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ADDENDUM TO THE FEASIBILITY STUDY

FOR THE SEAWAY SITE

TONAWANDA, NEW YORK

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EXECUTIVE SUMMARY

This executive summary provides an overview of the Addendum to the Feasibility Study (FS) report for the Seaway Formerly Utilized Sites Remedial Action Program (FUSRAP) site in Tonawanda, New York. The Addendum to the FS report was prepared by the U.S. Army Corps of Engineers (USACE) to serve as a principal source of information for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) decision-making for potential remedial actions to address FUSRAP contamination at the Seaway Site. The report is referred to as an addendum to the FS, because the US Department of Energy (DOE) prepared an FS in 1993 for the Tonawanda Site, which was defined at that time to include the Seaway Site, the Linde Site, the Ashland 1 Site, and the Ashland 2 Site in the Town of Tonawanda, New York. The Addendum to the FS report for Seaway describes earlier investigations by DOE and others and the more recent investigations at Seaway by USACE in 1998 and 2001. Contaminants of Concern (COCs), remedial action objectives (RAOs) and applicable or relevant and appropriate requirements (ARARs) for potential remedial actions at Seaway are identified. Remedial alternatives being considered for Seaway are identified and described. A comparative evaluation of the potential remedial options for Seaway in terms of CERCLA evaluation criteria is also presented. The above mentioned documents, as well as supporting documentation, may be found in the administrative record files for the Tonawanda Site or the Seaway Site at the USACE Public Information Center, 1776 Niagara Street, Buffalo, NY 14207 or the Tonawanda Public Library, 333 Main Street, Tonawanda, NY 14150.

BACKGROUND

Uranium ore processing was conducted at the Linde Site in Tonawanda under a Manhattan Engineer District (MED)/Atomic Energy Commission (AEC) contract in the 1940’s. During the uranium ore processing, portions of the property and buildings became contaminated with elevated levels of radionuclides (e.g., uranium, radium, and thorium). Subsequent disposal and relocation of process wastes from Linde resulted in radionuclide contamination at the Ashland 1, Ashland 2 and Seaway Sites in Tonawanda. At Seaway, the radionuclides are mixed with soil and solid waste.

DOE, under its FUSRAP authority at that time, initiated investigations at Linde and the other FUSRAP Sites in Tonawanda: Ashland 1, Ashland 2 and Seaway. A Remedial Investigation (RI) report, Baseline Risk Assessment (BRA), FS report and Proposed Plan (PP) were issued by DOE in 1993, addressing the Tonawanda FUSRAP sites. Following public review, DOE suspended decision-making on the Tonawanda Site to re-evaluate potential remedial alternatives. In October 1997, responsibility for identifying and implementing remedial actions at FUSRAP sites was transferred to USACE. In April 1998, a CERCLA Record of Decision (ROD) addressing remediation of Ashland 1, Ashland 2 and Area D of the Seaway Site was signed by USACE. In March 2000, a CERCLA ROD was issued by USACE for Linde Site soils and buildings, excluding Linde Building 14 and Linde groundwater. A ROD for Linde Building 14 was issued by USACE in April 2003. USACE remedial actions in accordance with these RODs are either completed or are underway. A "no action ROD" for the Linde Site Groundwater was signed on January 29, 2007. As described above, the Addendum to the FS report for Seaway will serve as a principal source for USACE decision-making on Seaway Site remediation.

SITE OVERVIEW

The Seaway Site property comprises about 100 acres referred to as the Seaway Industrial Park. It is owned by the Sands Mobile Park Corporation, successor by merger to the Seaway Industrial Park Development Company, Inc. and since the late 1980s was operated as a landfill by BFI through its subsidiary, Niagara Landfill, Inc. Approximately 89 acres of the Seaway property have been used for landfilling. Wastes were accepted at the Niagara Landfill beginning in 1930. A review of the list of waste disposed of up through 1979 indicates that hazardous substances were placed in the landfill that could fail the hazardous waste characteristics tests. The New York State Department of Environmental Conservation (NYSDEC) has classified the Niagara Landfill as an inactive hazardous waste disposal site and has reported that confirmed hazardous waste disposal at the site includes unknown quantities of printing ink and solvents.

The subsurface at the Seaway Site includes two confining clay strata varying in thickness from 45 to 75 feet (ft). The permeabilities of these clay materials is 1.6×10^{-8} centimeters per second (cm/s). For comparison, clay specified for liners in landfills must have a permeability (hydraulic conductivity) not exceeding 1×10^{-7} cm/s. Thus, these natural clays show hydraulic conductivities less than those required for landfill liners (i.e., are less permeable than clay landfill liners).

The Seaway property encompasses two zoning categories, Waterfront Commercial District (W-2) and Waterfront Industrial District (WID). The portion zoned W-2 is an approximately 1,000-ft-wide strip of land that fronts River Road. The rest of the Seaway property, including most of the landfill, situated south to southeast of the W-2 strip, is zoned WID. Reduction of the 1,000-ft-wide strip to 500 ft has been proposed.

LANDFILL CONDITIONS

A clay cutoff wall and leachate collection system were constructed at the landfill in 1983. The cutoff wall was located inside the property line at a distance of 55 feet. The design approved by NYSDEC required that the cutoff wall have a permeability of 1×10^{-7} cm/s or less over a width of 2 ft.

The leachate collection pipe system was also installed at the landfill in 1983. This system consists of 6-inch diameter perforated pipe installed inside the clay cutoff wall in a gravel/crushed stone trench surrounded by filter fabric. The perimeter leachate collection pipes drain to low spots in the system, on the east and west sides of the landfill. Leachate collected at these locations is pumped northerly to high points in the system, with flow continuing northerly by gravity to a metering manhole located on the northern portion of the landfill property. Flow from the metering manhole is conveyed to the Town of Tonawanda municipal wastewater collection system, which is served by a municipal wastewater treatment plant located nearby.

Landfill closure activities began in 1990 and the landfill ceased taking material in 1993. Low permeability perimeter berms were constructed around the landfill to contain leachate and provide slope stability. Berms, extending 10 feet above the ground surface, were constructed around most of the landfill perimeter at most locations. The landfill cap consists of 24 inches of low-permeability clay, covered by 6 inches of topsoil seeded with grassy vegetation. The cap was installed from June 1990 to December 1994. Total landfilled area prior to closure was about 89 acres. The total capped area is about 68 acres and about 60 acres in the southern portion of the landfill.

Installation of the gas collection system began in 1995. The gas collection system consists of 34 extraction wells located in the southern portion of the landfill. Pipelines run from the wells to a set of blowers. The blowers are designed to draw landfill gas to a flare, where combustible gases were burned. The flare system was authorized under NYSDEC Permit #9-0464-00184/00001. Active gas collection and use of the flare were discontinued in October 2000. Passive landfill gas vents are installed in the two capped areas in the northern portion of the landfill. These vents are not connected to the landfill gas collection system.

Landfill post-closure O&M is specified in Part 360, Title 6, of the Official Compilation of Codes, Rules and Regulations of the State of New York. The post-closure period is defined as a minimum of 30 years, or as long as leachate is capable of adversely impacting the environment.

An Environmental Monitoring Plan (EMP) was prepared for the Niagara Landfill by Recra Environmental, Inc., and approved by NYSDEC in 1990. The EMP was implemented to “detect changes in groundwater and surface water quality that may potentially occur as a result of operations at the facility”. Annual baseline, and quarterly routine, monitoring of 17 groundwater wells, 6 surface water stations, and leachate generated by the landfill is specified in the EMP.

SITE CONTAMINATION

As detailed in the 1993 RI and FS report, waste residues produced during uranium processing at Linde from 1944 to 1946 were deposited at the Haist property, now referred to as Ashland 1. Records indicate that approximately 8,000 tons of these residues, principally low-grade uranium ore tailings, were spread over two-thirds of the Ashland 1 property. During construction by Ashland Oil of a bermed area for two petroleum tanks and a drainage ditch on the Ashland 1 property in 1974, radioactively contaminated residues from Ashland 1 were transported to Seaway and Ashland 2 for disposal. Disposal at Seaway was in four (4) areas referred to as Areas A, B, C and D. This construction activity was not conducted by Ashland Oil on behalf of the federal government.

The 1993 RI report indicates that approximately 6,000 cubic yards (cy) of low grade uranium ore tailings from Ashland 1 were disposed of on Seaway Areas A, B and C in 1974. Since 1974, portions of the residues (in Areas B and C and part of Area A) have been buried under refuse and fill material. In September 1978, NYSDEC requested BFI to not “disturb any of the radioactive earth located on your landfill property until the U.S. Department of Energy’s decommissioning plans are implemented…” Area D contamination was reported to result from inadvertent spreading of contamination from soil-moving operations at Ashland 1, construction of a bentonite wall around Seaway, and shaping of a drainage ditch in the area. None of these activities were conducted by or for the federal government.

Seaway was characterized for the presence of radioactive contamination several times prior to the remedial investigations conducted at the Site in 1988-1991. From these initial surveys in 1976, 1981 and 1986, it was reported that active operation of the landfill altered the physical conditions of the property and that the locations of radioactive contamination varied from time to time. Based on comparisons of topographic maps of the landfill in 1976 and 1986, it was estimated that Areas B and C had been covered with up to 40 ft of fill material and refuse and that approximately 40 percent of Area A had been covered with a similar, but thinner layer of material (0 to 10 ft thick).

First-phase and second phase remedial investigations at Seaway were conducted from January 1988 through April 1988, October 1988 through March 1989, and from November 1990 through May 1991. Because landfill material covered Areas B and C to a depth up to 40 feet, soil samples for those areas could not be collected.

Area A is approximately 9 acres in size and Areas B and C together comprise approximately 3 acres based on the information available for the 1993 RI report.

USACE conducted additional investigations in Seaway Areas B and C in 1998. Gamma walkover surveys conducted in the spring and in December, 1998 revealed only background surface radioactivity in most of Areas B and C. However, two isolated locations surveyed in Area C, and one location in Area B, showed evidence of elevated radioactivity at the surface.

In December 1998, soil samples were collected at and in the vicinity of the locations in Areas B and C where elevated gamma radiation was detected during the gamma walkover surveys. The purpose of the investigation was to determine whether MED/AEC-related radiological contamination was present at locations showing elevated gamma radiation. In addition, random soil samples were collected at six locations in Areas B and C. A total of 18 Geoprobe soil borings were completed, 71 soil samples and one rock sample were collected and 44 samples were analyzed for the presence of uranium-234 (U-234), U-235, U-238, thorium-230 (Th-230), Th-232, radium-226 (Ra-226), protactinium-231 (Pa-231), and actinium-227 (Ac-227).

No elevated radiological contamination was detected in the samples from random locations in Areas B and C. At the location in Area B where elevated gamma radiation was detected during the gamma walkover survey, the elevated gamma radiation is attributed to a rock, 4 to 6 inches below the ground surface. A sample of this rock showed elevated concentrations of Th-230 and other radionuclides. The rock appeared to naturally contain these radionuclides and was not technologically enhanced or MED/AEC-related residue, and, therefore, is not considered to be a contaminant that should be addressed by this CERCLA action. In Area C, elevated levels of radionuclides were detected in biased soil samples 2 to 4 feet below the ground surface at one of the locations showing elevated gamma radiation during the walkover survey.

After completion of the characterization efforts in 1998, USACE, along with stakeholders, evaluated the results to determine if there were any other uncertainties that may impact the development and evaluation of potential remedial alternatives. The greatest uncertainty identified was whether the MED/AEC-related material remained as small isolated piles as described by Oak Ridge National Laboratory (ORNL) during their site investigation in 1976 or was the material spread throughout the landfill. Also, USACE decided to obtain additional information from Areas A, B and C regarding the nature of the material and whether the MED/AEC-related material was co-mingled with hazardous waste. USACE conducted subsurface investigations in Areas A, B and C during the summer of 2001. This investigation involved drilling and placing borehole casings, performing down-hole gamma logging, conducting on-site gamma spectroscopy on selected samples from the borings, and shipping some samples off-site for radiological and chemical analyses.

There were 45 boreholes completed and logged, with borehole depths ranging from 10 feet to approximately 80 feet deep. There were 10 boreholes in Area A, 10 boreholes in Area B, and 25 boreholes in Area C. The down-hole gamma logging indicated that there is in fact a lens of radiological material in Areas B and C that ranged in thickness from 1 foot to approximately 8 feet. The logging results also indicated that the lens extends from Area C over to Area B and that the radiological materials were not in small isolated piles. Based on the down-hole gamma logging results, the areal extent of contamination for Areas B and C is actually one large area as shown in Figure 2-3 in the Addendum to the FS, and in a few areas, the contamination is projected to extend under closed portions of the landfill. The major areas of contamination are located at an elevation of approximately 630 ft above mean sea level (msl) which is approximately thirty (30) ft above the bottom of the landfill and the leachate collection system. The in-situ volume of material was estimated using the tabulated cross-sections for each of the areas of contamination and the associated incremental thickness. Based on the results, the in-situ volume of MED/AEC-related residues in Areas B and C, combined, is approximately 23,000 yd^3. The original in-situ volume estimate for Areas B and C combined was 15,400 yd^3. This revised volume estimate is used in evaluating remedial alternatives and associated costs.

The sampling to further characterize the nature of the MED/AEC-related material in Areas A, B and C found that there were no hazardous substances present that would result in any excavated material having to be managed as both radiological and hazardous waste. Radiological analyses were also conducted on the leachate from aggressive acid leaching by the laboratory to assess the potential leachability of the

MED/AEC-related materials. These results were used in RESidual RADioactivity (RESRAD) modeling to estimate what impact, if any, the MED/AEC-related materials located approximately 30 ft above the leachate collection system would have on the leachate collection system. The modeling results indicate that the MED/AEC-related residues at Seaway have an insignificant impact on leachate collection system radionuclide concentrations at Seaway.

SEAWAY SOUTHSIDE CONTAMINATION

During the Ashland 1 Site and Seaway Area D remediation efforts covered by the April 1998 ROD for the Ashland 1 (including Seaway Area D) and Ashland 2 Sites, MED/AEC-related soil contamination was found to extend onto the Seaway property and under the closed portion of the landfill. The contamination was found in the vicinity of Area D, particularly at the north-west end of the Area D excavations and found to extend beyond the Seaway property line just east of an area northwest of Area D. During the Ashland 1 remediation efforts, USACE conducted further investigations of these two areas, Seaway Area D Adjacent Property (property adjacent to Area D in the northwest direction) and Northwest of Seaway Area D Adjacent Property, which are collectively referred to as Seaway Southside, to determine, to the maximum extent possible, the extent of the remaining MED/AEC-related soil contamination that may extend into the closed portion of the landfill. An evaluation of the results of those investigations is included in Appendix A of this Addendum.

The maximum Th-230, U-238 and Ra-226 concentrations found in the Seaway Area D Adjacent Property lens were 152.24 pCi/g, 13.44 pCi/g, and 2.25 pCi/g, respectively, during remediation of the area under the April 1998 ROD for the Ashland 1 (including Seaway Area D) and Ashland 2 Sites. Also, based on the results of the investigations in this area under that ROD, the material exceeding the April 1998 ROD 40 pCi/g Th-230 cleanup criteria for this area does not appear to extend further towards the land fill perpendicularly by more than 1 to 2 ft or towards the north end of the land fill by more than 7 ft. Using the distances between the clean samples and the elevated readings of the lens area (~28 ft) and assuming an average thickness of 8 inches, the remaining radiological materials in this area are estimated to be less than 3 yd^3. The approximate location of this small area is shown in Figure 2-3 in the text.

The radiological concentrations found in the lens northwest of the Seaway Area D Adjacent Property area were much higher than the concentrations found in the Seaway Area D Adjacent Property lens. They were also much higher than the concentrations found in Seaway Areas A, B and C and evaluated to assess the radiological doses and risks for various scenarios, particularly the Th-230 concentrations. There were twelve samples taken from the face of the lens in this area. The Th-230 concentrations ranged from 10.5 pCi/g to 1,761 pCi/g. Using the results from the twelve samples only, the UCL_{95} values for Th-230, U-238 and Ra-226 were 1,050 pCi/g, 112 pCi/g, and 8.09 pCi/g, respectively.

As discussed in Appendix A, historical photographs of this area before and during construction of the Ashland 1 tanks were used with the available data to estimate the possible areal extent of the MED/AEC-related contamination. The estimation of the extent of contamination using the historical photographs was done by comparing the locations of the elevated radiological results to visual features on the photograph. A correlation was found between elevated results and areas on the photograph where there appears to be little or no vegetation and where there appears to be material spread out over an area due to manually spreading or due to erosion. This same type of correlation was found during the Seaway Areas A, B and C investigations conducted by USACE in 2001. Based on those assessments, the areal extent of contamination is estimated to be approximately 19,800 sq. ft., which amounts to approximately 733 yd^3 of material assuming an average thickness of 12 inches. This areal extent of contamination is shown in Figure 2-3 where approximately 47% (~9,230 sq. ft.) of the material is located within the area covered by the leachate collection system while 53% (~10,570 sq. ft.) is located outside the leachate collection system. Also, the assumed lens of material is projected out approximately 100 ft from the slurry wall into the landfill area. Excavation of this material would impact the closed portion of the landfill and would have to be factored into the costs associated with any removal remedial alternatives.

SEAWAY NORTHSIDE CONTAMINATION

During remediation of the Ashland 2 area, contaminated materials were found up to the Seaway property line. All of the material was remediated up to within 7 ft of the Seaway property as discussed in the report contained in Appendix B. The remaining contaminated material appeared to be the result of surface runoff from Seaway Area A into the drainage system leading into Rattlesnake Creek. Therefore, the remediation of this material is being included as part of the Seaway remedial action and is shown as Seaway Northside in Figure 2-3 in the text. A sample of the material, as reported in Appendix B, showed Ra-226 and Th-230 concentrations of 14 and 396 pCi/g, respectively. These concentrations are greater than the UCL_{95} concentrations used in assessing the risks for Area A assuming no action, as discussed in Section 2.2.7 in the text. Based on the limited data, for volume estimating purposes, the material to be excavated was assumed to be an 8 ft wide by 72 ft long section on the Ashland 2 property and from the property line to the Seaway landfill clay containment cutoff wall.

CONTAMINANTS OF CONCERN AT SEAWAY

The results of soil sampling conducted for the remedial investigation in Area A show Th- 230 to be the principal radioactive contaminant in Area A. In addition to Th-230, elevated concentrations of Ra-226, total uranium (U_{total}), Pa-231 and Ac-227 have also been reported in Areas A, B and C. These five MED/AEC-related constituents are considered to be contaminants of concern at Seaway, as presented in Appendix C. USACE lacks authority under FUSRAP to address contaminants not associated with the Nation's early atomic energy program administered under MED/AEC and therefore will not remediate any radioactive or chemical contamination that is not MED/AEC-related or is not mixed or commingled with MED/AEC-related contamination.

The MED/AEC-related materials located in Seaway Southside and Seaway Northside are the same type residues found in Seaway since the residues were originally moved from the Ashland 1 area to Seaway. The contaminants of concern identified for Areas A, B and C are the same for Seaway Southside and Seaway Northside.

REMEDIAL ACTION OBJECTIVES FOR THE SEAWAY SITE

RAOs are used in CERCLA documents to provide a general description of what the remedial action at a site will accomplish. For the Seaway Site, the RAOs are:

- ensure protection of human health and the environment from exposure at unacceptable levels to MED/AEC-related radiological contaminants of concern that are eligible for FUSRAP remediation;
- ensure that the remedial action complies with the selected ARARs;
- prevent or mitigate the release of MED/AEC-related COCs to adjacent areas and surface water by surface runoff; and, reduce risks to human health associated with direct external exposure to, direct contact with, and inhalation and incidental ingestion of MED/AEC-related radiological contaminants in the surface and subsurface soils at the site.

