPORATION
CWM CHEMICAL SERVICES, INC.
MODERN LANDFILL INC.
DEBRIS
PARKING LOT
OPEN STORAGE
SCALE
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES
SAINT LOUIS
Walkover Survey:
JLR / DEG / TB
Drawn by:
MEM
Checked by:
JLR/JBM
Reviewed by:
Approved by:
US Army Corps of Engineers
SURFACE SOIL LOCATIONS AND EXCEEDANCES FOR SEMI-VOLATILE ORGANIC COMPOUNDS
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale: 1" = 300'
Date: 05-01-00
Drawing Code:
FIGURE NUMBER:
3
Sheet of


CWM CHEMICAL SERVICES, INC.
NIAGARA MOHAWK POWER CORPORATION
PROPERTY BOUNDARY
MODERN LANDFILL INC.
OPEN STORAGE
TAGM Soil Cleanup Objective
NY State TAGM (mg/Kg)*
Aroclor-1260; 1000 ug/Kg
Arsenic; 7.5
Barium; 300
Benzo(a)anthracene; 224 ug/Kg
Benzo(a)pyrene; 61 ug/Kg
Benzo(b)fluoranthene; 1100 ug/Kg
Benzo(k)fluoranthene; 1100 ug/Kg
Beryllium; 0.16
Cadmium; 1
Chromium; 10
Chrysene; 400 ug/Kg
Copper; 25
Dibenz(a,h)anthracene; 14 ug/Kg
Fluoranthene; 50000 ug/Kg
Indeno(1,2,3-cd)pyrene; 410 ug/Kg
Iron; 2000
Mercury; 0.1
Nickel; 13
Phenathrene; 50000 ug/Kg
Pyrene; 50000 ugKg
Selenium; 2
Zinc; 20
* mg/Kg except where noted
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
DITCH
WATERFLOW DIRECTION
TRENCH
WE WATER ELEVATION
SURFACE SOIL SAMPLING LOCATION
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
PROPERTY BOUNDARY
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
SEDIMENT SAMPLING LOCATION
SURFACE SOIL EXCEEDANCE
SEDIMENT EXCEEDANCE
SUSPECT UST
NOTES
New York State TAGM Numbers
TAGM = Technical and Administrative Guidance Manual
300 150 0 150 300FT
SCALE: 1" = 300'
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES
SAINT LOUIS
Walkover Survey:
JLR / DEG / TB
Drawn by:
MEM
Checked by:
JLR/JBM
Reviewed by:
Approved by:
US Army Corps of Engineers
SURFACE SOIL AND SEDIMENT
LOCATIONS AND EXCEEDANCES
FOR TAGM CRITERIA
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale: 1" = 300'
Date: 05-01-00
Drawing Code
FIGURE NUMBER:
4
Sheet of


BH809 Iron
BH411 Iron
BH811
BH812
BH502 Iron
BH503 Iron
BH501 Iron
BH810
BH406
BH407
BH410
BH808
BH405
BH404
BH402 Manganese
BH403 Iron Lead
BH401
BH408
BH409
BH412
BH419
BH418
BH416
BH415
BH421 Iron
BH601
BH603
BH602
BH604
BH414
BH413 Lead
BH417
BH309 Iron
BH308
BH306
BH807
BH806
BH311
BH310
BH307
BH304 Iron
BH805
BH302
BH215
BH205
BH213 Iron
BH209
BH217 Iron
BH207
BH204 Arsenic
BH202 Iron
BH803 Iron
BH802
BH804
BH801
PROPERTY BOUNDARY
NIAGARA MOHAWK POWER CORPORATION
CWM CHEMICAL SERVICES INC
MODERN LANDFILL INC
MODERN LANDFILL INC.
OPEN STORAGE
REGION 9 PRG (mg/kg
PRG for Arsenic: 21.65; nc
PRG for Iron: 23463.2; nc
PRG for Lead: 400.0; oswer
PRG for Manganese: 1762.4; nc
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
DITCH
WATERFLOW DIRECTION
TRENCH
WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
PROPERTY BOUNDARY
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
EXCEEDANCE
DETECTED
ANALYZED BUT NOT DETECTED
NOT ANALYZED
NOTES: PRG = Preliminary Remediation Goals
Land Use: Residential
Basis: nc
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0
oswer = Office of Solid Waste and Emergency Response
300 150 0 150 300FT
SCALE: 1" = 300'
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES
SAINT LOUIS
Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by:
Approved by:
US Army Corps of Engineers
SURFACE SOIL LOCATIONS
AND EXCEEDANCES
FOR METALS
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale: 1" = 300'
Date: 05-01-00
Drawing Code:
FIGURE NUMBER:
5
Sheet of

Symbol	Descriptions	Date	Approved

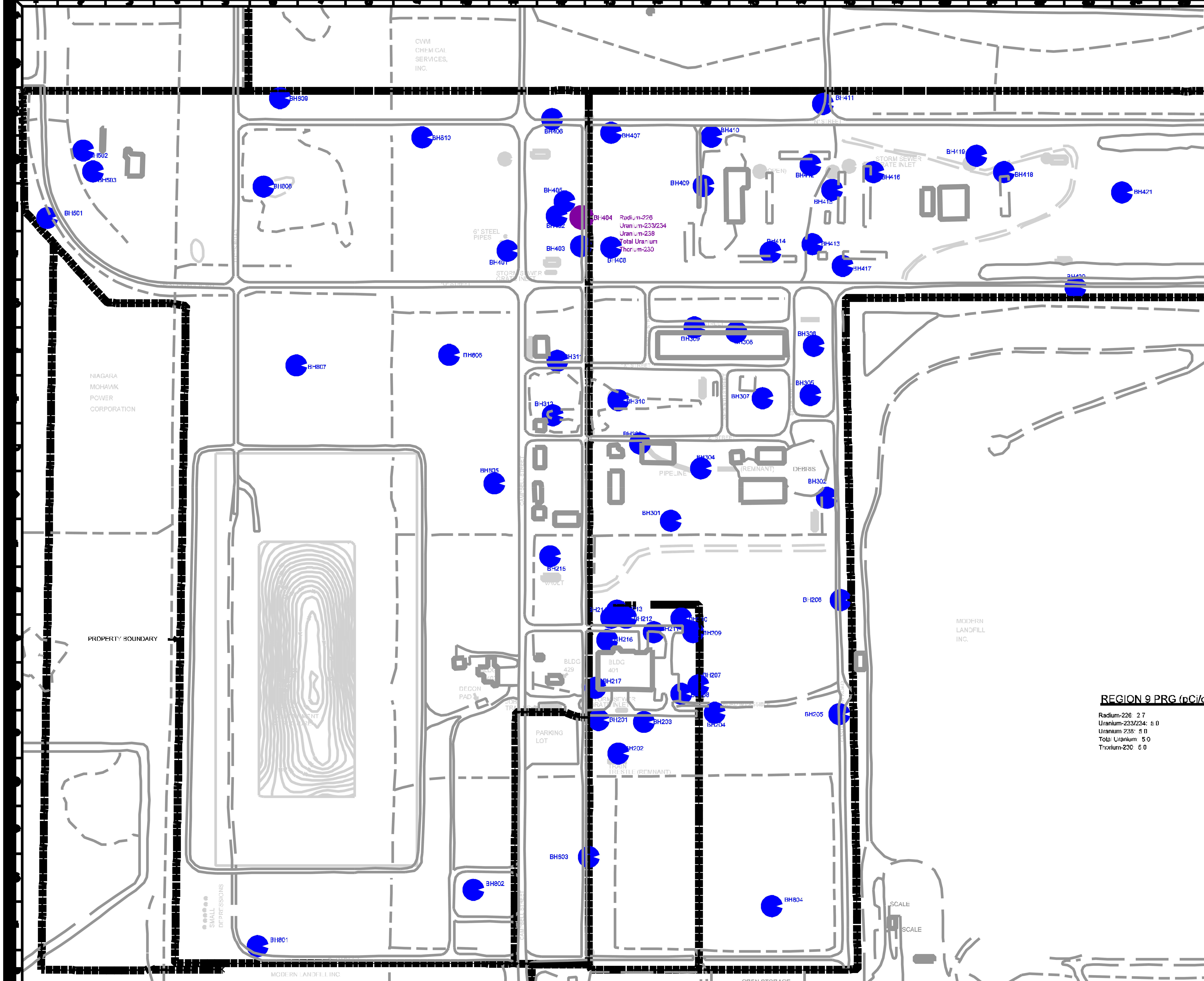
MAXIM TECHNOLOGIES SAINT LOUIS

Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by:
Approved by:

US Army Corps of Engineers

SURFACE SOIL LOCATIONS AND EXCEEDANCES FOR PESTICIDES & PCBs PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK

Scale 1" = 300'
Date: 05-01-00
Drawing Code:
FIGURE NUMBER: 6
Sheet of



REGION 9 PRG (pCi/g)

Radium-226: 2.7
Uranium-233/234: 5.0
Uranium-238: 5.0
Total Uranium: 5.0
Thorium-230: 5.0

LEGEND

- WATER FEATURE
- WETLANDS
- CULVERT
- SWAMP
- DEPRESSED AREA
- UNPAVED ROAD/TRAIL
- PAVED ROAD
- DRY DITCH
- DITCH
- WATERFLOW DIRECTION
- TRENCH
- WATER ELEVATION
- SUSPECT UST
- FOUNDATION
- FORMER RAILROAD LOCATIONS
- MANHOLE
- PROPERTY BOUNDARY
- BLDG., SLAB, OR RUIN
- FENCE
- FENCE OPEN
- EXCEEDANCE
- DETECTED
- ANALYZED BUT NOT DETECTED
- NOT ANALYZED

NOTES
PRG = Preliminary Remediation Goal
Land Use: Residential
Basis: ingestion pathway only
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0

300 150 0 150 300FT
SCALE: 1" = 300'

Symbol	Descriptions	Date	Approved

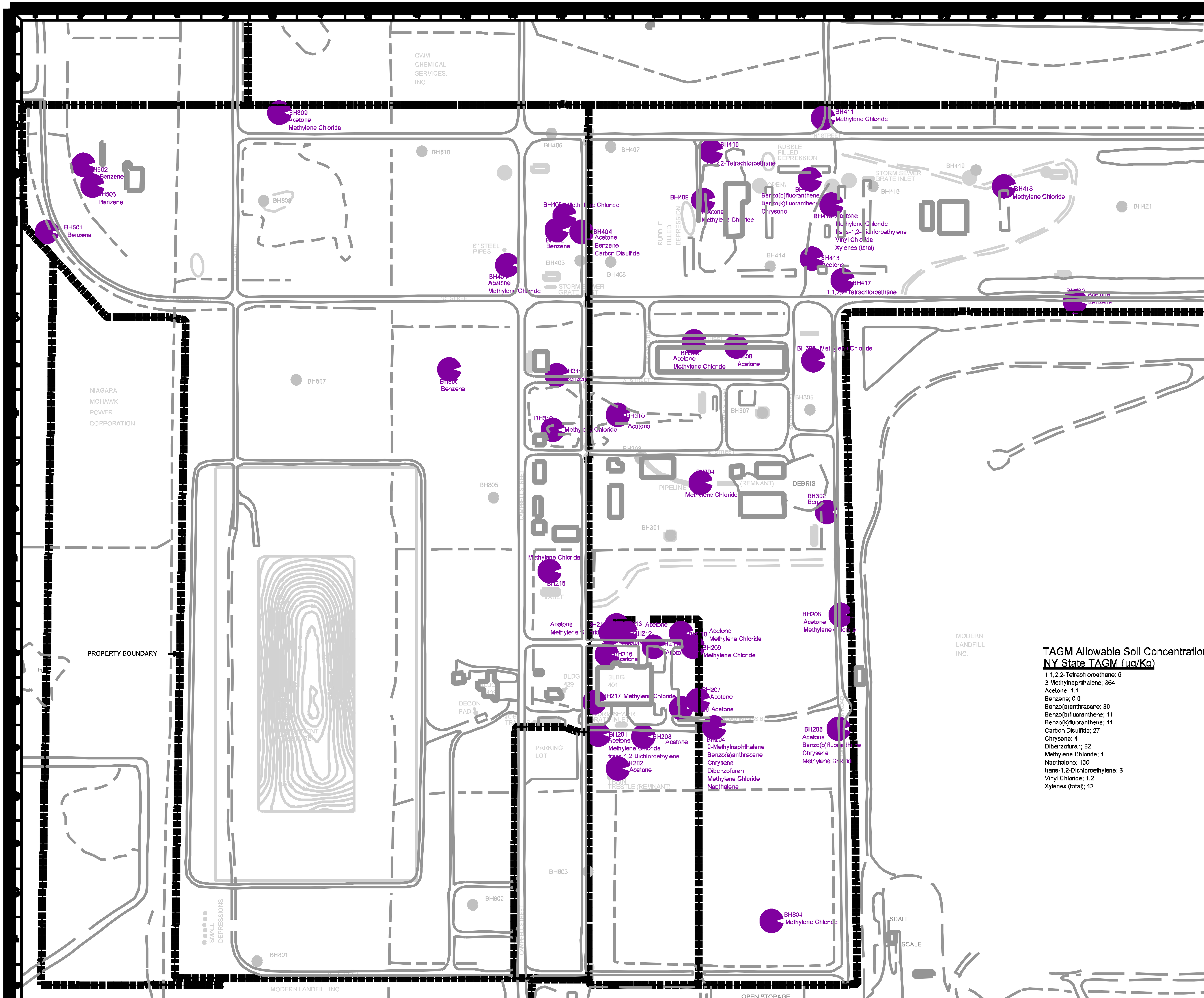
MAXIM TECHNOLOGIES SAINT LOUIS

US Army Corps of Engineers

SUBSURFACE SOIL LOCATIONS
AND EXCEEDANCES
FOR RADIONUCLIDES
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK

Walkover Survey:	JLR / DEG / TB
Drawn by:	MEM
Checked by:	JLR/JBM
Reviewed by:	
Approved by:	
Scale:	1" = 300'
Date:	05-01-00
Drawing Code:	
FIGURE NUMBER:	7
Sheet	of


BH809
BH810
BH502
BH503
BH501
BH411
BH811
FIRE HYDRANT
BH603
BH601
BH602
BH421
BH409
BH418
BH415 Tetrachloroethylene
Trichloroethylene
BH413
BH412
BH416
BH419
BH414
BH417
BH420
RUBBLE FILLED DEPRESSION
STORM SEWER GRATE INLET
"N" STREET
BH405
BH404
BH402
BH403
BH401
BH407
BH406
BH408
CWM CHEMICAL SERVICES, INC
NIAGARA MOHAWK POWER CORPORATION
BH807
BH806
BH805
BH311
BH312
BH310
BH309
BH308
BH306
BH305
BH307
BH304
BH303
BH302
BH301
PIPELINE
(REMNANT)
DEBRIS
BH215
BH214
BH213
BH212
BH211
BH210
BH209
BH216
BH217
BH207
BH208
BH206
BH205
BH204
BH203
BH202
BH201
Trichloroethylene
BLDG 401
BLDG 429
STORM SEWER GRATE INLET
TRAIN TRESTLE (REMNANT)
PARKING LOT
DECON PAD
PROPERTY BOUNDARY
MODERN LANDFILL INC
BH803
BH802
BH801
BH804
SCALE
SMALL DEPRESSIONS
MODERN LANDFILL INC.
OPEN STORAGE
REGION 9 PRG (ug/L
Tetrachloroethylene: 5686.0; ca*
Trichloroethylene: 2770.0; ca**
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
DITCH
WATERFLOW DIRECTION
TRENCH
WE
WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
PROPERTY BOUNDARY
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
EXCEEDANCE
DETECTED
ANALYZED BUT NOT DETECTED
NOT ANALYZED
NOTES: PRG = Preliminary remediation Goal
Land Use: Residential
ca* = The screening values based on a hazard quotient is less than 100x this screening value based on cancer risk.
ca** = The screening values based on a hazard quotient is less than 10x this screening value based on a cancer risk.
300 150 0 150 300FT
SCALE: 1"= 300'
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES
SAINT LOUIS
Walkover Survey
JLR / DEG / TB
Drawn by:
MEM
Checked by:
JLR/JBM
Reviewed by:
Approved by:
US Army Corps of Engineers
SUBSURFACE SOIL LOCATIONS AND EXCEEDANCES FOR VOLATILE ORGANIC COMPOUNDS
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale 1" = 300'
Date: 05-01-00
Drawing Code:
FIGURE NUMBER:
8



LEGEND

WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
DITCH
WATERFLOW DIRECTION
TRENCH
WATER ELEVATION
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
PROPERTY BOUNDARY
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
SUBSURFACE SOIL SAMPLING LOCATION
SUBSURFACE SOIL EXCEEDANCE
SUSPECT UST

NOTES
New York State TAGM Numbers
TAGM = Technical and Administrative Guidance Manual

300 150 0 150 300FT
SCALE: 1" = 300'

TAGM Allowable Soil Concentration
NY State TAGM (ug/Kg)

1,1,2,2-Tetrachloroethane; 6
2-Methylnaphthalene; 364
Acetone; 1.1
Benzene; 0.6
Benzo(a)anthracene; 30
Benzo(b)fluoranthene; 11
Benzo(k)fluoranthene; 11
Carbon Disulfide; 27
Chrysene; 4
Dibenzofuran; 62
Methylene Chloride; 1
Napthalene; 130
trans-1,2-Dichloroethylene; 3
Vinyl Chloride; 1.2
Xylenes (total); 12

Symbol	Descriptions	Date	Approved

MAXIM TECHNOLOGIES SAINT LOUIS

US Army Corps of Engineers

SUBSURFACE SOIL
LOCATIONS AND EXCEEDANCES
FOR TAGM CRITERIA
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK

Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by:
Approved by:
Scale: 1" = 300'
Date: 05-01-00
Drawing Code:
FIGURE NUMBER: 9
Sheet of


LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
DITCH
WATERFLOW DIRECTION
TRENCH
WATER ELEVATION
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
PROPERTY BOUNDARY
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
SUBSURFACE SOIL SAMPLING LOCATION
SUBSURFACE SOIL EXCEEDANCE
SUSPECT UST
NOTES
New York State TAGM Numbers
TAGM = Technical and Administrative Guidance Manual
TAGM Soil Cleanup Objective
NY State TAGM (mg/Kg)*
Acetone; 200 ug/Kg
Arsenic; 7.5
Benzo(a)pyrene; 61 ug/Kg
Beryllium; 0.16
Cadmium; 1
Chromium; 10
Copper; 25
Iron; 2000
Mercury; 0.1
Nickel; 13
Selenium; 2
Tetrachloroethylene; 1400 ug/Kg
Trichloroethylene; 200 ug/kg
Zinc; 20
* mg/Kg except where noted
PROPERTY BOUNDARY
NIAGARA MOHAWK POWER CORPORATION
MODERN LANDFILL INC
OPEN STORAGE
MAXIM TECHNOLOGIES SAINT LOUIS
Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by:
Approved by:
US Army Corps of Engineers
SUBSURFACE SOIL
LOCATIONS AND EXCEEDANCES
FOR TAGM CRITERIA
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale: 1" = 300'
Date: 05-01-00
Drawing Code:
FIGURE NUMBER: 10

Symbol	Descriptions	Date	Approved

MAXIM TECHNOLOGIES SAINT LOUIS

US Army Corps of Engineers

SUBSURFACE SOIL LOCATIONS AND EXCEEDANCES FOR SEMI-VOLATILE ORGANIC COMPOUNDS PHASE I NIAGARA FALLS STORAGE SITE NIAGARA COUNTY NEW YORK

Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by:
Approved by:
Scale: 1" = 300'
Date: 05-01-00
Drawing Code:
FIGURE NUMBER: 11
Sheet of

LEGEND

WATER FEATURE	FOUNDATION
WETLANDS	FORMER RAILROAD LOCATIONS
CULVERT	MANHOLE
SWAMP	PROPERTY BOUNDARY
DEPRESSED AREA	BLDG., SLAB, OR RUIN
UNPAVED ROAD/TRAIL	FENCE
PAVED ROAD	FENCE OPEN
DRY DITCH	EXCEEDANCE
DITCH	DETECTED
WATERFLOW DIRECTION	ANALYZED BUT NOT DETECTED
TRENCH	NOT ANALYZED
WATER ELEVATION	
SUSPECT UST	

NOTES

PRG = Preliminary Remediation Goals
Land Use: Residential
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0

300 150 0 150 300FT
SCALE: 1" = 300'

Revisions

Symbol	Descriptions	Date	Approved

MAXIM TECHNOLOGIES SAINT LOUIS

Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by:
Approved by:

US Army Corps of Engineers

SUBSURFACE SOIL LOCATIONS
AND EXCEEDANCES
FOR METALS
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK

Scale: 1" = 300'
Date: 05-01-00
Drawing Code:
FIGURE NUMBER: 12
Sheet of

GROUNDWATER LOCATIONS
AND EXCEEDANCES
FOR ALPHA
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
MAXIM TECHNOLOGIES
SAINT LOUIS
US Army Corps of Engineers
Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by:
Approved by:
Scale: 1" = 300'
Date: 06-07-00
Drawing Code:
FIGURE NUMBER: 13
Symbol
Descriptions
Date
Approved
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
PROPERTY BOUNDARY
WATERFLOW DIRECTION
TRENCH
WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
TEMPORARY MONITORING WELL
LOWER WATER-BEARING ZONE MONITORING WELL
BEDROCK AQUIFER MONITORING WELL
UPPER WATER-BEARING ZONE MONITORING WELL
NOTES
PRG for Alpha: 15.0 pCi/L
Land Use: Residential
Basis: ingestion only pathway
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0
NOTES
See color code left of Legend for chemical detection above or below the recommended PRG.
300 150 0 150 300FT
SCALE: 1" = 300'
COLOR CODES
PRG EXCEEDANCE
DETECTED AND BELOW PRG
ANALYZED FOR AND NOT DETECTED
NOT ANALYZED FOR MAPPED CONSTITUENT
PROPERTY BOUNDARY
MODERN LANDFILL INC.
NIAGARA MOHAWK POWER CORPORATION
OPEN STORAGE
PARKING LOT
DEBRIS
SCALE

Symbol	Descriptions	Date	Approved

MAXIM TECHNOLOGIES SAINT LOUIS

US Army Corps of Engineers

GROUNDWATER LOCATIONS AND EXCEEDANCES FOR RADIUM-226 PHASE I NIAGARA FALLS STORAGE SITE NIAGARA COUNTY NEW YORK

Walkover Survey: JLR / DEG / TB

Drawn by: MEM

Checked by: JLR/JBM

Reviewed by:

Approved by:

Scale: 1" = 300'

Date: 06-07-00

Drawing Code:

FIGURE NUMBER: 14

DWM CHEMICAL SERVICES, INC.
NIAGARA MOHAWK POWER CORPORATION
PROPERTY BOUNDARY
MODERN LANDFILL INC.
MODERN LANDFILL INC.
OPEN STORAGE
DEBRIS
PIPELINE
PARKING LOT
SCALE
SCALE
SMALL DEPRESSIONS
FIRE HYDRANT
BH809
WL BH50
WL BH61
WL BH62
BH502
BH503
BH501
BH810
BH808
BH406
BH405
BH402
BH404
BH403
BH401
BH407
BH410
BH409
BH415
BH417
BH411
WL BH51
BH603
BH602
BH604
WL BH63
WL BH57
WL BH60
BH807
BH806
BH311
BH312
BH310
WL BH15
BH307
BH309
BH308
BH306
BH304
BH302
BH303
BH805
BH215
BH214
BH213
BH212
BH211
BH210
BH209
BH216
BH217
BH207
BH208
BH201
BH203
BH204
BH205
BH206
BH803
BH802
BH804
BH801
WL BH48
WL BH49
WL OW5A
WL OW3A
WL OW4A
WL A45
WL A52
WL A42
WL A43
WL A50
WL A51
WL BH70
WL OW10A
WL A54
WL OW17A
WL A56
WL A57
WL OW6A
WL OW6B
WL A23A
WL BH12
COLOR CODES
PRG EXCEEDANCE
DETECTED AND BELOW PRG
ANALYZED FOR AND NOT DETECTED
NOT ANALYZED FOR MAPPED CONSTITUENT
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
PROPERTY BOUNDARY
WATERFLOW DIRECTION
TRENCH
WE WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
TEMPORARY MONITORING WELL
LOWER WATER-BEARING ZONE MONITORING WELL
BEDROCK AQUIFER MONITORING WELL
UPPER WATER-BEARING ZONE MONITORING WELL
NOTES
PRG for Thorium-228 0.76 pCi/L
Land Use: Residential
Basis: ingestion only pathway
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0
NOTES
See color code left of Legend for chemical detection above or below the recommended PRG.
300 150 0 150 300FT
SCALE: 1" = 300'
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES
SAINT LOUIS
Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by
Approved by
US Army Corps of Engineers
GROUNDWATER LOCATIONS
AND EXCEEDANCES
FOR THORIUM-228
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale: 1" = 300'
Date: 06-07-00
Drawing Code:
FIGURE NUMBER:
15
Sheet of

CWM CHEMICAL SERVICES INC
NIAGARA MOHAWK POWER CORPORATION
PROPERTY BOUNDARY
MODERN LANDFILL INC
MODERN LANDFILL INC.
OPEN STORAGE
DEBRIS
PARKING LOT
SCALE
BH809
WL BH60
BH810
BH406
BH407
BH410
BH411
BH502
BH503
BH501
BH808
BH405
BH402
BH404
BH403
BH401
BH409
BH415
BH417
BH603
BH602
BH604
WL BH63
WL BH57
WL WD205
WL BH60
BH807
BH806
BH306
BH309
BH308
BH312
BH310
WL BH 15
BH307
BH303
BH304
BH302
WL BH49
WL OW5A
WL OW4A
WL A45
WL OW3A
WL A52
BH805
BH215
WL A42
WL A50
WL A43
WL A51
WL BH70
WL OW10A
WL A54
WL OW17A
WL A56
WL A57
WL OW6A
WL A23A
WL OW6B
BH214
BH213
BH212
BH210
BH211
BH209
BH216
BH217
BH207
BH208
BH201
BH203
BH204
BH206
BH205
BH803
BH802
BH804
BH801
WL BH 12
WL BH 59
WL BH 48
COLOR CODES
PRG EXCEEDANCE
DETECTED AND BELOW PRG
ANALYZED FOR AND NOT DETECTED
NOT ANALYZED FOR MAPPED CONSTITUENT
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
PROPERTY BOUNDARY
WATERFLOW DIRECTION
TRENCH
WE
WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
TEMPORARY MONITORING WELL
LOWER WATER-BEARING ZONE MONITORING WELL
BEDROCK AQUIFER MONITORING WELL
UPPER WATER-BEARING ZONE MONITORING WELL
NOTES
PRG for Thorium-230 1.30 pCi/L
Land Use: Residential
Basis: ingestion only pathway
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0
NOTES
See color code left of Legend for chemical detection above or below the recommended PRG.
300
150
0
150
300FT
SCALE: 1" = 300'
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES
SAINT LOUIS
Walkover Survey:
JLR / DEG / TB
Drawn by:
MEM
Checked by:
JLR/JBM
Reviewed by
Approved by
US Army Corps of Engineers
GROUNDWATER LOCATIONS AND EXCEEDANCES FOR THORIUM-230 PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale 1" = 300'
Date: 06-07-00
Drawing Code:
FIGURE NUMBER:
16
Sheet of


CWM CHEMICAL SERVICES INC.
NIAGARA MOHAWK POWER CORPORATION
PROPERTY BOUNDARY
MODERN LANDFILL INC.
DEBRIS
PIPELINE
PARKING LOT
SCALE
OPEN STORAGE
COLOR CODES
PRG EXCEEDANCE
DETECTED AND BELOW PRG
ANALYZED FOR AND NOT DETECTED
NOT ANALYZED FOR MAPPED CONSTITUENT
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
PROPERTY BOUNDARY
WATERFLOW DIRECTION
TRENCH
WE WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
TEMPORARY MONITORING WELL
LOWER WATER-BEARING ZONE MONITORING WELL
BEDROCK AQUIFER MONITORING WELL
UPPER WATER-BEARING ZONE MONITORING WELL
NOTES
PRG for Thorium-232: 1.50 pCi/L
Land Use: Residential
Basis: ingestion only pathway
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0
NOTES
See color code left of Legend for chemical detection above or below the recommended PRG.
300 150 0 150 300FT
SCALE: 1" = 300'
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES
SAINT LOUIS
Walkover Survey:
JLR / DEG / TB
Drawn by:
MEM
Checked by:
JLR/JBM
Reviewed by:
Approved by:
US Army Corps of Engineers
GROUNDWATER LOCATIONS AND EXCEEDANCES FOR THORIUM-232 PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale: 1" = 300'
Date: 06-07-00
Drawing Code:
FIGURE NUMBER:
17

LEGEND

WATER FEATURE	FOUNDATION
WETLANDS	FORMER RAILROAD LOCATIONS
CULVERT	MANHOLE
SWAMP	BLDG., SLAB, OR RUIN
DEPRESSED AREA	FENCE
UNPAVED ROAD/TRAIL	FENCE OPEN
PAVED ROAD	TEMPORARY MONITORING WELL
DRY DITCH	LOWER WATER-BEARING ZONE MONITORING WELL
PROPERTY BOUNDARY	BEDROCK AQUIFER MONITORING WELL
WATERFLOW DIRECTION	UPPER WATER-BEARING ZONE MONITORING WELL
TRENCH	
WATER ELEVATION	
SUSPECT UST	

NOTES
PRG for Uranium-233/234: 1.10 pCi/L
Land Use: Residential
Basis: ingestion only pathway
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0

NOTES
See color code left of Legend for chemical detection above or below the recommended PRG.