As further described in the following section of this executive summary, a review of potential ARARs for the Seaway Site indicates that there are ARARs available that are considered protective of human health and the environment. The cleanup ARARs specify the residual contamination levels to which soil must be remediated to ensure that RAOs are met if removal of the MED/AEC-related material from the Site is conducted. ARARs are also available for remedial options that involve leaving some of the MED/AEC-related material at that site. For these options, which involve capping the MED/AEC-related material, the RAOs include ensuring that the MED/AEC-related material is isolated from the public and the environment for a period of up to 1,000 years, and:

1. Any proposed cap over Areas A, B and C must be maintained.

2. The existing cap over the remaining portions of the Seaway Site must be maintained to preclude overloading the leachate collection system.

3. The existing leachate collection system must be maintained in an operational condition..

4. Safety controls must be implemented to preclude contact with the MED/AEC-related contaminated material.

ARARs and remedial action alternative are further described in the following sections of this summary.

ARARs FOR SEAWAY

The 40 CFR Part 192 standards that are applicable to the cleanup of specific sites designated under the Uranium Mill Tailings Radiation Control Act (UMTRCA) are considered relevant and appropriate to the cleanup of the Seaway Site.

Subpart A of 40 CFR Part 192 establishes standards for control of residual radioactive materials at UMTRCA Sites and requires that designs for control must:

- be effective for up to one thousand years, to the extent reasonably achievable, and, in any case, for at least 200 years, and

- provide reasonable assurance that releases of radon-222 (Rn-222) from residual radioactive material to the atmosphere will not exceed an average release rate of 20 picocuries per square meter per second (pCi/m^2/s), or increase the annual average concentration of Rn-222 in air at or above any location outside the disposal area by more than one-half pCi/l.

Subpart B of 40 CFR Part 192 addresses cleanup of land contaminated with residual radioactive material from inactive uranium processing sites, and sets standards for residual concentrations of Ra-226 in soil. It requires that radium concentrations shall not exceed background by more than 5 pCi/g in the top 15 cm of soil or 15 pCi/g in any 15 cm layer below the top layer, averaged over an area of 100 m^2. These Subpart B requirements are considered relevant and appropriate to the cleanup of the Seaway Site.

10 CFR Part 40, Appendix A, is the U.S. Nuclear Regulatory Commission (NRC) regulation that establishes technical, financial, ownership and long-term site surveillance criteria relating to the siting, operation, decontamination, decommissioning and reclamation of licensed uranium and thorium mills and tailings. The regulation contains some substantive criteria pertaining to the hazardous substances or the circumstances of their release at the Seaway site. However, it only applies to NRC licensed sites. Seaway is not an NRC licensed site. Therefore, the regulation is not applicable.

USACE has determined that parts of 10 CFR Part 40, Appendix A, specifically the substantive requirements of Criterion 6(6), are relevant and appropriate to the cleanup at the Seaway site. The determination was based on the similarity of the uranium processing at Linde and the resulting radionuclides found in the waste transported to Ashland 1 and subsequently relocated, in part, to Seaway Areas A, B, C as well as those found on the south side of the site. In addition, the requirements are well suited to the site because the purpose of that criterion is to manage residual radioactive materials at the end of a milling operation at sites similar in nature to the Seaway Site.

10 CFR Part 40, Appendix A, Criterion 6(1) establishes performance criteria for covers to be placed over tailings or wastes at the end of milling operations. The performance standards for covers required by Criterion 6(1) are the same as those found in 40 CFR Part 192, Subpart A.

10 CFR Part 40, Appendix A, Criterion 6(6) requires that residual radioactive materials remaining after remediation will not result in a total effective dose equivalent (TEDE), considering all radionuclides present (e.g., radium, thorium, and uranium) to the average member of the critical group exceeding a benchmark dose established based on cleanup to the radium standards of 5 pCi/g in the top 15 centimeters and 15 pCi/g in subsequent 15 centimeter layers below the top layer and must be as low as reasonably achievable (ALARA). This benchmark dose is then used to establish allowable soil and surface concentration levels for the various radionuclides present other than radium. The concentration limits for each of those radionuclides is based on maintaining the benchmark dose for that radionuclide. The criterion states if more than one residual radionuclide is present in the same 100-m^2 area, the sum of the ratios (SOR) for each radionuclide of concentration present to the associated benchmark dose concentration limit will not exceed 1.0 (unity). Use of Criterion 6(6) increases the overall protectiveness of 40 CFR Part 192 by addressing other radiological contaminants and their associated dose that may be present at the site.

USACE computed surface soil benchmark doses for the group of individuals reasonably expected to receive the greatest exposure to Seaway Site contamination (i.e., the critical group). The critical group for the landfill is industrial receptors. Using the industrial scenario, USACE computed the benchmark doses to be 8.8 mrem/y (see USACE 2000c and Appendix C) while evaluating the external gamma, dust inhalation, and incidental soil ingestion pathways. The benchmark dose allowable concentration limits for each of the radionuclides for use in the SOR calculation are also documented in the technical memorandum addressing 10 CFR Part 40, Appendix A, Criterion 6(6) (USACE 2000c). For the key radionuclides, Ra-226, Th-230, and U_{total}, the associated concentration limits for the surface soil benchmark dose are 5 pCi/g, 15 pCi/g, and 110 pCi/g, respectively. (Note the U_{total} value of 110 pCi/g includes contributions from decay products Pa-231 and Ac-227, as described in Appendix C.) During remediation, the actual radionuclide concentrations within a 100- m^2 area will be divided by its corresponding concentration limit. These ratios are then added and must be equal to or less than1.0 (unity). If theSOR exceeds unity, additional soil removal is necessary. A subsurface soil benchmark dose of 4.1 mrem/y was also calculated for the industrial receptor. Associated concentration limits are 15 pCi/g, 44 pCi/g, and 1000 pCi/g for Ra-226, Th-230, and U_{total}, respectively. The SOR, 100-m^2 area limits, and decay product relationships between uranium, Pa-231, and Ac-227 also apply to the subsurface values.

The remaining parts of 10 CFR Part 40, Appendix A are not relevant and appropriate because they do not provide substantive criteria pertaining to the hazardous substances or circumstances of their release at the site. In addition, they do not address circumstances sufficiently similar to the Seaway Site.

REMEDIAL ACTION ALTERNATIVES

A total of 6 alternatives were considered in the 1993 DOE FS. USACE has reduced this number to 4. Two alternatives proposed in the DOE 1993 FS, Alternative 3 (Complete Excavation with Onsite Disposal) and Alternative 5 (Partial Excavation with Onsite Disposal), involved the placement of excavated soils from remediation of all of the Tonawanda Sites in an on-site engineered disposal cell to be located on Ashland 1, Ashland 2 or Seaway. These alternatives are no longer relevant since the other Tonawanda Sites have been or are in the process of being remediated under separate CERCLA actions and all excavated wastes are being shipped off-site for disposal. The descriptions of alternatives being considered by USACE are summarized below.

Alternative 1: No Action. The no-action alternative is required under CERCLA regulations to provide a baseline for comparison with other alternatives. Under this alternative, no action is taken to implement remedial activities. This alternative was evaluated in the 1993 FS, and is the baseline for comparison with other alternatives for the Seaway Site.

Alternative 2: Complete Excavation with Off-Site Disposal. This alternative was evaluated in the 1993 FS. Complete excavation of MED/AEC-related contaminated soils containing radionuclides above guidelines and off-site disposal would remove the source of elevated levels of radionuclides from the site. After removal, Areas A, B and C, Seaway Northside and Seaway Southside would be covered with a 1-foot layer of clean fill. Also, those areas of the closed portion of the landfill impacted by the removal activities would be restored to the original design configuration that existed prior to remediation.

Alternative 4: Partial Excavation with Off-Site Disposal. In the 1993 FS and PP, this alternative envisioned the removal and off-site disposal of MED/AEC-related contaminated soils from Area A exceeding DOE's cleanup guidelines and leaving MED/AEC-related contaminates in Area B and C in place. USACE has redefined Alternative 4 in light of new information on contamination in Areas B and C, Seaway Northside and Seaway Southside and the cleanup standards and guidelines now being proposed by USACE for Seaway cleanup. Alternative 4, as redefined, would involve removal and off-site disposal of all MED/AEC-related contaminated soils exceeding the cleanup levels from Area A and MED/AEC-related contaminated soils from Area C and areas located outside of the leachate collection system, such as areas within Seaway Southside and Seaway Northside, that are accessible and that exceed USACE's proposed cleanup levels. Accessible soils are defined as MED/AEC-related contaminated soils that are:

- Not located under 10 feet or more of non-MED/AEC-related contaminated refuse or other non MED/AEC-related contaminated landfill material, and removal of such soil would not impact the integrity of the closed portions of the landfill, or
- Soils located outside of the leachate collection system.

Following excavation and grading, as required, in Area C, Areas B and C would, where necessary, be capped by USACE with a landfill cover at least 4 ft thick. After placement of the cover in Areas B and C, the remaining MED/AEC-related contaminated soils would be located under 10 ft or more of cover and landfill material not containing MED/AEC-related contaminated soils. This type cover would not be necessary for Area A since that area would involve complete removal. The removal of MED/AEC-related contaminated soils located outside of the leachate collection system from Seaway Southside might involve minor impacts to portions of the closed cap. This might be necessary to remove any MED/AEC-related contaminated soils that exceed the cleanup criteria located at the slurry wall located under the toe of the closed cap. After removal of the materials from Seaway Southside, the impacted areas of the closed cap would be restored to the original design configuration that existed prior to remediation.

Alternative 6: Containment. This alternative was also evaluated in the 1993 FS. USACE has reviewed alternative 6 as defined in 1993 and has redefined alternative 6 to reflect updated information on contamination at the Seaway Site. Alternative 6, as redefined, would involve grading, as required, and USACE capping Areas A, B, and C with a landfill cover at least 4 to $5^1/_2$ ft thick. MED/AEC-related contaminated materials located outside of the landfill containment system (i.e., outside of the leachate collection system), such as within Seaway Southside and Northside, that exceed the cleanup criteria would be excavated and shipped off-site for disposal. Any impacts to the closed cap would be restored to the original design configuration that existed prior to remediation. Any MED/AEC-related contaminated materials that must be moved due to grading would be shipped off-site for disposal.

COMPARISON OF ALTERNATIVES

Table ES-1 summarizes a comparative analysis of the remedial alternatives for Seaway in terms of CERCLA threshold and balancing evaluation criteria.

BRUCE A. BERWICK
Brigadier General
Division Commander

29 April 2008
Date

Table ES-1 - Comparison of Remedial Action Alternatives

CERCLA Criterion	Alternative 1	Alternative 2	Alternative 4	Alternative 6
	No Action	**Complete Excavation with Off-Site Disposal**	**Partial Excavation with Off-Site Disposal**	**Containment**
Overall Protectiveness of Human Health and the Environment	Not protective of human health and the environment because no action would be taken to eliminate or control potential exposure pathways.	Protective of human health and the environment because residual radioactive material would be removed and isolated in an off-Site disposal facility.	Protective of human health and the environment, relying on land use controls to control potential exposure pathways in the future.	Protective of human health and the environment, relying on land use controls to control potential exposure pathways.
Compliance with ARARs	Not compliant with ARARs because MED/AEC-related wastes containing radionuclides above ARAR-based concentrations would be left in place and no land use controls would be established to control access to or releases of the residual radioactive material.	Compliant with ARARs because residual radioactive material would be removed to the concentrations required by the ARARs.	Compliant with ARARs because implementation of this alternative would be in accordance with the substantive standards and requirements of 40 CFR Part 192 and 10 CFR Part 40, Appendix A.	Compliant with ARARs because implementation of this alternative would be in accordance with the substantive standards and requirements of 40 CFR Part 192 and 10 CFR Part 40, Appendix A.
Long-Term Effectiveness and Permanence	Long-term effectiveness and permanence for this alternative is low because no action would be taken and risks, which are deemed unacceptable, would remain.	This alternative has a high degree of long-term effectiveness because all soils containing radionuclides above the ARAR requirements and guidelines would be removed from the Site and placed in a disposal facility that would be subject to long-term governmental land use controls related to a permanently closed waste disposal facility.	This alternative has the same high degree of long-term effectiveness and permanence as Alternative 2 since the residual materials would be isolated from the public and environment in the current disposal facility that will be subject to long-term governmental land use controls related to a permanently closed waste disposal facility.	This alternative has the same high degree of long-term effectiveness and permanence as Alternative 2 since the residual materials would be isolated from the public and environment in the current disposal facility that will be subject to long-term governmental land use controls related to a permanently closed waste disposal facility.

Table ES-1 – Comparison of Remedial Action Alternatives (continued)

CERCLA Criterion	Alternative 1 No Action	Alternative 2 Complete Excavation with Off-Site Disposal	Alternative 4 Partial Excavation with Off-Site Disposal	Alternative 6 Containment
Short-Term Effectiveness and Environmental Impacts	No increase in short-term risk.	This alternative is ranked low in short-term effectiveness because of increased risk to the community and remediation workers related to the need to remove significant quantities of refuse and cover material to gain access to the soils in Areas B and C and Seaway Southside. There is also an incremental risk associated with the transportation of the waste and the subsequent handling at the disposal facility.	This alternative is ranked relatively low in short-term effectiveness because significant quantities of material would be removed from the landfill which may include industrial waste and debris and these wastes may present a significant but unknown hazard to workers and the public. There is also an incremental risk associated with the transportation of the waste and the subsequent handling at the disposal facility.	This alternative is ranked relatively high in effectiveness because the amount of material to be disturbed is limited to grading and shaping of the landfilled area to facilitate capping and relatively minor quantities of material in areas such as Seaway Southside. Hazards to workers and community are limited because major excavation of materials which may include industrial waste and debris is limited.
Reduction in Toxicity, Mobility, or Volume Through Treatment	This alternative provides no reduction in toxicity, mobility or volume of site contaminants through treatment.	This alternative does not provide reduction in toxicity, mobility or volume of site contaminants through treatment at the Site but would include containment at the final disposal location.	This alternative does not provide reduction in toxicity, mobility or volume of site contaminants through treatment at the Site. It would include containment of the materials removed from the Site at the final disposal location.	This alternative does not provide reduction in toxicity, mobility or volume of site contaminants through treatment at the Site. It would include containment of the materials removed from the Site at the final disposal location.
Implementability	This alternative is easily implementable because no action is taken.	This alternative would involve a high degree of difficulty due to the need to remove a large volume of refuse currently covering the B and C areas, while ensuring the integrity of the existing covered and capped landfill. These actions, although implementable, are	This alternative would be moderately difficult since substantial quantities of material would be excavated and removed from the Site, but excavation would be limited to relatively shallow depths. During the removal of contaminated material from the Site, the integrity of the	This alternative would be relatively easy to implement from an engineering and design and administrative standpoint. During removal of contaminated materials from the site, the integrity of the existing covered and

Table ES-1 – Comparison of Remedial Action Alternatives (continued)

CERCLA Criterion	Alternative 1 No Action	Alternative 2 Complete Excavation with Off-Site Disposal	Alternative 4 Partial Excavation with Off-Site Disposal	Alternative 6 Containment
		technically difficult from an engineering perspective. Additionally, implementing this alternative is potentially difficult due to the need to stockpile a significant volume of refuse removed to gain access to the MED/AEC-related contaminated materials.	existing covered and capped landfill would need to be ensured or restored. Ensuring that land use controls are in place to protect the integrity of the cap to be constructed under this alternative, is considered feasible since land use controls are currently in place at the Site under New York State solid and hazardous waste regulations; USACE has concluded that no additional land use controls are necessary; USACE will prepare a Land Use Control Plan that, at a minimum, documents (1) which controls are necessary for protectiveness and why, (2) under what conditions would changes to the land use controls be warranted, (3) which federal, state, or local entities are responsible for maintaining the controls during given time frames, (4) frequency of reviewing current conditions to assess whether changes to either the land use controls or to the Land Use Control Plan are necessary for ensuring continued protectiveness, and (5) the necessary data needs for assisting in reviews of the continued adequacy of controls and of continued protectiveness; and the federal government will be responsible for maintaining the Land Use Control Plan.	capped landfill would need to be ensured or restored. Ensuring that land use controls are in place to protect the integrity of the cap to be constructed under this alternative is considered feasible since land use controls are currently in place at the Site under New York State solid and hazardous waste regulations; USACE has concluded that no additional land use controls are necessary; USACE will prepare a Land Use Control Plan that, at a minimum, documents (1) which controls are necessary for protectiveness and why, (2) under what conditions would changes to the land use controls be warranted, (3) which federal, state, or local entities are responsible for maintaining the controls during given time frames, (4) frequency of reviewing current conditions to assess whether changes to either the land use controls or to the Land Use Control Plan are necessary for ensuring

Table ES-1 – Comparison of Remedial Action Alternatives (continued)

CERCLA Criterion	Alternative 1 No Action	Alternative 2 Complete Excavation with Off-Site Disposal	Alternative 4 Partial Excavation with Off-Site Disposal	Alternative 6 Containment
				continued protectiveness, and (5) the necessary data needs for assisting in reviews of the continued adequacy of controls and of continued protectiveness; and the federal government will be responsible for maintaining the Land Use Control Plan.
Present Value Cost ($)	**$0**	**$113,000,000**	**$80,000,000**	**$30,000,000**

ADDENDUM TO THE FEASIBILITY STUDY
FOR THE SEAWAY SITE
TONAWANDA, NEW YORK

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ACRONYMS, ABBREVIATIONS AND SYMBOLS

Ac-227	actinium 227
AEC	Atomic Energy Commission
ARAR	applicable or relevant and appropriate requirement
BFI	Browning Ferris Industries
BNI	Bechtel National, Inc.
BRA	Baseline Risk Assessment
CDI	chronic daily intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeter
CT	central tendency
cy	cubic yard
COC	contaminant of concern
DOE	Department of Energy
EMP	Environmental Monitoring Plan
EPC	exposure point concentration
FBDU	Ford Bacon Davis Utah, Inc.
ft	foot/feet
FS	Feasibility Study
FUSRAP	Formerly Utilized Sites Remedial Action Program
g	gram
gpd/ft	gallons per day per foot
gpm	gallons per minute
GZA	Goldberg Zoino Associates
HDPE	High Density Polyethylene
L	liter
LUC	Land Use Control(s)
m	meters
MDL	minimum detection limit
MED	Manhattan Engineer District
NaI	sodium iodide
NCP	National Contingency Plan
NRC	Nuclear Regulatory Commission
NYSDEC	New York State Department of Environmental Conservation
O&M	Operations and Maintenance
ORNL	Oak Ridge National Laboratory
pCi	picocuries
PP	Proposed Plan
Pa-231	protactinium-231
Ra-226	radium-226
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RESRAD	residual radioactivity
RI	Remedial Investigation
RME	reasonable maximum exposure

ACRONYMS, ABBREVIATIONS AND SYMBOLS (continued)

Rn-220	radon-220
Rn-222	radon-222
ROD	Record of Decision
s	second
SB	soil bentonite
SF	slope factor
SFMP	Surplus Facilities Management Program
SOR	sum of ratios
TEDE	total effective dose equivalent
Th-230	thorium-230
U-238	uranium-238
U_{total}	total uranium
UCL_{95}	Upper 95% Confidence Limit
UMTRCA	Uranium Mill Tailings Radiation Control Act
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
W-2	Waterfront Commercial District
WID	Waterfront Industrial District
WL	Working Level
yr	year(s)

ADDENDUM TO THE FEASIBILITY STUDY FOR THE SEAWAY SITE TONAWANDA, NEW YORK

1. INTRODUCTION

1.1 Background

From 1942 to 1946, portions of the Linde site (currently Praxair) and several buildings located at Linde in the Town of Tonawanda, New York, were used for laboratory and pilot studies and subsequently for the processing of uranium ores. These processing activities, conducted by Linde Air Products under a Manhattan Engineer District (MED) contract, resulted in elevated levels of radionuclides in portions of the property and buildings. The radioactive contamination is the residual material (i.e., uranium, radium and thorium) from processing of ore for its uranium content during the period from 1942 to 1946, a period within which there were no federal or state licensing regulations. Therefore, all of the MED/AEC-related activities being addressed under FUSRAP were not subject to a federal or state licensing requirement at the time the activities were conducted. Subsequent disposal and relocation of processing wastes from the Linde property resulted in elevated levels of radionuclides at three nearby properties in the Town of Tonawanda: the Ashland 1 property, the Seaway property, and the Ashland 2 property. At the Seaway property, these radioactive residuals are mixed with soil and solid waste. Together these four properties have been referred to as the "Tonawanda Site." The locations of these properties are shown in Figures 1-1 and 1-2.