300 150 0 150 300FT
SCALE: 1" = 300'

Symbol	Descriptions	Date	Approved

MAXIM TECHNOLOGIES SAINT LOUIS

Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by:
Approved by:

US Army Corps of Engineers

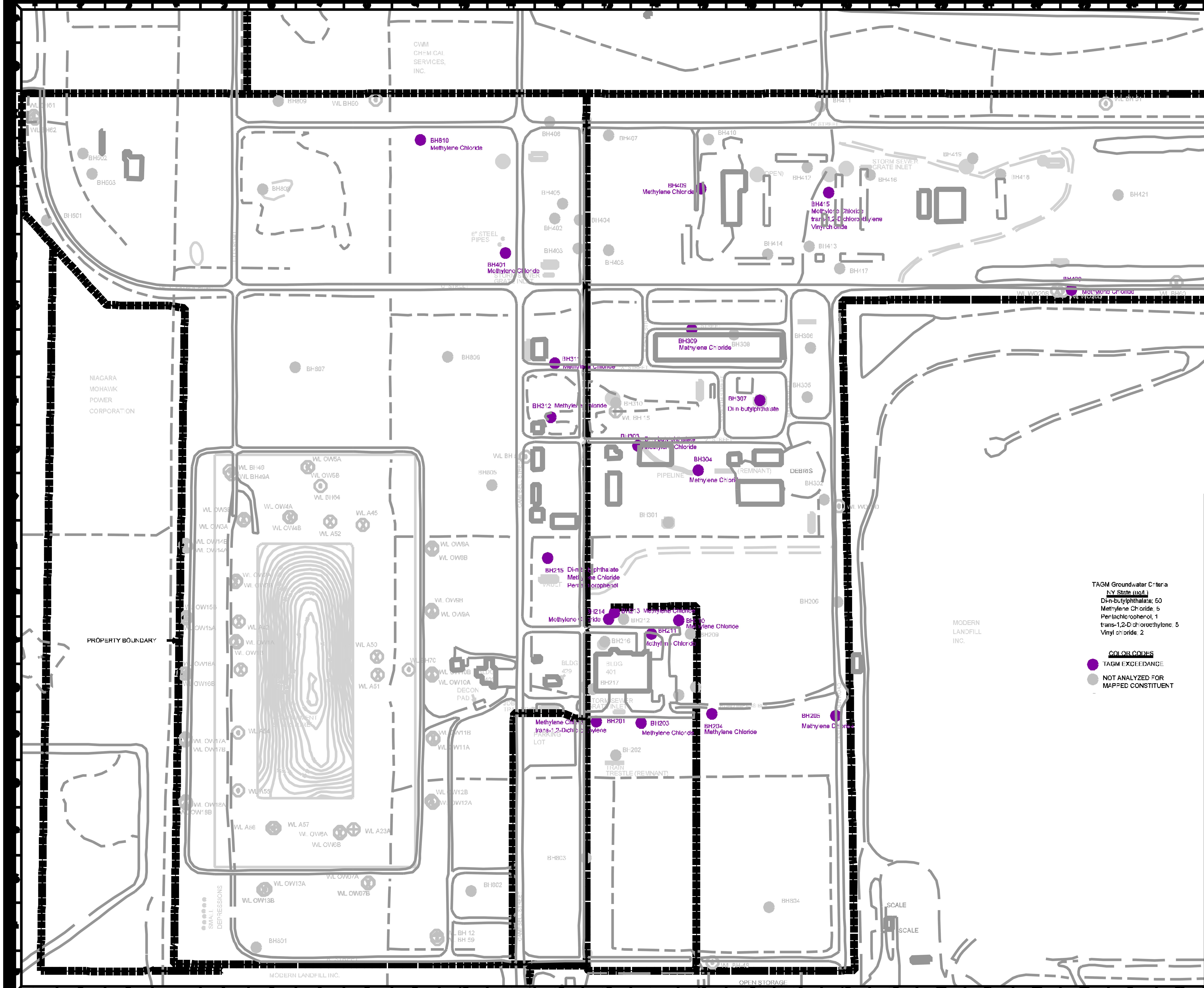
GROUNDWATER LOCATIONS AND EXCEEDANCES FOR URANIUM-233/234 PHASE I NIAGARA FALLS STORAGE SITE NIAGARA COUNTY NEW YORK

Scale: 1" = 300'
Date: 06-07-00
Drawing Code:
FIGURE NUMBER: 18
Sheet of


COLOR CODES
PRG EXCEEDANCE
DETECTED AND BELOW PRG
ANALYZED FOR AND NOT DETECTED
NOT ANALYZED FOR MAPPED CONSTITUENT
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
PROPERTY BOUNDARY
WATERFLOW DIRECTION
TRENCH
WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
TEMPORARY MONITORING WELL
LOWER WATER-BEARING ZONE MONITORING WELL
BEDROCK AQUIFER MONITORING WELL
UPPER WATER-BEARING ZONE MONITORING WELL
NOTES
PRG for Uranium-235/236: 1.10 pCi/L
Land Use: Residential
Basis: ingestion only pathway
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0
NOTES
See color code left of Legend for chemical detection above or below the recommended PRG.
300 150 0 150 300FT
SCALE: 1" = 300'
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES
SAINT LOUIS
Walkover Survey:
JLR / DEG / TB
Drawn by:
MEM
Checked by:
JLR/JBM
Reviewed by:
Approved by:
US Army Corps of Engineers
GROUNDWATER LOCATIONS AND EXCEEDANCES FOR URANIUM-235/236
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale: 1" = 300'
Date: 06-07-00
Drawing Code:
FIGURE NUMBER:
19
PROPERTY BOUNDARY
MODERN LANDFILL INC.
OPEN STORAGE
PARKING LOT
DEBRIS
SCALE
BH404
BH503
BH302
BH215
WL A42

PROPERTY BOUNDARY
NIAGARA MOHAWK POWER CORPORATION
CWM CHEMICAL SERVICES, INC.
MODERN LANDFILL INC.
DEBRIS
PIPELINE
PARKING LOT
SCALE
OPEN STORAGE
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
PROPERTY BOUNDARY
WATERFLOW DIRECTION
TRENCH
WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
TEMPORARY MONITORING WELL
LOWER WATER-BEARING ZONE MONITORING WELL
BEDROCK AQUIFER MONITORING WELL
UPPER WATER-BEARING ZONE MONITORING WELL
NOTES
PRG for Uranium-238: 1.10 pCi/L
Land Use: Residential
Basis: ingestion only pathway
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0
NOTES
See color code left of Legend for chemical detection above or below the recommended PRG.
COLOR CODES
10 X PRG EXCEEDANCE
PRG EXCEEDANCE
DETECTED AND BELOW PRG
ANALYZED FOR AND NOT DETECTED
NOT ANALYZED FOR MAPPED CONSTITUENT
300 150 0 150 300FT
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES SAINT LOUIS
Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by:
Approved by:
US Army Corps of Engineers
GROUNDWATER LOCATIONS AND EXCEEDANCES FOR URANIUM-238 PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale: 1" = 300'
Date: 06-07-00
Drawing Code:
FIGURE NUMBER
20

REGION 9 PRG (ug/L)
1,1-Dichloroethylene: 0.0456; ca
1,2-Dichloroethane: 0.1231; ca*
Chlormethane: 1.511; ca
cis-1,2-Dichloroethylene: 60.83; nc
Methylene Chloride: 4.276; ca
Tetrachloroethylene: 1.082; ca
trans-1,2-Dichloroethylene: 121.67; nc
Trichloroethylene: 1.640; ca*
Vinyl chloride: 0.0198; ca
COLOR CODES
PRG EXCEEDANCE
DETECTED AND BELOW PRG
ANALYZED FOR AND NOT DETECTED
NOT ANALYZED FOR MAPPED CONSTITUENT
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
PROPERTY BOUNDARY
WATERFLOW DIRECTION
TRENCH
WE WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
TEMPORARY MONITORING WELL
LOWER WATER-BEARING ZONE MONITORING WELL
BEDROCK AQUIFER MONITORING WELL
UPPER WATER-BEARING ZONE MONITORING WELL
NOTES
PRG = Preliminary Remediation Goal
Land Use: Residential
Basis: ingestion only pathway
ca = 1E-6 excess cancer risk
ca* = The screening value based on a hazard quotient is less than 100x this screening value based on cancer risk.
nc = hazard quotient of 1.0
NOTES
See color code left of Legend for chemical detection above or below the recommended PRG.
300 150 0 150 300FT
SCALE: 1" = 300'
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES
SAINT LOUIS
Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by:
Approved by:
US Army Corps of Engineers
GROUNDWATER LOCATIONS AND EXCEEDANCES FOR VOLATILE ORGANIC COMPOUNDS
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale: 1" = 300'
Date: 06-07-00
Drawing Code:
FIGURE NUMBER: 21
PROPERTY BOUNDARY
NIAGARA MOHAWK POWER CORPORATION
CWM CHEMICAL SERVICES, INC.
MODERN LANDFILL INC.
DEBRIS
BH610 Methylene Chloride Tetrachloroethylene
BH415 cis-1,2-Dichloroethylene Methylene Chloride Tetrachloroethylene trans-1,2-Dichloroethylene Trichloroethylene Vinyl chloride
BH204 Methylene Chloride
BH203 Methylene Chloride



LEGEND

- WATER FEATURE
- WETLANDS
- CULVERT
- SWAMP
- DEPRESSED AREA
- UNPAVED ROAD/TRAIL
- PAVED ROAD
- DRY DITCH
- PROPERTY BOUNDARY
- WATERFLOW DIRECTION
- TRENCH
- WATER ELEVATION
- SUSPECT UST
- FOUNDATION
- FORMER RAILROAD LOCATIONS
- MANHOLE
- BLDG., SLAB, OR RUIN
- FENCE
- FENCE OPEN
- TEMPORARY MONITORING WELL
- LOWER WATER-BEARING ZONE MONITORING WELL
- BEDROCK AQUIFER MONITORING WELL
- UPPER WATER-BEARING ZONE MONITORING WELL

NOTES
New York State TAGM Numbers
TAGM = Technical and Administrative Guidance Manual

NOTES
See color code left of Legend for chemical detection above or below the recommended PRG.

300 150 0 150 300FT
SCALE: 1" = 300'

Symbol	Descriptions	Date	Approved

MAXIM TECHNOLOGIES SAINT LOUIS

Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by:
Approved by:

US Army Corps of Engineers

GROUNDWATER LOCATIONS AND EXCEEDANCES FOR TAGM PHASE I NIAGARA FALLS STORAGE SITE NIAGARA COUNTY NEW YORK

Scale: 1" = 300'
Date: 06-07-00
Drawing Code:
FIGURE NUMBER: 22
Sheet of


CWM CHEMICAL SERVICES INC.
WL BH50
bis(2-Ethylhexyl)phthalate
NIAGARA MOHAWK POWER CORPORATION
PROPERTY BOUNDARY
Pentachlorophenol
BH215
WL A51
bis(2-Ethylhexyl)phthalate
MODERN LANDFILL INC
MODERN LANDFILL INC.
OPEN STORAGE
PARKING LOT
DEBRIS
PIPELINE
SCALE
REGION 9 PRG (ug/L)
bis(2-Ethylhexyl)phthalate: 4.802; ca*
Pentachlorophenol: 0.5603; ca
COLOR CODES
PRG EXCEEDANCE
DETECTED AND BELOW PRG
ANALYZED FOR AND NOT DETECTED
NOT ANALYZED FOR MAPPED CONSTITUENT
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
PROPERTY BOUNDARY
WATERFLOW DIRECTION
TRENCH
WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
TEMPORARY MONITORING WELL
LOWER WATER-BEARING ZONE MONITORING WELL
BEDROCK AQUIFER MONITORING WELL
UPPER WATER-BEARING ZONE MONITORING WELL
NOTES
PRG = Preliminary Remediation Goal
Land Use: Residential
Basis: ingestion only pathway
ca = 1E-6 excess cancer risk
ca* = The screening value based on a hazard quotient
is less than 100x this screening value based on cancer risk.
NOTES
See color code left of Legend for chemical detection above or below the recommended PRG.
300 150 0 150 300FT
SCALE: 1" = 300'
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES SAINT LOUIS
Walkover Survey
JLR / DEG / TB
Drawn by:
MEM
Checked by:
JLR/JBM
Reviewed by:
Approved by:
US Army Corps of Engineers
GROUNDWATER LOCATIONS AND EXCEEDANCES FOR SEMI-VOLATILE ORGANIC COMPOUNDS
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale: 1" = 300'
Date: 06-07-00
Drawing Code:
FIGURE NUMBER:
23


REGION 9 PRG (ug/L)
Aluminum: 36498.7; nc
Antimony: 14.60; nc
Barium: 2555.0; nc
Boron: 3285.0; nc
Boron (dissolved): 3285.0; nc
Copper: 1355.7; nc
Iron: 10949.9; nc
Lead: 15.0; TTAL
Lithium: 730; nc
Manganese: 876.0; nc
Nickel: 730.0; nc
Vanadium: 255.5; nc
COLOR CODES
PRG EXCEEDANCE
DETECTED AND BELOW PRG
ANALYZED FOR AND NOT DETECTED
NOT ANALYZED FOR MAPPED CONSTITUENT
LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
PROPERTY BOUNDARY
WATERFLOW DIRECTION
TRENCH
WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
TEMPORARY MONITORING WELL
LOWER WATER-BEARING ZONE MONITORING WELL
BEDROCK AQUIFER MONITORING WELL
UPPER WATER-BEARING ZONE MONITORING WELL
NOTES
PRG = Preliminary Remediation Goal
Land Use: Residential
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0
TTAL = Treatment Technique Action Level
NOTES
See color code left of Legend for chemical detection above or below the recommended PRG.
300 150 0 150 300FT
SCALE: 1" = 300'
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES
SAINT LOUIS
Walkover Survey:
JLR / DEG / TB
Drawn by:
MEM
Checked by:
JLR/JBM
Reviewed by:
Approved by:
US Army Corps of Engineers
GROUNDWATER LOCATIONS AND EXCEEDANCES FOR METALS
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale: 1" = 300'
Date: 08-07-00
Drawing Code:
FIGURE NUMBER:
24
Sheet of
PROPERTY BOUNDARY
NIAGARA MOHAWK POWER CORPORATION
CWM CHEMICAL SERVICES, INC
MODERN LANDFILL INC
MODERN LANDFILL, INC.
OPEN STORAGE
DEBRIS
PARKING LOT
BLDG 401
BLDG 429

REGION 9 PRG (pCi/g)
Radium-226: 2.7
Total Uranium: 5.0
Thorium-230: 5.0

LEGEND

- WATER FEATURE
- WETLANDS
- CULVERT
- SWAMP
- DEPRESSED AREA
- UNPAVED ROAD/TRAIL
- PAVED ROAD
- DRY DITCH
- DITCH
- WATERFLOW DIRECTION
- TRENCH
- WE WATER ELEVATION
- SUSPECT UST
- FOUNDATION
- FORMER RAILROAD LOCATIONS
- MANHOLE
- PROPERTY BOUNDARY
- BLDG., SLAB, OR RUIN
- FENCE
- FENCE OPEN
- EXCEEDANCE
- DETECTED
- ANALYZED BUT NOT DETECTED
- NOT ANALYZED

NOTES
PRG = Preliminary Remediation Goals
Land Use: Residential
Basis: ingestion only pathway
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0

300 150 0 150 300FT
SCALE: 1" = 300'

Symbol	Descriptions	Date	Approved

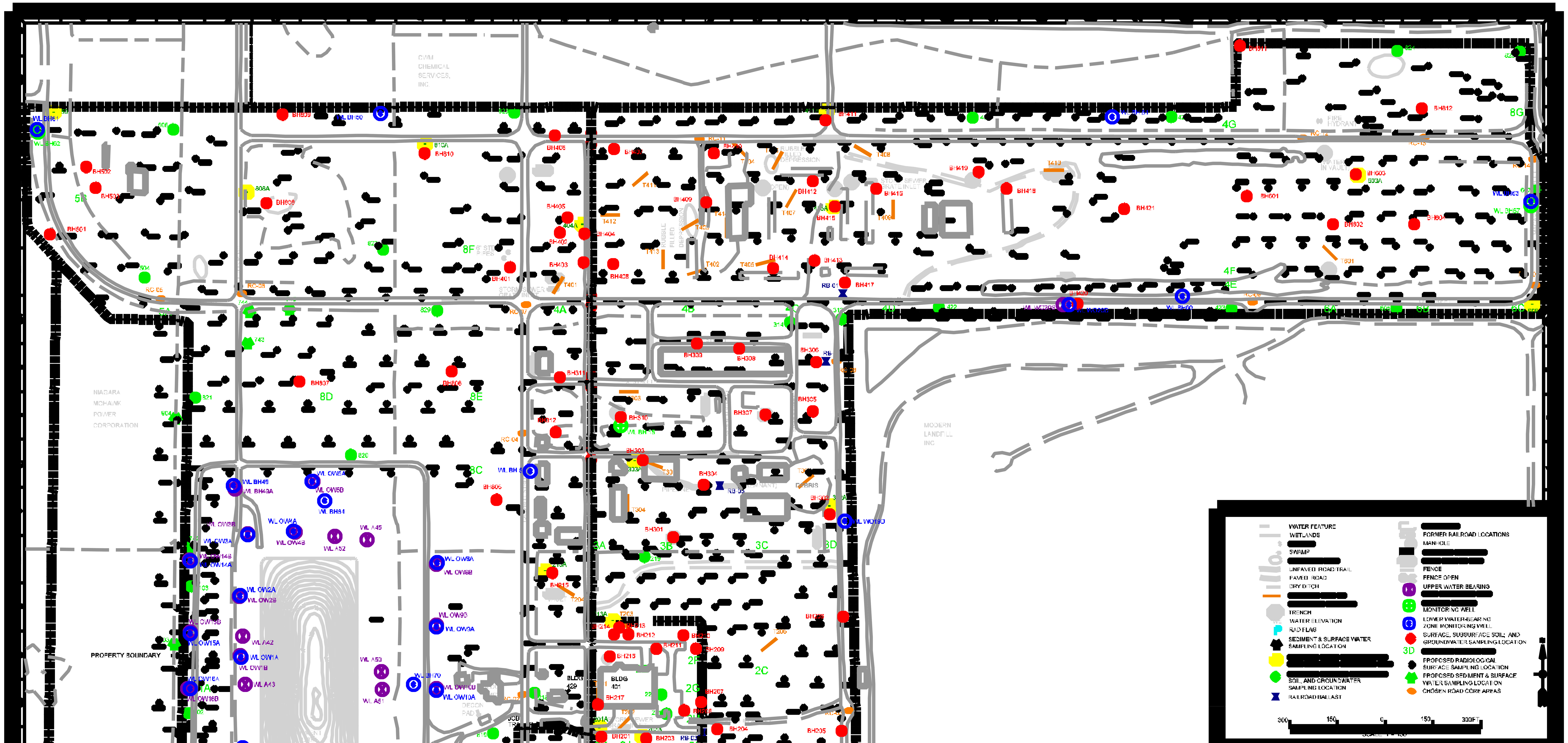
MAXIM TECHNOLOGIES SAINT LOUIS

US Army Corps of Engineers

SEDIMENT LOCATIONS
AND EXCEEDANCES
FOR RADIONUCLIDES
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK

Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by:
Approved by:
Scale: 1" = 300'
Date: 05-01-00
Drawing Code:
FIGURE NUMBER: 25
Sheet of


LEGEND
WATER FEATURE
WETLANDS
CULVERT
SWAMP
DEPRESSED AREA
UNPAVED ROAD/TRAIL
PAVED ROAD
DRY DITCH
DITCH
WATERFLOW DIRECTION
TRENCH
WATER ELEVATION
SUSPECT UST
FOUNDATION
FORMER RAILROAD LOCATIONS
MANHOLE
PROPERTY BOUNDARY
BLDG., SLAB, OR RUIN
FENCE
FENCE OPEN
EXCEEDANCE
DETECTED
ANALYZED BUT NOT DETECTED
NOT ANALYZED
NOTES
PRG = Preliminary Remediation Goals
Land Use: Residential
Basis: nc
ca = 1E-6 excess cancer risk
nc = hazard quotient of 1.0
300 150 0 150 300FT
SCALE: 1" = 300'
REGION 9 PRG (mg/kg)
Iron: 23463.2; nc
Manganese: 1762.4; nc
PROPERTY BOUNDARY
NIAGARA MOHAWK POWER CORPORATION
CWM CHEMICAL SERVICES, INC
MODERN LANDFILL INC
DEBRIS
PIPELINE
SCALE
SD701 Iron
SD702 Iron
SD703
SD704 Manganese
SD705 Iron
SD706 Iron
SD707 Iron
SD708
SD709 Iron
SD710 Iron
SD713 Iron
SD714
SD717
SD720 Iron
SD721
SD724
SD725 Iron
SD726
SD728
SD729
SD731
SD732 Iron
SD734
SD735
SD736
SD738
SD739 Iron
Symbol
Descriptions
Date
Approved
MAXIM TECHNOLOGIES SAINT LOUIS
Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR/JBM
Reviewed by
Approved by
US Army Corps of Engineers
SEDIMENT LOCATIONS
AND EXCEEDANCES
FOR METALS
PHASE I
NIAGARA FALLS STORAGE SITE
NIAGARA COUNTY NEW YORK
Scale: 1" = 300'
Date: 05-01-00
Drawing Code:
FIGURE NUMBER: 26



Symbol	Descriptions	Date	Approved

MAXIM TECHNOLOGIES SAINT LOUIS

US Army Corps of Engineers

SAMPLING LOCATIONS
PHASE II
NIAGARA FALLS
STORAGE SITE
NIAGARA COUNTY
NEW YORK

Walkover Survey: JLR / DEG / TB
Drawn by: MEM
Checked by: JLR
Reviewed by:
Approved by
Scale: 1" = 150'
Date: 06-06-00
Drawing
FIGURE NUMBER: 27

...\samp_loc_06-06-00.dgn Nov. 20, 2003 09:17:44

APPENDIX A

NFSS-TPP MEETING PHASE II INFORMATION RELATED TO THE PHASE I INVESTIGATION AND PLANNING OF THE PHASE II, MAY 3, 2000

This document is supplemented by the "NFSS-TPP Meeting Phase II Information Related to the Phase I Investigation and Planning of the Phase II, May 3, 2000". This latter document contains detailed summaries of Phase I analytical results and comparisons with screening values and was provided during the meeting held May 3rd and 4th, 2000.

APPENDIX B

PROJECT OBJECTIVES FROM THE MAY 3-4, 2000 TPP MEETING AND PROPOSED ACTIVITIES TO ACCOMPLISH THOSE OBJECTIVES

Objectives of the Remedial Investigation at the NFSS
(As Discussed in the May 3-4, 2000 TPP Meeting)
And Proposed Activities to Accomplish those Objectives

<u>PHASE I RI OBJECTIVES</u>:

1. Evaluate absence or presence of chemical released from the interim waste containment structure to the first or second water-bearing zone.