These sites are being addressed under the Formerly Utilized Sites Remedial Action Program (FUSRAP), which was established to identify and clean up, or otherwise control sites where residual contamination remains from activities conducted under contract to MED or the U.S. Atomic Energy Commission (AEC). From its inception in 1974 until October 1997, responsibility for FUSRAP was with the U.S. Department of Energy (DOE). In October 1997, the responsibility for identifying and implementing remedial actions at FUSRAP sites, which included the Tonawanda Site, was transferred to the United States Army Corps of Engineers (USACE). The annual FUSRAP appropriations provide authority for USACE to remediate "contamination at sites in the United States resulting from work performed as part of the Nation's early atomic energy program."

The Energy and Water Development Appropriation Act for Fiscal Year 2000, Public Law 106-60, provides authority to USACE to conduct restoration work on FUSRAP sites, subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code 9601 et seq., as amended. Therefore, USACE is conducting this project in accordance with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (the "NCP"), 40 CFR Part 300, as amended, as it relates to MED activity.

USACE will remediate MED/AEC-related contamination at the Seaway Site and non-MED/AEC-related radioactive and chemical contamination that is mixed or commingled with MED/AEC-related contamination. USACE lacks authority under FUSRAP to address

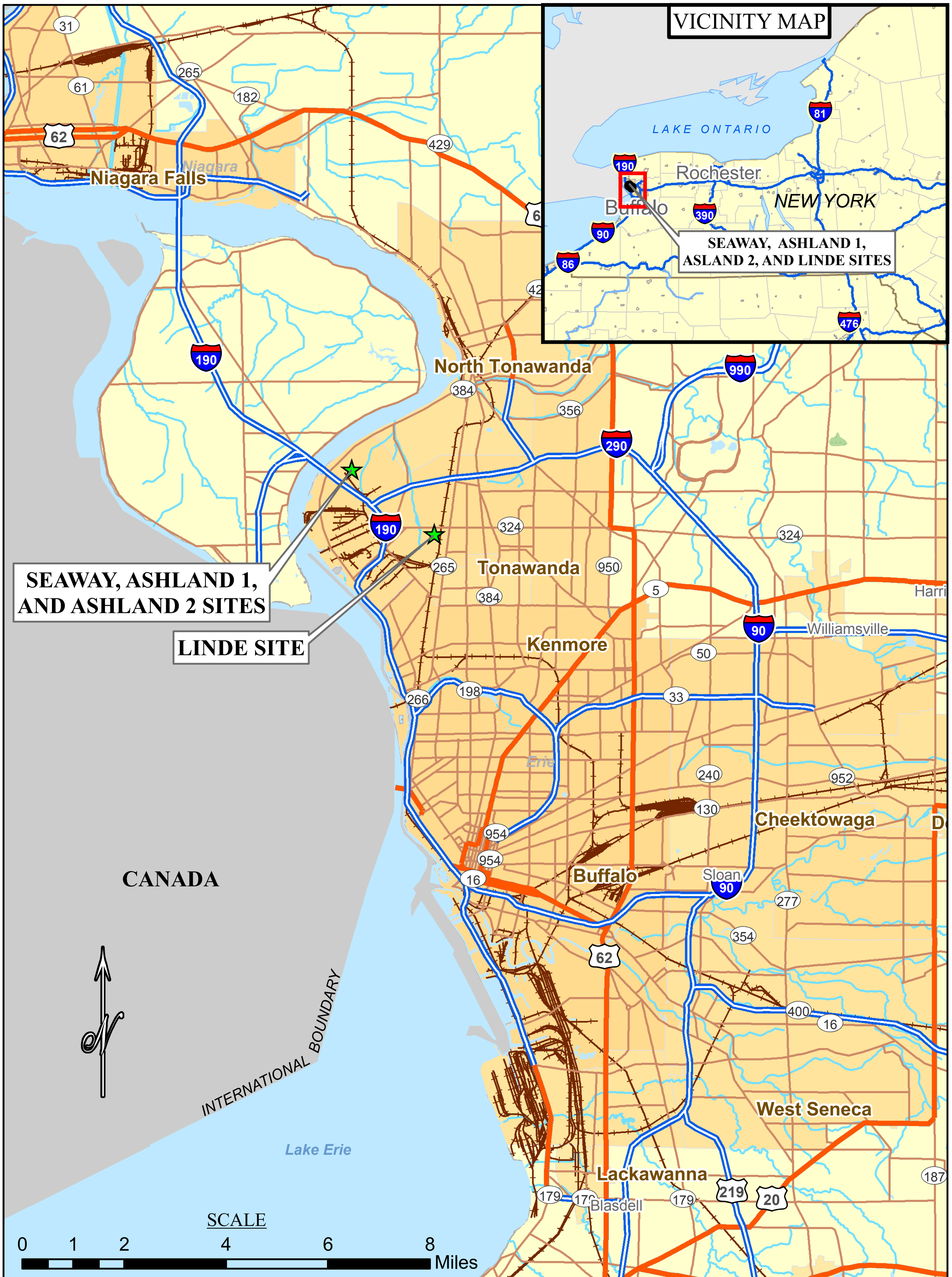

FIGURE 1-1: LOCATIONS OF THE TOWN OF TONAWANDA, NEW YORK AND THE SEAWAY, ASHLAND, AND LINDE SITES

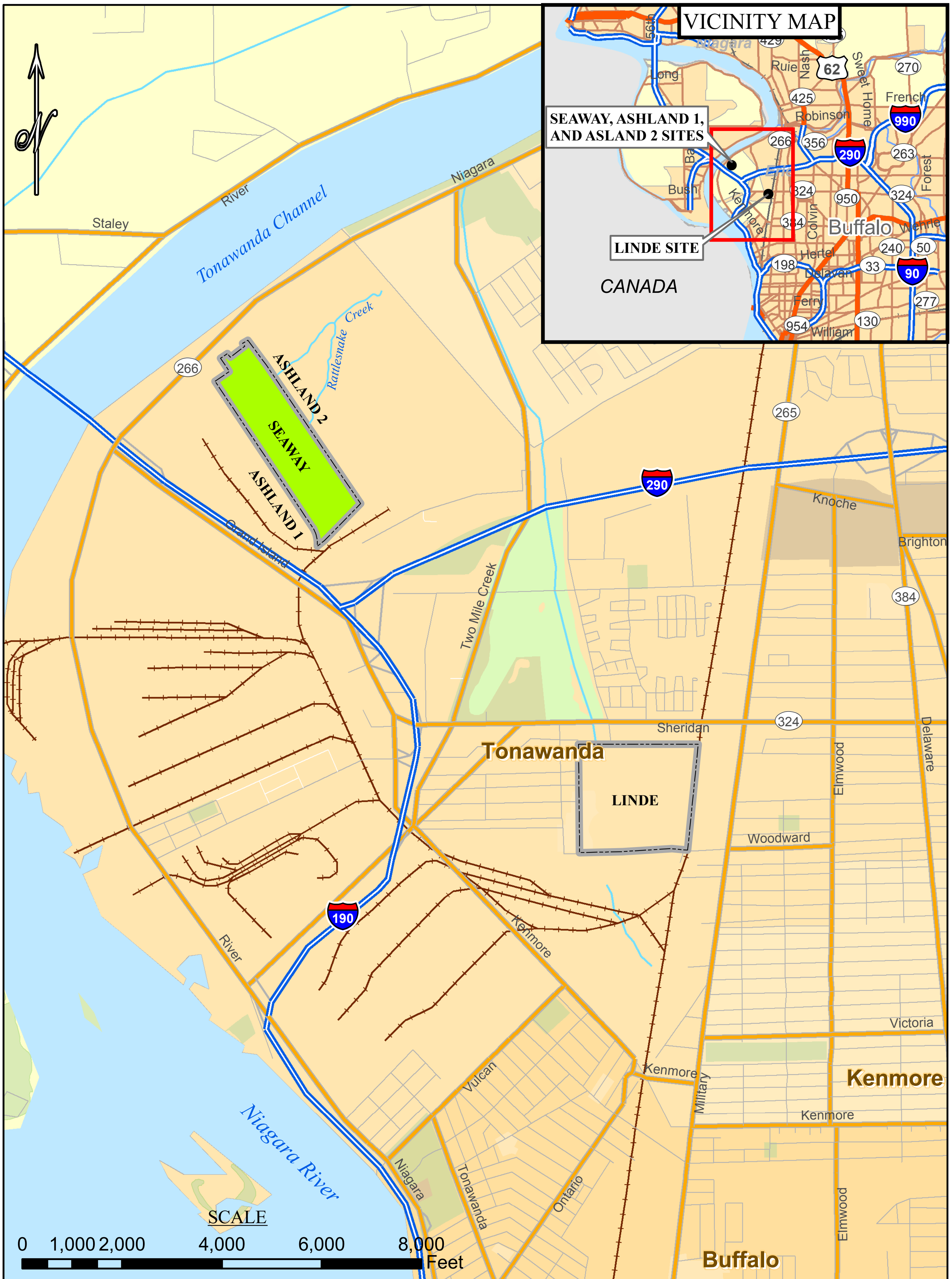

FIGURE 1-2: LOCATIONS OF THE SEAWAY, ASHLAND, AND LINDE SITES

contaminants not associated with the Nation's early atomic energy program administered under MED/AEC and therefore will not remediate radioactive or chemical contamination that is not MED/AEC-related or is not mixed or commingled with MED/AEC-related contamination (USACE 1999c).

DOE conducted surveys and investigations of the four properties located in Tonawanda and in 1993 issued a Remedial Investigation (RI) report prepared by Bechtel National, Incorporated (BNI) (BNI 1993) describing the nature and extent of contamination. DOE also assessed the risks to human health and environment. The findings of the risk assessment were described in the Baseline Risk Assessment (BRA) for the Tonawanda Site (DOE 1993a).

In November 1993, DOE issued a Feasibility Study (FS), identifying and evaluating alternative means for remediating the Tonawanda Properties (DOE 1993b). Concurrently, DOE prepared a Proposed Plan (PP) for public comment describing the preferred remedial action alternative for each property (DOE 1993c). The 1993 PP recommended that remedial wastes from all four properties be disposed in an engineered on-site disposal facility to be located at Ashland 1, Ashland 2, or Seaway.

At the public hearing and during the comment period, concerns and comments were raised by the community and their representatives regarding the preferred alternative described in DOE’s 1993 PP and the on-site disposal of remedial action waste. In 1994, DOE suspended the decision-making process on the 1993 PP and re-evaluated the alternatives that were proposed.

1.2 Tonawanda Site Status

1.2.1 Ashland 1, Ashland 2 and Seaway Area D

In September 1997, DOE prepared a revised PP addressing only the Ashland 1 and Ashland 2 properties and Area D of the Seaway property (the Ashland Sites), eliminating the engineered on-site disposal facility for remediation wastes proposed in 1993. Following transfer of FUSRAP from DOE to USACE in October 1997, USACE reviewed the history of the Ashland Sites and potential alternatives and issued the revised PP for the Ashland Sites (i.e., includes Ashland 1, Ashland, Seaway Area D and Rattlesnake Creek) (USACE 1997). After public review and comment, USACE issued its Record of Decision (ROD) for the Ashland Sites in April 1998 (USACE 1998a), adopting the remedial alternatives recommended in the 1997 PP. The preferred alternative for these sites was excavation of soils exceeding the site-specific guideline of 40 picocuries per gram (40 pCi/g) thorium-230 (Th-230) and shipping the soils off-site for disposal. One consideration in the development of this remedy was the fact that this area is proposed for future commercial and light industrial use in the Town of Tonawanda’s Waterfront Development Master Plan. Remediation of the Ashland 1 and Ashland 2 Sites has been completed. Remediation of Rattlesnake Creek was completed in September 2005. The locations of Ashland 1, Ashland 2 and Seaway Area D are shown in Figure 1-2.

1.2.2 Linde Site

Remedial plans for the Linde Site were addressed by USACE under separate Proposed Plans and Records of Decision. Remediation activities at the Linde Site are an on-going effort. The location of the Linde Site is shown in Figure 1-2.

1.2.3 Seaway Site, Areas A, B and C

The 1993 FS (DOE 1993) and 1993 PP (DOE 1993c) addressed the cleanup of Seaway Areas A, B and C (the Seaway Site). The 1993 FS identified soils in Area A of Seaway as accessible, and the 1993 PP recommended excavation of accessible contaminated soil from Area A, with the disposal of contaminated soil in an on-site engineered disposal facility at Ashland 1, Ashland 2 or Seaway. The 1993 FS identified contaminated soils in Areas B and C of Seaway as access-restricted and the 1993 PP recommended these access-restricted soils be left in place. The approximate locations of Seaway Areas A, B and C as described in the 1993 FS and 1993 PP are shown in Figure 1-2.

The remediation plan for Seaway proposed by DOE in 1993 was not implemented due to community concern over the Proposed Plan, which recommended that remedial wastes from all four of the Tonawanda Site properties be disposed in an engineered on-site disposal facility to be located at Ashland 1, Ashland 2 or Seaway.

1.3 Purpose of this Addendum to the FS

The 1993 FS for the Tonawanda Site (DOE 1993b) addressed the four properties that comprise the Tonawanda Site as defined at that time and was based on information available through about August 1993. This Addendum focuses on the Seaway Site and summarizes the findings of investigations and assessments subsequent to the 1993 FS, updates the information on current conditions at Seaway and the assessment of Seaway remedial alternatives, and provides a description of each plan being considered by USACE for remediation of the Seaway Site.

As described in more detail in the following sections, additions/revisions to the 1993 FS addressed in this Addendum include the following:

- The Seaway Landfill (also referred to as the Niagara Landfill) is now closed and major portions have been capped in accordance with plans approved by the New York State Department of Environmental Conservation (NYSDEC).

- Disposal of remedial wastes from other Tonawanda Sites in an on-site engineered disposal facility at Ashland 1, Ashland 2 or Seaway, as proposed in 1993 is not applicable to the specific actions being considered for the Seaway Site.

- To supplement the information available in 1993, USACE conducted additional investigations in Seaway Areas A, B and C in 1998. These investigations included a gamma walkover survey of Areas A, B, and C and a limited surface and subsurface investigation in Areas B and C, including the analyses of 44 soil samples for the presence of radionuclides. The findings of these investigations are reported in two documents, *Gamma Walkover Survey of the Seaway Landfill, Tonawanda, New York* (USACE 1998b) and *Additional Surface Characterization of Areas B and C at the Seaway Site* (USACE 1999a). These documents are available in the administrative record file for the Seaway Site and the findings of these investigations are summarized in Section 2.2.2 of this Addendum.

- USACE reassessed the volume estimates of radioactively contaminated material present in Seaway Areas A, B and C, considering the estimates available in the 1993 FS and PP, subsequent estimates by DOE and the new information obtained during 1998 USACE investigations. The reassessment also uses three-dimensional modeling techniques in refining the estimates of the location and in-situ volumes of radioactively contaminated material using a preliminary cleanup level of 40 pCi/g Th-230, as was used at the Ashland 1 and 2 sites. The findings of the reassessment are detailed in *Technical Memorandum: Synopsis of Volume Calculations for Seaway Site Areas A, B, and C, Tonawanda, New York* (USACE 1999b). Subsequently, the cleanup criteria were developed using 10 CFR Part 40, Appendix A, Criterion 6(6), which was promulgated after the volume estimates were completed. Since Th-230 and Ra-226 are the two key COCs and where the major components of both the 40 pCi/g Th-230 and current cleanup criteria, USACE has concluded that there is minimal impact on the overall volume estimates. Therefore, the volume estimates generated in this technical memorandum are used for generating cost estimates associated with the various alternatives, unless otherwise stated. This document is available in the administrative record file for the Seaway Site.

- USACE also re-evaluated the risks posed by the presence of radioactively contaminated material in Seaway Areas A, B and C. The final findings of these re-evaluations are provided in the document entitled *Technical Memorandum: Modeling of Radiological Risks From Residual Radioactive Materials Following Implementation of Remedial Alternatives For Seaway Landfill Areas A, B, and C, Tonawanda, New York"* (USACE 2000a). This document is available in the administrative record file for the Seaway Site. The technical memorandum (USACE 2000a) incorporates findings of investigations conducted by USACE in 1998 (USACE 1999a), the updated estimates of contaminated volumes in Areas A, B and C (USACE 1999b) and also addresses refinements in the alternatives considered for Seaway Site remediation.

- USACE estimated the potential air quality impacts of radon in landfill gas from Areas A, B and C. These estimates are available for use in assessing remedial alternatives involving capping Areas A, B and C, if landfill gas collection and flaring or passive landfill gas venting is necessary. The findings of this assessment are detailed in *Technical Memorandum: Estimates of Air Quality Impacts of Radon in Landfill Gas, Seaway Site, Areas A, B and C, Tonawanda, New York* (USACE 2000b). This document is available in the administrative record file for the Seaway Site and its findings are used in the evaluation of alternatives presented in this Addendum.

- USACE performed an evaluation of 10 CFR Part 40, Appendix A, Criterion 6(6), which was promulgated in 1999 to provide Nuclear Regulatory Commission (NRC) licensees with a regulatory basis for remediating soils and buildings at uranium and thorium mills where multiple radionuclides are present. The USACE evaluation included the calculation of surface and subsurface benchmark doses, the derivation of non-radium concentrations that would produce the benchmark dose, and an evaluation of hypothetical residual concentrations assuming Criterion 6(6) were selected as an ARAR for the Seaway Site. The results of the evaluation are contained in *Technical Memorandum:*

Application of 10 CFR Part 40, Appendix A, Criterion 6(6) and Derivation of Benchmark Doses for the Seaway Landfill Areas, A, B and C, Tonawanda, New York (USACE 2000c). This document is available in the administrative record file for the Seaway Site and its findings are used in the evaluation of the alternatives presented in this Addendum.

- Due to the uncertainties associated with the MED/AEC-related materials in Seaway Areas B and C, USACE decided to conduct an additional, more extensive investigation than done in 1998. This investigation was to further determine the extent and leachability of the contamination in Areas B and C and to assess whether any MED/AEC-related material is commingled with materials that would result in any excavated materials being managed as both radiological and hazardous waste. This investigation was conducted during the summer of 2001 and involved drilling and placing 45 boring casings, conducting down-hole gamma logging within the boring casings, sampling and analyses (radiological and hazardous waste characteristics) of selected areas of the removed boring materials, and on-site radiological (gamma spec) analysis of numerous other samples. The results of this subsurface investigation are reported in *Technical Memorandum: Summer 2001 Subsurface Investigation at the Seaway Site – Areas A, B and C, Tonawanda, New York* (USACE 2002). This document is available in the administrative record and the findings are summarized in Section 2.2.3 of this Addendum.

- During the remediation of the Ashland 1 and Seaway Area D sites, USACE discovered additional MED/AEC-related contamination that was located on the Seaway property and possibly located under the closed portion of the Seaway Landfill. USACE conducted sampling of the material and performed an evaluation of the potential nature and extent of this area referred to as Seaway Southside. The results of that evaluation of collected data are contained in Appendix A of this Addendum.

- During the remediation of the Ashland 2 Site, contaminated material was found up to the Seaway property line at a location on the north side of the Seaway property, referred to as Seaway Northside. The contaminated material was remediated to within seven feet of the Seaway property. These conditions are further discussed in Section 2.2.5 and the radiological data from the Seaway Northside area are provided in Appendix B.

- Subsequent to the completion of the 2001 investigation discussed above, USACE conducted a third evaluation of the risks present using the additional data collected in 2001. This evaluation was to assess whether the previous risk assessment findings were still valid and whether any additional radionuclides should be considered contaminants of concern (COC). The results of that evaluation are presented in Appendix C to this Addendum. The results corroborate the general finding and conclusions of the prior two assessments and are primarily used by this Addendum to generate final COC concentration limits, as discussed in Appendix C.