   <u>Status:</u>
   - Although some samples were collected, Phase I results do not conclusively support the potential release of contaminants from the IWCS. No soil or groundwater samples were collected west of the cell during Phase I.

   <u>Phase II Recommended Activities:</u>
   To accomplish this project objective three borings are proposed for the western side of the IWCS. Samples of surface soil, subsurface soil, and groundwater from a temporary wellpoint will be collected from each location. Additionally, fifteen existing wells surrounding the IWCS are proposed to be developed and sampled during the Phase II activities. Nine of these wells are in the upper water-bearing zone and six are in the lower water-bearing zone. The sampling of the existing wells will decrease the spacing of sample locations around the IWCS, potentially increase the UCL for the risk assessment, and bound the wells that exhibited constituents that were elevated in comparison to the PRGs, MCLs, and TAGM values.

2. Determine if chemical infiltration is occurring via groundwater into the interim waste containment structure.

   <u>Status</u>
   - This objective was completed in Phase I to the extent possible, with the exception of screening the results collected against background concentrations.

   <u>Phase II Recommended Activities:</u>
   For comparative purposes, background samples are proposed for collection in Phase II. After the background samples have been collected, the data will be analyzed in conjunction with the groundwater surface maps for the upper water-bearing zone to determine if the infiltration is occurring. The proposed background sampling includes:

   20 surface soil samples to be analyzed for SVOCs, metals, and radiological parameters;
   10 subsurface soil samples to be analyzed for metals and radiological parameters;
   5 groundwater samples from the upper water-bearing zone to be analyzed for metals and radiological parameters;
   3 groundwater samples from the lower water-bearing zone to be analyzed for metals and radiological parameters; and

2 groundwater samples from the bedrock water-bearing zone to be analyzed for metals and radiological parameters.

If possible the groundwater samples could be collected from offsite wells in each of the three water-bearing zones. These samples may be coordinated and/or collected with the background sampling scheduled for the Phase II RI of the LOOW.

3a. Determine if hazardous substances and radiological activity at the site comply with ARARs.

Status:

- Work to support this objective was initiated in the Phase I RI. Data was screened with Region IX PRGs, TAGM, and others such as groundwater MCLs. Screening for radionuclides in soil against potential ARARs is needed. More complete analysis of ARARs will be done in the feasibility study (FS).
- It was recommended during the May 4th TPP session for the Phase II RI that radiological data be screened against potential radiological ARARs:
  - 40 CFR 192, 5/15 pCi/g for Ra and Th
  - 10 CFR 40,criterion 6(6), benchmark for U and for Th-230 ingrowth
  - Criteria that are not ARARs but could be used for screening purposes; Radiological TAGM, and DOE Order 5400

Phase II Recommended Activities:

Work of this nature is iterative due to the need to identify contaminants of potential concern (COPC) and to evaluate the relationship of the contaminants of concern to the land-use scenarios, migration pathways, and exposure pathways. Analytical results from the Phase I and Phase II RI will be screened against all the listed guidance and regulatory criteria as part of the RI report and the baseline risk assessment. Some of the listed criteria require determination of background concentrations prior to screening. Since ARARs will not be developed until the FS and accepted until the record of decision (ROD), the ability to achieve this objective (as stated) is impossible at the RI stage of the project.

3b. Determine Constituents of Potential Concern.

Status:

- This objective was completed in Phase I by the above screening, with the exception of screening against background concentrations.

From the background data collected to achieve Objective 2 and the screening to be completed to achieve Objective 3a, the COPCs will be determined. Additional COPCs, in addition to those identified through Phase I sampling, may be identified through results of sampling and analyses through the combined results of future activities and/or trenching, excavations, and purposeful Phase II sampling.

4. Define site physical features and characteristics.

<u>Status:</u>

- This objective was completed in the Phase I RI with the exception of identifying the physical features and characteristics of several pipelines and debris piles.

<u>Phase II Recommended Activities:</u>

During Phase II RI activities, twenty-five trenches will be installed to investigate site physical features: four to investigate potential USTs and associated piping; three to investigate storm sewer inlets and piping; nine to investigate underground pipelines that include; sewers, water lines, and steam lines; five to investigate debris piles; and four to investigate the disturbed area (that was reported to be remediated) in the western part of the acidification area.

PHASE II OBJECTIVES:

5. RI: Nature and Extent

<u>USACE Recommendations:</u>

- Evaluate potential of existing background data sources for usability for screening NFSS metals and PAHs in soil and metals in groundwater.
- Downgradient sources are allowable for background as long as there are no impacts present in the media of concern.
  Sources include:
  - Lake Ontario Ordnance Works (LOOW)
  - Chemwaste Landfill
  - Modern Landfill
  - US Geological Survey
  - Soil Conservation Service

<u>Phase II Recommended Activities:</u>

As an alternative to collecting the background data (that is discussed in Objective 2), the data from existing sources will be examined to determine if it could be used as background data for the NFSS. The potential sources for this data is listed above. Background data is needed for metals and radioactive constituents in surface soil, subsurface soil, and all three water-bearing zones with the inclusion of SVOCs for surface soil.

6. RI: Definition of Site Background

<u>USACE Recommendations:</u>

Review existing Phase I RI data for use as NFSS background.

- Surface soil PAHs
- Chemical (i.e., non-radiological) data, if available

- Subsurface soils could be a source for radiological background
- Groundwater background data is also required

Constraint: Surface soil radiological background sources are to limited to offsite samples.

Phase II Recommended Activities:

As another alternative to collecting the background data (that is discussed in Objectives 2 and 5), the data collected in the Phase I RI will be examined to see if a statistical background value for metals and radioactive constituents in each sampled media and for SVOCs in surface soil can be made. However, radiological constituents in the surface soil will not be allowed (per the NYSDEC) to be utilized in this fashion. The background samples for the surface soil radiological constituents are limited to an off-site area upwind from the NFSS in an undisturbed area. See Objective 7.

7. RI: Define the background concentrations for metals, radionuclides, and semi-volatile compounds in surface soil, subsurface soil, and groundwater (upper zone, lower zone, and bedrock zone) through sampling and analyses.

USACE Recommendations:

- Surface soils are to be analyzed for SVOCs to determine background concentrations; SVOC background concentrations will not be determined for other media.
- Most metals and phthalates should not be considered as COPCs.

Phase II Recommended Activities:

The background sampling is discussed in Objective 2. If possible, the background sampling would be conducted in conjunction with the RI for the LOOW.

8. RI: Nature and Extent of Radiological Constituents:

USACE Recommendations:

Conduct gamma walkover on entire site.

- Use same grid spacing for MARSSIM Class II and III areas, smaller grid spacing for Class I areas

Constraint: Scheduling of gamma walkover needs to be coordinated with performance of ecological survey.

Phase II Recommended Activities:

A gamma walkover will be performed across the entire NFSS property. Class 1 areas will have complete (100%) coverage. Class 2 areas will have coverage of 20 %. Class 3 areas will have coverage of 5 %. Additionally, in Class 2 and 3 areas, features such as foundations and ditches will receive complete (100%) coverage. However, gamma surveys will not be conducted on potential wetlands or areas with standing water.

At "hot spots" identified by elevated gamma survey results, confirmatory surface soil samples will be collected. Additional surficial soil samples will be collected to define the extent of contamination around any identified hot spots.

Where possible, the walkover surveys will be accomplished with methods that generate corresponding GPS coordinates. The walkover surveys will be completed after the performance of an ecological survey and determination of presence of critical habitat and after the necessary clearing and grubbing of vegetation. The clearing would be accomplished to provide access for the survey, but wholesale clearance of the site is not desirable.

9. RI: Nature and Extent:

    USACE Recommendations:
    Determine radiological composition of slag and rock fill.

    Phase II Recommended Activities:
    Composite samples of the railroad ballast will be collected from five locations at the site and analyzed for radiological isotopes to determine the nature of the material. These results will be compared to similar materials located on other parts of the LOOW, or published sources, if those results/sources are found.

10. Use of MARSSIM guidance to design sampling/analysis during the Phase II RI.

    USACE Recommendations:
    - MARSSIM classes will be designated before the site gamma walkover survey.
    - Process will involve evaluation of previous data for usability in final status survey.

    Phase II Recommended Activities:
    MARRSIM will be used to design the sampling for the Phase II RI and the Class types will be assumed prior to the walkover survey. No gridded samples will be collected in Class 1 areas. Class 2 areas will have an average of 20 samples collected per MARRSIM unit in a triangular grid pattern. Class 3 areas will have 20 samples collected on a randomly distributed pattern. All data generated from the RI will be used for a final status survey. Older documented information may be used if the data has sufficient QA/QC documentation, sample location information, and is approved by the USACE for inclusion.

11. Determine nature and extent of contamination posing unacceptable risk.

    Suggest refining this objective to*:*

12. Define and quantify an exposure point concentration for each exposure unit as appropriate for use in the risk assessment.

Phase II Recommended Activities:

To define and quantify an exposure point concentration requires a sufficient number of samples needed to provide an acceptable estimation of the UCL. The nature and extent of contamination above screening values must first be determined. The exposure units depend on the type of land use scenario that is used in the risk assessment. Note that the only size given in the risk assessment guidance documents is for residential (one-quarter to one-half acre units). Due to the extreme amount of samples that would be needed for each one-half acre exposure unit, the Phase II RI investigation will be based on exposure units that are larger than residential areas. Risks for the residential areas will need to be extrapolated due to budget constraints.

Exposure units are estimated for the industrial/managed recreational land use scenario to be roughly equal to the areas of investigation from the Phase I. Surface soil, subsurface soil, and groundwater samples will be collected from 27 proposed locations from areas not investigated in the Phase I RI and 29 locations needed to bound areas from Phase I RI that exceeded the corresponding screening values. To optimize the amount of data collected and to provide an acceptable estimation of the UCL from each exposure unit for the risk assessment, a sufficient number of samples in each exposure unit will be analyzed for the constituents that are COPCs.

13. RI: Establish the potential future land-use scenario, migration and exposure pathways (Conceptual Site Model) for surface soil, subsurface soil, groundwater, sediment, and surface water.

USACE Recommendations:

- Land use scenarios will consider the following future uses:
  - Managed recreation
  - Trespasser
  - Future construction worker
  - Industrial worker
  - Resident
  - Farmer

Phase II Recommended Activities:

A conceptual site model will be completed as part of the risk assessment. This model will include all the land uses and media listed above. Potential migration and exposure pathways will be included in this model. Additional proposed Phase II RI sampling needed to support the risk assessment is discussed in Objective 12.

14. RI: Characterize risk to current and future exposed human populations

USACE Recommendations:

- COPC determination for inclusion in risk assessment will consider screening against:
  - Background
  - EPA Region 9 PRGs

- TAGMs (will not be used to determine which chemicals will be evaluated in FS, only risk & potential ARARs will be used for these purposes)
- Frequency of detection

- Baseline risk assessment will not be performed in those areas where no chemicals failed the above screening process.

<u>Phase II Recommended Activities:</u>
Based on the conceptual site model discussed in Objective 13, a baseline risk assessment will be performed. This risk assessment will determine the COPCs using the above listed items (including results generated from sampling, values from other published sources, the guidance documents, and regulatory documents). Although a detailed baseline risk assessment will not be performed in those areas where no chemicals failed the screening process, the baseline risk assessment will consider the whole NFSS property.

15. RI: Obtain data for ecological survey

<u>USACE Recommendations:</u>
- Evaluate Chemwaste ecological assessment for information such as State endangered species present in area.

Constraint: Performance of ecological survey must be coordinated with the gamma walkover survey.

<u>Phase II Recommended Activities:</u>
It is unknown who will perform the ecological survey at this time. Maxim will assume the USACE will perform the survey.

The ecological survey will be performed prior to the clearing necessary for the gamma walkover surveys. This survey will consider the ecological survey performed at the Chemwaste site (north of the NFSS), examine information such as State endangered species present in area, and will define habitat areas that must not be cleared.

16. SI/RI: Evaluate absence/presence of contamination to offsite surface soil, sediment, and surface water at the Niagara-Mohawk Power Corporation property west of the NFSS. If found, then determine nature and extent.

<u>USACE Recommendations:</u>
- One sampling effort proposed
- Evaluate previous site operations for determination of sampling areas.
- Use elevated gamma screening as a potential indicator of the presence of chemical contamination

<u>Phase II Recommended Activities:</u>
Four samples of sediment and surface water and 20 samples of surface soil will be collected on the Niagara-Mohawk property. The use of field screening (i.e., gamma walkover survey) to determine the location for "hot spot" surface soil sampling and

subsequent sampling to define the extent of contamination will supplement the collection of surface soil samples for radiological constituents at gridded sample locations (MARSSIM).

17. RI: Understand groundwater characteristics at site. (Movement, flow, discharge, and interconnectivity)

<u>USACE Recommendations</u>:

- Consolidate data from all sources
  - Past DOE investigation documents
  - Chemwaste
  - Phase I
  - Modern Landfill

<u>Phase II Recommended Activities:</u>

Enough information exists to evaluate the groundwater movement and flow in the lower and bedrock water-bearing zones. Historical documents indicate no local discharge of groundwater from the lower and bedrock water-bearing zones, with the possible exception of the reported interconnectivity of the upper and lower water-bearing zones. Groundwater characterization in the upper water-bearing zone has not been determined on a site-wide basis. With the exception of one well, all of the upper water-bearing zone wells at the NFSS are located around the IWCS.

It is proposed in the Phase II RI that fifteen wells be installed, developed, and sampled in the upper water-bearing zone. Data collected from these fifteen installed wells (along with data collected in the Phase I RI from the existing wells) will help determine the movement and flow of the three water-bearing zones. Sampling of fifteen additional existing wells in the upper and lower water-bearing zones around the IWCS is also recommended. This information, along with the past DOE documents, Chemwaste reports (to be provided by the NYSDEC), and the results from the Phase I RI, will provide information concerning the nature and extent of contamination and potential for interconnectivity of all three water-bearing zones.

18. RI: Evaluate DOE NFSS site data for use in RI/FS.

<u>Phase II Recommended Activities:</u>

Due to the existing data being in a proprietary database, this project objective (review and evaluation) will be performed by the USACE. If significant information is discovered, that information will be submitted to Maxim for review and incorporation into the RI report and recommendations for the future FS.

BUILDING 401 and FS OBJECTIVES

The following items are not addressed in the Remedial Investigation and activities designed to achieve them will not be addressed by this investigation.

19. Bldg 401: Chemically characterize to dispose of the building materials
    - Future phase

20. Bldg 401: Chemically characterize soils outside of building
    - Future phase
    - The boundary of the Building 401 area needs to be established and incorporated in a future document, preferably in a figure in the Phase II FSP.

21. Bldg 401: Radiologically characterize subsurface soils
    - Future phase

22. Bldg 401: Radiologically characterize surface soils to complete delineation
    - Future phase

23. Bldg 401: Radiologically characterize “high bay” portion of building
    - Future phase

24. FS: Understand surface water flow.
    - In the event of a catastrophic event for remedy effectiveness.

25. Evaluate potential remedies for the interim waster containment structure
    - Future phase

FUTURE PROJECT OBJECTIVES LEADING TO SITE CLOSEOUT

The following items are not addressed in the Remedial Investigation and activities designed to achieve them will not be addressed by this investigation.

26. FS: Determine acceptable risk-based cleanup levels

27. FS: Determine ARARS

28. FS: Identify and Screen Potentially Suitable Technologies – Evaluate effectiveness, implementability, and cost of technology

29. FS: Perform Detailed Analysis of Remedial Alternatives – Evaluate long-term effectiveness, short-term effectiveness, implementability (short/long term), risk-based evaluation of remedial alternatives (toxicity, mobility, volume of contamination), cost (net present worth and O&M)

30. PP: Develop a proposed plan

31. ROD: Record of Decision

32. Remedial Design:

33. Remedial Action

Site Closeout activities: Includes final site status surveys

APPENDIX C

SAIC RADIOLOGICAL SAMPLING RECOMMENDATIONS

An Employee-Owned Company

To: Mike Giordano
From: David King
Date: June 6, 2000
Re: Responses to Maxim's Request for Information Regarding Phase 2 Sampling at NFSS

Maxim requested that SAIC ~~has been requested to~~ address a number of issues related to Phase 2 sampling at the Niagara Falls Storage Site (NFSS). The following ~~lists~~ presents the ~~specific~~ requests/issues with responses. The specific request is given in Italics.

Request 1: *Develop land use scenarios and corresponding DCGL(s) for the NFSS site. The DCGL is necessary in order to plan sampling to determine the nature and extent of contamination and status of survey units.*

The full development of scenarios will require a coordinated effort with the District risk assessor (and possibly the CX risk assessor), a task better suited for the BRA than the RI. Because DCGLs can not be developed without exposure scenarios, conservative default scenarios should be used. ARARs have not yet been evaluated, so dose-based DCGLs may or may not be required. What is known at this point is that the risk from exposure to site contaminants will be evaluated using RAGS and RAGS-defined scenarios. Therefore, it is reasonable to start with EPA default exposure scenarios.

Industrialized lands and farmland surround the site. The most likely future use is industrial, although residential land use is conceivable given the site's proximity to area farms. Other less conservative scenarios may also be considered including recreational, construction, etc. Given this range, it is reasonable to default to the most conservative plausible land use, residential.

Having arrived at an exposure scenario, a DCGL can then be derived for each individual contaminant. While data are limited, it is known that material from Mallinckrodt and Linde were shipped and stored at NFSS. The list of potential contaminants from these sites includes the long-lived radionuclides from the uranium, thorium, and actinium decay series. Specifically included are U-238, U-234, Th-230, Ra-226, and Pb-210 from the uranium series; Th-232, Ra-228, and Th-228 from the thorium series; and U-235, Pa-231, and Ac-227 from the actinium series. It is also known that nuclear reactor-related materials have also been transported to the site. Therefore, long-lived fission products may also be located at NFSS including Co-60, Sr-90, Cs-137, and Am-241. Plutonium may also be present in trace amount, but the fission products would be identified first (i.e., could be used as a flag).

A limit must be defined in order to derive a DCGL for each radionuclide of interest. The limit can be concentration-based (as with the 5 pCi/g limit from 40 CFR Part 192), dose-based (as with the 25 mrem/yr limit from 10 CFR Part 20 Subpart E), or risk-based (i.e., using the CERCLA target risk range of 10^{-6} to 10^{-4}). Concentration-based and dose-based limits are specific to ARARs that have not yet been identified for the site. Instead of providing a DCGL for all potential ARARs, only risk-based limits are initially considered. Limits at the point of departure (1×10^{-6}) and the upper bound of the risk range (1×10^{-4}) should be provided for each potential contaminant. Note that the upper bound of the risk range is not defined, but EPA typically used 1×10^{-4}. EPA has also argued that 3×10^{-4} may be used for radionuclides (although this value is not used here).

Potential DCGLs for the EPA-default residential or other relevant scenarios may be obtained from the ORNL Internet site titled ***Risk Assessment Tools and Information*** with the address of *http://risk.lsd.ornl.gov/prg/prg_document.shtml*. These values are PRGs (produce 10^{-6} risk for the EPA-default scenario) interpreted as potential DCGLs. Table 1 lists the DCGLs for the residential and industrial scenarios for the total of the inhalation, soil ingestion, and external gamma pathways. Table 1 shows that uranium is considered for both its carcinogenic and non-carcinogenic properties.

Note that average background concentrations for the first eight radionuclides in Table 1 are each about 1 pCi/g. Many of these potential DCGLs are unachievable at the 10^{-6} level as they are below background. Even setting the Ra-226 residential DCGL to the 1×10^{-4} risk level of 0.28 pCi/g is below background and unachievable (background for Ra-226 appears to be around 1 pCi/g based on Phase 1 results). However, the DCGL (based on the PRG) does not have to correlate to exactly 10^{-6} or 10^{-4} risk. The value can go higher than 10^{-4} to get a value distinguishable from background. An approach for developing the DCGL could go as follows:

1. Characterize background. Collect enough samples to allow future flexibility. That is, collect enough samples to calculate a UCL_{95} and enough samples to satisfy anticipated requirements per MARSSIM unit. Twenty to thirty samples should suffice, ***making sure to characterize a complete set of analytes***.
2. Identify the residential PRG for the anticipated risk driver(s). The risk drivers are likely Ra-226, Th-230, Pa-231 and Ac-227 unless fission products are encountered. If the PRG is less than background or below analytical limits at 10^{-6} risk, move off of 10^{-6} until reaching an acceptable/achievable level. The acceptable level should be distinguishable from background. For example, use the UTL of twice the average background level for Ra-226.
3. Identify the appropriate test. The Buffalo District may prefer the Sign test even though the contaminants are present in background.
4. Estimate the number of samples per survey unit per MARSSIM and the defined DCGLs. The calculations should be carefully documented and subjected to independent review. The standard deviation should be estimated from Phase 1 data or the background data, whichever produces the more conservative result (more samples). Set upper and lower boundaries on the number of samples per unit based on the available budget. ***For example***, set the lower limit to 8 samples per unit (based on RAGS supplemental guidance

for estimating the source term) and the upper limit to 20 samples (based on budget constraints). Allow for contingency and hot spot sampling.

5. Break the site into survey units by class based on preliminary data. Bias units towards Class 1 but have enough flexibility to change classes as the characterization continues.

Considering that Ra-226 is the primary contaminant of concern, an interim DGCL could be established based on the anticipated range of background. Looking at Phase 1 data, background is around 1 pCi/g. If the DCGL were around 3 pCi/g, it could be scanned (see MDCs listed in MARSSIM) and distinguished from background. The final DCGL for the site may combine multiple radionuclides into a sum-of-the-ratios approach. However, it is too early to tell if this will happen. The assumption here is that Ra-226 may be used as a proxy for other radionuclides. That is, it is assumed that the remediation of Ra-226 will adequately remove other radionuclides (this is a complete guess). After Phase 2 data are analyzed, the DCGL may be modified.

Table 1. Potential Risk-Based DCGLs for NFSS

Radionuclide	Residential DCGL (pCi/g)		Industrial DCGL (pCi/g)	
	1×10^{-6} Risk	1×10^{-4} Risk	1×10^{-6} Risk	1×10^{-4} Risk
U-238	6.3E-01	6.3E+01	3.1E+00	3.1E+02
U-234	2.0E+01	2.0E+03	6.5E+01	6.5E+03
Th-230	2.3E+01	2.3E+03	7.4E+01	7.4E+03
Ra-226	2.8E-03	2.8E-01	6.7E-03	6.7E-01
Pb-210	9.4E-01	9.4E+01	3.2E+00	3.2E+02
Th-232	2.6E+01	2.6E+03	8.2E+01	8.2E+03
Ra-228	1.3E-02	1.3E+00	6.6E-02	6.6E+00
Th-228	7.0E-03	7.0E-01	3.5E-02	3.5E+00
U-235	1.6E-01	1.6E+01	8.2E-01	8.2E+01
Pa-231	1.3E+00	1.3E+02	5.8E+00	5.8E+02
Ac-227	4.5E-02	4.5E+00	2.2E-01	2.2E+01
Co-60	4.5E-03	4.5E-01	2.2E-02	2.2E+00
Sr-90	1.7E+01	1.7E+03	5.7E+01	5.7E+03
Cs-137	2.1E-02	2.1E+00	1.0E-01	1.0E+01
Am-241	2.2E+00	2.2E+02	7.9E+00	7.9E+02
Chemical	Residential DCGL (mg/kg)		Industrial DCGL (mg/kg)	
	0.1 Hazard Quotient	1.0 Hazard Quotient	0.1 Hazard Quotient	1.0 Hazard Quotient
Uranium	2.1E+02	2.1E+03	5.7E+02	5.7E+03

All values taken from *http://risk.lsd.ornl.gov/prg/prg_document.shtml* using default exposure parameters and the total pathways option.

K-40 could be added to this list as it will be present in site soils.

Request 2: *Recommend Type 1 and Type 2 Error values for use in design of sampling grids in Class 2 and Class 3 areas.*

Default errors are typically 5% for both Type 1 and Type 2. These defaults are consistent with other statistical values used in data management (e.g., UCL-95 or UTL-95) and are a good starting place. However, the Buffalo District has shown a preference to move the Type 2 error to 10%, somewhat increasing the risk of removing too much material. A type 1 error of 5% and a Type 2 error of 10% would be consistent with practices of the St. Louis District and is reasonably conservative. The recommended Type 1 and Type 2 errors are 5% and 10%, respectively.

Request 3: *Prepare recommendations concerning definition of radiological background values at NFSS. Is it necessary? In our May 9 meeting it was suggested an approach which assumes that background is negligible might be appropriate. If background data is necessary, can we use our existing data to define background? Evaluate and recommend whether the Wilcoxon Test or the Sign test should be used to evaluate radiological sampling/analysis results for survey units at NFSS. Evaluate sources of background data for radionuclides, including properties such as former LOOW, Modern Landfill, Chemwaste, and NFSS.*

The Buffalo District prefers the Sign test to the Wilcoxon test, even if the contaminant is present in background. Minor adjustments could be made to accommodate including the evaluation of gross vs. net concentrations and gross vs. net doses and risks. However, the use of the Sign test does not preclude the collection of background data. For radionuclides, the background screen is critical to the BRA. In fact, the identification of a background location and the collection of background data should be one of the first steps in the RI. It will be against these data that all characterization results will be compared, regardless of the test eventually used in the final status survey.

Preliminary background values may be estimated from Phase 1 data. However, these values should not take the place of actual background data collected upwind (predominantly) and upstream of the site. The background area should contain native soils un-impacted by human activities. Investigation may find that this area does not exist immediately adjacent to NFSS with the nearest location several miles away. In such a case a compromises may be required conditional to Corps approval. The specific distance from the site is less important than the potential for human impact.

Characterization of background should not be limited to analytical results. Background data should be collected from all instruments and surface types used to characterize site wastes. This is likely limited to 2×2 NaI detectors and µR/hr meters, but background for these instruments can very over relatively short periods of time. A common practice for characterizing background for GPS surveys is to identify a convenient reference location and then survey it at the beginning of the day and after the mid-day break. Field surveys from the morning are tracked with the morning background survey and the field surveys in the afternoon are tracked with the afternoon background survey. The reference area survey should be large enough to collect a significant number of data points (e.g., 100) but not so large that it take significant time away from field measurements. If µR/hr measurements are made in the field, at least one reference area data point should also be collected each period of operation (e.g., morning and afternoon). The detector responses and not the GPS (position) data from the reference area surveys are important. As an alternative to a walking survey, technicians could collect detector responses from a fixed location as long as the detector height above the ground is the same for the reference count and the field surveys (geometry is very important).

Note that the reference area does not necessarily have to be located at the designated background area. The reference area should have the same characteristics of background, but is used to monitor detector responses and local variations in radiation levels. Ideally, the survey of the designated background area and the reference area will produce indistinguishable results. Background estimates for major surface types (soil vs. asphalt) would be helpful, although frequent reference area surveys are likely only necessary for soil surfaces.

Reference area surveys do not take the place of routine source checks.

Request 4: *Develop Scan MDCs for use during Phase 2 investigations at the NFSS site. Describe proposed instrumentation to be used for walkover surveys, calibration methods to be used, and address the issue of comparability of data generated by different instruments.*

Scan MDCs are defined in MARSSIM Table 6-7. These values are consistent with the values listed in NUREG-1507. There is currently no apparent reason why other values should be used, at least not at this point.

Note that the walkover scans is a finding tool. Scan data in CPM may not always be correlated to pCi/g values, especially when there is a mixture of contaminants. For NFSS, a mixture of contaminants is expected and some of the radionuclides can not be identified through field gamma measurements (e.g., Th-230) without a proven surrogate. Because walkover surveys are relatively cheap and do provide good coverage of surface soils, they should be used at NFSS. However, it is very difficult to calculate a single MDC (or CPM action level) for an undefined mixture of radionuclides.

Also note that DOE remediated some area to DOE Order 5400.5 guidelines. These guidelines may not be acceptable today. For example, the Order would allow up to 10 time the generic guideline or up to 150 pCi/g of Ra-226 in a 1-m^2 area. It is unlikely that 150 pCi/g of Ra-226 would be allowed today under a free-release scenario, no matter what the surface area. The areas remediated by DOE could be covered with clean backfill. If there is a foot or more of soil covering the residual radioactivity, the MDC is infinity (it can not be detected with a walkover survey).

The manufacturer specifies calibration methods. All radiological instruments should be calibrated annually.

Request 5: *Based on Phase 1 results, recommend radiological analytes, analytical methods, and reporting limits to be included in Phase 2 sampling in surface soil, groundwater, surface water, and sediment.*

All of the radionuclides presented in Table 1 should be considered in the BRA. If never detected, the Corps can say that they looked and did not find a radionuclide vs. not having any idea. Analysis of the complete list is probably not necessary throughout the effort. Initially, Pb-210 and Sr-90 should be dropped. Isotopic thorium (to get Th-232 and Th-230) should be performed and so should isotopic uranium (to get U-238, U-235, and U-234). All the remaining radionuclides would be analyzed by gamma spectrometry. Once there is ample evidence that the uranium is neither depleted nor enriched, the isotopic uranium analysis could be dropped, relying only on gamma spectrometry results. It does not look like there is enough Phase 1 data to drop isotopic uranium analysis at this time. Additional samples with elevated uranium levels would be required. If fission products start showing up in the results, Sr-90 may be added as well if plutonium. In fact, it may be a good idea to stockpile samples until there is ample evidence for eliminating some of the analyses. As is typical, equilibrium conditions could be assumed between Pb-210 and Ra-226, thus avoiding the direct analysis of Pb-210. In summary, the following analyses are recommended:

- Isotopic thorium for the duration of Phase 2;
- Isotopic uranium until it is evident that the site does not contain enriched or depleted uranium (not enough Phase 1 data available although there is no indication of enrichment or depletion);
- Gamma spectrometry for all gamma emitting radionuclides in Table 1 including U-238 and U-235;
- Sr-90 and plutonium could be added if fission products are encountered (Phase 1 sample SD-717-333 has a Cs-137 result of about 450 pCi/g); and
- Assume Pb-210 is present at the same concentration as Ra-226.

Note that Th-230 should specifically be excluded from the gamma spectrometry analyses. Some laboratories claim that they can achieve relatively low detection limits, but the results are usually unusable.

The laboratory should specify what detection limits are achievable. Target detection limits could be listed by radionuclide assuming the standard analytical methods are used.

It is possible to convert isotopic uranium data in pCi/g into parts per million (for non-carcinogenic risk calculations), but ten to twenty samples could be sent for total uranium (non-radiological) analysis. This way, the conversion relationship could be supported by actual data.

Request 6: *Recommend criteria for selection of the number and locations of confirmatory samples and analytes for radiological parameters, in response to results of gamma walkover surveys planned for Phase 2.*

It is reasonable to follow the approach outlined in MARSSIM to estimate the number and location of samples. However, the initial assumption is that there is a preliminary data set including all the contaminants of concern. The current data set does not contain all of the likely risk drivers (Ra-226, Th-230 through ingrowth of Ra-226, *Pa-231*, and *Ac-227*). Even with this available information it is difficult to assign a screening value for gamma walkover surveys. A screening value may be derived assuming a cleanup level and mixture of radionuclides, and using the MDCs from MARSSIM, but there would be considerable uncertainty in this approach. Perhaps it is possible to review Phase 1 data and compare analytical results with scan data. Otherwise, the decision to collect a sample based on gamma walkover results depends solely on background/reference area scan data.

2,000 CPM above surface specific background may be used as an initial action level consistent with NUREG guidance and assuming a 2×2 NaI detector is used. Once samples are analyzed, the action level may be modified. Note that some of the potential contaminants are not gamma emitters or have a weak gamma/x-ray signal. Also note that contaminants may be mixed, currently making it impossible to identify a single action level. Once data have been collected, patterns may develop that can then be used to refine the action level. Until that time, no single site-specific value may be derived.

Whatever action level is developed site planners should be advised to continuously check the validity of the value. If an action level results in samples that are all within the range of background, the action level should be adjusted to compensate. There is no reason to waste time and effort by collecting samples based on an overly conservative action level.

The same policy should apply to bounding elevated area. If an elevated area is identified, some samples will likely be collected. A decision tree can be used to come up with a precise number of samples to match a range of conditions. This approach can be avoided during the RI by applying a little common sense. No matter how complicated the decision tree, there will always be an unexpected condition. It is simpler (and probably just as effective) to assign a number of samples on a case-by-case using best professional judgement. Consider the following sequence of events:

1. Gamma walkover surveys have been performed and are reviewed by field managers;
2. Based on the walkover data, three areas show elevated activity well above the action level – each area is targeted for sampling;
3. Field technicians are instructed to identify the location within each of the three elevated areas with the highest gamma radiation levels;
4. A surface sample is collected from each of these areas;
5. Area 1 is large and/or contains a few hot spots – technicians are instructed to collect two to three samples from Area 1;
6. Analytical results indicate that there is no contamination above the action level in Areas 2 and 3 – no additional sampling is required;
7. Area 1 results come back above the action level – additional sampling is necessary to bound Area1 ;
8. Based on the size and shape of the area, the field managers initially assign 6 surface and 12 subsurface samples and designate the approximate location of each of these samples in

order to identify the boundary of the Area 1. (Use best professional judgement to assign the number and location of samples.)

9. Technicians prepare to collect the Area 1 samples at the designated locations – they could use a hand auger and should log the holes with a NaI detector;
10. One subsurface sample per hole is collected at the interval with the highest radiation levels;
11. Another subsurface sample is collected at the interval considered to be below the potential contamination (if required);
12. Results come back showing that one portion of the area is not yet bound – additional samples are assigned and the sampling process is repeated.

This sequence can be put into a flow diagram if required, but is presented only as a reasonable example of the sequence of events that could take place during Phase 2. The key to a successful effort is that qualified personnel review data as it is generated and make reasonable decisions. One key to the sequence presented above is quick data turnaround (both GPS and analytical data).

Quick turnaround will allow field managers to better balance sampling and surveying activities. For example, managers will need to know if additional samples are required in some areas or whether contamination has been bound. Otherwise, the field operations could be extended while waiting for analytical results. Having the results quickly will also allow managers to evaluate activities and determine if changes are required (some of the planned activities may be based on assumed conditions to be verified in the field).

The number of analytical samples for Class 2 and Class 3 areas can be calculated using a few simple assumptions. First assume that the DCGL for Ra-226 is 3 pCi/g (see Request 1). The number of samples per survey unit can be estimated using MARSSIM and Phase 1 data. A Type 1 error of 5%, a Type 2 error of 10%, and a LBGR of 1.5 are assumed. The standard deviation is set to 1.7 pCi/g and the survey unit average is set to 1.4 pCi/g (eliminating the maximum result and the results < 0.1 pCi/g from the Phase 1 data set). With these assumptions, the number of samples per survey unit would be above 30 for either the Sign or the WRS test. In either case, the approach falls back to 20 samples as specified under the response to Request 1. The maximum and minimum number of samples per unit should be specified in the DQOs. This approach is a conservative guess at using a preliminary DCGL for a single risk driver (used as a surrogate for other contaminants) to calculate the number of samples. After Phase 2 data have been collected and possible regulatory limits have been identified, the DCGL approach should be reviewed and modified as appropriate.

Request 7: *Describe methods SAIC considers appropriate for documentation of the locations and coordinates of gamma walkover surveys in Class 1, Class 2, and Class 3 Areas.*

It is assumed that GPS will be used in uncovered areas. Using this assumption, detector results (CPM), position data, and time data are logged. SAIC has considerable experience using GPS to collect gamma data and considers the use of GPS far superior to standard (hard copy) survey methods. If additional details on the use of GPS are required, contact SAIC management.

There are options for covered areas where GPS is not feasible. The initial assumption is that the undergrowth in wooded areas is too thick to conduct detailed surveys and it is not worth the effort to clear the undergrowth (i.e., GPS still would not work and the areas are Class 2 or Class 3). Some data should still be collected. Here are a few ideas:

First, the GPS team(s) can drop the GPS components since they would not work in the area and would only be an additional drag. The data logger should be used to make a reasonable effort to collect data from the designated area (e.g., over an acre or site grid). The surveyor walks a meandering path over the area going where the terrain allows. If hot spots are identified, the surveyor “drops a flag” for future sampling (if required). Relatively more effort should be taken near roads or worn pathways where materials could have been dumped or otherwise discarded. The data collected over the acre/grid unit represents the surface radiation reading for the area. Summary statistics would then be used to indicate whether a more focussed survey is required.

Second, a fixed number of systematic points could be identified per acre/grid unit. The surveyor gets to these points as best he/she can, then collects fixed-point measurements. While moving from point to point, the surveyor should look for hot spots. These additional data could be logged, but the idea is for the surveyor to locate hot spot between systematic sampling locations. The number of sampling points should be left to individuals most familiar with the site. If the undergrowth is very dense, only a few points per acre may be reasonable. If after some short time it become apparent that several more or several fewer locations should be identified, the reason for the adjustments should be documented and a new sample density assigned.

Request 8: *Comment on the extent of gamma walkovers in Class 1, 2, and 3 Areas suggested in the May 9 meeting notes. Recommend walkover coverage throughout the site.*

It would be nice to get complete coverage of the entire site. However, this is not feasible given the large surface area of the site and considering the physical restrictions posed by the wooded areas. MARSSIM suggests 100% coverage in Class 1 areas, 10-100% coverage in Class 2 areas, and 0-100% coverage in Class 3 areas. A reasonable effort should be made to match these percentages including something above 0% for Class 3 units. A coverage of 100% for Class 1, 20% for Class 2 and 5% for Class 3 seems reasonable assuming it is acceptable to the Buffalo District.

In order to save some time in open areas, an ATV could be used with several detectors mounted on the front. Perhaps two or three detectors could be spaced 3 feet apart to represent a path width of 12 feet (adding 1.5 feet on each end). The ATV could probably move a little faster than someone walking (using a constant rate with fewer breaks), covering two to three times the area. The acres covered per day would depend on the survey rate and the number of detectors mounted on the ATV. A rate of approximately 2 feet per second is common, depending on terrain. Also see the response to Request 7.

Table 1. Potential Risk-Based DCGLs for NFSS

Radionuclide	Residential DCGL (pCi/g)		Industrial DCGL (pCi/g)	
	1×10^{-6} Risk	1×10^{-4} Risk	1×10^{-6} Risk	1×10^{-4} Risk
U-238	6.3E-01	6.3E+01	3.1E+00	3.1E+02
U-234	2.0E+01	2.0E+03	6.5E+01	6.5E+03
Th-230	2.3E+01	2.3E+03	7.4E+01	7.4E+03
Ra-226	2.8E-03	2.8E-01	6.7E-03	6.7E-01
Pb-210	9.4E-01	9.4E+01	3.2E+00	3.2E+02
Th-232	2.6E+01	2.6E+03	8.2E+01	8.2E+03
Ra-228	1.3E-02	1.3E+00	6.6E-02	6.6E+00
Th-228	7.0E-03	7.0E-01	3.5E-02	3.5E+00
U-235	1.6E-01	1.6E+01	8.2E-01	8.2E+01
Pa-231	1.3E+00	1.3E+02	5.8E+00	5.8E+02
Ac-227	4.5E-02	4.5E+00	2.2E-01	2.2E+01
Co-60	4.5E-03	4.5E-01	2.2E-02	2.2E+00
Sr-90	1.7E+01	1.7E+03	5.7E+01	5.7E+03
Cs-137	2.1E-02	2.1E+00	1.0E-01	1.0E+01
Am-241	2.2E+00	2.2E+02	7.9E+00	7.9E+02
Chemical	**Residential DCGL (mg/kg)**		**Industrial DCGL (mg/kg)**	
	0.1 Hazard Quotient	1.0 Hazard Quotient	0.1 Hazard Quotient	1.0 Hazard Quotient
Uranium	2.1E+02	2.1E+03	5.7E+02	5.7E+03

All values taken from *http://risk.lsd.ornl.gov/prg/prg_document.shtml* using default exposure parameters and the total pathways option.

K-40 could be added to this list as it will be present in site soils.

APPENDIX D

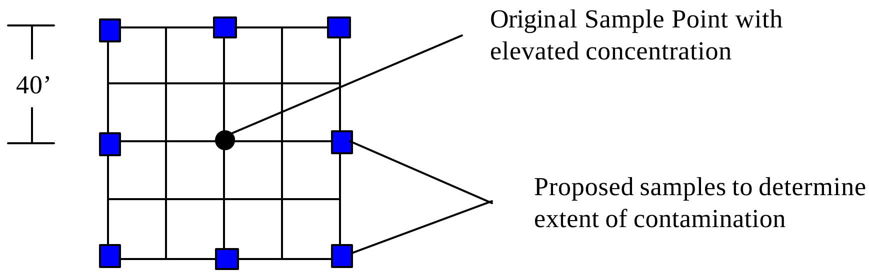
APPROACH FOR COLLECTION OF SAMPLES FOR RADIOLOGICAL CONSTITUENTS

Approach to Sampling for Radionuclides in the Surface Soil at the NFSS

This approach replaces the 607 gridded samples that were included in the draft Phase II FSP. All other sampling described in that plan (pending revision and approval) will be conducted. The approach follows:

1. The proposed MARSSIM class units, as determined in the draft Phase II FSP, will be retained.

2. Collect surface soil samples surrounding the 10 locations where the radionuclide concentration exceeded the screening values (from Figure 1 of the draft FSP). These samples will be located in all cardinal directions and half steps (8 samples) from the original sample location using a 40 foot grid spacing as shown below.



Where field screening of surface samples or other information indicates the potential for subsurface contaminants, additional samples will be collected at depth sufficient to delineate the vertical extent of contaminants.

Samples will not be collected within the Class 1 areas. However, eight samples will be collected at the corners of the Class 1 area of unit 5B. The unit is depicted on Figure 27 of the draft FSP. Significantly elevated concentrations of radionuclides were determined in surface soil samples from BH502 and BH503 in unit 5B.

Two samples will be collected south of the Class 1 area of unit 2J. The unit is depicted on Figure 27 of the draft FSP. Significantly elevated concentrations of radionuclides were determined in the surface soil sample from BH203 in unit.

A total of 90 samples will be collected for this extent delineation.

3. Conduct a gamma walkover survey of the site. As described in the draft FSP, with a revision to the Class 1 percentage, the coverage planned for the gamma walkover is as follows:

Class 1	up to 100% *
Class 2	10%**
Class 3	10%**
Roads	100%
Ditches	100%

*As necessary to delineate impacted area and significant hot spots
**With bias surveys for each unit based on Historical Site Assessment and site configuration

The above changes are based on the forthcoming scope of work for the Gamma Walkover. Actual coverage may be revised as conditions warrant.

After compiling the results from the gamma walkover survey, a meeting will be held with the contractors and the USACE to describe those results and to optimize a sampling strategy to place samples at hot spot and delineation locations. This strategy may include the following:

Placement of surface soil samples at the high gamma reading locations (i.e., hot spots),

Placement of subsurface soil samples from 1.5 to 2.0 feet below the ground surface or as necessary to delineate the vertical extent of contaminants at the hot spots, and

Placement of surface soil samples to determine the extent surrounding the hot spots.

Although the number of samples will not be known until that meeting, a total of 80 samples will be reserved for this task for planning and budgeting purposes.

4. Using the grid from the draft Phase II FSP and the locations developed in the gamma walkover survey review meeting, 3 to 4 additional samples will be placed in each MARSSIM unit.

These samples will be placed in a stratified random fashion in locations that avoid the hot spot and delineation samples from the review meeting.

A total of 100 samples will be collected in this stratified random fashion.

APPENDIX E

MONITORING WELL INSTALLATION PROCEDURE

MONITORING WELL INSTALLATION, WELL DEVELOPMENT, AND IN-SITU PERMEABILITY TESTING PROCEDURES

Fifteen permanent groundwater monitoring wells are proposed to be installed during the Phase II RI. Proposed locations are depicted on Figure 27 and are discussed in Section 3.0 Proposed Phase II Activities of the Draft Phase II RI FSP. All wells will be completed in the upper water-bearing zone to a maximum total depth of approximately 25 feet below ground surface. The following sections describe the procedures and materials to be used during the installation of permanent monitoring wells. Included is a discussion of subsequent well development and in-situ permeability testing methods.

A. Monitoring Well Installation

All monitoring well design, installation, and documentation procedures will follow USACE EM 1110-1-4000, dated 1 November 1998. Site-specific procedures are outlined in the subsequent paragraphs of this sub-section.

1. Drilling Methods and Equipment – Maxim will perform all necessary drilling operations involved in the installation of the 15 groundwater monitoring wells during this Phase II RI. Maxim will provide the necessary drill rig and associated support equipment and crew and will drill and install the monitoring wells using a truck-mounted or track-mounted drill rig. All well boreholes will be drilled using 4-1/4 inch inside diameter (I.D.) hollow-stem augers, which will advance an approximate eight-inch diameter hole through the soil column. All wells will be completed as above-grade installations (i.e., the well casing top will rise approximately two to three feet above the ground surface). Water used during steam cleaning and drilling operations will be obtained from either the fire hydrant located near the IWCS or the spigot located at Building 429.

Soil boring procedures, including surface and subsurface soil sampling and field measurement procedures, will be conducted as specified in Section 4.3 of the Phase I RI FSP. Groundwater sampling of the wells will be conducted as described in the "Technical Memorandum and Standard Operating Procedure for Existing Well Sampling". This document was prepared by Maxim and approved by the USACE-Buffalo District prior to Phase I RI sampling of existing wells in January 2000.

As specified in the Site Safety and Health Plan (SSHP), each drilling site will be inspected and approved as safe for drilling by the Maxim on-site Engineer/Geologist and the Site Safety and Health Officer. Prior to conducting drilling activities, Maxim will contact New York's Underground Facility Protection Organization (UFPO) to request a site underground utility locate meeting for both the NFSS and Niagara-Mohawk Electric property. In addition, Maxim will review existing site utility diagrams to identify the locations of buried underground utilities in the vicinity of each proposed boring location.

2. Well Materials

a. Well Casing (Riser)

Monitoring well risers will consist of new, threaded flush joint, two-inch inside diameter (ID) polyvinyl chloride (PVC) pipe. The risers will, at a minimum, conform to the requirements of ASTM-D 1785 Schedule 40 pipe and the National Sanitation Foundation potable water grade requirements. The pipe will bear markings that identify the material specified.

b. Well Screen

The monitoring well screen will not exceed 10 feet in length, will be constructed of Schedule 40 PVC, and will be compatible in size with the well riser. The screen will be non-contaminating, factory constructed with a slotted design. The slot size will be 0.010-inch width. After the borehole has been drilled to the desired depth, the hollow stem augers will remain in place while the well screen/casing assembly is installed through the center of the augers. An attempt will be made to set the screen at a depth which will allow the upper two to four feet of the screen to extend above the top of the groundwater table as determined at the time of installation.

c. Joining Screen and Riser

Threaded, flush-joint couplings, to form watertight unions, will join well screen and riser sections. Solvent PVC glues will not be used at any time in construction of the wells. The bottom of the screen will be sealed with a threaded cap or plug of inert, noncorroding material similar in composition to the screen itself.

d. Filter Pack, Bentonite and Grout

(i.) Filter Pack

A filter pack consisting of clean silica sand ("Global 8" or equivalent) will be used within the annulus. The filter pack will be placed in the well annulus from the bottom of the boring to a minimum of three feet and maximum of five feet above the top of the screen. If necessary, the filter pack will be placed with a tremie pipe. The amount of filter pack above the screen may be adjusted in the field if the well is less than approximately 15 feet deep.

(ii.) Bentonite Seal

A three- to five-foot seal of 1/4-inch bentonite pellets or chips will be placed in the annular space immediately above the filter pack. The thickness of the filter pack and bentonite seal will be measured through use of a weighted measuring tape. The bentonite pellets will be installed and hydrated in six-inch lifts using site tap water. The bentonite seal may be adjusted in the field if the well is less than 15 feet deep.

(iii.) Grout Mix

A non-shrink, neat, cement grout will be used. The grout will generally consist of not more than six gallons of water per bag (one cubic foot or 94 pounds) of Portland cement (ASTM-C 150), plus three percent (by weight) of bentonite powder. If necessary, more water may be added to obtain a pumpable mixture. The grout will be placed from the top of the bentonite seal to near the ground surface with a tremie pipe. The surface seal will extend to one foot below the anticipated frost line. After 24 hours, the drill team and the Maxim geologist/engineer will check the borehole for grout settlement. If necessary, more grout will be added to the annulus.

3. Surface Completion

At all times during progress of the work, precautions will be taken to prevent tampering or introducing foreign materials into the well. Upon completion of the well, a suitable vented cap will be installed to prevent material from entering the well. The PVC riser will be surrounded by a large diameter protective steel casing which rises 24 to 36 inches above ground level and will be set into concrete. The steel casing shall have a 0.25 inch diameter drainage port drilled immediately above the concrete collar and will be provided with a lock and cap. The protective top should be installed to a depth below the frost line to avoid frost heave.

a. Concrete Pad Placement

A minimum two-foot radius pad will be constructed around the well casing at the final ground level elevation. The pad will be constructed of Portland cement, with a minimum pad thickness of 3.5 inches, to avoid frost heave damage. Four two-inch diameter or larger round steel posts will be spaced equally around the well and embedded in concrete. These posts will not be sent into the pad surrounding the well. The steel protective casing and posts will be covered with a permanent high visibility paint. Protective posts will not be placed within the concrete pad. The ground immediately surrounding the top of the well will be sloped away from the well.

4. Well Survey

The 15 permanent monitoring wells will be surveyed as described in Section 4.6 of the Phase I RI FSP.

5. Logs and Well Installation Diagrams

Suitable drawings detailing as-built well construction details will be prepared during the field work. In addition, Maxim will complete and submit the HTRW Drilling Logs as required by the USACE. A qualified geologist/geotechnical engineer, present during all drilling and well installations, will prepare both of these logs. Information provided in the logs will be in accordance with EM 1110-1-4000 and include but not be limited to the following information:

- Date(s) well was drilled and installed;

- Evidence of contamination (e.g. odors, PID measurements, staining, etc);

- Identification of the material of which each stratum is composed according to the Unified Soil Classification System;

- Depth interval of each stratum material;

- Depth interval from which each formation sample was taken;

- Static water level upon completion of well;

- Type of samplers used;

- Any sealing-off of water-bearing strata;

- Construction details of well;

- The manufacturer and quantities of all materials used in the well, and;

- Reason for boring termination.

Copies of the original HTRW Drilling Logs and Maxim's Monitoring Well Installation Diagrams will be submitted to the USACE after the well installations are completed. All of the logs will be copied for inclusion into an appendix of the RI - Phase II Report.

6. Survey Marker

A permanent aluminum tag will be attached to the protective casing of each well. Each aluminum tag will be stamped with 0.125 inch tall letters with the following information:

- USACE Buffalo District;
- Well ID;
- Month and year of installation;
- Elevation: TOC PVC (top of PVC casing); and
- Ground surface elevation.

B. Well Development

The development of the wells will be performed in accordance with EM 1110-1-4000, except as noted in the FSP. A procedural overview of monitoring well development for the 15 new wells is presented in the paragraphs, which follow.

The development of the wells will be initiated not sooner than 48 hours after, nor longer than seven days beyond, the placement of the internal mortar collar or the final grouting of the well. Maxim will develop the wells by pumping and surging with a submersible pump and/or bailing and surging with a dedicated, disposable bailer. Development shall continue until one of the following criteria are met:

i) Stabilization of pH (±0.2 units), conductivity (<10% variation), and temperature (±0.5^{o}C) for three consecutive readings, which will be measured for each well volume (standing water in the well casing plus the saturated portion of annulus) removed.

ii) Removal of a maximum of three well volumes (standing water in the well casing plus the saturated portion of annulus), regardless of whether the stabilization criteria is met.

iii) Pumping a well dry on three separate days.

A portable water quality meter (Hydrolab, Model - Scout II or Yellow Springs Instrument, Model - YSI 600XL) will be used to monitor pH, conductivity, turbidity, dissolved oxygen, oxidation-reduction potential, and temperature of the well water initially, periodically during development, and at the end of the development activity. The water quality instrument(s) will be calibrated at the beginning and end of each work day. An attempt will be made to achieve a turbidity value of 20 Nephelometric Turbidity Units (NTUs) or less at the completion of development.

All well development water will be collected and managed in accordance with the IDW procedures described in Section 7 of the Phase I RI FSP.