- Throughout 2003 and 2004, USACE reviewed the remedial action alternatives for the Seaway Site and the current and future land use controls (LUCs) that would be necessary in the event that a remedial alternative is selected that leaves some MED/AEC-related contaminated material on the Site. Details of the USACE LUC review, findings and recommendations are provided in Appendix D. USACE also reviewed needs for real estate interests associated with remedial alternatives under consideration at Seaway. The findings of the review and USACE's Real Estate Plan for the Seaway Site are included in Appendix E.

As described in more detail in the following sections, the Seaway Site has been used as a landfill for more than 50-60 years and a wide range of materials and wastes have been disposed on the Seaway property.

2. EXISTING CONDITIONS UPDATE

The 1993 RI and FS describe the Seaway Site and the extent of MED/AEC-related contamination based on information available at that time. The 1993 RI and FS concluded that the deep groundwater system beneath the Ashland and Seaway Sites was not impacted by MED/AEC-related materials. Subsequent studies by USACE have not observed any data that would revise this conclusion, as discussed in Section 2.4. The landfill in the Seaway Site is known as the Niagara Landfill. The following sections provide an update on current conditions at the Seaway Site, based on reviews of Browning-Ferris Industries, Inc. (BFI) closure documents on file at NYSDEC relating to the closure efforts at the Niagara Landfill, investigations conducted by USACE in 1998 and 2001, results of Ashland 1 and Seaway Area D remediation by USACE, reassessment of existing conditions by USACE, and further assessments of historical documentation by USACE.

2.1 Site Overview

The Seaway FUSRAP site is located in the Town of Tonawanda, New York approximately 10 miles north of downtown Buffalo. The Ashland 1, Ashland 2 and Rattlesnake Creek sites (together called the Ashland sites), and the Linde site are located in close proximity to Seaway as previously shown in Figures 1-1 and 1-2. The Seaway Site is accessed by River Road which is adjacent to the Niagara River. The properties immediately east and west of the site are owned by the Ashland Oil & Refining Company. These properties are being used primarily for industrial purposes, as are other nearby properties along River Road. The nearest residences are located ½ miles away from the site to the northwest, across the Niagara River on Grand Island, and to the east in the Town of Tonawanda.

The Seaway Site property comprises about 100 acres referred to as the Seaway Industrial Park (BNI 1993). It is owned by the Sands Mobile Park Corporation, successor by merger to the Seaway Industrial Park Development Company, Inc. and since the late 1980s was operated as a landfill by BFI through its subsidiary, Niagara Landfill, Inc. Approximately 89 acres of the Seaway property have been used for landfilling.

A report prepared by Wehran Engineering in 1979 (Wehran 1979) indicates that wastes were accepted at the Niagara Landfill beginning in 1930. According to the Wehran 1979 report, the wastes described in Table 2-1 were accepted at the landfill from a number of industrial generators. A review of the list of waste disposed of up through 1979 indicates that significantly large quantities of hazardous materials (e.g., 130,000 gallons per year of spent cleaning solvents) were placed in the landfill that could fail the RCRA hazardous waste characteristics tests or presently be considered a listed hazardous waste. The NYSDEC has classified the entire Niagara

Table 2-1

Industrial Waste Reported to Have Been Disposed of at the Niagara Landfill From 1930 to 1979

Generators	Waste Description	Quantities	Time Period
Western Electric	(1) Misc. paper products (2) PVC plastic (3) Misc. plastic (4) Rubber (5) Restaurant waste (6) Fly ash (7) spent cleaning solvents (8) Waste oils (9) Drummage and pallets (10) Continental enamel	441 tons per year 550 tons per year 154 tons per year 2.2 tons per year 73.5 tons per year 1,000 tons per year 130,000 gal. per year 66 gallons 750 tons 1,000 gallons	1967-1977
Carborundum Co. (Coated Abrasives)	(1) Wood, paper, rags, abrasive grain & scrap sandpaper (2) Incinerator ash & solidified resins (3) Floor sweepings & waste filler including calcium carbonate & clay	2,500 tons per year 5 tons per year 30 tons per year	1948-1972 1948-1972 1948-1972
Ford Motor Co. (Stamping Plant)	Garbage and rubbish		1972
Chevrolet Forge Plant	Pit sludge (steel sealer, graphite, oil resin & sodium carbonate		1975-1979
Chevrolet Metal Casting Plant	(1) Waste sand (clay, insoluble metal compounds, trace oil, resins & corn flour (2) Sand slurry		1971-1975, 1975-1979 1971-1975
Chevrolet Motor Plant	(1) Fly ash (2) Pit sludge		1970-1975 1970-1975
Trico Products	General solid bulk refuse		1960-1979
Union Carbide/Linde	Misc. trash		1966-1979
FMC	Yard trash, floor sweepings, scrap perbonate & misc. garbage, lauroyl peroxide		1962-1979
Pennwalt	Sludge		1976-1978
Bernal Foam Products	(1) Scrap polyurethane foam toluene (2) Diisocyanate (a liquid drummed) (3) Mixture of polyether, polyol, chloroethene & catalysts (4) Misc. wood & paper rubbish	5 tons per year 1 ton per year 10 tons per year	1975-1979 1975-1979 1975-1979 1975-1979
Allied Chemical Specialty Chemical Division (plastics)	Scrap & chlorinated polyethylene, trash, wood, garbage, ceramic saddle packing & catalyst	1,000 cubic yds per year	1960-1977
Allied Chemical Specialty Chemical Division (dye plant)	Pretreatment sludge, filter sludges containing organics, colors & metals & liquid still bottoms	<10,000 tons	1968-1974
Allied Chemical Semet-Solvay Division	Plant scrap	1,248 tons per year	1930-1978
DuPont (Tonawanda)	Dry "Corian" wastes, "Vexar" netting & "Tedlar"	1,300 tons	1974-1976
Spaulding Fibre	Scrap vulcanized fibre, vulcanized fibre sheet & thermosetting plastic & trimmings		1969-1974
Hooker (Durez)	Rubbish (paper, wood & cardboard)	500 tons	early 1970's
F.N. Burt	Waste paperboard, waste cellophane, waste gold leaf, scrap wood, waste plastic garbage. Waste adhesive (animal glue, polyvinyl, acetate, dextrins), waste cans & metal		

Note: The information reported in this table was taken from the May 1979 Wheran Engineering Corporation report entitled *Hydrogeological Investigation, Seaway Industrial Park Sanitary Landfill, Tonawanda, Erie County, New York.* (Wheran, 1979)

Landfill as an inactive hazardous waste disposal site (NYSDEC 1998a). A further description of the status of the Niagara Landfill as an inactive hazardous waste disposal site is provided in Section 2.6.2.2. The list contained in Table 2.1 also indicates that there are other likely sources of radiological materials similar to the MED/AEC-related radionuclides (i.e., uranium, radium, and thorium). These sources would include, for example, fly ash and waste oils that contain naturally occurring radionuclides.

Files available in the NYSDEC Region 9 office in Buffalo, indicate that Niagara Landfill, Inc. filed an Application for Approval to Operate a Solid Waste Management Facility with NYSDEC on July 20, 1979. The application was submitted in accordance with Part 360, Title 6, of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR Part 360). The application listed the following:

Type of waste accepted:	municipal, commercial, industrial, and construction solid wastes from communities within 6 to 8 miles of the site.
Wastes not accepted:	hazardous wastes, liquids, sewage sludge, insecticides, whole tires, trees, and explosives.
Operations:	Existing sanitary landfill operation. The processes and components include solid waste deposition, compaction, and cover material placement, as required for a sanitary landfill operation.

Although, as stated above, the permit application listed hazardous waste as “waste not accepted”, prior to the 1979 permitting process, significantly large quantities of hazardous materials were placed throughout the entire landfill as discussed earlier in this section. As further described in Section 2.3, the Niagara Landfill ceased taking landfill material in 1993.

As detailed in the 1993 RI and FS reports, waste residues produced during uranium processing at Linde from 1944 to 1946 were deposited at the Haist property, now referred to as Ashland 1. Records indicate that approximately 8,000 tons of these residues, principally low-grade uranium ore tailings, were spread over two-thirds of the Ashland 1 property. During construction by Ashland Oil of a bermed area for two petroleum tanks and a drainage ditch on the Ashland 1 property in 1974, radioactively contaminated residues from Ashland 1 were transported to Seaway and Ashland 2 for disposal. Disposal at Seaway was in four (4) areas referred to as Areas A, B, C and D. This construction activity was not conducted by Ashland Oil on behalf of the federal government.

Figure 2-1 shows the location of the Ashland 1, Ashland 2 and Seaway properties and the approximate locations of Seaway Areas A, B, C and D as described in the 1993 RI and FS reports. Ashland 1, Ashland 2 and Seaway Area D are being remediated in accordance with the plan and Record of Decision (ROD) for the Ashland Sites (USACE 1997) (USACE 1998a). The locations of Areas A, B and C shown in Figure 2-1 are from a 1976 survey conducted by Oak Ridge National Laboratory (ORNL) (ORNL 1978).

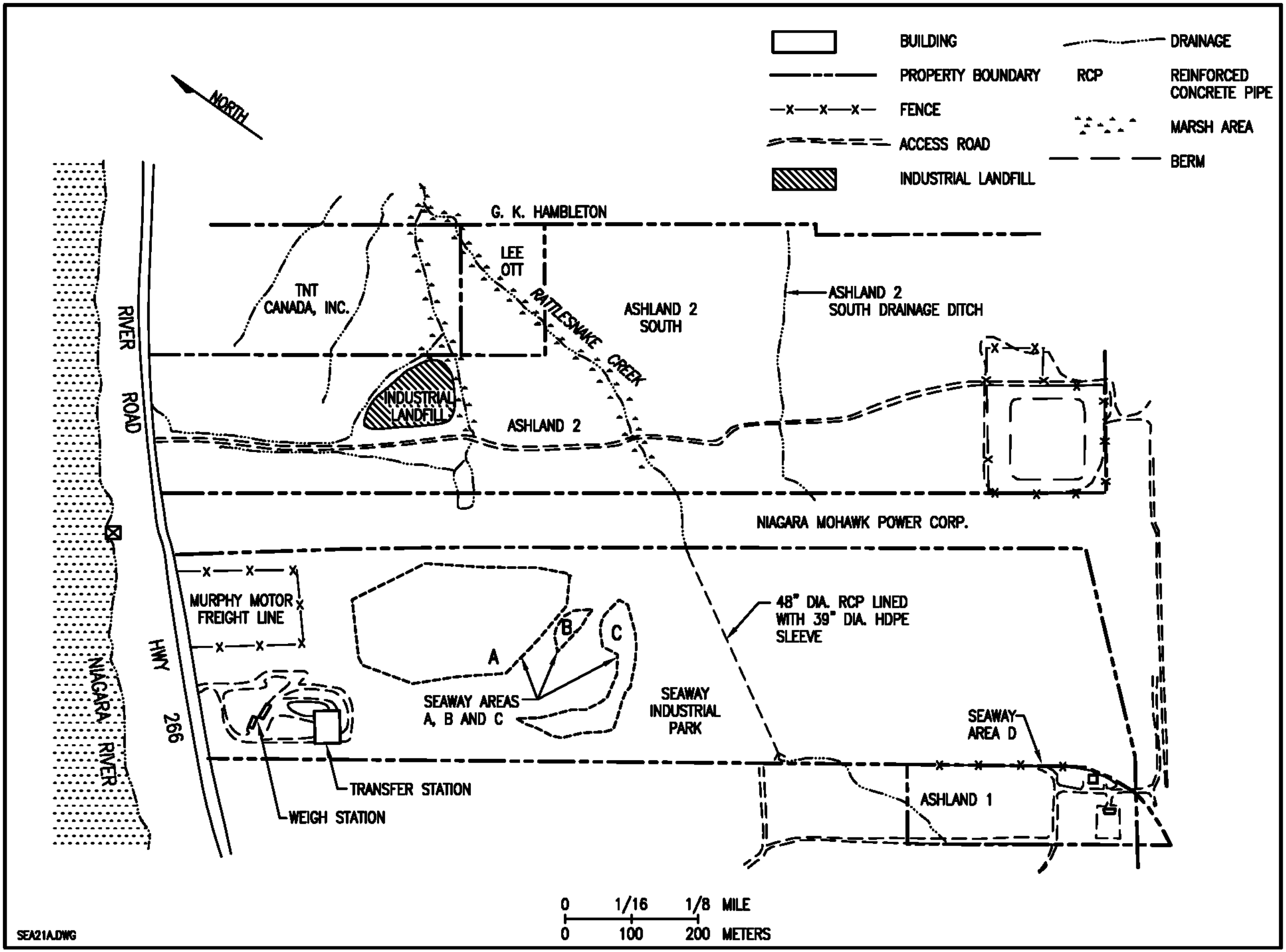

FIGURE 2-1
LOCATION DETAILS - SEAWAY PROPERTY

The RI report (BNI 1993) indicates that approximately 6,000 cubic yards (cy) of low grade uranium ore tailings from Ashland 1 were disposed in the Seaway landfill or at Ashland 2 in 1974. Since 1974, portions of the residues (in Areas B and C and part of Area A) have been buried under refuse and fill material. In September 1978, NYSDEC requested BFI to not "disturb any of the radioactive earth located on your landfill property until the U.S. Department of Energy's decommissioning plans are implemented…" (NYSDEC 1978). Area D contamination was reported to result from inadvertent spreading of contamination from soil-moving operations at Ashland 1, construction of a bentonite wall around Seaway, and shaping of a drainage ditch in the area (BNI 1993). None of these activities were conducted by or for the federal government.

Seaway was characterized for the presence of radioactive contamination several times prior to the remedial investigations conducted at the Site in 1988-1991. From these initial surveys in 1976, 1981 and 1986, it was reported that active operation of the landfill altered the physical conditions of the property and that the locations of radioactive contamination varied from time to time (BNI 1993). Based on comparisons of topographic maps of the landfill in 1976 and 1986, it was estimated that Areas B and C had been covered with up to 40 feet (ft) of fill material and refuse and that approximately 40 percent of Area A had been covered with a similar, but thinner layer of material (0 to 10 feet thick) (BNI 1993).

First-phase and second phase remedial investigations at Seaway were conducted from January 1988 through April 1988, October 1988 through March 1989, and from November 1990 through May 1991. Because landfill material covered Areas B and C to a depth up to 40 feet, soil samples for those areas could not be collected (BNI 1993).

Area A is approximately 9 acres in size and Areas B and C together comprise approximately 3 acres based on information available in 1993.

As briefly described in Section 1.3, additional investigations were conducted by USACE at Seaway Areas B and C in 1998 and 2001. The findings of the 1998 and 2001 investigations are described in Sections 2.2.2 and 2.2.3, respectively. USACE also evaluated findings associated with contamination identified on the south side of the landfill. This area of contamination is referred to as Seaway Southside as further described in Section 2.2.4. USACE also evaluated contamination on the north side of the landfill, referred to as Seaway Northside as further described in Section 2.2.5.

2.2 Site Contamination Overview

2.2.1 Site Contamination Information Available in 1993

In the 1976 survey conducted by ORNL (ORNL 1978) at Seaway, 60 soil samples were collected in Areas A, B and C, typically to a depth of about 2 ft, with some samples collected to a depth of 6½ ft. Maximum radium-226 (Ra-226) and uranium-238 (U-238) concentrations in Area A were reported to be 50.8 and 63 pCi/g, respectively. In Area B, maximum Ra-226 and U-238 were reported as 92.6 and 102 pCi/g, respectively (BNI 1993). Also noted in the 1976 survey was that the radiological contamination in Areas B and C was limited to small isolated piles of residue (BNI 1993). A 1981 survey by Ford Bacon Davis Utah, Inc. (FBDU) (FBDU 1981) generally showed agreement with 1976 results, indicating that most of the radioactive contamination in Areas A, B and C was within the top 1 to 3 ft of depth of soil as the topography existed at that time.

Between the 1976 and 1981 surveys, Area A was apparently stable, but radioactively contaminated material in Area C had washed down the slopes to the south. In 1988, a walkover gamma scan indicated that Area A had been disturbed by placement and shaping of landfill material and radioactive material had moved toward the Niagara Mohawk property (BNI 1993). Areas B and C could not be found by surface scanning (BNI 1993). It is possible that material formerly placed in small isolated piles in Areas B and C was subsequently spread and/or used as cover material in the B and C areas. As described in Section 2.1, a comparison of 1976 and 1986 topography showed Areas B and C to be covered with landfill material and about 40 percent of Area A was covered.

The results of soil sampling conducted during the second phase of the remedial investigation in Area A showed Th-230 to be the principal radioactive contaminant in Area A, with the highest concentration reported at 880 pCi/g. Radioactive contamination was encountered primarily in the shallow soils of Area A in surveys conducted prior to the remedial investigations initiated in 1988.

2.2.2 Findings of USACE Investigations Conducted at Seaway in 1998

At the time the 1993 DOE FS and PP were prepared, sufficient characterization data were available to allow acceptable estimates of contamination and remediation volumes for Seaway Area A where most of the contamination is present. Only limited information was available for Areas B and C.

To refine the contaminated volume estimates and supplement the data available for the assessment of risks associated with Seaway contamination, USACE conducted additional investigations in Seaway Areas B and C in 1998. Gamma walkover surveys conducted in the Spring and in December, 1998 revealed only background surface radioactivity in most of Areas B and C. However, two isolated locations surveyed in Area C, and one location in Area B, showed evidence of elevated radioactivity at the surface.

In December 1998, soil samples were collected at and in the vicinity of the locations in Areas B and C where elevated gamma radiation was detected during the gamma walkover surveys. The purpose of the investigation was to determine whether MED/AEC-related radiological contamination was present at locations showing elevated gamma radiation. In addition, random soil samples were collected at six locations in Areas B and C. A total of 18 Geoprobe soil borings were completed, 71 soil samples and one rock sample were collected and 44 samples were analyzed for the presence of uranium-234 (U-234), U-235, U-238, thorium-230 (Th-230), Th-232, radium-226 (Ra-226), protactinium-231 (Pa-231), and actinium-227 (Ac-227). The December 1998 sampling locations are shown in Figure 2-2.