1. Development Record

The volume of water removed and any odor, color, turbidity, or elevated PID readings will also be noted on the Well Development Log and in the Site Manager's bound notebook. The Well Development Log will conform to the specifications contained in paragraph 6-10 of EM 1110-1-4000.

2. Photographs

After final development of each well, approximately one liter of water from the well will be poured in a clear glass jar, labeled and photographed using 35 mm color print film or a digital camera. The photograph will be a suitably back-lit close-up print, which shows the clarity of the water. The print will be submitted as part of the well log.

C. In-situ Permeability Testing

After development and sampling of the monitoring wells, the in-situ permeability of the screened water-bearing strata of the 15 monitoring wells will be measured in accordance with the U.S. Water Conservation Laboratory, Agricultural Research Service, U.S. Department of Agriculture publications "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells (1976)" and “The Bouwer and Rice Slug Test - An Update (1988)”.

The in-situ permeability testing will be conducted using the following method. The depth of water (from the top of the PVC well casing), will be measured with an electronic pressure transducer connected to a data logger or an electronic water level indicator will be used. A PVC bailer of known volume, filled with sand and sealed at both ends, will be lowered into the water column (a "falling-head" or "slug-in" test). Immediately after the bailer is lowered, a Hermit 3000C Data Logger will monitor the change in water level over time. After the water level has stabilized, the bailer will be removed and the test will be repeated as a "rising-head" or "slug-out" test. If the water level stabilizes in 15 minutes or less, each rising- and falling-head slug test will be performed at least three times. If the well is slow to recharge (15 minutes or more), fewer than three tests may be conducted.

The Aqtesolv or Aquifer Test computer software packages will be used to graph the drawdown vs. time curves and to calculate the value of hydraulic conductivity. For wells in which the screened interval intersects the vadose/phreatic zone interface, only slug out test data will be analyzed.

APPENDIX F

ROAD CORE COLLECTION PROCEDURE

ROAD CORING AND SAMPLE COLLECTION PROCEDURE

1. At the locations designated on the site drawing (RC-01 to RC-14) conduct a gamma walkover survey over the proposed area of the sampling location in question. Mark the location with the highest reading. During this survey, particular attention to the cracked pavement should be maintained. Elevated readings were found in Phase I emanating from the cracks.

2. Decontaminate the coring bit using the decontamination procedures found in the FSP-Phase I edition. Place the clean bit into a coring machine or attach it to the drill rig.

3. Obtain a core of the pavement. Use water to cool and lubricate the bit while coring. (Note: if insufficient sample recovery is obtained with the first core, drill multiple cores within a small area to achieve the required volume necessary for the analytical tests.)

4. Remove the core from the bit and examine it. If distinct multiple layers are found, separate the layers and take gamma reading from each layer. Additionally, take a gamma reading from the hole.

5. From the layer with the highest gamma reading (note: this can be the base material also), collect enough sample to fill a half gallon poly bottle. Additional cores may be necessary to obtain sufficient sample volume.

6. Fill the holes created in the pavement with the leftover cored material. If additional material is required, use pea-gravel or asphalt cold-patch to fill the hole to the surface.

7. Record the samples on a Chain-of-Custody and pack them into a cooler for shipment.

8. Ship the samples to the Maxim St. Louis geotechnical laboratory.

9. In the Maxim St. Louis geotechnical laboratory, crush each sample individually using the "Chipmunk" crusher. (Note: all equipment used during these procedures needs to be precleaned before each sample is processed.)

10. Use a number 20 sieve to segregate the material. Crush the larger pieces with a mortar and pestle so they fit through the number 20 sieve. When at least 150 grams of material is obtained stop crushing. Place the leftover material back in the original polyethylene bottle.

11. Place the smaller segregated material in an aluminum or stainless steel bowl and mix thoroughly with an aluminum or stainless steel spoon.

12. Fill the appropriate jars for radiological constituent analyses (as specified in Table 3-3 of the QAPP) with the material. Place the remainder of the material back in the original polyethylene bottle for delivery back to the NFSS.

13. Record the samples on a Chain-of-Custody and pack them into coolers for shipment.

14. Ship the sample to GEL for analyses.

15. Ship the remaining material in the polyethylene bottles back to the NFSS.

APPENDIX G

RAILROAD BALLAST COLLECTION PROCEDURE

RAILROAD BALLAST COLLECTION PROCEDURE

1. Place a stake in the general vicinity of the railroad ballast sample area.

2. Collect enough stones to fill a half-gallon polyethylene sample container (a minimum of 10 stones) from various locations within the same ballast stone area. (Note: If the minimum number of 10 stones will not fit in one sample container use as many containers as necessary.)

3. Sketch the area surrounding the collection points. Measure between the collection points and the staked point to be surveyed and record the distances in the field notes.

4. Record the samples on a Chain-of-Custody and pack them into a cooler for shipment.

5. Ship the samples to the Maxim St. Louis geotechnical laboratory.

6. In the Maxim St. Louis geotechnical laboratory, crush all of the stones for one sample location at one time using the "Chipmunk" crusher. (Note: all equipment used during these procedures needs to be precleaned before each sample is processed.)

7. Use a number 20 sieve to segregate the material. Crush the larger pieces with a mortar and pestle so they fit through the number 20 sieve. When at least 150 grams of material is obtained stop crushing. Place the leftover material back in the original polyethylene bottle.

8. Place the smaller segregated material in an aluminum or stainless steel bowl and mix thoroughly with an aluminum or stainless steel spoon.

9. Fill the appropriate jars for radiological constituent analyses (as specified in Table 3-3 of the QAPP) with the material. Place the remainder of the material back in the original polyethylene bottle for delivery back to the NFSS.

10. Record the samples on a Chain-of-Custody and pack them into coolers for shipment.

11. Ship the sample to GEL for analyses.

12. Ship the remaining material in the polyethylene bottles back to the NFSS.

APPENDIX H

TRENCHING PROCEDURE

TRENCHING AND EXCAVATION PROCEDURE

1.0 Purpose and Scope

As part of its goal to provide a safe and healthful workplace, this procedure is provided to demonstrate the required activities and protect workers from the hazards associated with trenching and excavation operations. This procedure applies to all work locations and workers involved in those operations.

2.0 Relevant Regulations

29 CFR 1926.650 through 1926.652 (29 CFR 1926 Subpart P, "Excavations") and USACE EM 385-1-1

3.0 Definitions

Accepted Engineering Practices are those requirements, which are compatible with standards of practice, required by a registered Professional Engineer.
Benching System is a method of protecting workers from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
Cave-In is the separation of a mass of rock or soil material from the side of an excavation and its sudden movement into the excavation, either by sliding or falling, in sufficient quantity so that it could entrap, bury, or otherwise injure an worker.
Competent Person is defined by OSHA as one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to workers, and who has authority to take prompt corrective measures to eliminate them. The Competent Person must remain at the job site during operations.
Excavation is any manmade cut, cavity, trench, or depression in an earth surface, formed by earth removal operations.
Failure is the breakage, displacement, or permanent deformation of a structural member or connection that reduces structural integrity and its supportive capabilities.
Hazardous Atmosphere is an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.
Professional Engineer is an individual licensed and registered under the laws of the State having jurisdiction to engage in the practice of engineering.
Sloping System is a method of protecting workers from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure and application of surcharge loads.
Spoil Pile is material excavated from an excavation, trench, tunnel, or excavated shaft.

Trench (Trench Excavation) is a narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of the trench as measured at the bottom is not greater than 15 feet.

4.0 General Procedure

1. The estimated location of utility installations, such as sewer, water, electrical service lines, etc., which may be affected shall be determined prior to opening an excavation.

2. Where possible, the equipment used to excavate the trench shall be positioned at one end of the trench.

3. The excavation shall begin and spoils shall be placed in a spoil pile a minimum of 2 feet from the sidewall of the excavation.

4. Health Physics personnel shall scan the excavation spoils. If the spoils register 2 times the background condition, those spoils shall be segregated and placed on plastic.

5. As the excavation proceeds, a Competent Person shall insure that the sidewalls of the trench remain stable. If spalls or splays of the sidewalls are observed, at a minimum the spoils pile should be moved away from the excavation. If necessary, the sidewalls shall be benched or sloped to increase the stability of the sidewalls.

6. As excavation activities take place, open excavations shall be protected by barricades, covers, or other means deemed appropriate by the Competent Person to prevent personnel from accidentally falling into the excavation.

7. Samples will be collected as set forth in Section 5.0 of this procedure.

8. Backfill the trench with the spoils generated (except those segregated materials) from the excavating.

9. Every effort should be made to backfill trenches the same day that they are excavated. If it is necessary to leave a trench open overnight, the trench should be surrounded with protective barricades and appropriate signs should be posted in accordance with the Site Safety and Health Plan.

10. Cover the segregated material with plastic to avoid transport of potential contaminants into the surrounding surface soils.

5.0 Sampling

The excavator bucket shall be decontaminated before and between each excavation location.

Soil samples shall be collected from "virgin" soil using the bucket of the machine that is used to excavate the trench. (Alternatively, a bucket auger or similar device can be used to collect soil samples. However, because this alternative method requires the worker to stand near the sidewall of the trench, it should be used only when project objectives specifically prohibit the collection of soil samples from the machine bucket.) The soil samples will be handled as set forth in the Field Sampling Plan.

6.0 Responsibilities

Competent Person

a. Shall understand the requirements of this procedure and be able to recognize potential hazards associated with excavation and trenching work.

b. Shall provide requirements for the use of protective shielding and shoring systems in excavations.

c. Shall inspect excavations, at a minimum, once a day for the purpose of identifying and abating potential hazards associated with the excavation.

d. Shall have the authority to stop all work being performed in an excavation due to a hazardous situation or hazardous practices.

e. Shall approve all hazard controls used at excavation sites at the facility.

f. Shall approve adequate measures to ensure underground utilities do not pose a safety or health hazard to personnel while the excavation is open.

Workers

a. Individual workers affected by this procedure are required to read, understand and comply with the requirements of this procedure; and

b. Report unsafe or unhealthful conditions and practices to the site manager or the health and safety manager.

APPENDIX I

COMMENTS AND RESPONSES TO THE DRAFT PHASE II FSP ADDENDUM

COMMENT/RESPONSE PACKAGE

PROJECT: FSP Addendum Phase II of RI

REVIEWER: Chris Hallam DATE: 7-16-00

COMMENT NUMBER	SECTION	COMMENT	RESPONSE
1	1.0	Please remove reference to specific USACE personnel. This is a team effort.	Agreed. The reference will be removed.
2	2.4.1.2	MARSSIM approach is being misused and the number of samples is excessive. We are NOT in a position to use the FSS process in a blanket fashion across the site. We ARE in a position to ensure our data can be used toward that final endpoint and that we follow the MARSSIM guidance to ultimately achieve that endpoint. MARSSIM provides guidance on a number of radiological issues including scan MDC's, establishing DQO's, performing historical site assessments, evaluation of data, classification of areas, etc – all of which are useful tools for a site investigation. However, it is apparent from the data gaps still present that it is inappropriate to incorporate a final status survey approach with a random grid pattern when the nature and extent of contamination has not even been determined. Although MARSSIM classification of a given area is helpful, walkover surveys and followup sampling should be conducted (with results assessed) instead of throwing up MARSSIM grids with specific sample points. It is much more appropriate to use a biased survey	Disagreed. The amount of sampling was not excessive just a bit overly optimistic to provide the desired results of both an extent of contamination survey and potentially optimized for use in the Final Status Survey for the NFSS under the current budgetary constraints. This approach was designed to meet the objectives as stated in Sections 2.4.4 and 5.3 of the MARSSIM document and those of District personnel. The number of samples was calculated based on the limited sampling conducted during Phase I and the assumed DCGL, type 1, and type 2 errors. Because of the concerns from several of the reviewers, a revised approach was established. The revised approach, which is based on gamma walkover results, delineation of elevated concentrations found during Phase I, planned sample locations, and stratified random locations, has been created and has been distributed to the District for approval.

		pattern based on indicators from site history, site configuration (sloping, drainage, etc) as well as walkover surveys in the selection of samples points, and perhaps add a small number of random samples for remaining areas. Where I advocate the approach of collecting data/samples for potential inclusion in a FSS is where the areas already have been sufficiently evaluated by walkover and biased sampling with negative results. A small number of followup random samples could be used to build confidence using the MARSSIM FSS process for an early assessment that a given area is not impacted. However, where to use additional random samples requires strong assessment skills and the ability to determine where it is economical to do so. A good job is done in selecting and justifying the biased sampling locations in the tables. However, the number of random samples proposed at this point of the investigation is simply not justified from both a technical and financial standpoint. Recommend abandoning the site wide MARSSIM grid application and try to exercise good field judgement on a limited number of essentially random samples spaced around the site (in addition to the biased samples).	

COMMENT/RESPONSE PACKAGE

PROJECT: FSP Addendum Phase II of RI

REVIEWER: Chris Hallam DATE: 7-16-00

3	3.0 9. And Appendix A 8.	Gamma walkover coverage should be UP TO 100% as necessary to delineate the impacted surface areas (Class 1). Please don't waste a whole lot of time with a highly detailed walkover of impacted areas; we are not releasing the area! Just ensure enough coverage to draw the box, get a general evaluation of what's in it, and indicate the hot spots.	Agreed. This will be changed in the Text. However, the Appendix was the work of SAIC and the opinions contained within it were a basis for the text but not included as the text. This reference will not be changed.

Jim **Richards**

From: Tom Lachajczyk
Friday, August 18, 2000 8:57 AM
Jim Richards
~nject: FW: Maxim Response to Comments concerning NFSS Phase 2 FSP Addend urn

Importance: High

Chris Hallam

—-Original Message—--
From: Leithner, Judith S LRB [SMTP:Judith.S.Leithner@lrbOl .usace.army.mil]
Sent: Friday, August 04, 2000 4:00 PM
To: Tom Lacha]czyk
cc: Hallam, christopher M LRB
Subject: FW: Maxim Response to comments concerning NFSS Phase 2 FSP Addend um
Importance: High

I am forwarding Chris Hallam's reply to your response to his comments. Please see below.
Judy

——Original Message—-
From: Hallam, christopher M LRB
Sent: Friday, August 04, 2000 3:55 PM
To: Leithner, Judith S LRB; Brancato, David J LRL02; cram, Michael E NWO; Meyer, Anita K NWDO2; Peterson, Julie A NWDO2; Kozminski, Alfred

C LRB; Rimer, Dennis LRB; Rhodes, Michelle C LRB

cc: Boglione, Fredrick L LRB; Rieman, craig R LRB; Yaksich, Stephen M LRB; 'Tom Lachajczyk'
Subject: RE: Maxim Response to comments concerning NFSS Phase 2 FSP Addendum

Judy

~sponse is satisfactory when included with the mark-up revision (where I tracked and highlited changes) from earlier this ~k. As long as the mark-up goes through, you have the "thumbs up" from me!

Chris Hallam
Health PhysicistlRSO
U.S. Army Corps of Engineers, Buffalo District
1776 Niagara St.
Buffalo, NY 14207-3199
Phone: (716) 879-4171
Fax: (716) 879-4355
E-mail:christopher. m.hallam@usace.army.mil
Visit our web Site at: <http://wwwlrb.usace.army.mil>

-----Original Message
From: Leithner, Judith S LRB
Sent: Friday, August 04, 2000 3:11 PM
To: l3rancato, David J LRLO2; Cram, Michael E NWO; Meyer, Anita K NWDO2; Peterson, Julie A NWDO2; Hallam, Christopher M LRB; Kozminski, Alfred C LRB; Rimer, Dennis LRB; Rhodes, Michelle C LRB

Cc': Boglione, Fredrick L LRB; Rieman, Craig R LRB; Yaksich, Stephen M LRB; Tom Lachajczyk
Subject: FW: Maxim Response to Comments concerning NFSS Phase 2 FSP Addendum
Importance: High

Here are responses to your comments on Maxim's work plans for Phase 2 of the NFSS RI. Please look these

Jim **Richards**

over ASAP and state whether your comments have been answered satisfactorily. I regret the short suspense, but we are trying to get the Contractor in the field by 14 August (or very close to this date).

Jim **Richards**

—Original Message—
From: Tom Lachajczyk [SMTP:tlachajc@maximusa.com]
Sent: TI,ursday, August 03, 2000 6:05 PM
To: Judith.S.Leithner@usace.army.mil'
'ject: Maxim Response to comments concerning NFSS Phase 2 FSP Addendum

The following responses to comments have been prepared, reviewed, and edited, and are attached for your review and approval. If acceptable, they will be integrated into the Final FSP Addendum.

IJ~ACE COMMENTS

Chris Hallam	ch_coniments.doc
Alfred Kozminski	ak_comments.doc
Dennis Rimer	dr_comments.doc
Michelle Rhodes	mr comments.doc

~ACE CX COMMENTS

Dave Brancato	db_comments.doc
Michael Cram	mc_comments.doc
Anita Meyer	am_comments.doc
Julie Peterson	jpcomments.doc

«CH comments.doc» «AK comments.doc» «DR comments.doc» «MR comments.doc» «DBcomments.doc» «MC_comments.doc» «AM_comments.doc» «J Pcomments.doc»

This is the "first" of responses. We are targeting tomorrow for submittal of responses for the ren7aining comments on work plans.

Tom Lachajczyk
314-426-0880 extension 3255

«File: CH_comments.doc» «File: AK_comments.doc» «File: DR_comments.doc» «File: MR_comments.doc» «File: DB_comments.doc» «File: MC_comments.doc» «File: AM_comments.doc» «File: JP_comments.doc»

Fred Kozminski comments for draft NFSS Phase II, RI

1. The QA lab for this phase of the project will be, (send samples to),
   Nuclear Technology Services
   635 Hembree PRWY
   Roswell, GA 30076

   Phone: 770 663 0711
   Fax: 770 663 0547

   Attn: Dr. Rao

   Response: This will be added to the revised text of the Final Phase II FSP.

Table 2

1. Please give all the analytes for all the analytical fractions for all the methods that are eluded to in this document
   For example the parameter, radiological isotopes, what method is this and what analytes are being analyzed for?

   Response: This information is contained within the draft Phase II QAPP. A reference to that document will be placed in the text of the Final Phase II FSP.

2. Do not analyze QA/QC for non-primary parameters, i.e. gross alpha/beta and total Uranium.

   Response: Agreed. This information was in the Phase I FSP and the QAPP. The text of the Final Phase II FSP will be revised to include this statement.

Jim **Richards**

From: Tom Lachajczyk
~nt: Friday, August 18, 2000 8:58 AM
Jim Richards
~oject: FW: Maxim Response to Comments concerning NESS Phase 2 FSP Addend urn

Fred Kozminski

-——Original Message
From: Leithner, Judith S LRB [SMTP:Judith.S.Leithner@IrbOl.usace.army.mil]
Sent: Friday, August 11.2000 11:18AM
To: Tom Lachajczyk
Subject: FW: Maxim Response to comments concerning NFSS Phase 2 FSP Addend um

-—Original Message—--
From: Kozminski, Alfred C LRB
Sent: Tuesday, August 08, 2000 9:46 AM
To: Leithner, Judith S LRB; Brancato, David J LRLO2; cram, Michael E NWO; Meyer, Anita K NWDO2; Peterson, Julie A NWDO2; Hallam,
christopher M LRB; Rimer, Dennis LRB; Rhodes, Michelle C LRB

cc: l3oglione, Fredrick L LRB; Rieman, craig R LRB; Yaksich, Stephen M LRB; ‘Tom Lachajczyk
subject: RE: Maxim Response to comments concerning NFSS Phase 2 FSP Addendum

Judy,

These are acceptable, however, there are no responses to my comments for the addendum.

Thanks,

Fred K.

——Original Message——
. ..,m: Leithner, Judith S LRB
Sent: Friday, August 04, 2000 3:11 PM
To: Brancato, David J LRLO2; cram, Michael E NWO; Meyer, Anita K NWDO2; Peterson, Julie A NWDO2; Hallam, christopher M LRB; Kozminski, Alfred C LRB; Rimer, Dennis LRB; Rhodes, Michelle C LRB

cc: Boglione, Fredrick L LRB; Rieman, craig R LRB; Yaksich, Stephen M LRB; Tom Lachajczyk
Subject: FW: Maxim Response to comments concerning NFSS Phase 2 FSP Addendum
Importance: High

Here are responses to your comments on Maxim’s work plans for Phase 2 of the NESS RI. Please look these over ASAP and state whether your comments have been answered satisfactorily. I regret the short suspense, but we are trying to get the Contractor in the field by 14 August (or very close to this date).

—---Original Message——
From: Tom Lachajczyk [SMTP:tlachajc@maximusa.com]
Sent: Thursday, August 03, 2000 6:05 PM
To: Judith.S.Leithner@usace.army.mil’
Subject: Maxim Response to comments concerning NFSS Phase 2 FSP Addendum

The following responses to comments have been prepared, reviewed, and edited, and are attached for your review and approval. If acceptable, they will be integrated into the Final FSP Addendum.

USACE COMMENTS

Chris Hallam	ch_comments.doc
Alfred Kozminski	ak_comments.doc

Dennis Rimer
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USACE CX COMMENTS

ye Brancato
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db_comments.doc
mc_comments.doc
am_comments.doc
jpcomments.doc

«CH_comments.doc» «AK comments.doc» «DR comments.doc» «MR_comments.doc» «DB_comments.doc» «MCcomments.doc» «AMcomments.doc» «JP_comments.doc»

This is the "first batch" of responses. We are targeting tomorrow for submittal of responses for the remaining comments on work plans.

Tom Lachajczyk
314-426-0880 extension 3255

«File: OH_comments.doc» «File: AK_comments.doc» «File: DR_comments.doc» «File: MR_comments.doc» «File: DR_comments.doc» «File: MC_comments.doc» «File: AM_commentsdoc» «File: JP_comments.doc»

Subject: Comments on NFSS Phase 2 Field Sampling Plan (18 July 2000)
Author of Plan: Maxim Technologies, Inc.
Reviewer: Judith Leithner, CELRB-PE-EE

<table>
<tr><th>Comment #</th><th>Page or Section</th><th>Comment</th><th>Response</th></tr>
<tr><td>1</td><td>General</td><td>Report is terse with minimal extraneous material. Good job.</td><td>Thank you</td></tr>
<tr><td>2</td><td>General</td><td>Described field decisions in Phase 1 were logical and appropriate.</td><td>Thank you</td></tr>
<tr><td>3</td><td>General</td><td>Exceedance figures were well done. They nicely summarized results of Phase 1 field sampling.</td><td>Thank you</td></tr>
<tr><td>4</td><td>Figure 27</td><td>Planned sampling map was useful and this format strongly enhanced the whole package.</td><td>Thank you</td></tr>
<tr><td>5</td><td>Page 5, 4th para.</td><td>What was the cps reading for soils surrounding the railroad ballast?</td><td>It was variable depending on location. The following table shows the soil background values for the locations near the proposed sampling location and other areas where ballast was observed.
<table>
<tr><th>Location</th><th>Soil Background (cps)</th><th>Ballast Reading (cps)</th></tr>
<tr><td>202</td><td>9,000 - 11,000</td><td>no readings taken</td></tr>
<tr><td>204</td><td>13,000 - 14,000</td><td>no readings taken</td></tr>
<tr><td>304</td><td>11,000 - 12,000</td><td>13,000 - 15,000</td></tr>
<tr><td>306</td><td>11,000 - 12,000</td><td>13,000 - 15,000</td></tr>
<tr><td>417</td><td>18,000 - 19,000</td><td>19,000 - 22,000</td></tr>
<tr><td>730</td><td>9,000 - 11,000</td><td>13,000 - 18,000</td></tr>
</table></td></tr>
<tr><td>6</td><td>Page 5 , Section 2.4 & Table 7</td><td>USACE will approve the acquisition of only 15 background samples. 15 background sample locations have been selected by USACE for the adjoining Lake Ontario Ordnance Works (LOOW), and chemical results from these will be used for NFSS. Maxim should provide someone to accompany LOOW sampling personnel to acquire rad samples at each of these 15 locations. This is likely to take place in 3-4 weeks. We are not taking the full complement of background samples that would be required by a rigid MARSSIMS approach. This is because the full MARSSIMS approach (including full background sampling</td><td>Agreed. However, the background samples that will be collected must not be in areas that have been shown on historical maps as contaminated, known to have been remediated, or been shown on maps as having elevated gamma levels.</td></tr>
</table>

Comment #	Page or Section	Comment	Response
		complement) is really designed for the post-remediation final status survey. That is when the full protocol will be followed.	
7	Page 10, 1st full para.	As you suggest, the gross alpha readings may well be due to NORM. We need to establish this, however, by analyzing for a number of radionuclides. Please suggest a suitable list and clear with our HPs.	Individual radionuclides in groundwater from the existing wells and the temporary wellpoints above the ORNL screening values were described in the seven paragraphs following the paragraph cited in the comment. These were also shown on Figures 14-20. The expanded list of radionuclides for the Phase II activities is the following: Actinium-227 Americium-241 Cobalt-60 Cesium-137 Protoatinium-231 Radium-226 Radium-228 Thorium-228 Thorium-230 Thorium-232 Uranium-234 Uranium-235 Uranium-238
8	Page 10, 1st full para.	Because you had no PRGs for gross alpha, you used MCLs. This was reasonable for a first cut, although drinking water standards are extremely low. By selecting individual radionuclides for analysis in the next phase, some ORNL standards may be applicable.	Agreed. In general, the individual radionuclides exceed the ORNL standards (i.e., the screening values) in the same wells or wellpoints that the gross alpha exceeded the MCL. Additionally, CERCLA states in section 121(d)(2)(A) that all Superfund remedial actions meet any Federal standards, requirements, criteria, or limitations that are determined to be legally ARARs. This list includes the Safe Drinking Water Act where MCLs are promulgated.
9	Page 10, 1st full	Please analyze both filtered and unfiltered samples for a	Agreed. To determine if the radionuclides occur in the

Comment #	Page or Section	Comment	Response
	para.	portion (say 15%) of next rad groundwater samples.	groundwater or the particle phase, the following procedure will be implemented in Phase II: Samples for total and dissolved radionuclides will be collected at each well and temporary wellpoint with sufficient water. The total samples will be analyzed. Where the radionuclide concentration is exceeded in the total samples, the corresponding dissolved sample will be analyzed.
10	Page 13, 4th para.	For analysis of As, Se, Pb, please use graphite furnace AA rather than ICP (unless you are using something more sensitive than conventional ICP).	Agreed. The lower detection limit methods will be used for the specified metal constituents.
11	Section 3.0, Item 2	You have set up a grid and have proposed samples at each node. I know that the grid issue was extensively discussed at the TPP meeting and that Dave Brancato urged its use (although he did not propose samples at each node). After much in-house debate, my position is to "undo" the grid, "undo" the sample site selections, wait until we have results of the gamma walkover, and then have a meeting to discuss number and placement of surficial samples. (Your subsurface rad sample proposals are fine). At this point, Dave Brancato is the only proponent of the grid, as a grid is only mandated for MARSSIMS final status surveys and not necessarily for the investigative phase. Please note that the investigative MARSSIMS protocol calls for a reference coordinate system, but this isn't necessarily a grid. It is just a means of establishing sampling point locations so you know where they are on the site, i.e. place them on a map with reference landmarks. I regret to say that there is still some debate going on internally regarding the grid/non-grid issue. Sorry for the inconvenience. More to come.	It was overly optimistic to make this characterization survey into a full-blown Final Status Survey given the budget of the investigation. An alternative approach containing extent sampling around the hot spots found in the Phase I, sampling as a result of the gamma walkover survey, and stratified random points has been submitted to the USACE.
12	Section 3.0, 7.	Please see my previous comments on background samples.	Agreed. The text will be revised to reflect the changes as offered in comment and response No. 6.
13	Section 3.0, Item 8	The Right of Entry for this property has now been received and a scope will be forthcoming for sampling the Niagara Mohawk property. Maxim will receive the work for all of	Agreed.