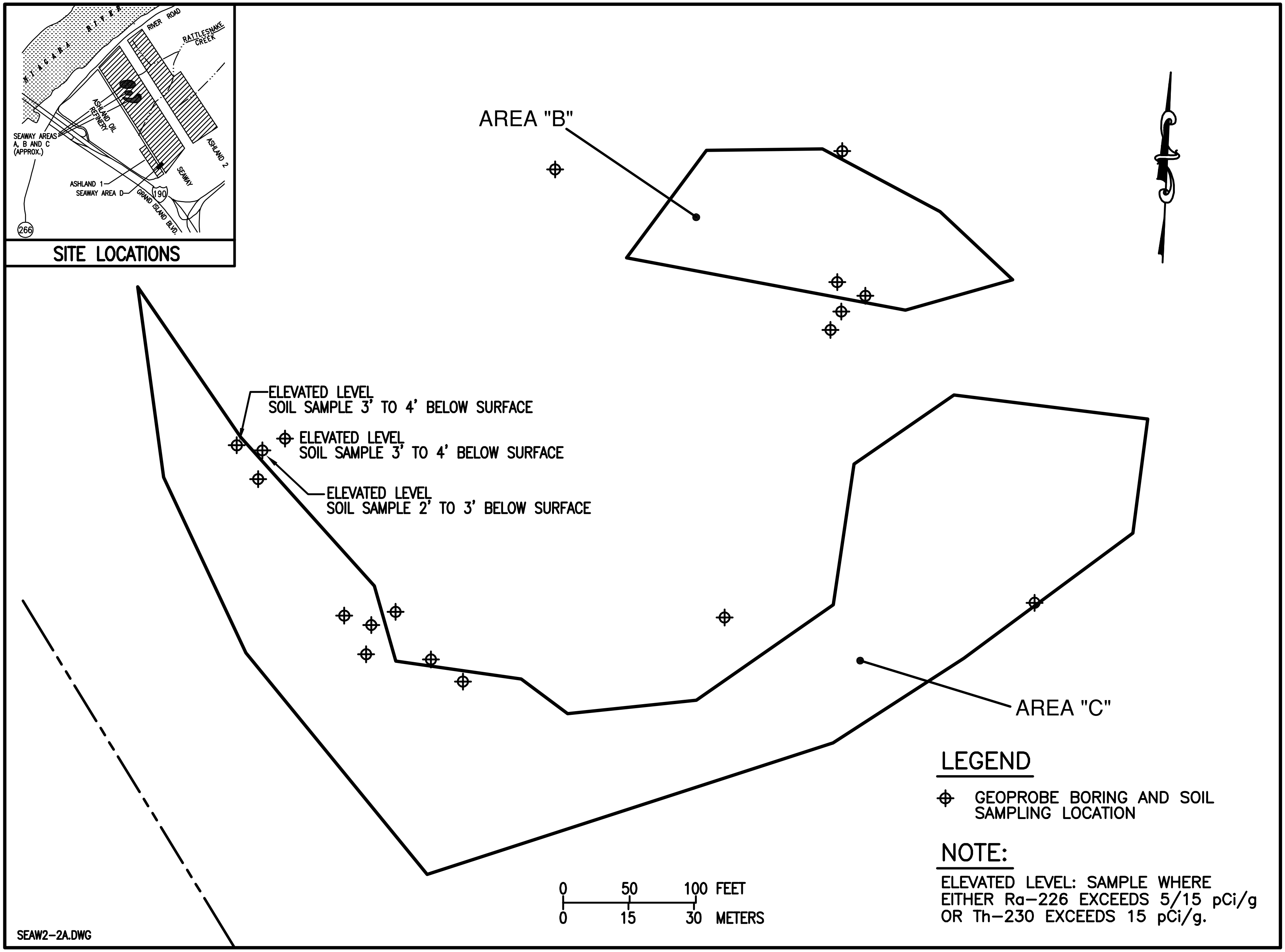

FIGURE 2-2
SAMPLING LOCATIONS DECEMBER 1998
INVESTIGATION SEAWAY AREAS B AND C

2.2.2.1 Findings – Area B

The results of analyses of 16 soil samples from Area B indicated that none of the soil samples had significantly elevated Th-230 levels. The highest concentration of Th-230 detected in soil samples from Area B was 2.41 pCi/g. A rock was found approximately 4 to 6 inches beneath the ground surface at the location in Area B where elevated gamma radiation was detected during the gamma walkover survey. Analysis of a sample of this rock showed Th-230 at 196 pCi/g, Ra-226 at 76 pCi/g, U-238 at 260 pCi/g, U-235 at 6 pCi/g, U-234 at 260 pCi/g and Th-232 at 145 pCi/g. The rock appeared to naturally contain these radionuclides and was not technologically enhanced or MED/AEC-related residue, and therefore is not considered to be a contaminant that should be addressed by this CERCLA action.

2.2.2.2 Findings – Area C

The results of analyses of 27 soil samples from Area C showed elevated levels of radionuclides at 3 locations in the western portion of Area C. These samples, taken at approximately 2 to 4 feet below the ground surface, showed Th-230 at 411.6 pCi/g, 236.2 pCi/g, and 181.9 pCi/g and Ra-226 in these samples was detected at 10.93 pCi/g, 7.97 pCi/g and 4.93 pCi/g, respectively. Elevated gamma radiation was detected at the location of these samples during the gamma walkover survey. The locations of these soil samples are noted in Figure 2-2.

2.2.2.3 Subsurface Conditions and Summary of the 1998 Investigation

During the investigation subsurface material encountered included clay, silt and gravel used as cover material, and refuse. Refuse encountered included wood, brick, newspaper, fabric, plastics, and glass. Refusal or refuse was encountered at depths of 4 feet or less at 7 of the 12 sampling locations in Area C.

No elevated radiological contamination was detected in the samples from random locations in Areas B and C. At the location in Area B where elevated gamma radiation was detected during the gamma walkover survey, the elevated gamma radiation is attributed to a rock, 4 to 6 inches below the ground surface. A sample of this rock showed elevated concentrations of Th-230 and other radionuclides (as described in Section 2.2.2.1). The rock appeared to naturally contain these radionuclides and was not technologically enhanced or MED/AEC-related residue, and therefore is not considered to be a contaminant that should be addressed by this CERCLA action. In Area C, elevated levels of radionuclides were detected in biased soil samples 2 to 4 feet below the ground surface at one of the locations showing elevated gamma radiation during the walkover survey.

The approximate locations of radioactive contamination in Seaway Areas A, B and C are shown in Figure 2-1, based on information that was available following the 1998 USACE investigations.

The contamination areas shown in Figure 2-1 are described in detail in the USACE 1999 Technical Memorandum on calculating the volumes of contamination at the Seaway Site (USACE 1999b).

2.2.3 Findings of USACE Investigations Conducted at Seaway in 2001

After completion of the characterization efforts in 1998, USACE evaluated the results to determine if there were any other uncertainties that may impact the development and evaluation of potential remedial alternatives. The greatest uncertainty identified was whether the MED/AEC-related material remained as small isolated piles as described by ORNL during their site investigation in 1976 (ORNL 1978) or was the material spread throughout the landfill. Also, USACE decided to obtain additional information from Areas A, B and C regarding the nature of the material and whether the MED/AEC-related material was co-mingled with hazardous waste. Therefore, USACE conducted subsurface investigations in Areas A, B and C during the summer of 2001. This investigation involved drilling and placing borehole casings, performing down-hole gamma logging, conducting on-site gamma spectroscopy on selected samples from the borings, and shipping some samples off-site for radiological and chemical analyses. The details of the investigation and the results are available in the field investigation technical memorandum (USACE 2002). The key findings associated with that effort are summarized in the following paragraphs.

There were 45 boreholes completed and logged, with borehole depths ranging from 10 feet to approximately 80 feet deep. There were 10 boreholes in Area A, 10 boreholes in Area B, and 25 boreholes in Area C. The down-hole gamma logging indicated that there was in fact a lens of radiological material in Areas B and C that ranged in thickness from 1 foot to approximately 8 feet. The logging results also indicated that the lens extends from Area C over to Area B and that the radiological materials were not in small isolated piles. Based on the down-hole gamma logging results, the areal extent of contamination for Areas B and C is actually one large area as shown in Figure 2-3, and in a few areas, the contamination is projected to extend under closed portions of the landfill. The major areas of contamination are located at an elevation of approximately 630 feet (ft) above mean sea level (msl) which is approximately thirty (30) ft above the bottom of the landfill and the leachate collection system. The in-situ volume of material was estimated using the tabulated cross-sections for each of the areas of contamination and the associated incremental thickness. Based on the results, the in-situ volume of MED/AEC-related residues in Areas B and C, combined, is approximately 23,000 yd^3. The original in-situ volume estimate for Areas B and C combined was 15,400 yd^3 (USACE 1999). This revised volume estimate is used in evaluating remedial alternatives and associated costs.

The sampling to further characterize the nature of the MED/AEC-related material in Areas A, B and C found that there were no hazardous substances present that would result in any excavated material having to be managed as both radiological and hazardous waste. Radiological analyses were also conducted on the leachate from aggressive acid leaching by the laboratory to assess the potential leachability of the MED/AEC-related materials. These results were used in residual radioactivity (RESRAD) modeling to estimate what impact, if any, the MED/AEC-related materials located approximately 30 feet above the leachate collection system would have on the leachate collection system. The modeling results indicate that the MED/AEC-related residues at Seaway have an insignificant impact on leachate collection system radionuclide concentrations at Seaway (USACE 2002).

2.2.4 Seaway Southside Findings during Ashland 1 and Seaway Area D Remediation

During the Ashland 1 Site and Seaway Area D remediation efforts covered by the April 1998 ROD for the Ashland 1 (including Seaway Area D) and Ashland 2 Sites (USACE 1998a), MED/AEC-related soil contamination was found to extend onto the Seaway Property and under the closed portion of the landfill. The contamination was found in the vicinity of Area D, particularly at the north-west end of the Area D excavations and found to extend beyond the Seaway property line just east of an area northwest of Area D, known as Survey Unit Areas 24 and 31, and under the road surrounding the landfill, known as Stone Road. USACE did not find any elevated areas [i.e., radiological readings using a sodium iodide (NaI) detector in the field during intrusive field work were not above typical background] at the Rattlesnake Creek drainage pipe inlet that opens to the east side of the landfill (Shaw 2003). During the Ashland 1 remediation efforts, USACE conducted further investigations of these two areas, Seaway Area D Adjacent Property (property adjacent to Area D in the northwest direction) and Northwest of Seaway Area D Adjacent

Property, which are collectively referred to as Seaway Southside, to determine, to the maximum extent possible, the extent of the remaining MED/AEC-related soil contamination that may extend into the closed portion of the landfill. An evaluation of the results of those investigations is included in Appendix A of this Addendum. The following sections discuss the investigation results for these two areas.

The maximum Th-230, U-238 and Ra-226 concentrations found in the Seaway Area D Adjacent Property lens were 152.24 pCi/g, 13.44 pCi/g, and 2.25 pCi/g, respectively, during remediation of the area under the April 1998 ROD for the Ashland 1 (including Seaway Area D) and Ashland 2 Sites. Also, based on the results of the investigations in this area under that ROD, the material exceeding the April 1998 ROD 40 pCi/g Th-230 cleanup criteria for this area does not appear to extend further towards the land fill perpendicularly by more than 1 to 2 feet or towards the north end of the land fill by more than 7 feet. Using the distances between the clean samples and the elevated readings of the lens area (~28 feet) and assuming an average thickness of 8 inches, the remaining radiological materials in this area are estimated to be less than 3 yd^3. The approximate location of this small area is shown in Figure 2-3.

The radiological concentrations found in the lens northwest of the Seaway Area D Adjacent Property area were much higher than the concentrations found in the Seaway Area D Adjacent Property lens. They were also much higher than the concentrations found in Seaway Areas A, B and C and evaluated to assess the radiological doses and risks for various scenarios, particularly the Th-230 concentrations. There were twelve samples taken from the face of the lens in this area. The Th-230 concentrations ranged from 10.5 pCi/g to 1,761 pCi/g. Using the results from the twelve samples only, the UCL_{95} values for Th-230, U-238 and Ra-226 were 1,050 pCi/g, 112 pCi/g, and 8.09 pCi/g, respectively.

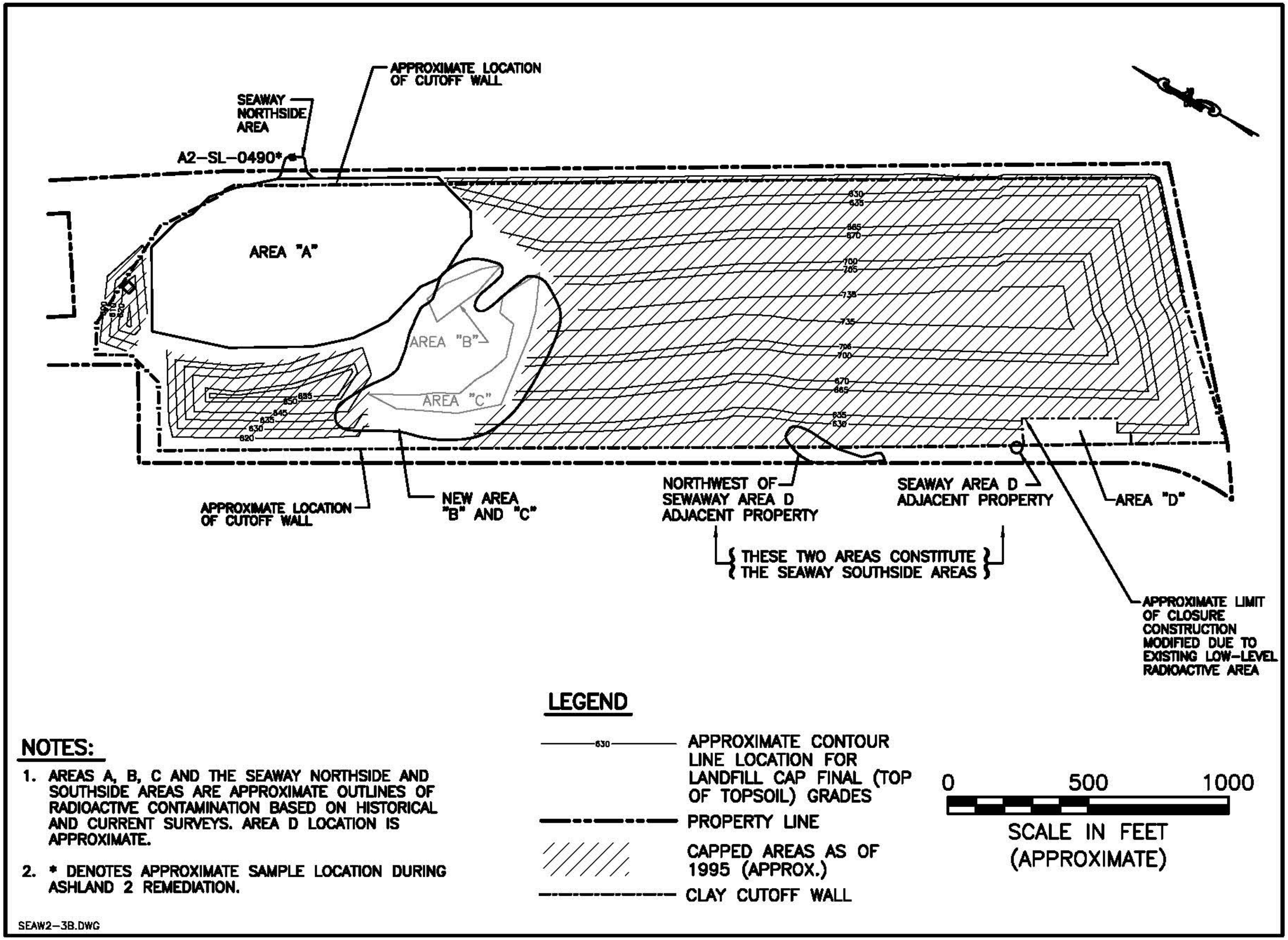

FIGURE 2-3

SEAWAY PROPERTY CONTAMINATION BASED ON HISTORICAL AND CURRENT SURVEYS

As discussed in Appendix A, historical photographs of this area before and during construction of the Ashland 1 tanks were used with the available data to estimate the possible areal extent of the MED/AEC-related contamination. The estimation of the extent of contamination using the historical photographs was done by comparing the locations of the elevated radiological results to visual features on the photograph. A correlation was found between elevated results and areas on the photograph where there appears to be little or no vegetation and where there appears to be material spread out over an area due to manually spreading or due to erosion. This same type of correlation was found during the Seaway Areas A, B and C investigations conducted by USACE in 2001. Based on those assessments, the areal extent of contamination is estimated to be approximately 19,800 sq. ft., which amounts to approximately 733 yd^3 of material assuming an average thickness of 12 inches. This areal extent of contamination is shown in Figure 2-3 where approximately 47% (~9,230 sq. ft.) of the material is located within the area covered by the leachate collection system while 53% (~10,570 sq. ft.) is located outside the leachate collection system. Also, the assumed lens of material is projected out approximately 100 feet from the slurry wall into the landfill area. Excavation of this material would impact the closed portion of the landfill and would have to be factored into the costs associated with any removal remedial alternatives.

2.2.5 Seaway Northside Findings during Ashland 2 Remediation

During remediation of the Ashland 2 area, contaminated materials were found up to the Seaway property line. All of the material was remediated up to within seven feet of the Seaway property as discussed in the report contained in Appendix B. The remaining contaminated material appeared to be the result of surface runoff from Seaway Area A into the drainage system leading into Rattlesnake Creek. Therefore, the remediation of this material is being included as part of the Seaway remedial action and is shown as Seaway Northside in Figure 2-3. A sample of the material, as reported in Appendix B, showed Ra-226 and Th-230 concentrations of 14 and 396 pCi/g, respectively. These concentrations are greater than the UCL_{95} concentrations used in assessing the risks for Area A assuming no action, as discussed in Section 2.2.7. Based on the limited data, for volume estimating purposes, the material to be excavated was assumed to be an 8 foot wide by 72 foot section on the Ashland 2 property and from the property line to the Seaway landfill clay containment cutoff wall.

2.2.6 Contaminants of Concern, Seaway Site

The 1993 BRA determined that the radiological MED/AEC-related contaminants of concern for the Tonawanda soils were Ra-226, Th-230 and U-238 and their associated decay products. The BRA also identified other MED/AEC-related radiological materials that, during the site wide screening process, were determined not to be contaminants of concern, but were included in the risk assessments since they were MED/AEC-related. These radionuclides were the Th-232 and U-235 series. USACE updated the risk assessment for the current situation using additional data made available by the USACE investigations in 1998.

As described in detail in the USACE technical memorandum on modeling risks at the Seaway Site, Areas A, B and C (USACE 2000a), five (5) sources of radiological contamination data were used in assessing radiological risks in Seaway Areas A, B and C. These data included results of radiological characterization by ORNL in 1976 (ORNL 1978), FBDU in 1981 (FBDU 1981), investigations for the RI (BNI 1993), investigations by USACE in 1998 (USACE 1999a), and

USACE estimates of contamination volumes (USACE 1999b). Using these sources of radiological data and, where necessary, estimates in cases where data were not consistently available, a statistical analysis was performed on the data to determine the maximum, minimum, mean and upper 95 percent (%) confidence level (UCL_{95}) on the mean concentrations for each radionuclide for Area A and for Areas B and C. The UCL_{95} is the concentration, when calculated repeatedly for randomly drawn subsets of site data, equals or exceeds the true mean concentration 95 percent of the time.

The background concentrations for each radionuclide were subtracted from the UCL_{95} concentrations and the resulting concentrations were used in the assessment of radiological risks. In the assessment, the radionuclides with UCL_{95} concentrations above background at one or more locations or depths in Areas A, B and C include: U-238, U-234, Th-230, and Ra-226 from the U-238 decay series; and U-235, Pa-231, and Ac-227 from the U-235 decay series; and Th-232.

Although not identified as MED/AEC-related COCs in the BRA, USACE also included the Th-232 and U-235 series radionuclides in the risk assessment to provide for a conservative radiological assessment that addressed all radionuclides that were identified above the background levels, as was done in the BRA. USACE's risk assessment at that time did not conclude that the MED/AEC-related contaminants of concern identified in the BRA should be revised. However, USACE conducted a third risk evaluation using data collected from the additional investigations conducted in 2001. This evaluation was to assess whether the previous BRA and USACE risk assessment findings were still valid and whether any additional radionuclides should be designated as COCs. The results of that evaluation are presented in Appendix C to this Addendum. Results show two additional radionuclides, uranium decay products actinium-227 (Ac-227) and protactinium (Pa-231), are also COCs. Therefore, the COCs for Seaway are now radium-226 (Ra-226), thorium-230 (Th-230), and Total Uranium (U_{total}) where U_{total} includes, through the correlations presented in Appendix C, contributions from Ac-227 and Pa-231.

The MED/AEC-related materials located in Seaway Southside are the same type residues found in Seaway since the residues were originally moved from the Ashland 1 Area to Seaway. The contaminants of concern identified for Areas A, B and C are the same for Seaway Southside.

Because the Niagara Landfill has been used for waste disposal for many years, a wide range of chemical contaminants are expected to exist in the filled areas. No chemical characterization of the solid waste landfill area was performed for non-radiological contaminants in the landfill area since they are assumed to be present. As shown in Table 2-1, waste reported to have been disposed at the landfill ranges from garbage to fly ash to industrial sludges, solvents, and wastes. As described in Section 1.1, USACE will not remediate any radioactive or chemical contamination that is not MED/AEC-related or is not mixed or commingled with MED/AEC-related contamination. Any MED/AEC-related materials commingled with chemical hazardous substances could possibly be considered radiological waste commingled with RCRA hazardous waste should the hazardous substance fail the RCRA hazardous waste characteristic tests. A limited number of samples taken during the 2001 investigation where subjected to the hazardous waste characteristics tests. The results indicated the materials were not RCRA hazardous.