Comment #	Page or Section	Comment	Response
		this sampling <u>except the gamma walkover</u>.	
14	Section 3.0, general	A mod will be forthcoming to conduct sampling of the piping network discovered at the northern part of the property. It is desired to sample the contents of the pipeline at several points along its length. Optimum (rather than maximum) number of samples should be proposed. Please include some samples for nitroaromatics.	Agreed. Additional pipeline contents samples will be collected along the pipeline where conditions (i.e., rad meter readings, PID reading, odors, or staining) warrant. Nitroaromatics will be added to the planned samples and the additional pipeline contents samples.
15	Section 3.0, Item 12	Trenching will be covered by a mod to your contract if it fits within my RI project budget. Limited trenching is a good idea. Please provide me with an approximate "per trench" cost, including analytical cost. Please save performance of trenching until results of the geophysical study are available. Based on what the study shows, trenches should then be planned around anomalies and the number needed should be decided at that point.	Agreed. The trenching proposed in the Phase II was to determine the nature of various debris piles, areas of probable soil disturbance (potentially by remedial activities), and the underground sewers, steam, and water lines From the submitted estimate, costs breakdown as follows (on a per trench basis): Maxim cost 4 hrs @ $65/hr = $260 SAIC cost 4 hrs @ $85/hr = $340 Excavation Subcontractor Equipment and Personnel = $1,000 Analytical Testing = $900 Total $2,500 per trench

Jim Richards

From: Tom Lachajczyk
Friday, August 11,2000 11:33 AM
Jim Richards
..~bject: FW: Your response to my comments on addendum FSP

Please note in records for resolution of comments.

TL

——Original Message—-
From: Leithner, Judith S LRB [SMTP:Judith.S.Leithner~Irb01 .usace.army.mil]
Sent: Friday August11, 2000 11:45 AM
To: Tom Lachajczyk
Subject: Your response to my comments on addendum FSP

Tom,
I agree with the responses Maxim has made to my comments.
Judy Leithner

COMMENT/RESPONSE PACKAGE

Draft Sampling Plan Addendum Phase 11 Edition

REVIEWER: Richard Leonard DATE: 6/29/00

COMMENT NUMBER	SECTION	COMMENT	RESPONSE
1	p.4 ,Sect. 2.2 sentence after last bullet	Add" However, it appears more likely that the upper water bearing zone is a seasonally perched water table with little connectivity to the lower water bearing zone." Sp "clay". Replace may be limited with "is limited"	I am not sure how he arrived at this conclusion. The typographical error will be corrected. Disagree. There is no direct evidence that the presence of the clay definitely limits the mobility of the contaminants. This is due in part to the "majority of the samples tested" that were classified as CL (not all of the samples). Therefore the statement will remain as written.
2	p.5 par.2	Is this COE site manager?	No. This is the Maxim site manager. The text will be revised as follows: …direction of the *contractor* Site Manager *with concurrence with the USACE* in order to further define …
3	p.5 2.4	LOOW has two excellent soil background locations with extensive chemical characterization. In addition, I have reviewed metal background data for 80 to 100 locations at CWM This data has been statistically analyzed to arrive at background levels which will be applicable to the NFSS site. I do not see any need to obtain any further background metals data at either LOOW or NFSS	It is unfortunate that the background data in the 3 reports submitted by the USACE for Maxim's review did not include all constituents of potential concern. Not all metals and no SVOCs or radionuclide background concentrations were represented in the data. Further evidence of the lack of sufficient background concentrations is the Phase II sampling of the LOOW. Therefore, Maxim sees the

COMMENT/RESPONSE PACKAGE

Draft Sampling Plan Addendum Phase 11 Edition

REVIEWER: Richard Leonard DATE: 6/29/00

COMMENT NUMBER	SECTION	COMMENT	RESPONSE
			need to collect and analyze background samples.
4	p. 10	Most of the data discussed here reflects turbidity in the collected samples, especially from temporary wells. It does not reflect ground water quality. I suggest that both filtered and unfiltered samples be analyzed.	Agreed. To determine if the radionuclides occur in the groundwater or the particle phase, the following procedure will be implemented in Phase II: Samples for total and dissolved radionuclides will be collected at each well and temporary wellpoint with sufficient water. The total samples will be analyzed. Where the radionuclide concentration is exceeded in the total samples, the corresponding dissolved sample will be analyzed.
5	p.11 par.5	Replace “walloping” with “well”	Agreed. The typographical error will be corrected with “wellpoint”
6	p.13 2.4.4 par.2	Confusing –sediment or surface water	The word sediment in this sentence should be surface water. This will be corrected in the revised document.
7	p.16 no. 3	Sp-found	The word in question will be in lower case letters.
8	p.17	See comment 3 for metals. LOOW data for groundwater should be reviewed for applicability to NFSS	See response to comment 3.
9	Table 2	Are RAD screening data cps or cpm.	These values are in cps as stated in the table.

Comments from Dennis Rimer

Maxim has addressed my concerns that I brought up at the TPP meeting relating to trenching in disturbed areas, underground pipes and sewer lines, daily reports and charts to keep track of completed items and objectives, better organized sample teams and less rotation of personnel.

Response: Thank you.

Hopefully, a review of existing background samples from Modern, LOOW and CWM can reduce some of the sampling required on site.

Response: It is unfortunate that the background data in the 3 reports submitted by the USACE for Maxim's review did not include all constituents of potential concern. Not all metals and no SVOCs or radionuclide background concentrations were represented in the data. Further evidence of the lack of sufficient background concentrations is the Phase II sampling of the LOOW. Therefore, Maxim sees the need to collect and analyze background samples.

Dennis

INDEPENDENT TECHNICAL REVIEW
COMMENT SHEET

Complete and Return to: Maxim Technologies

Project: FUSRAP – NFSS – Draft Field Sampling Plan Addendum Phase II RI, Lewiston, NY

Reviewer/Section: Michelle Rhodes, CELRB-PE-EE

Date: July 15, 2000

COMMENT NUMBER	PAGE OR SHEET	COMMENT	RESPONSE
1	3 Section 2.1	The geophysical survey will be conducted during the Phase II RI, but will be considered part of the Feasibility Study.	Agreed. Maxim will not perform the geophysical survey, but will be provided with a map and a list of anomalies for trenching. The trenching will occur after the geophysical survey is complete.
2	General	Please remember to post a Gantt chart to compare progress with schedule	Agreed.
3	General	Good definition of Phase II sampling and analysis strategies and justification!	Thank you.
4	General	Please make sure that USACE is contacted for any intrusive activities not previously approved, so USACE HP support can be provided.	All intrusive activities not currently approved will be approved by the USACE prior to initiation.
5	General	Please note that there may be at least one manhole (underwater) that may or may not be covered. Take caution when walking through wooded or swampy areas. We tried to mark as many as possible for your safety. Please see me for map of located sumps and possible unlocated positions.	Agreed and noted. Safety is always a priority for Maxim field personnel.
6	General	Were any overflow locations, possibly coming from off-site, detected during Phase I sampling? If so, please sample and analyze for landfill-suspect analytes.	Several run-on areas were noted during Phase I after the 4-inch rainfall event. These were sampled in Phase I for various analytes. Does the USACE wish to resample these locations?

Jim Richards

From: Tom Lachajczyk
Monday, August 07, 2000 8:14 AM
Jim Richards; Greg Dawdy
~~bject: FW: RI Phase II

-——Original Message——-
From: Rhodes, Michelle C LRB [5MTP:Michelle.C.Rhodes@LRBOI.usace.army.mil]
Sent: Monday, August 07, 2000 8:25 AM
To: Leithner, Judith 5 LRB
Cc: tlachajc@maximusa.com
subject: RI Phase II

Judy,

The response to comments look good to me. For my #6 comment, no additional sampling of on-site migration from the adjacent landfill will be necessary for Phase II. Also, I will supply Maxim a map indicating manhole locations for input into the SSHP.

Michelle

Responses to Dr. David J. Brancato

Comment #1, General – Information on PAHs under CERCLA
(text not repeated)

Response to #1: This terminology is useful, but not relevant to this project. The PAHs identified in the Phase I sampling basically came from 2 locations: 1) in areas with visible coal particles and 2) on a gravel road north of the combined shops building. These areas do not fall under the exemptions listed.

Comment #2, Figures
I thought we agreed to use other than red dots to represent exceedances.

Response to #2: Maxim does not believe that this was decided in the TPP meeting. Using the color set available for printing and copying it is becoming difficult to provide unique colors that will be discernable after black and white photocopies are made.

Comment #3, Appendices A & B

Regarding Grid:

- Please clarify selection of grid configuration,
- Provide a description of how you have used site knowledge to select a specific subset of nodes to sample.
- And finally a few lines describing how you will use the statistics to determine areas of contamination.

To clarify the needs of the project:

- With the site knowledge we use the GRID as a tool to explain purposeful sample locations **at specific nodes** (stratified bias) on the GRID….again precluding the need to sample every node.
- Further, with the GRID we can begin to determine extent..in other words if is permissible (under budget constraints) we move forward with stratified random choice of sample locations……all being guided by the GRID.
- In effect the GRID becomes a GUIDE (similar to a compass) that will direct one's bearing to answering the questions….'Well, how do you know that contamination is not over there….'
- Further, MARSSIM demands a GRID; i.e. hot spot delineation, and the like. VSP model covers chem and rad and unifies the requirements of both to produce one GRID. Respective to MARSSIM GRID for NFSS, why not incorporate a chem GRID and make the two compatible? Additionally, we will have the gamma walk-over that will complement the theoretical.

Response to #3: Due to budgetary constraints and various review comments the grid has been removed from this phase of sampling. Samples will be placed by biased means (by location of process and or identified contamination and by gamma survey results).

Jim Richards

From: Tom Lachajczyk
Friday, August 18, 2000 8:56 AM
Jim Richards
....ibject: **FW:**
Importance: High

David Brancato 2.

—-Original Message—-
From: Leithner, Judith S LRB (SMTP:Judith.S.Leithner~lrb01
.usace.army.mil]
Sent: Friday, August 04, 2000 3:32 PM
To: Tom Lachajczyk
Cc: Brancata, David J LRL02
Subject:
Importance: High

Tom,

I am passing this on to you from David Brancato.

Judy

Judy:

I concur with the response to my comments.

Dr. Dave

Reviewer Name:	Crain, Michael
Discipline	Geology
CX Project Review No.	67101
Date:	9/3/2003
Project Location	Niagara Falls, NY
Document Name:	Draft FSP Addendum, Phase II RI, Niagara Falls Storage Site

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Comment # 1: 2.4.1.2, pg 8, 2nd paragraph, last sentence - The distinction between the two objectives stated for the Phase II subsurface sampling is not clear. Please clarify.

Response: Agreed. The sentence will be revised as follows:

Additional subsurface sampling is planned for Phase II, at 67 locations throughout the site, in order to 1) fill data gaps in areas where subsurface sampling was not performed during Phase I, and 2) in order to delineate potential contamination locations found during Phase I.

Comment # 2: 2.4.4, pg 13, 2nd paragraph - It appears that this paragraph incorrectly refers to sediment samples and should be changed to surface water samples.

Response: Agreed. The reference will be changed.

Comment # 3: 3.0, pg 17, Task 5 - The task description refers to the use of low flow techniques for purging, but does not seem to specify low flow techniques for sampling. Low flow purging and sampling should be performed as one continuous process to maintain the representativeness of the sample. The introduction of a bailer or similar sampling device into a well after low flow purging will cause colloidal particles to become suspended in the water column and negate the benefits of the purging process. It is critical that once a representative flow of water is established from the well, that the flow is maintained uninterrupted for sampling. Please clarify and specify the use of low flow techniques for sampling.

Response: Agreed. The low flow purging and sampling method was employed during the *Phase I* sampling event *(after a flurry of emails describing the procedure and approval from the USACE). This method will be continued in Phase II.*

Comment # 4: App. C, Sec. B Well Development, second paragraph - The criteria for completion of development need to be more stringent. By only requiring one of the three sets of criteria to be met, it is likely that only three well volumes will be removed from each well. The wells should be repeatedly surged and then continuously pumped until pH, conductivity and temperature stabilize and turbidity is reduced to as low a level as practical based on the nature of the formation. 10 ntu's is generally used as a target value. The text should be changed to require both of the first two stated criteria to be met, except in the case where a well cannot be pumped without pumping it dry, and to place more emphasis on lowering to turbidity. Turbidity is critical due to the concerns about metals.

Response: Disagreed. The development criteria will remain as written. This criteria was approved by the USACE during the Phase I of the RI. Given the history of the NFSS project to date, the stabilization of all three criteria was almost impossible is some of the wells at the site. This, in part, was due to the minimal amounts of water contained within the upper water-bearing zone and the heavy mineralization from the bedrock water-bearing zone. The upper water-bearing zone is perceived as several areas of perched water that may or may not be interconnected.

While we agree that turbidity may be a problem, metal concerns in the groundwater are a fairly low priority at this site. Additionally, where groundwater samples are collected for metals, samples for both total and dissolved metals will be collected. These analyses of the samples, along with turbidity readings collected from the wells during development and purging, should provide enough information of the quality necessary to make future decisions.

B. Well Development

The development of the wells will be performed in accordance with EM 1110-1-4000, except as noted in the FSP. A procedural overview of monitoring well development for the 15 new wells is presented in the paragraphs, which follow.

The development of the wells will be initiated not sooner than 48 hours after, nor longer than seven days beyond, the placement of the internal mortar collar or the final grouting of the well. Maxim will develop the wells by pumping and surging with a submersible pump and/or bailing and surging with a dedicated, disposable bailer. Development shall continue until one of the following criteria are met:

i) Stabilization of pH (~0.2 units), conductivity (<10% variation), and temperature (~0.5^0C) for three consecutive readings, which will be measured for each well volume (standing water in the well casing plus the saturated portion of annulus) removed.

ii) Removal of a maximum of three well volumes (standing water in the well casing plus the saturated portion of annulus), regardless of whether the stabilization criteria is met.

iii) Pumping a well dry on three separate days.

A. portable water quality meter (Hydrolab, Model Scout II or Yellow Springs Instrument, Model YSI 600XL) will be used to monitor pH, conductivity, turbidity, dissolved oxygen, oxidation-reduction potential, and temperature of the well water initially, periodically during development, and at the end of the development activity. The water quality instrument(s) will be calibrated at the beginning and end of each work day. An attempt will be made to achieve a turbidity value of 20 Nephelornetric Turbidity Units (NTUs) or less at the completion of development.

All well development water will be collected and managed in accordance with the IDW procedures described in Section 7 of the Phase I RI FSP.

1. Development Record

The volume of water removed and any odor, color, turbidity, or elevated PID readings will also be noted on the Well Development Log and in the Site Manager's bound notebook. The Well Development Log will conform to the specifications contained in paragraph 6-10 of EM 1110-1-4000.

•2. Photo~ranhs

After final development of each well, approximately one liter of water from the well will be poured in a clear glass jar, labeled and photographed using 35 mm color print film or a digital camera. The photograph will be a suitably back-lit close-up print, which shows the clarity of the water. The print will be submitted as part of the well log.

Michael Cram Comment # 4: App. C, Sec. B Well Development, second paragraph . The criteria for completion of development need to be more stringent. By only requiring one of the three sets of criteria to be met, it is likely that only three well volumes will be removed from each well. The wells should be repeatedly surged and then continuously pumped until pH, conductivity and temperature stabilize and turbidity is reduced to as low a level as practical based on the nature of the formation. 10 ntu's is generally used as a target value. The text should be changed to require 1:)oth of the first two stated criteria to be met, except in the case where a well cannot be pumped without pumping it dry, and to place more emphasis on lowering to turbidity. Turbidity is critical clue to the concerns about metals.

Maxim Response: Disagreed. The development criteria should remain as written. This criteria was approved by the USA CE and NYSDEC during the Phase I of the RI Given the history of the NFSS project to date, the stabilization of all three criteria was almost impossible is some of the wells at the site. This, in part, was due to the minimal amounts of water contained within the upper water-bearing zone and the heaiy mineralization from the bedrock water-bearing zone. The upper water-bearing zone is perceived as several areas ofperched water that may or may not be interconnected

Of the 35 wells sampled during the Phase IRI, 12 had turbidity values exceeding JO ntu. Of these !2, only seven had NTU values exceeding 25 NTU Wells with the highest NTU values were generally those that purged dry.

While we agree that turbidity may be a problem, metal concerns in the groundwater are a fairly low priority at this site. Additionally where groundwater samples are collected for metals, samples for both total and dissolved metals were collected during the Phase I RI and will be collected in the Phase .11 Ri These analyses of the samples, along with turbidity readings collected from the wells during development and purging should provide enough information of the quality necessary to make future decisions regarding metals results.

Michael Cram Rebuttal:

Original Message
From: Cram, Michael E NWO
Sent: Tuesday, August 08, 2000 10:39 AM
To: Leitbner, Judith S LRB
Subject: RE: Maxim Response to Comments concerning NFSS Phase 2 FSP Addendum

Judith, Sorry I didn't get back to you sooner but I was out of the office yesterday. Thanks for the responses. The first three look fine. The response to the fourth one may require a little discussion. N4y concern is that the plan, as written, doesn't require any development beyond the removal of three casing volumes for any wells. Of course, in cases where wells purge dry, it will be

B. Well Development

impossible to achieve a certain turbidity requirement or to get aquifer parameters to stabilize, etc, and the plans need to allow for those instances. However, Maxim's response says that only 7 of 35 wells had turbidity values that exceeded 25 ntu's. In other words, 80% of the existing wells cleared up to reasonable levels, either through initial development or through repeated cycles of purging and sampling. Based on that, it appears that most new wells at this site could be developed so they meet all the criteria in the plan in a reasonable amount of time. The work plans often have a minimum volume requirement as an absolute requirement with additional requirements to try and achieve the parameter stabilization and turbidity criteria for a certain period of time before stopping development or consulting with the Corps. The object is to assure that a reasonable effort is made beyond the absolute minimum requirement, which, in my opinion, the work plan does not (::ulTently do. There certainiy has to be allowances made for those exceptions where wells purge dry, but those exceptions shouldn't dictate the standard for the rest.

Sorry, I don't mean to be long-winded. I'd be happy to discuss this with you and the folks from Maxim to clarify things. I'm sure it can be resolved without holding anything up. The changes required would be fairly minor, without changing things in a way that adversely affects previous agreements with your regulators, I'm sure. Please feel free to call me (or have the Maxim folks call i:ne) at 402-697-2451. I should be in the office for the next few days and I'd be glad to help out any way I can.

Mike Cram

Maxim Rebuttal Response: The following memorandum was approved by the USA CE during Phase I well development activities.

—--Original Message——
From: Tom Lachajczyk
Sent: Thursday, November 11, 1999 6:28 PM
To: 'Judith.S.Leithner§usace.army.mil'; 'Alfred.c.Kozminski@usace.army.mil'
Cc: Paul Smith; TBiggs196O~aoI.com'; Max Gricevich
Subject: Recommended change in well development criteria

Tim Biggs' *11-9-99* memo, titled "Sample hierarchy for temporary well groundwater collection /analysis at the NFSS" faxed to me, states,

"In conversation with Mr. Kozminski of the USACE, it was agreed that if, during well development, existing monitoring wells continue to be pumped dry prior to meeting the stabilization criteria outlined in the FSP, a maximum of 3 well volumes plus annulus will be removed, regardless of meeting stabilization criteria."

Response from Tom Lachajczyk:

Guidance received from Mr. Clyde Yancey, Maxim's Independent Technical Reviewer/Sr. Hydrogeologist, on this topic, forwarded on Nov. 8 to Tim Biggs, indicates that the procedure described above is more than what is necessary. Following these procedures could significantly affect project schedule, duration of well development, and project costs.

Removal of three well volumes from a well that has repeatedly pumped dry and has a slow recharge

B. Well Development

rate dry could take several days and many man-hours of work. Mr. Clyde Yancey suggested that

B. Well Development

pumping a well dry three times during development is sufficient, regardless of stabilization. He recommended one additional purge prior to sampling. Clyde also recommended that if a well pumps continuously but does not stabilize, removal of three well volumes would be sufficient to complete development.

Tim Biggs, Site Manager has reviewed well development procedures with Kent Johnson of NYSDEC. Tim advised me that he believes NYSOEC would be receptive to termina tion of well development after a well pumps dry three times. Kent indicated similar procedures were used at the neighboring landfills.

Nancy Dickens, Project Geologist, also agreed with termination of development after an existing monitoring well pumps dry three times.

Maxim is recommending that well development criteria be modified as described above. This recommendation will conserve project expenditures and is considered technically acceptable.

Please call if you wish to discuss, or respond by email.

Thank you.

Tom Lachajczyk

One of the more salient points of the rebuttal: "it appears that most new wells at this site could be developed so they meet all the criteria in the plan in a reasonable amount of time.~~

These were not wells installed during our Phase L The wells in question were installed between 1979 to 198~ the wells had been previously developed, and some of them have been sampled numerous times before being redeveloped and sampled by us in January 2000.

While we are optimistic that the installed wells may be able to achieve the criteria, we disagree that the wells will be developed until stability in the temperature, conductivity, pH, and turbidity criteria of less than JO NTU's has been achieved We recommend that the proposed USA CE and NYSDEC approved plan be employed at the NFSS for the duration of the Remedial Investigation.

Reviewer Name:	Anita Meyer
Discipline	Risk Assessment
CX Project Review No.	5446.67101
Date:	9/3/2003
Project Location	Lewiston/Porter, NY
Document Name:	Draft Field Sampling Plan Addendum, Phase II Edition, Remedial Investigation

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Comment # 1: General. The number of proposed samples is excessive for an effort whose purpose is to determine nature and extent of contamination. Using MARSSIM as the basis for the sampling design does not make sense, especially if a gamma walkover survey will be performed. Recommend that the District consider using the results of the gamma walkover survey as a basis for siting soil sampling locations instead of the gridded approach presented in the document.

Response: Noted. This approach was designed to meet the objectives as stated in Sections 2.4.4 and 5.3 of the MARSSIM document. The number of samples was calculated based on the limited sampling conducted during Phase I and the assumed DCGL, type 1, and type 2 errors.

Because of the concerns from several of the reviewers, a revised approach was established. The revised approach, which is based on gamma walkover results, delineation of elevated concentrations found during Phase I, planned sample locations, and stratified random locations, has been created and has been distributed to the District for review and comment.

.

Jim Richards

From: Tom Lachajczyk
~nt: Friday, August 18, 2000 9:00 AM
Jim Richards
~ubject: FW: Maxim Response to Comments concerning NESS Phase 2 FSP Addend urn

Anita Meyer

--—-Original Message—--
From: Leithner, Judith S LRB [SMTP:Judith.S.Leithner~Irb01 .usace.army.mil]
Sent: Friday , August 11,200011:24 AM
To: Tom Lachajczyk
cc: Meyer, Anita K NWDO2
Subject: FW: Maxim Response to comments concerning NFSS Phase 2 FSP Addend urn

I told Anita she can specify which remarks should be changed. She has not provided changes to date. If she sends changes, I will pass them on to you.

Judy

--—-Original Message--—
From: Peterson, Julie A NWDO2
Sent: Sunday, August 06, 2000 2:14 PM
To: Leithner, Judith S LRB
Subject: RE: Maxim Response to Comments concerning NFSS Phase 2 FSP Addendum

Judyl reviewed the responses. Although I disagree with some of the editorial remarks, the content of the revised sampling plan is satisfactory. Julie

—--Original Message—--.rom: Leithner, Judith S LRB
Sent: Friday, August 04, 2000 2:11 PM
To: Brancato, David J LRLO2; Cram, Michael E NWO; Meyer, Anita K NWDO2; Peterson, Julie A NWDO2; Hallam, Christopher M LRB; Kozminski, Alfred C LRB; Rimer, Dennis LRB; Rhodes, Michelle C LRB

Cc: Boglione, Fredrick L LRB; Rieman, Craig R LRB; Yaksich, Stephen M LRB; Tom Lachajczyk
Subject: FW: Maxim Response to Comments concerning NFSS Phase 2 FSP Addendum
Importance: High

Here are responses to your comments on Maxim's work plans for Phase 2 of the NESS RI. Please look these over ASAP and state whether your comments have been answered satisfactorily. I regret the short suspense, but we are trying to get the Contractor in the field by 14 August (or very close to this date).

-——Original Message—
From: Tom Lachajczyk [SMTP:tlachajc@maximusa.com]
Sent: Thursday, August 03, 2000 6:05 PM
To: Judith.S.Leithner@usace.army.mil
Subject: Maxim Response to Comments concerning NFSS Phase 2 FSP Addendum

The following responses to comments have been prepared, reviewed, and edited, and are attached for your review and approval. If acceptable, they will be integrated into the Final FSP Addendum.