2.2.7 Risk Assessment

Note the following discussion describes basic methodologies and results for the 1993 baseline risk assessment (BRA, DOE 1993a) and the 2000 supplemental evaluation (USACE 2000a). USACE conducted a third evaluation using data collected in 2001, as described in detail in Appendix C. Results corroborate the general finding and conclusions of the prior two assessments and are primarily used by this Addendum to generate final COC concentration limits - see Appendix C for additional details

The NCP defines human health risks in terms of lifetime excess cancer risks to an individual. The NCP establishes an excess upper bound cancer risk to an individual between 10^{-4} and 10^{-6}.

For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

Risk = CDI x SF

where: risk = a unitless probability (e.g., 2×10^{-5}) of an individual's developing cancer
CDI = chronic daily intake averaged over the exposure duration (mg/kg-day)
SF = slope factor, expressed as $(\text{mg/kg-day})^{-1}$.

These risks are probabilities that usually are expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure (RME) estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual's developing cancer from all other causes has been estimated to be as high as one in two (American Cancer Society 1999). USEPA's (or CERLCA's) target risk range for generally acceptable site-related exposures is 10^{-4} to 10^{-6}.

A BRA (DOE 1993a) was performed for the Tonawanda FUSRAP sites including an evaluation of the Seaway landfill. After the BRA was completed, additional risk calculations were performed by USACE as presented in *Technical Memorandum – Modeling of Radiological Risks from Residual Radioactive Materials Following Implementation of Remedial Alternatives for Seaway Landfill Areas A, B, and C, Tonawanda, New York* (USACE 2000a). Both assessments considered the most likely current and potential future receptor (recreational), although the BRA defines this individual as either an adult or child transient and the USACE assessment considers an adolescent. As discussed in Section 3.1.1.2, USACE has also defined industrial workers as members of the critical group, or the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances based on the current and planned land uses surrounding the site. Remediation goals are based on exposures to the critical group even though recreational is the more plausible scenario for Seaway.

Other differences are due to revisions to the RESRAD dose/risk modeling code used in both assessments. Relevant specific revisions include updates to the external pathway model (in 1995) and to the cancer slope factors (in 1996). The USACE assessment was not an update to the BRA.

Rather, it was an independent evaluation of risk scenarios specific to Seaway (the BRA assessed risk for all of the Tonawanda FUSRAP sites) using limited additional data and statistical tools to refine exposure point concentration (EPC) estimates. Specific details are presented in the following text.

Note that the concept of a RME can be applied to EPCs, receptor-specific parameters (e.g., exposure duration), and groups of receptors (e.g., recreational versus industrial). For the BRA and the USACE assessment all three of these concepts are applied so that a risk assessment using RME concentrations, RME parameter values, and the RME receptor compounds conservatism and likely result in an overestimates of risk. USACE assessment of risk is primarily limited to MED/AEC-related contaminants and, in addition to assessing radiological risk of these contaminants, also addresses any non-radiological concerns (e.g., chemical hazard of uranium).

Finally, estimates for both radiological dose [in millirems per year (mrem/yr)] and carcinogenic risk are presented in the BRA and USACE assessment and are herein summarized. Dose results may be compared to appropriate ARARs, if any, or other limits while risk results may be compared to the CERCLA target risk range of 10^{-6} to 10^{-4}.

Exposure Point Concentrations. Assessment-specific EPCs are presented in Table 2-2 from the BRA and Table 2-3 from the USACE assessment. Note that the BRA considered both mean and RME EPCs while the USACE assessment considered only RME concentrations. For EPC development, RME concentrations are defined as the smaller of the maximum results and the upper 95% confidence limit of the mean concentration (UCL_{95}). Both assessments subtract average background concentrations in the EPC development. Finally, it is noted that the BRA divided the source term into surface and subsurface strata while the USACE assessment combined results for all depths. Overall the USACE assessment produces more conservative EPCs compared to either the BRA's surface or subsurface intervals. Also note that Th-232 was included in the both assessments to provide for a conservative radiological assessment that addressed all of the radionuclides that were identified above the background levels found in earlier site investigations.

Receptor Assumptions. Risk calculations in both the BRA and the USACE assessment were performed using the RESRAD computer code and cancer slope (and radiological dose) factors available at the time of the respective calculations. To the extent possible the USACE assessment utilized site-specific exposure parameters from the BRA, but some specific differences in the dose models are noted. For example, the BRA evaluated both central tendency (CT or mean) and RME receptors while the USACE assessment did not. The BRA also considered a transient receptor using CT and RME exposure parameters while the USACE assessment utilizes a single set of exposure parameters. However, these differences are easily addressed by comparing side-by-side risk estimates, as shown in Table 2-4, for similar receptors (i.e., the recreational receptor since the BRA did not address the industrial receptor). Table 2-4 presents both CT and RME exposure parameters for both the BRA and USACE assessment.

Both assessments consider dust inhalation, soil ingestion, and external gamma radiation as complete exposure pathways. Exposure to radon is not included in final risk summaries (although the BRA does evaluate the pathway) and the recreational receptor is assumed to drink water from off-site sources only. Similarly, the recreational receptor does not hunt or fish on the property and does not ingest on-site fauna. These assumptions are considered reasonable given the landfills past operations and given that site characteristics will likely remained unchanged well into the foreseeable future.

USACE also evaluated the radiological consequences should materials from Area A be transported to adjacent properties through erosion or other means. This evaluation assumed that no actions are taken at the site and the MED/AEC-related materials currently in Area A that are at or near the surface could easily transport to the adjacent property. To assess this scenario, USACE assumed that the possible residual concentrations on adjacent property could be similar to the radiological conditions that exist in Area A. Also, the adjacent property could be used for industrial or commercial development. As a conservation assessment of the impacts should the materials be transported to the adjacent property, USACE used the source term for Area A and assumed an industrial worker receptor, considered an average member of the critical group as defined by Criterion 6(6).. This receptor would be exposure for 8 hrs/d for 250 days per year over a 25-year period. The worker has a soil ingestion rate is 50 mg/d and an inhalation rate of 20 m^3/day, otherwise the exposure parameters are the same as with the USACE recreational receptor. As with the transient/recreational receptor, complete exposure pathways include dust inhalation, soil ingestion, and external gamma radiation.

Risk Summary. Table 2-5 summarizes risk and dose estimates from both the BRA and the USACE assessment in 2000. USEPA guidance requires that the modeling include what is called an RME scenario. For current land uses this RME receptor is defined as a recreationist such as a child playing frequently at the Site. The exposure to this receptor was modeled using RESRAD software (Yu 1993) and the results, as presented in Table 2-5, predicted that exposure would exceed the NCP's range of acceptability for the Seaway property. The BRA estimates an RME risk of 2.4×10^{-4} for the Seaway transient while the USACE RME risk for the recreational receptor is 3×10^{-4}. The industrial risk is estimated to be 2×10^{-3} and, like the RME transient/recreational risks presented in Table 2-5, exceeds the CERCLA target risk range and are considered to be conservative since these results reflect current conditions at the site, which is an incomplete closure cover over Seaway Areas A, B and C. The USACE evaluation of the re-baseline risks found that the recreational risk was 1×10^{-4} and is within the acceptable CERCLA risk range. These results support the carcinogenic risk assessment findings that, under baseline conditions, potential current and future receptors may be exposed to contaminants in excess of health based standards.

Table 2-2. Seaway Area A Source Term from 1993 BRA

Analyte [a]	Units	Surface Soil [b]		Subsurface Soil [b]	
		Mean EPC	RME EPC	Mean EPC	RME EPC
Radium-226	pCi/g	3.23	5.68	2.76	3.99
Thorium-230	pCi/g	1.13	2.50	26.3	61.3
Thorium-232	pCi/g	0.00	0.08	4.64	0.38
Uranium-238	pCi/g	3.35	9.65	4.64	7.67

[a] Equilibrium assumed with associated decay products. Uranium-235 assumed to be present at 5% or U-238 concentration.
[b] Values presented after subtracting average background concentrations as per the 1993 BRA.
EPC = exposure point concentration
RME = reasonable maximum exposure concentration; smaller of the maximum result and the upper 95% confidence limit on the mean concentration

Table 2-3. Seaway Area A Source Term from 2000 USACE Assessment

Analyte [a]	Results > Detection Limit	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Mean (pCi/g)	UCL_{95} (pCi/g)	RME EPC (pCi/g) [b]
Radium-226	248/251	0.12	140	7.5	8.8	7.7
Thorium-230 [c]	250/251	0.0	2800	130	160	160
Thorium-232	93/125	0.50	21	1.5	1.7	0.50
Uranium-238	84/180	0.030	74	11	12	8.9

[a] Where analytical results are not available: Ac-227 = 1.02 × Ra-226; Pa-231 = Ac-227; Pb-210 = Ra-226, Ra-228 = Th-228 = Th-232; U-234 = U-238, U-235 = 0.046 × U-238. All values rounded to two significant digits.
[b] Smaller of UCL_{95} and maximum detected value minus background using the following background concentrations: Ac-227, Pa-231 and U-235 = 0.14 pCi/g; Pb-210 and Ra-226 = 1.1 pCi/g; Ra-228, Th-228 and Th-232 = 1.2 pCi/g, Th-230 = 1.4 pCi/g, and U-234 and U-238 = 3.1 pCi/g.
[c] Includes combination of analytical data and estimated values using multiplication factor. Gross Th-230 = 20.188 × (Ra-226 – 1.1) + 1.4 based on regression analysis.
EPC = exposure point concentration; considered the RME concentration.
RME = reasonable maximum exposure.
UCL_{95} = upper 95% confidence limit on the mean concentration.

Table 2-4. Comparison of Recreational Parameters

Parameter	Units	1993 BRA		2000 USACE	
		CT Values	RME Values	CT Values	RME [a] Values
Exposure time outdoors	hr/yr	250	250	150	250
Exposure duration	yrs	6	24	9	24
Inhalation rate	m^3/hr	0.83	1.4	1.4	1.4
Dust loading	$\mu g/m^3$	30	30	30	30
Soil ingestion rate	mg/d	50	100	100	100

[a] Scaled to match 1993 BRA RME.
BRA = Baseline Risk Assessment.
CT = central tendency (i.e., mean).
RME = reasonable maximum exposure.
USACE = U.S. Army Corp of Engineers.

Table 2-5. Baseline Risk and Radiological Dose Summary

Parameter	1993 BRA Transient [a]		2000 USACE Recreational		USACE 2000 Industrial Worker
	CT	RME	CT	RME [b]	
Dose (mrem/yr)	0.13	13.4	12	53	110
Risk [c]	6.8×10^{-7}	***2.4* x 10^-4^** $\boldsymbol{2.4 \times 10^{-4}}$	6×10^{-5}	$\boldsymbol{3 \times 10^{-4}}$	$\boldsymbol{2 \times 10^{-3}}$

[a] Future use scenario from BRA Table 3-2 for dose and Table 5-1 for risk (DOE 1993).
[b] Scaled from CT using RME exposure frequency and exposure duration from BRA receptor;
Scaling factor = (250 hr/yr ÷ 150 d hr/yr) × (24 yr ÷ 9 yr) = 4.44
[c] Values that exceed target risk range of 10^{-6} to 10^{-4} are presented with ***bold italics***.
CT = central tendency (i.e., mean).
RME = reasonable maximum exposure.

2.2.8 Radon

Risks from radon inhalation are normally reported separately from other pathways and not summed into the total. This is because significant exposures do not occur except inside buildings and the concentration inside buildings is highly variable depending upon how well the building floor is sealed, how well the building is ventilated, and the permeability of the soil underlying the building.

40 CFR Part 192, Subpart A and 10 CFR Part 40, Appendix A, Criterion 6(1) prescribe that controls shall be designed to provide reasonable assurance that releases of Rn-222 from residual radioactive material to the atmosphere will not exceed an average release rate of 20 pCi/m^2/s. The assessment showed that only the no cover scenarios fail to meet the radon flux standards for Seaway Area A. The assessment also concluded that the cover applied over Area A would need to be a minimum of 4½ to 6 feet to account for cover erosion and still meet the standard in year 1,000 if no MED/AEC-related material is removed. For the removal alternatives, no cover material is necessary for Areas A, B, and C to meet the Rn-222 outdoor flux standard.

NYSDEC conducted radon measurements of the landfill gas that, at that time, was collected in the southern portion of the Niagara Landfill and conveyed to the flare (NYSDEC 1996). NYSDEC used the measured radon concentrations, measured gas flow rates and operating conditions in the flare to estimate radon concentrations in the gas flow from the flare stack after combustion. NYSDEC then used a NYSDEC dispersion model to estimate potential ambient air quality impacts of the radon emitted with the gas stream from the flare and found the impacts to be negligible (NYSDEC 1996).

USACE also conducted an assessment of potential air quality impacts of radon in landfill gas from Seaway Areas A, B and C (USACE 2000b). This assessment was conducted to assess potential radon impacts in the event that passive venting of landfill gas or collection of landfill gas is required in association with capping Seaway Areas, A, B and C under Alternatives 4 or 6. The Alternative 4 evaluated in this assessment is considered a conservative scenario and the results bounding for the current Alternative 4 scenario. The scenario evaluated involved only removing the top 4 feet of material thus leaving behind more materials than the current scenario where all of Area A is removed and material from Area C removed that is not already beneath 10 feet or more of landfill material. The results of the assessment were compared to the standards of 40 CFR Part 192, Subpart A, which limit Rn-222 annual average impact at or above the property line of a UMTRCA site to 0.5 pCi/L. The assessment concluded that this standard would be met in the case where landfill gas from Areas A, B and C is collected and conveyed to the existing gas collection system at the landfill and is directed to the existing landfill gas flare. As described in Section 2.3.2, active collection of landfill gas and the use of the landfill gas flare was discontinued in October 2000 with NYSDEC approval. The assessment also concluded that the 0.5 pCi/L standard would be met in the case of construction of multiple passive landfill gas vents as part of capping Areas A, B and C as long as the vents are constructed at the proper height above the cap and at the proper distance from the property line. See USACE 2000b for the details of this assessment. The additional volume of MED/AEC-related materials found in Seaway Southside (approximately 736 yd^3 total with approximately 392 yd^3 outside of the area covered by the leachate collection system represents less than 1.5% of the total volume of material assessed in Areas A, B and C. Also, this material is under 10 to 30 feet of landfill material with little to no landfill refuse beneath it and is located approximately 100 feet from the closest landfill vent. Considering the small amount of material, its location relative to the current landfill vents, and the amount of material over the contaminants, USACE believes qualitatively that this material does not impact the conclusions of the radon assessment.

2.3 Landfill Details and Closure Update

The Niagara Landfill ceased taking landfill material in 1993 and landfill closure was completed in 1995 (Erk 1998). Figure 2-4 shows closure conditions. In the following sections, relevant details of subsurface conditions and landfill construction are described, followed by a detailed description of conditions at closure.

2.3.1 Subsurface Conditions, Cutoff Wall and Leachate Collection System

As described above, an application for permitting the Niagara Landfill was submitted to the NYSDEC in 1979. In 1983, a Part 360 application for renewal and modification to the existing permit was submitted to the NYSDEC (RECRA Research 1983). The modification included expansion at the landfill into the southeastern portion of the landfill area, referred to as the former Lefler property and an increase in the landfill height. Also proposed were perimeter berms for the base of the landfill and a leachate collection system. As an integral part of the leachate collection system, a compacted clay cutoff wall was proposed at the perimeter of the landfill extending downward to be keyed into the clay layer that underlies the Seaway property and its vicinity.

2.3.1.1 Subsurface Conditions

Site Geology

Subsurface conditions at the Seaway Site, including the presence of a clay layer under the property, are described in the 1979 Wehran hydrogeological investigation report for the Seaway landfill (Wehran 1979) and in the 1983 application for permit renewal and modification (RECRA Research 1983). The following summary of the geology of the site is excerpted from the RECRA Research permit renewal and modification application.

"Camillus Shale composes the bedrock unit underlying the site. The unit is encountered at elevations varying from approximately 505 to 545 across the site.

A sandy glacial till was always encountered immediately above the bedrock unit, although thickness ranged from approximately one (1) to nineteen (19) feet.

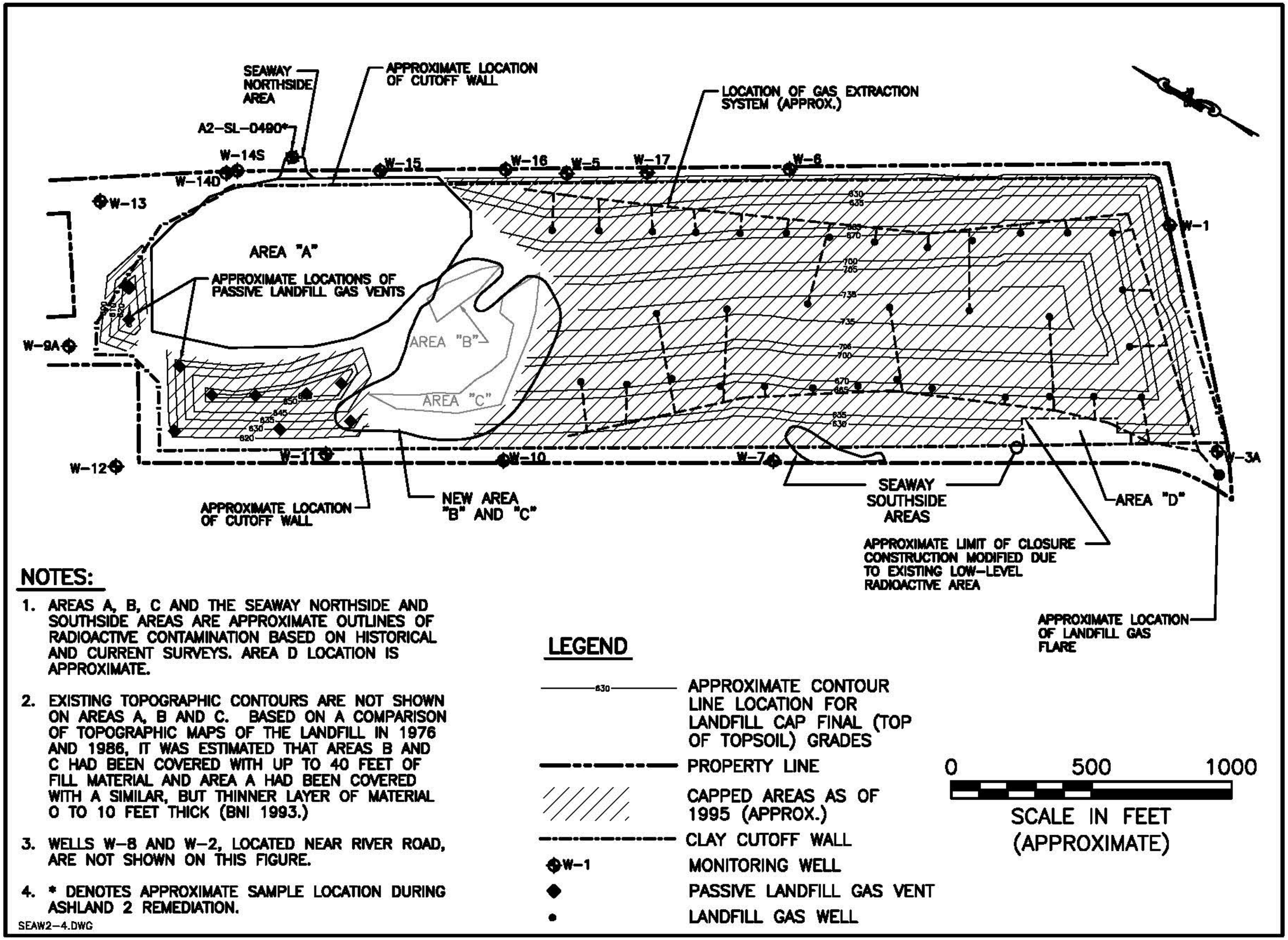

FIGURE 2-4

NIAGARA LANDFILL CLOSURE CONDITIONS

Basal Glaciolacustrine Clay, differentiated from the remainder of the Glaciolacustrine Clay unit by an increase of the frequency and thickness of silt beds and appearance of thin beds of fine sand, often overlaid the sandy glacial till unit with thickness ranging from zero to seven feet.

Glaciolacustrine Clay, ranging in thickness from five to 45 feet, was encountered throughout the site. The typical in situ permeability of this unit was estimated to be 1.6 x 10^{-8} cm/sec, based upon laboratory testing of "undisturbed" Shelby Tube samples.

An Upper Clayey Glacial Till outcrops over the majority of the site (not including man placed fill or waste). The typical in situ permeability of this unit was also determined by laboratory testing to be approximately 1.6 x 10^{-8} cm/sec. It was noted that desiccation has resulted in a network of shrinkage cracks to a depth of ten (10) to twelve (12) feet, which introduces a secondary permeability.

Recent alluvial deposits were found to occur on the property within two stream channels which transect the property in an east-west direction. The southern and larger of the two channels is exposed as it proceeds easterly across adjacent properties, ultimately to join Two-Mile Creek. The valley occupied by the stream is one of moderate relief, with the valley walls being only 15 to 20 feet above the valley floor. Along the eastern property line at the point where the stream valley emerges from beneath the landfill, the alluvial deposits are greater than 16 feet in thickness. The upper 12 feet of the Recent alluvium was generally fine-grained, consisting of dark gray organic clayey silt, underlain by brown silts and clays. The basal five to six feet of the alluvium consisted of gray coarse-to-fine sand of relatively high permeability. The northerly stream channel is considerably smaller in magnitude and in apparent depth of alluvial deposits. The alluvial deposits [in the northerly stream channel] were found to be less than four feet in thickness, and in many respects were similar to the uppermost alluvial deposits found in the larger stream valley."

<u>Site Groundwater</u>

The 1983 RECRA Research permit application cites the 1979 geologic report's conclusions regarding groundwater conditions at the Seaway site prior to the installation of the clay cutoff wall in 1983. The report concluded that there were unconfined groundwater conditions existing across the site within the permeable upper recent alluvial deposits, which underlie the landfill. The report also concluded that leachate from the landfill would eventually become surface water and join the area's surface water drainage system and that downward migration to the deep, confined aquifer of the Camillus Shale, is essentially precluded by the extremely low permeability of the Upper, Clayey Glacial Till and the Glaciolascustrine Clay unit, known as an aquiclude. The average thickness of the aquiclude was reported to be 60 feet and the permeability determined to be approximately 1.6 x 10^{-8} cm/sec. The report estimated that it would take roughly 1,500 years for groundwater to pass through the aquiclude. The report also reported that the deep, Camillus Shale aquifer under the landfill was hydraulically separated from the landfill due to the presence of the aquiclude. As described in detail in Section 2.3.1.2, below, a subsurface clay cutoff wall, keyed into the clay layer that underlies the site, was constructed around the landfill perimeter in 1983. The cutoff wall together with the natural clay layer was designed to preclude leachate releases to the surrounding area.

2.3.1.2 Clay Cutoff Wall and Leachate Collection System

A report prepared by CH_2M Hill in 1984 (CH_2M Hill 1984) summarizes the construction of the clay cutoff wall and leachate collection system that was constructed at the landfill in 1983. In general, the cutoff wall was located inside the property line at a distance of 55 feet. The report notes that the design approved by the NYSDEC required that the cutoff wall have a permeability of 1×10^{-7} centimeters per second (cm/s) or less over a width of 2 ft and that this allowed construction of the cutoff wall using either a soil bentonite (SB) slurry or a compacted clay wall. Most of the cutoff wall was constructed using a SB slurry, except in the northern portion of the landfill, where a compacted clay wall was installed. The depth of the SB cutoff wall varied with site conditions and ranged from 6 to 24 feet below the ground surface. The wall was keyed into the underlying glaciolacustrine clay unit a minimum of 2 feet and the actual thickness of the SB cutoff wall varied from 30 inches to 48 inches, with an average thickness of 30 to 36 inches (CH_2M Hill 1984). The CH_2M Hill report concluded that, based on field and laboratory test results, the permeability of the SB cutoff wall is in substantial compliance with NYSDEC Part 360 guidelines. A similar conclusion was reached for the compacted clay cutoff wall constructed on the north side of the landfill. The approximate location of the cutoff wall constructed in 1983 is shown in Figure 2-3.

A leachate collection pipe system was also installed at the landfill in 1983. This system consists of 6-inch diameter perforated pipe installed inside the clay cutoff wall in a gravel/crushed stone trench surrounded by filter fabric. Lateral leachate collectors were also installed to provide a pathway for leachate to reach the leachate collection pipe. These laterals were installed where leachate seeps were noted during construction, and where the collection pipe was not in direct contact with the landfilled waste, at 200 foot intervals. The perimeter leachate collection pipes drain to low spots in the system, on the east and west sides of the landfill. Leachate collected at these locations is pumped northerly to high points in the system, with flow continuing northerly by gravity to a metering manhole located on the northern portion of the landfill property. Flow from the metering manhole is conveyed to the Town of Tonawanda municipal wastewater collection system, which is served by a municipal wastewater treatment plant located nearby.

Figure 2-5 shows leachate collection system details. As shown in Figure 2-5, pump station No. 1 is located on the east side of the landfill. Leachate collected at this location is pumped northerly approximately 500 feet to the leachate pipeline, where flow is northerly by gravity. Pump station No. 2 is located on the west side of the landfill. Leachate collected at this point is pumped northerly about 1,250 feet to the leachate pipeline where flow is northerly by gravity. The leachate flows in the easterly and westerly branches of leachate pipeline system join at the north side of the landfill, is directed to the metering manhole and then flows by gravity to a manhole in the Town of Tonawanda sanitary sewer system along River Road. Pump Station No. 3 conveys leachate from the northeastern corner of the landfill (the formerly Lefler property) to the gravity pipe along the southern and western perimeter of the landfill, which ultimately discharges to pump station No. 2.

A schematic detail of the clay cutoff wall and the leachate collection pipe is shown in Figure 2-5.

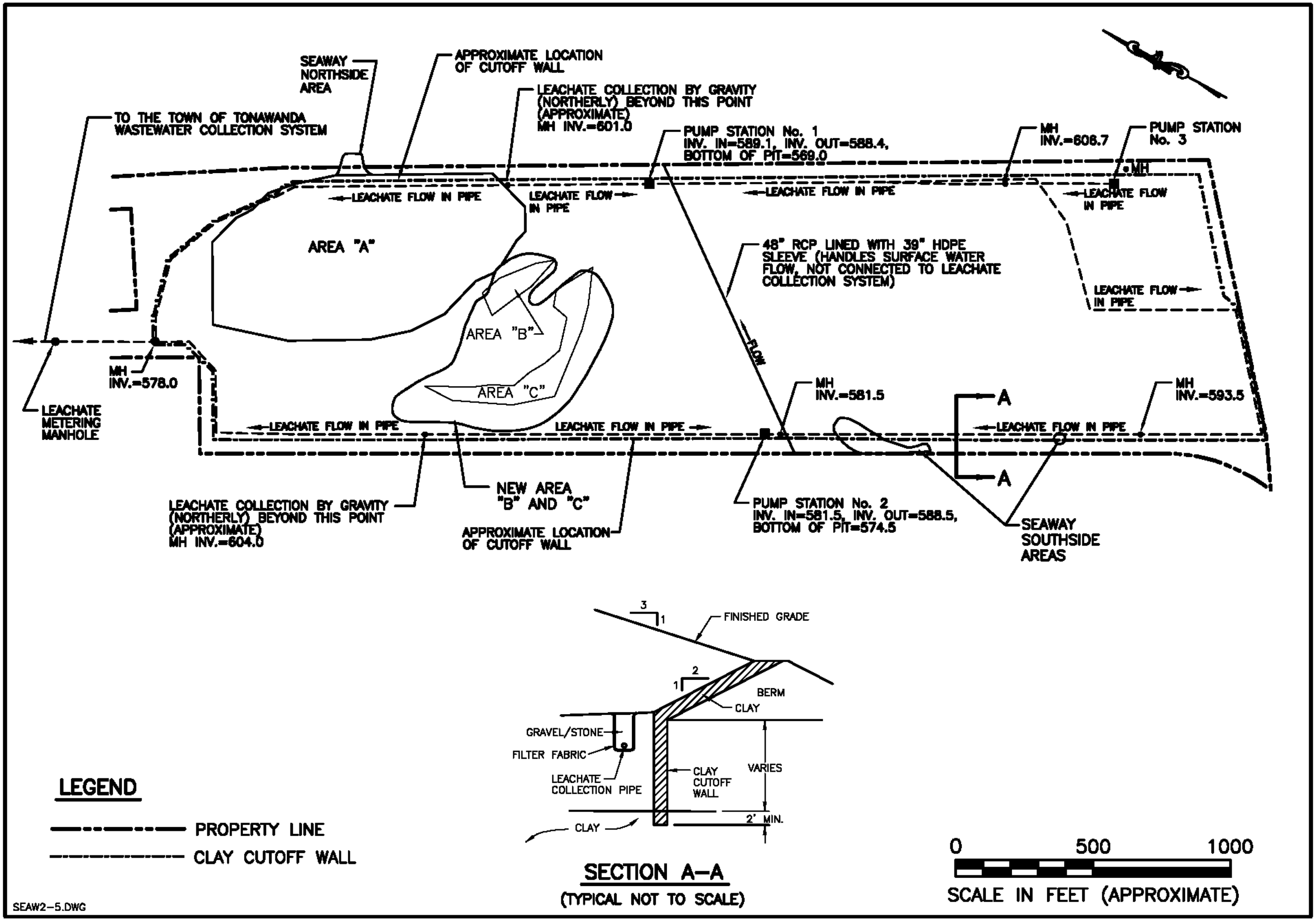

FIGURE 2-5

NIAGARA LANDFILL LEACHATE COLLECTION SYSTEM DETAILS

2.3.2 Landfill Closure Details

A landfill closure plan was submitted to NYSDEC by Goldberg-Zoino Associates (GZA) in September 1988. The closure plan proposed construction of perimeter containment berms around the landfill, emplacement of a low-permeability cap with vegetative cover (excluding capping of the radiological contamination areas A, B, C and D, pending decision/actions by the federal government), development of site drainage, and installation of a gas venting system.

Landfill closure activities began in 1990. Low permeability perimeter berms were constructed around the landfill to contain leachate and provide slope stability. Berms, extending 10 feet above the ground surface, were constructed around most of the landfill perimeter at most locations. The interior slopes of the berms (the landfill side) are designed with a 2-foot thick clay liner connected to the clay cutoff wall (GZA 1995). Where the berm is not constructed in the northeast corner of the landfill, the landfill cap was designed to be connected directly to the clay cutoff wall. The landfill cap consists of 24 inches of low-permeability clay, covered by 6 inches of topsoil seeded with grassy vegetation[1]. The cap was installed from June 1990 to December 1994. Total landfilled area prior to closure was about 89 acres. The total capped area is about 68 acres including two capped areas in the northern portion of the landfill, comprising about 8 acres and about 60 acres in the southern portion of the landfill. The approximate extent of the cap is shown in Figure 2-4. The remaining 21 acres are uncapped, consisting of Areas A, B and C (approximately 12 acres) and areas between Areas A, B and C.

Installation of the gas collection system began in 1995. The gas collection system consists of 34 extraction wells located in the southern portion of the landfill. The extraction wells are 6 inches in diameter, perforated plastic, and extend to 1-foot above the bottom of the landfill. Pipelines run from the wells to a set of blowers. The blowers are designed to draw landfill gas to a flare, where combustible gases are burned. The flare system was authorized under NYSDEC Permit # 9-0464-00184/00001. Operation of the gas collection system began in February 1996. With NYSDEC approval, active gas collection and use of the flare were discontinued in October 2000. Passive landfill gas vents are installed in the two capped areas in the northern portion of the landfill. These vents are not connected to the landfill gas collection system. The approximate locations of the gas collection system, flare and vents are shown in Figure 2-4.

2.3.3 Landfill Post Closure Monitoring

In December 1996, the landfill operator submitted a letter to NYSDEC indicating that all construction activities related to the closure of the Niagara Landfill were completed. Landfill post-closure O&M is specified in Part 360, Title 6, of the Official Compilation of Codes, Rules

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[1] Under NYSDEC landfill regulations, 6 NYCRR Part 360, landfills having an approved closure plan and that ceased accepting waste before October 9, 1993 must meet the closure and post-closure requirements of the regulations that were in effect prior to October 1993. This is the case at the Niagara Landfill. The current regulations for landfills operating after October 9, 1993 specify capping design based on whether or not the landfill is lined and whether the soils under the landfill have a coefficient of permeability of 1×10^{-7} cm/s or greater. Where underlying soils have a permeability less than 1×10^{-7} cm/s, the current regulations require a landfill cover designed as follows: a gas venting layer, a minimum of 12 inches thick below a low permeability barrier soil cover; the gas venting layer must be separated from the low permeability barrier soil cover and the bottom soils by a filter layer; the low permeability layer placed over the gas venting layer must have a minimum compacted thickness of 18 inches and must have a maximum permeability of 1×10^{-7} cm/s; a barrier protection layer of soil not less than 24 inches thick must be installed on top of the low permeability barrier soil cover; a topsoil layer, capable of supporting vegetative growth and a minimum of 6 inches thick, must be placed over the barrier protection layer; synthetic/geosynthetic landfill cover components may be used in lieu of natural materials, subject to NYSDEC approval; gas venting or gas collection is required.

and Regulations of the State of New York, Section 360-2.15. The post-closure period is defined as a minimum of 30 years, or as long as leachate is capable of adversely impacting the environment. Post-closure activities include maintenance of drainage control structures, gas venting structures, soil cover integrity, slopes, cover vegetation, environmental and facility monitoring points, and the leachate collection system. Annual baseline and quarterly routine monitoring must be performed at groundwater, surface water, and leachate sampling points. A post-closure registration report must be submitted every five years certifying that the facility complies with all applicable closure and post-closure criteria.

An Environmental Monitoring Plan (EMP) was prepared for the Niagara Landfill by Recra Environmental, Inc., and approved by NYSDEC on November 5, 1990. The EMP was implemented to “detect changes in groundwater and surface water quality that may potentially occur as a result of operations at the facility”. Annual baseline, and quarterly routine, monitoring of 17 groundwater wells, 6 surface water stations, and leachate generated by the landfill is specified in the EMP. Analytical reports from EMP sampling activities are on file at the Buffalo NYSDEC office.

The 1997 *Niagara Landfill Post Closure Monitoring and Maintenance Operations Manual and Contingency Plan* (GZA 1997) includes the EMP described above, describes the environmental monitoring procedures, outlines operational procedures for the gas system, documents contingency plans for the leachate collection system and gas system, outlines other maintenance activities, and provides design details of the landfill gas collection system and the landfill gas flare. This document was used by USACE to develop the descriptions of the gas system and locate the gas system components shown in Figure 2-4, locate the monitoring wells shown in Figure 2-4, and locate the pump stations shown in Figure 2-5.

2.3.4 Monitoring Results

2.3.4.1 Landfill Leachate

Leachate from the Niagara Landfill leachate collection system is discharged to the Town of Tonawanda municipal wastewater collection system from the leachate metering manhole located on the north end of the landfill under Permit No. 355, with an authorized discharge of approximately 32,000 gpd.

In the period 1995 through 1999, daily average leachate flow was as shown in Table 2-6 (BFI 2000a). The discharge permit issued by the Town does not address effluent limitations for radionuclides. Under the environmental monitoring plan approved by NYSDEC, annual landfill leachate testing is conducted for a number of parameters, including gross alpha and gross beta radiation.

Table 2-6 Leachate Flow Rates - Niagara Landfill

Year	Gallons Per Day (average)
1995	44,500
1996	26,900
1997	30,600
1998	34,000
1999	24,200

Some of the earlier test results are listed below.

Table 2-7 Earlier Leachate Monitoring Results - Niagara Landfill

Date	Niagara Landfill – Leachate from the Metering Manhole	
	Gross alpha (pCi/L)	Gross Beta (pCi/L)
August 1999	11.3	121
November 1998	30.86 14.31 (Duplicate)	139.67 139.72 (Duplicate)
August 1997	30	130
May 1995	<2	170(±20)
May 1992	12(±10)	13(±20)

The permit does not address effluent limits for radionuclides and there are no data available regarding radionuclide concentrations in landfill leachates for USACE to use in assessing whether the presence of MED/AEC-related materials in the landfill have had significant impact, if any, on the leachate. Therefore, USACE assessed the leachate results against what other radiological industries are allowed to discharge to sanitary sewers to see if there are any potential problems. There are regulatory limits specified by Nuclear Regulatory Commission (NRC) for discharges of specific radionuclides from licensed facilities to sewer systems, as well as gross alpha and gross beta activities when the radionuclides are not known. These NRC limits are specified in 10 CFR Part 20, Appendix B. Although the landfill is not an NRC licensed facility, these standards would be suitable to use for evaluation of the Seaway leachate results since they specifically address releases to sewers. The radionuclides of concern for the MED/AEC-related materials are Ra-226, uranium and Th-230, which are naturally occurring alpha emitters. NRC's monthly average concentration limits for discharges to sewer systems for Ra-226, uranium and Th-230 are 600 pCi/L, 3,000 pCi/L, and 1,000 pCi/L, respectively. Although isotopic data does not exist for the earlier leachate results presented above to assess what portion of the gross alpha readings were associated with Ra-226, uranium and Th-230, the data does indicate that the total alpha activity is well below the limits specified for Ra-226, uranium and Th-230. Isotopic data does exist for one leachate sample collected in 1993. The results for the Ra-226, U-238 and Th-230 were 9.5 pCi/L, 6.1 pCi/L, and 12.2 pCi/L, respectively. These results, as well as the more recent isotopic results summarized in Table 2-8 further illustrate that the concentrations of radionuclides similar to the MED/AEC-related radionuclides (i.e., Ra-226, uranium and Th-230) are well below NRC's regulatory limits for discharges to sewage systems which further supports the modeling results from the summer investigation which concluded that the MED/AEC-related materials in Areas A, B and C would have little to no impact on the leachate system. Based on this information, USACE has concluded that the landfill leachate at the Seaway site is not being significantly impacted by radionuclides similar to the MED/AEC-related contamination located in Seaway Areas A, B and C, Seaway Northside and Seaway Southside under current uncapped conditions in those areas.

2.3.4.2 Landfill Gas

As described in Section 2.3.2, the southern portion of the Niagara Landfill is equipped with a landfill gas collection system designed to convey collected gas to an enclosed landfill gas flare located near the southwest corner of the landfill property.

In October 1996, NYSDEC conducted sampling of landfill gas from the closed (southern) portion of the landfill and reported a total gas flow of 1,200 ft^3/min (NYSDEC 1996). During subsequent sampling by NYSDEC in January, April and July 1997, the gas flow rate was reported to be reduced, with the July 1997 gas flow rate about 860 ft^3/min (NYSDEC 1998a). Based on data available from Browning-Ferris Industries (BFI 1999), 1998 gas flow from the southern portion of the landfill averaged about 733 ft^3/min and about 706 ft^3/min in 1999 (BFI 2000b).

NYSDEC conducted an assessment of potential air quality impacts of radon in landfill gas that was collected in the southern portion of the landfill and conveyed to the landfill gas flare (NYSDEC 1996). USACE conducted an assessment of potential air quality impacts of radon in landfill gas from Seaway Areas A, B and C (USACE 2000b). The findings of the NYSDEC and USACE assessments are briefly summarized in Section 2.2.8. As noted in Section 2.3.2, active gas collection and use of the landfill gas flare were discontinued with NYSDEC approval in October 2000.