USACE COMMENTS

Chris Hallam ch_comments.doc
Alfred Kozminski ak_comments.doc

Dennis Rimer
Michelle Rhodes
dr_comments.doc
mr_comments.doc
USACE CX COMMENTS

ye Brancato
hael Cram
Anita Meyer
Julie Peterson
db_comments.doc
mc_comments.doc
am_comments.doc
jpcomments.doc

«CH_comments.doc» «AK comments.doc» «DR_comments.doc» «MR_comments.doc» «DB_comments.doc» «MCcomments.doc» «AM_comments.doc» «JP_comments.doc»

This is the 'first batch" of responses. We are targeting tomorrow for submittal of responses for the remaining comments on work plans.

Tom Lachajczyk
314-426-0880 extension 3255

«File: CH_comments.doc» «File: AK comments.doc» «File: DR_comments.doc» «File: MRcomments.doc» «File: DB_coriiments.doc» «File: MC_comments.doc» «File: AM_comments.doc» «File: Jpcomments.doc»

Reviewer Name:	Peterson, Julie A.
Discipline	Health Physics
CX Project Review No.	5446.67101
Date:	9/3/2003
Project Location	Niagara Falls Storage Site, Niagara County, NY
Document Name:	Draft - FSP Addendum, Phase II Edition, RI

Comment # 1: The overall approach to this sampling plan requires significant modification. On page 7, is the following statement:

> "The size of each MARSSIM unit and the number of samples required within each unit *to evaluate extent of contamination* is based on published MARSSIM guidance." (emphasis added)

MARSSIM is NOT used to evaluate extent of contamination. Rather, it aids with the design and implementation of a final status survey (i.e., to provide legally and scientifically defensible data demonstrating that material that remains on-site meets cleanup objectives). It is inappropriate to use NUREG-1575 to design a characterization survey. Moreover, this approach does not take previously obtained data fully into consideration, it will not yield the most informative results, and it likely will not be most cost-effective.

It is recommended that a new sampling plan be developed. It should be based upon the results of Phase I and should take into consideration that fact that no subsurface contamination was measured (only 1 sample at 1.4 ft) and that surface soil contamination was only in AOIs 2, 3, 4, and 5. It also should be based upon the gamma walkover to be performed in Phase II. It should *supplement* the gamma walkover, further defining (type and extent) areas of contamination discovered during the walkover.

***Response**: MARSSIM is used to evaluate the extent of contamination as stated in Sections 2.4.4 and 5.3.1 of that document. It may have been overly optimistic to attempt to make this characterization survey into a full-blown Final Status Survey given the budget of the investigation. An alternative approach containing extent sampling around the hot spots found in the Phase I, sampling as a result of the gamma walkover survey, and stratified random points has been submitted to the USACE for review and comment.*

Comment # 2: The groundwater data from Phase I seems inconclusive. At each sampling location, the result from the temporary wellpoint is always higher than the result from the existing well indicating that turbidity is a problem. This should be factored into the Phase II approach. Also, the pathway for groundwater contamination is questioned since no subsurface contamination was measured in Phase I.

***Response:** The groundwater from the temporary wellpoints was not always higher in concentration than the groundwater from the existing wells. In general, temporary wellpoints were not placed neat permanent wells, making it impossible to make this conclusion. To determine if the turbidity is the* *contributing factor for the radionuclides in the groundwater, both total and dissolved radionuclide samples will be collected. The total radionuclide sample will be analyzed from each groundwater sample collected in Phase II. If the total concentration of any individual radionuclide exceeds the risk-based screening criteria, a dissolved sample from that well will be analyzed. The dissolved sample will be analyzed for the radionuclides proposed in the draft Phase II QAPP.*

Groundwater from background wells will be collected in Phase II to determine the overall gross alpha and radionuclide concentrations. Comparison of concentrations of groundwater samples collected at the NFSS to these background conditions may remove the groundwater pathway from further consideration during the baseline risk assessment.

Additionally, with only 69 subsurface locations sampled over a 191-acre site, making the determination that all subsurface contamination is less than the screening values is not practical at this point of the RI.

Comment # 3: Page 16, first bullet - The significance of "20,000 cps" should be provided.

Response: *This value (20,000 cpm) is approximately two times site background concentrations. The text will be revised by adding "(approximately two times background)" after "20,000 cpm". Please note the units are changed to counts per minute (cpm).*

NYSDEC comments on the Draft Sampling Plan Addendum Phase II Edition

1. Page 16 – Section 3.0, *Planned Phase II Activities*: Objective 2 references the survey units that will be created in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and describes sampling in Pre-Designated MARSSIM units. The first bullet states, "No soil samples will be collected from the eight MARSSIM Class I units." The presumed reason for this is that contamination has been identified in those units above some limit, and future remediation will be necessary.

   a. The reason why no sampling will be performed in these units should be stated in the text. The plan should also discuss when these areas would be subjected to further testing.

      Response: The reason for the lack of sampling in Phase II in the Class 1 units (with the exception of the surface soil samples exhibiting elevated gamma readings) is the presumption of remediation necessary prior to release. These areas will be further addressed in the Feasibility Study or during Remedial Actions.

   b. If the reason for not sampling these units at this time is known contamination, has the horizontal and vertical extent of the contamination been determined, or has a decision been made to define the extent during any remediation.

      Response: The horizontal and vertical extent of contamination is not fully defined in the Class 1 units. Gamma walkover surveys will be conducted in those units during Phase II. Remedial activity is not a scope item under the current contract. These areas will be further addressed in the Feasibility Study or during Remedial Actions.

   c. The plan should identify the highest contamination in each unit.

      Response: Currently, not all units contain analytical results for radionuclides in the soil. Analytical results will be addressed in the Remedial Investigation report that will be submitted after the performance of the Phase II sampling event. The purpose of the draft Phase II FSP was to define areas of further concern, not to make conclusion.

2. Page 16 – Section 3.0, *Planned Phase II Activities*: In section 3.0, *Planned Phase II Activities*, Objective 2, the second and third bullets specify a certain number of samples for other MARSSIM survey unit designations. While it is acknowledged that some samples collected during the RI may be used as final status survey (FSS) data, it is not clear whether all of this data is going to be used in lieu of FSS data.

   a. Usually, a specific plan is prepared which goes through the process of determining the adequate number of samples for a MARSSIM unit. This includes calculation the standard deviation of the contaminant level, which is available from previous survey data. Is enough data available for this determination? From discussions in Appendix B, it does not appear so.

Response: Any plan to develop the number of samples at this point would be preliminary and that number may be subject to major revision based on the results of Phase II.

b. Please explain how this data will be used in relation to the MARSSIM FSS data.

Response: All data collected will be part of the Final Status Survey with the exception of areas that will undergo or that are adjacent to remedial activities.

c. An entire section of the plan should be devoted to the calculation of the adequate number of samples

Response: All data collected in this phase of work will be part of the Final Status Survey to the extent possible with the exception of areas that will undergo or that are adjacent to remedial activities.

3. Page 17 – *Proposed Phase II Activities,* Item 7: The result of the Phase I investigation did not indicate elevated levels of Metals. In addition, semi-volatile compounds were only detected in areas known to have been impacted by past operations. This does not justify the collection of additional "background samples for these parameters.

   Response: Phase I data for metals and SVOCs were elevated relative to risk-based screening values as background values were not available at that time. Since then three reports were received containing background data. It is unfortunate that the background data in those three reports submitted by the USACE for Maxim's review did not include all constituents of potential concern. Not all metals and no SVOCs or radionuclide background concentrations were represented in the data. Further evidence of the lack of sufficient background concentrations is the Phase II sampling of the LOOW. Therefore, Maxim sees the need to collect and analyze background samples.

   All decisions (i.e., baseline risk assessment, feasibility study, cleanup levels, and remedial actions) that follow the remedial investigation should be based on a complete background data set.

4. Table 1 – Why is additional investigation not proposed in the vicinity of investigation location BH308 and BH309? Previous investigations have indicated elevated levels of organic constituents. In addition, for location BH 415, the proposed investigation of contamination detected at this location is not sufficient to make a determination of the extent of soil and groundwater contamination. Additional soil/groundwater sample locations in the immediate vicinity are necessary.

   Response: Additional investigation around the locations addressed in the comment was included in the draft Phase II FSP. The tables of additional sample locations that were added to the Phase II investigation were developed separately from those sample locations *that would be collected to bound samples exceeding the screening values. Discussions of the sample location in question follow.*

Seven surface soil samples, surrounding locations BH308 and BH309, will be collected in the Phase II activities. These samples are presented in the draft FSP Table 3.

Seven subsurface soil samples, surrounding BH415, will be collected in the Phase II activities. They are presented in the draft FSP Table 4. Groundwater samples were inadvertently omitted but will be restored to each subsurface location surrounding BH415.

USEPA comments on the Draft Sampling Plan Addendum Phase II Edition

1. Page 4-5, section 2.3, *Gamma Walkover Surveys and Resulting Phase II Data Needs*: Another reason for poor correlation between the walkover survey results and the radioanalytical results could be the contribution of gammas from subsurface contamination

Response: This may be true but has not been observed to be the case at the NFSS. Sixty-nine subsurface locations were examined for subsurface gamma readings and only one (at 1.4 feet below the ground surface) had any elevated gamma readings.

2. Page 4-5, section 2.3, *Gamma Walkover Surveys and Resulting Phase II Data Needs*: Thousands of counts per second seem high for spots that were indicated during a site visit as slightly above background.

Response: Agreed. The large values of cps may be a result of the poor record keeping and lack of confirmatory sampling after remedial activities under the DOE. This is ultimately the purpose for conducting this remedial investigation. In response to the thousands of counts per second, it should be noted that the relative gamma background (based only on the Phase I gamma walkover surveys) was calculated to be approximately 10,000 cps.

3. Page 5, section 2.3, *Gamma Walkover Surveys and Resulting Phase II Data Needs*: What was the background count-rate for soil surrounding the railroad ballast?

Response: It was variable depending on location. The following table shows the soil background values for the locations near the proposed sampling location and other areas where ballast was observed.

Location	Soil Background (cps)	Ballast Reading (cps)
202	9,000 - 11,000	no readings taken
204	13,000 - 14,000	no readings taken
304	11,000 - 12,000	13,000 - 15,000
306	11,000 - 12,000	13,000 - 15,000
417	18,000 - 19,000	19,000 - 22,000
730	9,000 - 11,000	13,000 - 18,000

4. Page 6 (section 2.4.1.1), page 16 (section 3.0, item 2), and Figure 27: Provide a table listing each proposed MARSSIM unit and the rationale for each unit's classification.

Response: A table detailing the MARSSIM class, area of the unit, and reasoning for its classification will be included in the revised FSP.

5. Page 16, section 3.0 *Planned Phase II Activities*, item 1: As part of the Phase II activities, a surface sample will be collected where the NaI reading exceeded 20,000 cps. How or when will you address the presence or absence of the subsurface contamination at these locations? What is the basis for using 20,000 cps as the cut off to take a surface soil sample? What was the ambient background count-rate?

Response: Additional soil samples will be collected at a depth from 1.5 to 2 feet below the ground surface to determine concentrations of the radionuclides at these locations.

The cutoff was chosen to be 2 times background.

As stated in response to comment 2, the background gamma readings are approximately 10,000 cps.

6. Page 16, section 3.0 *Planned Phase II Activities,* item 3: The Phase II activity described is unclear. Table 4 identifies 15 subsurface soil samples from buildings 401 and the acidification area. How do these match with the 29 locations for surface and subsurface soils and groundwater samples stated in the text? What is meant by collecting samples to "bound constituents found in samples that exceed screening values?"

Response: These samples are not included in the stated 29 locations that had specific justifications for placement. These samples were added to "bound" or delineate the horizontal and vertical extent of concentrations that exceeded the screening values.

7. Tables 2, 3, 4, and 7: What are the purpose and interpretation of gross α and β measurements for soil samples? In addition to "Total U," will isotopic uranium be provided under "Radiological Isotopes?" What radionuclides will be evaluated under "Radiological Isotopes?" Will it be the thirteen radionuclides listed in the draft QAPP?

Response: Gross α and β were initially taken in the soil samples to be an indicator of unanalyzed radionuclides or potential transuranic radionuclides that historically were stored at the NFSS. An exceptionally large imbalance over the analyzed radionuclides of the gross α and β would have triggered additional testing of the Phase I soil samples.

Yes, isotopic uranium will be analyzed in addition to the total uranium.

Yes, the list of radionuclides for the Phase IIis that from the draft QAPP. This expanded list of radionuclides for the Phase II activities is the following:

> *Actinium-227, Americium-241, Cobalt-60, Cesium-137, Protoatinium-231, Radium-226, Radium-228, Thorium-228, Thorium-230, Thorium-232, Uranium-234, Uranium-235, and Uranium-238*

8. Table 6: Isotopic radium analysis should be done for groundwater samples.

Response: Agreed. Both radium-226 and radium-228 will be analyzed in the groundwater samples.

Comment Sheet
For the Draft Field Sampling Plan Addendum - Phase II Edition
Remedial Investigation at the Niagara Fall Storage Site, June 2000

Reviewer: Nancy Dickens, CPG

Page/Location	Comment	Response
General Comment 1	A number of grammatical and spelling errors were noted with red ink in the text. Individual comments have not been generated for each instance.	Agreed. Those that are noted will be corrected.
General Comment 2	In a number of instances, acronyms are used with no explanation as to what they represent. At the first occurrence, please spell out what the acronym represents.	Agreed. All acronyms will be spelled out on their first occurrence and followed by the acronym in parenthesis.
General Comment 3	Tables are not referred to in the text in numerical order.	Agreed. Where possible the Tables will be renumbered to accomplish this.
Page 1, Section 1.0, para 2, last sent.	Revise as follows: "...not a part of the current Scope of Work (SOW) and will be addressed by separate SOW documents.	Agreed. The text will be revised as suggested
Page 1, Section 1.0, para 3, last sent.	Radionuclides are not really "used", perhaps "to be included in the analytical program" would best describe their inclusion.	Agreed. The text will be revised as suggested.
Page 2, Section 2.0, para 2, last sent.	"Historical information" was cited as a basis for selection of the analytes. Wouldn't it be better to be more explicit to say "past activities at the site and previous analytical results" rather than grouping it together?	Agreed. The first sentence of this paragraph will read "Sample locations and analytes were based on past activities at the site and previous analytical results, evidence of contamination … …that correspond to each individual sample location, as discussed…".
Page 4, discussion of water levels.	Is there some explanation for the extreme in the water levels? Since the topography is fairly level (except for the cell), doesn't most of the water-bearing units encountered represent perched water rather than an integrated and free-flowing aquifer?	The depth below the ground surface is a somewhat misleading definition of the groundwater surface. This will be changed to actual elevations in the revision. Topography is not necessarily indicative of groundwater levels or flow direction. Groundwater contour maps of the lower and bedrock water-bearing zones appear to indicate that these zones are continuous and flowing toward the northwest. Removing the localized high water level in well OW11A makes the contour map much smoother also. The difference in groundwater elevations is mainly due to the distance between wells (approximately 5,000 feet east to west and 3,000 feet north to south).

Comment Sheet For the Draft Field Sampling Plan Addendum - Phase II Edition Remedial Investigation at the Niagara Fall Storage Site, June 2000		
Reviewer: Nancy Dickens, CPG		
Page/Location	**Comment**	**Response**
		The water in the upper water-bearing zone is most probably in a perched condition in several locations. The absence of wells in this zone (only one well is not located around the IWCS) makes it difficult to make any determination of groundwater flow direction if any exists. If the water is perched then any flow direction based on the data is inaccurate. It is unfortunate that we do not have any nested wells that include all 3 water-bearing units. Hopefully this will be rectified in at least one location during the Phase II. This will happen only if the installation of permanent wells in the upper water-bearing zone is not significantly reduced or removed from the planned activities.
Page 4, Paragraph 3.	If the word "reported" is used, a reference should be supplied.	Agreed. The following text will come after the word reported in both sentences in this paragraph: …reported by the NYSDEC…
Page 5, top of page.	The explanation of poor correlation between the walkover survey results and the corresponding laboratory samples is extremely unclear. Please reword.	This paragraph will be revised as follows: "…results of radiological analyses of corresponding samples. *The correlation fails in two ways. The first failure is that a single reading from the gamma walkover survey exhibits multiple concentrations from an individual constituent, some of which exceed the screening value. As an example, for the 11,000 cps gamma survey reading, radium-226 concentrations ranged from 0.734 pCi/g to 9.49 pCi/g. Some of these concentrations are above the 2.7 pCi/g screening value).*

Comment Sheet
For the Draft Field Sampling Plan Addendum - Phase II Edition
Remedial Investigation at the Niagara Fall Storage Site, June 2000

Reviewer: Nancy Dickens, CPG

Page/Location	Comment	Response
		The second failure is that some gamma walkover values exhibit a reverse correlation (i.e., at 9,000 cps uranium-238 has a value of 120 pCi/g and at 126,000 cps the uranium-238 value is 1.8 pCi/g). This is probably due…".
Page 5, Section 2.4.	Something is missing from the second to the last sentence.	Agreed. The following will be appended to the sentence in question: "...will be available for this project."
Page 5, Section 2.4.	For clarity, could a summary table be developed that lists the total number of surface soil, subsurface soil, TWP groundwater, well groundwater, ballast and core samples?	Agreed. The table would be helpful for the review of the document. It will be added in the revision.
Page 6, Section 2.4.1.1	I think a one or two sentence discussion summarizing what MARSSIM is used for and why it will be used in this project would be helpful.	Agreed. The text will be added as follows: "…DOE during its site cleanup. *The Multi-Agency Radiation Survey & Site Investigation Manual (MARSSIM) was used in planning the activities for Phase II. This document provides guidance for planning, conducting, evaluating, and documenting environmental radiological surveys of surface soil and building surfaces for demonstrating compliance with regulations. MARSSIM is a multi-agency consensus information document, which was developed collaboratively over the past three years by the following Federal agencies having authority for control of radioactive material: Department of Defense, Department of Energy, Environmental Protection Agency, and Nuclear Regulatory Commission.* The majority of the site has been preliminarily…".

Comment Sheet
For the Draft Field Sampling Plan Addendum - Phase II Edition
Remedial Investigation at the Niagara Fall Storage Site, June 2000

Reviewer: Nancy Dickens, CPG

Page/Location	Comment	Response
Page 7, paragraph 1.	Could you state what the TAGM concentration is for benzene? The second to the last sentence is extremely long and should be broken into two sentences.	The sentences starting with the fifth sentence will be revised as follows: Benzene was detected in 11 surface soil samples from AOI's 3, 4, 5, 6, and 8 at levels ranging from 1.2 to 2.6 ug/kg. When compared to the TAGM level of 0.6 ug/kg and the PRG of 670 ug/kg, the TAGM allowable soil concentration seems to be very low. NYSDEC representatives at the May 2000 TPP meeting expressed the opinion that these observations cannot be dismissed due to their potential of being an indicator of higher nearby concentrations. Therefore, this Phase II Plan includes limited surface soil sampling for VOCs, at six locations in the AOIs cited above. This sampling will be conducted to further investigate contamination found during Phase I and to investigate new areas where VOCs might be present based on site history. The rationale for selection of Phase II VOC sampling locations is detailed in Table 1.
Page 8, paragraph 1	The 18 planned samples for PCBs - are the locations near former transformer locations? For locations not near past PCB hits, why were they selected?	Of the 14 planned surface soil samples, 11 are planned to delineate the extent of PCBs found during Phase I. The 3 remaining samples are located in areas that were not addressed in Phase I, 2 on the northern boundary of the site (at he northwest and northeast corners of the site) and 1 downgradient (from surface water runoff) of the decontamination pad.
Pages 10-12.	Please identify the TWP or well exhibiting the highest concentration.	Agreed. The location of the highest concentration listed will be included in the revision.
Page 12, paragraph 2	Are samples being collected for total and dissolved metals or just total? The text does not indicate.	Dissolved and total metals will be collected. The text does mention that the work will be conducted in accordance with the Phase I FSP where this was stated.

Comment Sheet For the Draft Field Sampling Plan Addendum - Phase II Edition Remedial Investigation at the Niagara Fall Storage Site, June 2000		
Reviewer: Nancy Dickens, CPG		
Page/Location	**Comment**	**Response**
Page 12, Table 1	The table does not really indicate whether the groundwater is from a permanent well or a TWP. I am assuming a TWP after going through the document. To clarify for field personnel, the distinction needs to be made.	Those samples presented in Table 1 are to be collected from temporary wellpoints. This will be further clarified in the revision.
Page 13, Paragraph 2.	The text notes that 1,1,2,2-tetrachloroethane was found as a TIC in the SVOC sample - this would indicate the compound is a laboratory artifact. After the sample is extracted (8270C), any VOCs would have volatilized.	Disagreed. The assumption that all TICs in SVOCs analysis are laboratory artifacts is false. Not all VOCs volatilize during SVOC sample extract preparation. Review of the chromatography associated with this particular sample reveals a distinguishable peak and spectra, which has been identified as 1,1,2,2-tetrachloroethane. This compound may have its origin from the actual sample or could be attributed to laboratory contamination, such as employment dirty glassware. This compound would not have volatilized during sample extract preparation since 1,1,2,2-tetrachloroethane is significantly heavier than the methylene chloride extraction solvent and the extract concentration procedure (inert gas blow-down) would not have effectively volatilized or purged this volatile compound from the final extract.
Page 14, Para 3.	How do you know that human exposure is unlikely?	The paragraph in question will be revised as follows: Metals exceeded the screening values in 36 surface water samples. The screening values used to assess Phase I results would be protective of ecological receptors. The need for an ecological assessment is currently under evaluation by USACE. Surface water concentrations are transient and the metal concentrations in flowing streams can vary greatly over time. With those conditions, it is unlikely

Comment Sheet
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Remedial Investigation at the Niagara Fall Storage Site, June 2000

Reviewer: Nancy Dickens, CPG

Page/Location	Comment	Response
		that long term human exposures would occur. Further sampling for the delineation of the samples where metal concentrations exceeded screening values is not planned at this time, pending results of the ecological survey.
Page 16, Section 3.	Text needs to state the procedures for collection of surface, subsurface and groundwater samples are presented in the Final FSP.	Agreed. This (with the addition of approved procedures subsequent to the FSP) will be added to the revision.
Page 16, Section 16.	Will any of the TWPs and new wells penetrate the lower gravel aquifer? If so, are there any plans to double case the wells?	No temporary wellpoints or constructed wells will be advance past the upper water-bearing zone (i.e., stopped at the gray clay layer interface).
Page 17, Number 5.	A maximum time for well development is not stated in the text or Appendix C.	Well development will be conducted as stated in the Phase I FSP and subsequent discussions/decisions with the USACE that occurred during the Phase I.
Page 18, Number 8.	Who will obtain the rights of entry for the off-site properties? This responsibility should be spelled out.	Agreed. The USACE will be responsible for all rights of entry. This will be added to the revised document.
Page 19, numbers 10 and 11.	Procedures for collection of ballast and core samples are not included in the text or Appendix C. Text should be added or SOPs developed.	Agreed. These procedures will be added in the revision as Appendices.
Page 19, Number 11.	The text mentioned results of similar ballast materials from the LOOW. Reference? When were these samples collected?	This was stated at the May 2000 TPP meeting by the USACE. This will be added to the revised text. It is not currently evident when the similar ballast material samples were collected or what the results were for those samples. The information on the similar ballast material may also be included in some of the reports that were examined for the document review. If the information is not found, the USACE will be responsible for transmitting this to Maxim.
Page 19-20, Number 12.	Procedures for trenching need to be added to the text or Appendix C.	Agreed. This procedure will be added in the revision as an Appendix.

Comment Sheet For the Draft Field Sampling Plan Addendum - Phase II Edition Remedial Investigation at the Niagara Fall Storage Site, June 2000		
Reviewer: Nancy Dickens, CPG		
Page/Location	**Comment**	**Response**
Page 20, Numbers 13 and 14.	Please reference applicable section of the FSP for procedures.	Disagreed. As requested in a previous comment, the FSP will be globally referenced in this Phase II addendum.

Jim Richards

From: Tom Lachajczyk
nt: Monday, August 07, 2000 8:14 AM
Jim Richards
Subject: FW: Comment Sheet

——Original Message——
From: **Nancy Dickens**
Sent: **Monday, August 07, 2000 8:13 AM**
To: **Tom Lachajczyk**
Subject: **RE: Comment Sheet**

Tom,

I agree with all but the response to the comment on Page 13, paragraph 2 (about the 1,1,2,2-tetrachioroethane). I've talked with Dave Collins about this and he said the density of the compound has little to do with it. Unless the sample had a very high concentration of 1,1,2,2-tetrachloroethane, the process during the extraction would volatilize the VOCs. I don't know if VOCs were run on this sample . that would answer the question (if it wasn't in the VOC sample, then it's not really in the SVOC sample). The text indicates that the compound is in the sample and Dave said it is very very unlikely the compound is actually in the sample. When this same compound showed up in SVOC samples at KOW, I talked with the QA person (I don't remember his name . but you know the person who went to Fernald) and he is the one who first told me the compound was a laboratory contaminant. He said it will frequently show up as a lab artifact is SVOC samples

The rest of the responses are fine.

Nancy

——Original Message——
From: **Tom Lachajczyk**
Sent: **Friday, August 04, 2000 3:00 PM**
To: **Nancy Dickens**
cc: **Jim Richards**
Subject: **Comment Sheet**

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Please review the responses and indicate whether you are in concurrence with the responses.

TL

Reviewer: David E. Germeroth, P.E.		
Specific Comments		
Section	**Comment**	**Response**
General Comment	Tables should be numbered in the order in which they are discussed in the text. Also tables listing specified analytes should consistently placed relative to tables describing location justifications. For example, the table justifying rock ballast sample locations follows the table listing ballast analytical requirements and the table justifying road core samples precedes the road core analytical requirements table.	Agreed. Where possible the Tables will be renumbered to accomplish this. Additionally, the current Table 9 will be split into 2 tables to rectify the problems shown in your example.
Section 2, sixth bullet	The rainfall event was approximately a 24-hour rain event. This fact should be stated in the text.	Agreed. Text will reflect the 24-hour rainfall event.
Section 2, page 2, third paragraph, first sentence	Need a space behind '100': 100[sp]M^2	Agreed. Additionally the first time it is encountered it will be spelled out (square meters) and changed to a lowercase (m) as typically shown in literature.
Section 2, page 2, second paragraph.	The analyte list for each sample was selected based on historical evidence, etc. So were most of the sample locations. Perhaps this fact should be explicitly stated.	Agreed. The first sentence of this paragraph will read "Sample locations and analytes were based on past activities at the site and previous analytical results, evidence of contamination … …that correspond to each individual sample location, as discussed…".
Section 2, page 2, third paragraph, last sentence	The word 'well' should be replaced with 'temporary well-point'.	Agreed. The word will be changed to wellpoint.
Section 2, page 3, fourth paragraph	Delete the word 'planned'.	Agreed. The word will be deleted.
Section 2.2, page 4, top of page	Insert the word 'under-laying' before 'Gray Clay Layer'. Also, as a strictly editorial comment, is it necessary to capitalize 'Gray Clay Layer' and 'Brown Clay Layer' throughout the document?	Agreed. Underlying will be added. The Brown and Gray Clay Layers are capitalized for consistency with the Phase I FSP and the proper usage of "named" units in a geological sense.
Section 2.2, page 4, second full sentence.	Delete the phrase 'either non-existent'. If a boring was terminated because a saturated zone was encountered, the gray clay may be present below the saturated zone. However, we have no evidence concerning its presence or absence.	Agreed. The text will be changed as suggested.
Section 2.2, page 4, first paragraph	We installed 69 borings. 58 borings were terminated because the gray clay was encountered and 11 borings were terminated because a saturated zone was encountered. In these 11 borings, the gray clay may or may not be present at some depth below the saturated unit. Does this mean that no boring was terminated before encountering the gray clay and before	Yes.

Reviewer: David E. Germeroth, P.E.		
Specific Comments		
Section	**Comment**	**Response**
	encountering a saturated unit (i.e. terminated because some predetermined depth was drilled)?	
Section 2.2, page 4, second paragraph, starting with "Hydrology... "	We discuss three distinct water-bearing units. The data shows that all three units share approximately the same piezometric surface. What is the basis by which we separate these units and designate the lower two as 'semi-confined'? Our piezometric data does not support this differentiation. If we are relying on a published source for the description of these three water-bearing units, perhaps this fact should be stated in the text.	It is unfortunate that we do not have any nested wells that include all 3 water-bearing units. Hopefully this will be rectified in at least one location during the Phase II. This will happen only if the installation of permanent wells in the upper water-bearing zone is not significantly reduced or removed from the planned activities. The separation of the upper (the perched water in the brown clay) and lower (sand and gravel beneath the gray clay) water-bearing units is by the Gray Clay Unit. The separation of the lower and bedrock (upper fractured portions of the Queenston shale) water-bearing units by the Red Silt Unit. The bedrock water-bearing unit is semi-confined hydraulically connected to the lower-water bearing unit where the Red Silt Unit is missing. Please do not confuse the issue by making the global assumption that the water levels at all locations are the same. This is definitely not true. One good example of this is between OW 20S (water level 317.84) and OW 20D (water level 309.85). Other wells may not show this extreme condition but there are differences. And finally, the Phase I FSP documented all of the above descriptions of the water-bearing units. Those descriptions were based on several previous reports and documents that are referenced in it.
Section 2.2, page 4, third paragraph, last sentence, and starting with "It has also been reported... "	If the bedrock unit is semi-confined, isn't it likely that it is also connected to the lower water-bearing zone?	Agreed. It is connected and hence the term "semi-confined". Just for your information, the water level data shows that of the 4 pairs of lower and bedrock wells the differences in groundwater elevation are: (bedrock

Reviewer: David E. Germeroth, P.E.		
Specific Comments		
Section	**Comment**	**Response**
		– lower) 0.29-, 0.04-, 0.55-, and 0.86-foot. The positive values indicate an upward flow gradient. The 0.55- and 0.86-foot difference may indicate a confined condition at these locations.
Section 2.2, page 4	Concerning directions of groundwater flow: Are these directions taken from published sources, or are they determined from piezometric data from the wells/well points? The uppermost water-bearing unit has a piezometric surface, which ranges from 2.5' to 15' bgl. This range probably exceeds the range in local relief (excepting ditches and CSF, both of which are man-made). This kind of data may suggest 'perched' conditions. Such conditions typically do not have a 'regional' flow direction.	The groundwater flow directions were determined from the data collected from the permanent wells on November 4, 1999. Data from the temporary wellpoints were not used in the maps. This will be noted in the revision. Agreed. The water in the upper water-bearing zone is most probably in a perched condition in several locations. However, the absence of wells in this zone (only one well not around the IWCS) makes it difficult to make any determination of groundwater flow direction if any exists. If the water is perched then any flow direction based on the data is inaccurate.
Section 2.4, page 5, fifth sentence	Reword sentence to: 'However, background sample locations have not yet been determined.' Also, maybe we should replace the fifth and sixth sentences with: 'At the TPP meeting, the USACE stated that they might be able to supply suitable background data for this investigation. If this is the case, background samples will not be collected during this investigation. However, at this time this issue is not yet resolved. Background samples have been proposed in this plan as a contingency in the event that the USACE is not able to supply suitable background data. If it is necessary to collect background samples for this project, the proposed locations for the background samples will be described in a supplement to this plan.'	Agreed the text will be changed as suggested.
Section 2.2, page 4, last paragraph in section	Typo: 'Clan' should be 'Clay'	Agreed. The typographical error will be corrected.
Section 2.3	A table showing the gamma scan results along with the radionuclide concentrations would be helpful.	Agreed. This may be too much information for the Phase II FSP though. It would probably be best after the collection of the Phase II data and during the compilation of the RI report where it will make more

Reviewer: David E. Germeroth, P.E.		
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		sense and be complete.
Section 2.4, page 5, second from last sentence.	The sentence is incomplete. Perhaps we should append the following phrase to the end of the sentence: "...will be available for this project."	Agreed. The sentence will be revised. Although preliminary indications are the data from the submitted reports is not of the quality necessary and does not include all constituents of interest.
Section 2.4.2, page 6, second paragraph	Was the screening value of 5 pCi/g developed by ORNL? It is my understanding that this value is published in the CFR. I believe the 5 pCi/g value predates the development of the ORNL screening values.	The 5 pCi/g value was used to be in compliance with the 5/15 rule (as presented in 40 CFR 110???). In all reality the uranium will have a higher remedial goal, but as a screening value it will help focus the areas that may be remediated by requiring a few more samples to be collected to determine extent of contamination. The text will be revised to make this more clear.
Section 2.4.1.1, first paragraph, first sentence	The sentence would be clarified if we insert the word "some" before "surface soil samples".	Agreed. The word some will be added to the sentence.
Section 2.4.1.1., page 6, last full sentence on page	Does the 607 samples include all surface soil rad samples (at known hotspots, off-site, background, MARSSIM grids, etc.), or just the gridded MARSSIM samples?	The 607 samples are just the gridded sample points on-sit and off-site. No background, known hotspot, or delineation samples are included in this number. Known hotspot and background samples are discussed later in the document. These are samples that are planned to be taken in Phase II. Allowances for 50 additional samples to be taken in the hotspot and delineation of those hotspots are budgeted in the gamma walkover survey. The text will be revised to make this more clear.
Section 2.4.1.1, page 7, second paragraph	The text is not clear. The sixth sentence states that some samples have benzene concentrations that exceed the TAGM. The next sentence states: "Although the levels detected ... are low in comparison to the TAGM screening values ..." This second sentence implies that the sample	The sentences including the (fifth) will be revised as follows: Benzene was detected in 11 surface soil samples from AOI's 3, 4, 5, 6, and 8 at levels ranging from 1.2 to 2.6 ug/kg. When compared to the TAGM

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	concentrations are less than the TAGM values. Also, were the sample results discussed in this paragraph 'J' flagged in the data report? If they were, the results may be artifacts of the analysis.	level of 0.6 ug/kg and the PRG of 670ug/kg, the TAGM allowable soil concentration seems to be very low. NYSDEC representatives at the May 2000 TPP meeting expressed the opinion that these observations cannot be dismissed due to their potential of being an indicator of higher nearby concentrations.
Section 2.4.1.1, page 7, last paragraph, third sentence	For clarity, we should note that the 'participants' were participating in the TPP meeting.	Agreed. Will be revised as follows: "… agreement among the participants of the May 2000 TPP meeting, including NYSDEC …".
Section 2.4.1.2, page 8, second paragraph	For clarity, we should reword the paragraph to clarify the fact that the first sentence and the fourth sentence are both describing the same sample.	To provide the needed clarification, the third and fourth sentences be changed as follows: PCBs in the surface soil samples that exceeded the screening values were found only in AOI 4, with the highest value detected (2,030 ug/kg) being located in close proximity to a former pole-mounted transformer.
Section 2.4.1.1, page 8, last sentence in section	Delete reference to Table 3. This table does not specify the collection of any VOC samples. Also, the VOC column of Table 3 should be deleted.	Agreed. However, the sentence should reference all soil samples that are not uniquely rad related instead of just for VOCs. It will be changed as follows: The list of surface soil samples to be collected for further characterization of the NFSS and those to delineate areas found during Phase I is presented in Tables 2 and 3.
Section 2.4.1.2 and 2.4.1.1	General comment: Rather than stating the total number of samples to be collected for phase 2 (i.e., combining samples to be collected to investigate new areas and samples collected to bound known contamination), it would be helpful for the plan to state the number of samples to be collected for each of these justifications. This would make it easier to reconcile this section with the various tasks described in Section 3.	Agreed. The text will be revised to reflect the two types of samples to be collected.
Section 2.4.1.2, page 11, fourth paragraph	Simply installing permanent wells and sampling those wells will not clarify the gross alpha/turbidity issue. We also should determine TSS and dissolved gross alpha for samples collected from site wells and	The collection of samples from the undeveloped wellpoints may have greatly inflated the constituents due to the turbidity that some of the samples exhibited. I agree that a

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	from the background wells. Given this data, we could investigate the correlation between TSS and gross alpha concentrations. Also, are the concentrations for the nuclide specific results 'totals' or 'dissolved'?	permanent well will not completely remove all of the turbidity. The TSS and dissolved gross alpha would be the way to differentiate if the turbidity was the reason the gross alpha was elevated. The intent of placing permanent wells is to determine the nature of the groundwater. The groundwater collected from these new wells will be comparable to groundwater collected from background wells and the permanent wells already installed at the site. The text will be revised to clearly state this objective. The gross alpha samples will be total (not dissolved) to be comparable to the MCL.
Section 2.4.2, page 11, fifth paragraph, first sentence	What are "four temporary walloping samples"?	Samples that beat the living *&^* out of the other samples. The sentence will be revised to indicate they were "wellpoint" samples.
Section 2.4.2	The elevated concentrations of the organic compounds found in samples collected from temporary well points may, in part, be attributable to solids in the samples. This fact should be stated in the text.	Agreed. The text will be revised to incorporate this comment.
Section 2.4.3, page 12, second paragraph	"Radionuclide" should either be plural, or, if only a single nuclide was found, should be specified.	Agreed and it is. The text states "Concentrations of radionuclide, VOC, SVOC, metal, and pesticide <u>constituents</u> in the…".
Section 2.4.3, page 13, third line	Replace the phrase 'suggested by exceedances' with 'above screening criteria'.	Agreed. The text will be revised as suggested.
Section 2.4.3, page 13, fifth paragraph	Was the heptachlor result 'J' flagged? If it was, the reliability of this result is suspect. Also, maybe we should reword the sentence as follows: 'Heptachlor was detected in a single sample, at a concentration of 1.7 ug/kg. (This result was J flagged by the laboratory and the sample result may overstate the actual heptachlor concentration in the sample.)'	The Heptachlor result was not flagged. The sentence will be revised as follows: Heptachlor was detected in one sediment sample at a concentration of 1.7 ug/kg.
Section 2.4.4, page 13, first paragraph	Revise first sentence to read: "Analyte concentrations in surface water samples ..."	Agreed. The text will be revised as suggested.

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Specific Comments		
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Section 2.4.4, page 13, second paragraph	I am confused by the references to sediment results in this section. Should these references be to 'surface water'?	Agreed. The typographical error of "sediment" will be changed to "surface water".
Section 2.4.4, page 14, third paragraph	The sentence 'It is unlikely that human exposures would occur' should be further qualified. Under the current land use, it is unlikely that human exposures would occur. However, land use scenarios can be postulated which could result in exposure to the contaminants found in the surface water. The semi-colon in the last sentence should be replaced with a comma, or the sentence should be reworded. The sentence 'Surface water concentrations are transient' is missing a period. Also, maybe we should revise this sentence to read 'The total and dissolved metals concentrations in surface water in flowing streams can vary greatly over time because these concentrations tend to be highly correlated with stream flow rate.'	The paragraph in question will be revised as follows: Metals exceeded the screening values in 36 surface water samples. The screening values used to assess Phase I results would be protective of ecological receptors. The need for an ecological assessment is currently under evaluation by USACE. Surface water concentrations are transient and the metal concentrations in flowing streams can vary greatly over time. With those conditions, it is unlikely that long term human exposures would occur. Further sampling for the delineation of the samples where metal concentrations exceeded screening values is not planned at this time, pending results of the ecological survey.
Section 2.4.4, page 14, fourth paragraph	Was this sample result 'J' flagged?	Yes. A clarification of the text will be made in the revision as follows: This result was J flagged by the laboratory and the sample result may overstate the actual Aroclor concentration in the sample.
Section 2.4.4, page 14, fifth paragraph	This paragraph implies that surface water samples will be collected as part of the Phase II investigation. However, in the third paragraph we state that 'further sampling is not planned at this time'.	The sentence in question will be removed. The text will be revised to indicate that no surface water delineation samples will be collected for the metals, SVOC, or the PCB constituents that were detected.
Section 2.5, first paragraph	SAIC did not recommend the methods of investigation. They concurred with our plan. Nor did SAIC recommend an approach. They provided input and advice for several specific items. Their input and advice was incorporated, as appropriate into our plan.	Splitting hairs but the radionuclides were suggested by SAIC. The sentence will be reworded as appropriate to demonstrate this fact.
Section 3.0, general comment	It would be helpful if we provided a simple one-page table that called out the number of samples to be collected for each media. Also, it would greatly clarify the document if we could produce, as appropriate, an 11"x14" drawing, showing sample locations, for each described task.	Agreed. The table would be helpful for the review of the document. It will be added in the revision. However, the individual figures would be confusing to the reader and would require several "page flipping episodes" to make a reasonable

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Section	**Comment**	**Response**
		understanding. These figures will be helpful for the collection of the samples and will be prepared for that purpose.
Section 3.0, Task 1	Insert the number of samples to be collected into the first sentence. I believe the number is 9.	For consistency, the number of samples to e collected will not be inserted in the heading.
Section 3.0, Task 2	These are gridded samples. A brief description of the range in sizes of the grids might be helpful. It would also, perhaps, assuage some reviewer's concerns that we are collecting 'excessive' data.	Agreed. A table showing the area size, MARSSIM class, and the grid spacing for each sub unit will be included in the revision.
Section 3.0, Task 3	The text states that 29 samples will be collected. However, the referenced table describes only 11 samples.	Additional bullets will be added to correctly reference 44 surface locations in Table 3, 15 subsurface locations in Table 4, and ??? groundwater locations in Table ???
Section 3.0, Task 4	The text states that 27 samples will be collected. However, Table 2 shows only 17 samples will be collected from uninvestigated areas. Also, it would be helpful to add a column to the tables showing the corresponding task number for each sample. Apparently, not all samples are sampled for all matrices. The number of surface soil, subsurface soil and groundwater samples should be included in the text. Will the groundwater samples be collected with permanent wells or with temporary well points?	Additional bullets will be added to correctly reference 44 surface locations in Table 3, 15 subsurface locations in Table 4, and ??? groundwater locations in Table ??? Agreed. The task numbers would be helpful to the reader, but this suggestion will not be incorporated. This is due to the use of the tables in the field. The additional column (if added) would not include any information that was useful to the sampling and may confuse the workers. Additionally this issue will not be implemented for consistency with the Phase I FSP. The groundwater samples (accidentally omitted from the tables and plan) will be collected from temporary wellpoints.
Section 3.0, Task 5	I assume that the wells will be permanent wells. Since we have in the past only installed temporary well points, the fact that these wells will be permanent should be explicitly stated in the text.	Agreed. The text will be revised to reflect the suggestion.
Section 3.0, Task 6	Will a well be installed which is deeper than 25' bgl or will wells have a maximum depth of 25'?	This is a reference to Task 5. Wells will not be installed below 25 feet as stated in the Appendix C.

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Section 3.0, Task 7	Table 7 describes 28 surface soil samples and the text says 20 surface soil samples will be collected. Which is correct? Last sentence of section: back to my private beef. Did we even ask SAIC what their opinion was concerning background samples for sediment and surface water? Even if we did, they concurred with our position. They did not recommend anything.	The table is correct. The text will be changed to reflect this. - They had the plan and they haven't commented on it yet. But I am sure the will ask us to remove it.
Section 3.0, Task 8	The text states that the justification for these samples is shown in Table 1. I cannot determine which samples this section is referring to in Table 1. Same for Table 2.	Rows will be added to Tables 1 and 2 to help the reader distinguish which samples are for the individual tasks.
Section 3.0, Task 9	I don't understand the phrase 'extent of contamination sampling' and I can find no reference to it in appendix B.	Delineation of areas with elevated gamma readings or the bounding of areas with samples of known contamination will be substituted for this phrase. The reference (although with not the exact wording) is in Request 6 in Appendix B.
Section 3.0, Task 10, bulleted paragraph	Will a sample from each layer be submitted to the laboratory? If yes, this fact should be stated. Also, what is 'large diameter'? We should specify a minimum core size. We probably wouldn't want to attempt a core any smaller than 3 or 4 inches and we probably wouldn't want to collect a core any bigger.	A sample from the layer with the highest elevated activity will be analyzed. The text will be revised to reflect this. The core diameter will be a minimum of 6 inches (to allow for the amount of sample necessary) with a maximum or 10 inches. This does depend on the type of coring machine used.
Section 3.0, Task 10, first full paragraph	Replace the word 'indicated' with 'measured'.	Agreed. The word will be changed.
Section 3.0, Task 11	Replace the phrase 'in as depicted on the location map' with 'collected at the locations shown on Figure 27.' Who is responsible for the collection and analysis of the 'background' ballast material at the LOOW?	Agreed. The text will be changed. It is my understanding that this has already been done by the USACE or others and it is
Appendix C	The first paragraph states that the wells will be installed to a maximum depth of approximately 25' bgl. What if a functional well cannot be installed at a particular location at that depth? Do we move the well?	This is a good point but will potentially only affect 4 of the planned 15 wells (the others are being placed very near to the original wells that had water above 25 feet. My thought is that we will not move the other planned wells if we do not find water above 25 feet.

Reviewer: David E. Germeroth, P.E.		
Specific Comments		
Section	**Comment**	**Response**
Appendix C, Section 3	To avoid frost heave problems, the protective top should be installed to a depth below the frost line and the concrete pad should not be in contact with the protective top. The protective posts probably should not be set into the pad either.	Agreed. The Appendix will be revised to add these concerns.

Jim Richards

From: Tom Lachajczyk
~nt: Friday, August 04, 2000 4:58 PM
Jim Richards
Subject: FW: Reviewer: David E

---——Original Message--—-
From: Dave Germeroth
Sent: Friday, August 04, 2000 5:49 PM
To: Tom Lachajozyk
subject: RE: Reviewer: David E

The responses adequately address my comments.

DEG

-----Original Message——
From: Tom Lachajczyk
Sent: Friday, August 04, 2000 4:06 PM
To: Dave Germeroth
Cc: Jim Richards
Subject: Reviewer: David E

«File: DEG comments_.doc» Please review responses to comments and if acceptable indicate concurrence.

TL

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
ENGINEERING AND ENVIRONMENTAL MANAGEMENT GROUP

DOCUMENT REVIEW RECORD

DOCUMENT PREPARER: MAXIM
DOCUMENT TITLE: Field Sampling Plan Addendum, Phase II Edition, Remedial Investigation at the Niagara Falls Storage Site, Niagara County, New York
DOCUMENT NUMBER:
REVISION: Draft
DATE TRANSMITTED: 6/23 DATE COMMENTS REQUIRED: 6/30
REVIEW TYPE

[X] Technical [X] editorial [ ] peer [ ] Design Verification

Comments that are annotated with an * are mandatory and require a response and resolution

Page or sect/Para	Reviewer Comments	Preparer Response	Reviewer accept/reject
Section 2.0	The areas called out in this paragraph should be included on a map.	These areas were explained in detail in the Phase I FSP and were shown on Figure 1.4.3-1 of that document. In order to provide new content, instead of reiterating the old, the reference will be made and no figure will be added.	
S. 2.2 1st bullet	Locations of these should be on a map and the map should be referenced here.	These sample locations are on Figure 27. However, this document represents the trends/indications that were found in Phase I and does not provide definite conclusions (other than the need to surround locations with concentrations higher than the screening values). This suggestion will be included as part of the RI report.	
S 2.2 last Paragraph	"USCS classification of Clay with"	Agreed. The typographical error will be corrected.	
S 2.3	The tables called out here are not in order. (1,2,9,10,8) They should appear in order as called out in the text.	This will be corrected in the revision. Additionally, some tables will be divided to address single issues instead of multiple ones.	
S 2.4.1	Why only Ingestion Pathway. Why not a complete pathway with background subtracted.	Background data currently does not exist for the NFSS. It is planned to be collected during Phase II. After the collection of background data, the suggested pathway may be examined in addition to the ingestion only pathway.	
S 2.4.1.1	How do I tell which are the Class 2 and 3 units. IT is not obvious from the figure (27)	A table showing the MARSSIM unit name, class designation, approximate spacing, and the number of samples to be collected will be added to the revision.	

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ENGINEERING AND ENVIRONMENTAL MANAGEMENT GROUP

Page or sect/Para	Reviewer Comments	Preparer Response	Reviewer accept/reject
S 2.4.2 page 11 5th Paragraph	"four temporary walloping samples"??	Agreed. The typographical error will be corrected the word will be changed to wellpoint.	
S 3.0 #1	Why 20,000 cps.? I haven't seen any justification for this number. It may actually be correct but I need to know why.	The number (20,000 cps) was developed to be approximately 2 times background. Background was estimated from the walkover surveys for the borings and sediment locations.	
S 3.0 #11	1. Did any one think to look at the rock-type of the ballast. Granitic rock would be naturally expected to have elevated readings. 2. Second line of bullet ') in as depicted'?	1. Some of the ballast that was observed during the Phase I activities appeared to be granitic in nature. It is agreed that this may have naturally occurring radioactivity. During the May 3-4, 2000 TPP meeting, it was stated that all contamination from the NFSS was to be dealt with during the project, including the ballast. It was also suggested that the USACE already had some samples of this material from offsite properties and would compare the results from the Phase II to those. 2. The typographical error will be corrected.	
Table 1	It would be very useful if one column contained the number of the reason for the samples from section 3.	Table 1 is being revised to separate out the samples with a header row. Hopefully this will reduce the confusion. The suggestion of the extra column is noted but will not be implemented for this revision.	
Appendix A. Page 4.	My copy only had a partial page.	This will be corrected in the revision.	

Reviewed By: Response By:

Jim Richards

From: Tom Lachajczyk
'it: Monday, August 07, 2000 8:13 AM
Jim Richards
~ubject: FW: Response from Bob Tucker

——Original Message—
From: Giordano, Michael D. £SMTP:MIcHAEL.D.GIORDANO@saic.com]
Sent: Monday, August 07, 2000 8:23 AM
To: Tom Lachajczyk (E-mail)
cc: Max Gricevich (E-mail)
Subject: Response from Bob Tucker

Tom (please forward to Jim Richards - I don't have his email),

Here is the one comment from Bob. He concurs with all responses to his comments EXCEPT the one he mentions. Maybe a phone discussion between him and Jim would be beneficial??? Let me know if you think that would work. Jim can call him in the Columbus office today 614/793-7600.

Michael D. Giordano, PE & CHMM
SAIC Sr. Project Manager & Asst. VP
4900 Blazer Pkwy.
Dublin, Ohio 43017
Office 614/791-3345
Fax 614/793-7620
Mobile 513/659-1900

Original Message
From: Tucker, Robert W.
nt: Monday, Au~ust 07, 2000 8:15 AM
Giordano, Michael D.
Subject:RE: DOCUMENT REVIEW RECORD

Mike:

With one exception I concur. That exception is the comment on pathways (S 2.4.1). I accept that they will consider additional pathways after they have background. However their further explanation that "Additionally, other pathways have low (approximately 10-2) risk based screening levels that are indistinguishable from background." does not jive with their previous statement. In addition 10-2 is not a low risk but is —100 times the acceptable upper risk range defined by EPA (10-6 - *10-4).* I have been told that background is frequently in the upper end of the risk range but that is still 100 times lower than 10-2 - I hope that this is simply poorly expressed and not a fundamental miss-understanding of risk and pathways.

Bob

..........Original Message
From: Giordano, Michael D.
Sent: Sunday, August 06, 2000 9:42 PM
To: Tucker, Robert W.
Subject: FW: DOCUMENT REVIEW RECORD

Jim Richards

Bob Take a look to be sure you concur.

Thanks,

Michael 0. Giordano, PE & CHMM
SAIC Sr. Project Manager & Asst. VP
4900 Blazer P kwy.
Dublin, Ohio 43017
Office 614/791-3345

Jim Richards

Fax 614/793-7620 Mobile 513/659-1900

...Original Message---—
From: Tom Lachajczyk
[SMTP:tlachalc@maximusa.com]
‘lto: [SMTP:tlachaic@maximusa.coml>
<mailto:[SMTP:tlachaic@maximusa.com]
~aill~[SMTP:tlachaic@maximusa.com]>>
Sent: Friday, August 04, 2000 6:03 PM
To: ‘giordanom@saic.com’
Cc: Jim Richards
Subject: DOCUMENT REVIEW RECORD

.c<SAIC commentsl_.doc»
The attached comments and responses are being sent to SAIC for their review. Please forward and coordinate the review of the responses with Dr. Tucker. If appropriate, please indicate concurrence.

Thanks Tom Lachajczyk “File: SAIC commentsl_.doc»