2.4 USACE's Conclusions Concerning Potential for Adverse Impacts to Groundwater Related to MED Material

As described in Section 2.3.1.2, the landfill has a leachate system which collects leachate from the entire landfill base, as required by State regulations. This system would collect leachate, if any, from the MED/AEC-related wastes in the landfill as well. The landfill is currently in the post-closure monitoring and maintenance phase of landfill closure and the 30-year post-closure monitoring of the landfill includes analysis of leachate and groundwater samples for radioactive constituents. The MED/AEC-related wastes in the landfill are residues from processing for uranium removal at the Linde site, including treatment to remove soluble constituents. The remaining residues transported to the landfill area are highly insoluble and not subject to significant leaching. Any leachate potentially generated from the MED/AEC-related waste at the

Table 2-8
Seaway Leachate Sampling Results (pCi/L)for Indicated Sampling Dates

	August 23, 2000		January 26, 2001		April 7, 2001		July 24, 2001	
Analytes	**Regular**	**Duplicate**	**Regular**	**Duplicate**	**Regular**	**Duplicate**	**Regular**	**Duplicate**
Gross Alpha	ND	47.03	18.89 J	17.17	20.12 J	35.42	ND	ND
Gross Beta	85.07	144.56	88.23	68.31	91.72	97.23	79.50	84.77
Actinium-228	ND	ND	ND	ND	ND	ND	ND	22.25 J
Bismuth-212	ND	ND	ND	ND	ND	ND	ND	ND
Bismuth-214	ND	ND	31.21 J	ND	ND	ND	26.40 J	30.83
Cesium-137	ND	ND	ND	ND	ND	ND	ND	ND
Cobalt-60	NR	NR	ND	ND	ND	ND	ND	ND
Lead-212	ND	ND	ND	ND	ND	ND	ND	ND
Lead-214	ND	ND	21.74 J	17.82 J	ND	24.80 J	ND	13.17 J
Protactinium-234m	ND	ND	ND	ND	ND	ND	ND	ND
Radium-226	1.23	1.14	1.59	1.89	2.78	4.51	2.62	3.31
Radium-228	ND	1.43	1.16 J	ND	3.02	3.22 J	1.76	ND
Thallium-208	ND	30.39	ND	ND	ND	17.93 J	24.23 J	ND
Thorium-228	ND	ND	ND	ND	ND	ND	ND	ND
Thorium-230	3.00	0.56 J	ND	0.90 J	ND	0.52 J	0.56 J	0.61 J
Thorium-232	ND	ND	0.57 J	ND	ND	ND	ND	ND
Thorium-234	ND	ND	ND	ND	134.30 J	97.95 J	110.80 J	ND
Uranium-234	5.94	3.98	10.14	8.91	8.4	11.08	3.42	1.32 J
Uranium-235	ND	ND	ND	ND	ND	ND	ND	ND
Uranium-236	ND	ND	NR	NR	NR	NR	NR	NR
Uranium-238	5.38	3.81	10.61	9.80	9.63	11.59	1.83	0.99 J

J = Estimated Value
ND = Not Detected
NR = Not Requested/Not Reported

Seaway Site under current uncapped conditions for Areas A, B and C would be collected in the facility's leachate collection system, which is monitored for radioactive constituents, and discharged to the Town's wastewater treatment facility.

As described in Section 2.3.1.1, the subsurface at the Seaway Site includes two confining clay strata varying in thickness from 45 to 75 feet. The permeabilities of these clay materials is 1.6×10^{-8} cm/s. For comparison, clay specified for liners in landfills must have a hydraulic conductivity not exceeding 1×10^{-7} cm/s. Thus, these natural clays show hydraulic conductivities less than those required for landfill liners (i.e., are less permeable than clay landfill liners). USACE has reviewed these subsurface conditions, the landfill design which includes a clay cutoff wall and a leachate collection system and the results of leachate and groundwater monitoring. USACE has concluded that the landfill leachate at the Seaway Site is not being significantly impacted by radionuclides similar to the MED/AEC-related contamination located in Seaway Areas A, B, and C, Seaway Northside and Seaway Southside under current uncapped conditions (USACE 2002). The 1993 RI and FS concluded that the deep groundwater system beneath the Ashland and Seaway Sites was not impacted by MED/AEC-related materials. The results of the USACE investigation and review of the BFI leachate results support the fact that the leachate system has not been impacted and modeling shows that it will not be significantly impacted, thus it would be unlikely that there can be any impacts to the deep groundwater system. USACE has also concluded that the groundwater at the Seaway Site is not being impacted by MED/AEC-related contamination located in Seaway Areas A, B, and C, Seaway Northside and Seaway Southside under current uncapped conditions, and will not be impacted in the next 1000 years (USACE 2002). USACE concludes that the existing controls provide sufficient protection to prevent any MED/AEC-related material from adversely impacting the groundwater outside of the capped landfill structure. Groundwater is not being used as a source of drinking water at or near the site.

2.5 Overview of Physical and Environmental Conditions at Seaway and its Vicinity

2.5.1 Location, Setting, Topography and Environmental Conditions

As shown in Figures 1-2 and 2-1, the Seaway Site is located off River Road, just south of the Niagara River. Its setting is described as industrial, with the former Ashland Oil Refinery and the Ashland 1 Site located to the southwest, the Ashland 2 Site located to the northeast, and property owned by the Niagara Mohawk Power Corporation abutting its northeast side.

The original topography of the Seaway property has been drastically altered by the landfill, which rises to an elevation of approximately 120 feet above the surrounding area in the portions of the landfill that have been filled to finished grade and capped.

The ridge of the landfill directs surface water runoff to the southwest toward the Ashland refinery property and northeast to the Niagara Mohawk property and Ashland 2. Runoff to the southwest is directed to a drainage ditch along the Seaway/Ashland 1 boundary. Most of the runoff from the northeastern slope of the landfill is directed to the Niagara Mohawk property and Ashland 2 as overland flow into channels at Ashland 2. The southeast runoff enters a small drainage ditch in the southeast portion of Ashland 2 that eventually discharges to Two Mile Creek. Surface water runoff from the middle portion of the landfill drains into Rattlesnake

Creek. The northwestern area of the landfill, which includes the area where MED/AEC-related residues were deposited, drains to a drainage ditch on the southwestern side of Ashland 2 that conveys flows under River Road and discharges to the Niagara River (see Figure 2-1).

Engineering controls are implemented at the landfill to prevent erosion, including seeding and terracing of the steep slopes.

A 4-foot diameter reinforced concrete pipe intersects the Seaway property and passes under the landfill, conveying stormwater flow from a ditch at Ashland 1 northeasterly under the landfill to the Niagara Mohawk property, Ashland 2 and eventually Rattlesnake Creek. (See Figure 2-1). The interior of this pipe was sliplined with a high density polyethylene (HDPE) sleeve in the early 1990's (Tarnawskyj 1999). The HDPE sleeve is 39 inches in diameter. After the sleeve was installed, the annular space between the existing reinforced concrete pipe and the new HDPE sleeve was filled with non-shrink grout. The amount of grout was measured to ensure that the annular space was completely filled (BFI 1996).

Due to its former use as a landfill, the Seaway property supports only sparse vegetation composed of shrubs and grasses. NYSDEC regulations require seeding with native grasses during the closure and post-closure phases of solid waste disposal facilities to slow erosion and promote evapotranspiration. Landfill operations and nearby industrial activity have limited wildlife use of the area, although gulls and crows are present (DOE 1993b). The Seaway Site is not located within a 100-year flood zone and no wetlands have been identified on the site (DOE 1993b). Except for occasional transient individuals, no federally-listed or proposed endangered or threatened species under jurisdiction of the U.S. Fish and Wildlife Service (USFWS) have been sighted in the project area, and no listed or suspected critical habitats occur on the Seaway Site (DOE 1993b). Also, the Seaway Site does not provide adequate habitat for ecological receptors, thus precluding the need to evaluate remedial alternatives based on the protection of ecological receptors. A review of New York State records on archaeological, cultural, and historical resources indicates that none of these resources are close to the project area (DOE 1993b).

2.5.2 Soils and Subsurface Conditions

Soils and subsurface conditions are described in Section 2.3.1.1. As detailed in Section 2.3.1.1, the site is underlain by two confining clay strata, with a combined thickness of between 45 and 75 feet and a permeability of approximately 1.6×10^{-8} cm/sec. These natural clays show hydraulic conductivities less than those required for landfill liners (i.e., are less permeable than clay landfill liners).

USACE has reviewed these subsurface conditions and the landfill design which includes a cutoff wall keyed into the layer of highly impermeable material that underlies the site, and a leachate collection system and concludes that the existing controls provide sufficient protection to prevent any MED/AEC-related material from adversely impacting the groundwater outside of the capped landfill structure.

2.6 Land Use Controls

2.6.1 Zoning

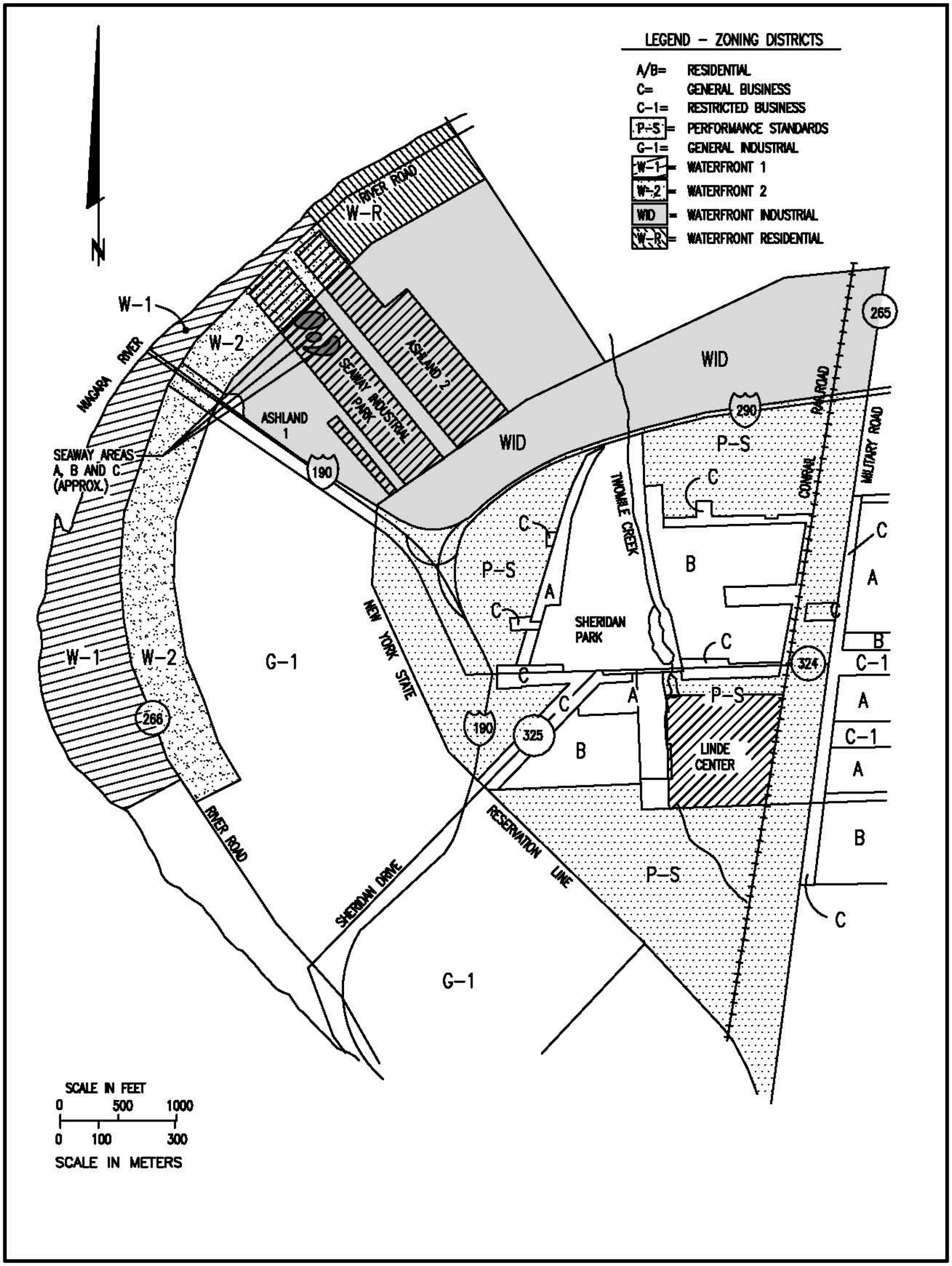
According to the Town of Tonawanda Zoning Map dated April 12, 1982 (last update 09/09/96), the Seaway property encompasses two zoning categories, Waterfront Commercial District (W-2) and Waterfront Industrial District (WID). The portion zoned W-2 is an approximately 1,000 ft wide strip of land that fronts River Road. A reduction in the 1,000 ft wide strip to 500 ft has been proposed (Wendel Duchscherer 2003). The rest of the Seaway property, including most of the landfill, situated south to southeast of the W-2 strip, is zoned WID. Figure 2-6 shows zoning boundaries at the Seaway Site and its vicinity.

The purpose of the W-2 zoning is to "promote and accommodate the development of a mix of uses which are designed to recognize the unique and irreplaceable character of the Niagara shoreline, to encourage appropriate riverfront recreational or commercial use, and to encourage flexibility in design and use of sites within the shoreline area while preserving the unique environmental features and maintaining or reviving the aesthetic qualities of the waterfront area." Land uses permitted with site plan approval in W-2 zoning include public and private parklands, trails, docks, fishing facilities, cartop boat launching facilities, and picnic areas. Land uses requiring special permits include boatyard and storage facilities, visitor centers, hotels, general commercial, automotive stations, travel plazas, business and professional offices, and accessory uses to the preceding uses.

The purpose of the WID zoning is to "accommodate, industrial development of a manufacturing, processing and/or assembly nature, as well as wholesale and warehousing activities without having an unreasonable adverse impact on surrounding land uses and the waterfront region in general, to promote uses that will provide job opportunities and strengthen the town's tax base, and to maintain design objectives of the waterfront region." Land uses permitted with site plan approval in WID zoning include public and private parklands and trails. Land uses requiring special permits include boat storage facilities, offices necessary to business or industry operating within this district, light manufacturing, assembly, wholesale business and storage, warehousing, truck terminals, service or repair of an industrial nature, public utilities, business offices, research facilities, medical professional buildings, and accessory uses to the preceding uses. Prohibited land uses include: residences, junkyards, hazardous/noxious uses, waste transfer or disposal, land mining, stockyards, and "any use which creates any dangerous, injurious, noxious, or otherwise objectionable hazard, noise, vibration, smoke, dust, odor, or other form of pollution; heat, cold, dampness, electromagnetic or other disturbance; glare, liquid or solid waste; or any other substance, condition or element, in such manner or in such amount as to, in the opinion of the Town Building Department, adversely affects the use of surrounding areas or property."

2.6.2 NYSDEC Controls

NYSDEC maintains substantial regulatory control over the Niagara Landfill through its regulations, which are enforceable under the New York State Environmental Conservation Law. These controls are described in the following sections.



SEAF2-6.DWG

FIGURE 2-6 ZONING BOUNDARIES

2.6.2.1 NYSDEC Solid Waste Regulations

A solid waste facility was operated on the Seaway property, therefore subjecting it to the Codes, Rules and Regulations for Solid Waste Management Facilities outlined in 6 NYCRR Part 360. Landfill post-closure operation and maintenance criteria are detailed in Section 360-2.15(K) paragraphs 1 through 9. The post-closure period is specified as a minimum of 30 years after closure of the landfill. Environmental and facility monitoring, and facility maintenance and operation must continue during the post-closure period, or as long as leachate is a threat to human health or the environment, as determined by the NYSDEC. Landfill closure criteria restrict land use of the property during, and after, the 30-year post-closure period to that which "shall not disturb the integrity of the final cover, liners, or any other components of the containment system, or the function of the monitoring or environmental control systems." The details of closure, monitoring and reporting required by NYSDEC at Niagara Landfill are described in Sections 2.3.2 and 2.3.3

The regulations are specific with respect to a deed notice at time of landfill closure. 6 NYCRR Part 360, Section 2.15(k) requires:

> "For a landfill subject to closure, a provision must be included in the property deed indicating the period of time during which the property has been used as a landfill, describing the wastes contained within and noting that records of the facility have been filed with the Department. The deed must also reference a map which shall be filed with the county clerk and which will clearly indicate the limits of the landfilled areas within the property boundary. The deed must also indicate that the use of the site is restricted pursuant to the provisions of paragraph (9) of this subdivision."

Paragraph (9) of Section 2.15(k) requires:

> "A description of the planned uses of the property during and after the post-closure period is required. Use of the property shall not disturb the integrity of the final cover, liners, or any other components of the containment system, or the function of the monitoring or environmental control systems, unless necessary to comply with the requirements of section 360-2.20 of this Subpart. The Department will approve any other disturbance if the owner or operator demonstrates that disturbance of the final cover, liner, or other component of the containment system, including any removal of waste, will not increase the potential threat to human health or the environment."

Thus, the Seaway Site is subject to substantial Land use controls by the NYSDEC, under its solid waste regulations, including the control of activities which would disturb the integrity of the landfill components that are in place and a requirement for a plan for post-closure use, which is subject to NYSDEC approval.

2.6.2.2 New York State Inactive Hazardous Waste Disposal Site Regulations

The Seaway Site (Niagara Landfill) is an inactive hazardous waste disposal site pursuant to 6 NYCRR Part 375, "Inactive Hazardous Waste Disposal Sites", and is listed in the Registry maintained by NYSDEC. Under 6 NYCRR Part 375, Subpart 375-1.8, inactive hazardous waste disposal sites are classified with respect to the threats they pose to the environment, with a Class "1" classification posing the greatest threat, ranging to Class "5", which indicates a site that is properly closed with continued operation, maintenance, or monitoring not required.

The Seaway Site, Registry Site No. 9-15-094, is classified as a Class "4" site (NYSDEC 1998b). This classification indicates the site "is properly closed - requires continued monitoring."

The 6 NYCRR Part 375 regulations outline a process for investigation and remediation of listed sites mirroring, in most part, the CERCLA and NCP requirements.

Subpart 375 - 1.2(e) of the regulations state in part that:

- No person shall undertake at a site listed in the Registry, as a Class "1" or "2" site, any physical alteration that constitutes storage, treatment or disposal of hazardous waste, the presence of which served as the basis for such listing, unless done with express written approval of NYSDEC, granted by consent order or other manner directed by NYSDEC.

Since the Seaway Site is classed as "4", this requirement is not applicable.

Additionally, however, Subpart 375 - 1.2(e) states, in part, "that no person shall engage in an activity:

- that will, or that reasonably is anticipated to prevent or interfere significantly with any proposed, on going, or completed program at any site listed in Registry; or

- that will, or is reasonably foreseen to, expose the public health, or the environment to a significantly increased threat of harm or damage at any site listed in the Registry."

Subpart 375 - 1.2(f) adds "No person shall make a substantial change of use at a site listed in the Registry without having given notice 60 days in advance." Under Subpart 375 - 1.6, this notice is to be given to the NYSDEC and to the clerks of the county; the town or city; and village within which the site is located. This notice is to include a brief description of the proposed substantial change in use.

The notice is also to be given to persons on a list developed for the site under Subpart 375 - 1.5(b)(2), including government representatives, civic organizations, environmental groups, residents, media representatives, business interests, and other individuals that have expressed interest in the Site. The notice must also be given to adjacent property owners.

In summary, inclusion of the Seaway Site on the New York State Registry subjects it to a comprehensive set of land use controls currently enforceable by NYSDEC. Also note that the USEPA has recently issued guidance (USEPA 2003) on long-term land use controls (USEPA terminology is “institutional controls”) under the Resource Conservation and Recovery Act (RCRA), which could take the form of continued permit obligations, an order, or other enforceable obligations that continue past a permit even if the permit is terminated.

2.6.3 Future Land Use Controls

Land use controls (LUCs) are legal or administrative mechanisms that limit access to or use of property, or warn of a hazard. LUCS can be imposed by the property owner or the government. There are two categories of LUCs: (1) Proprietary Controls, and (2) Government Controls. Proprietary controls are contractual mechanisms contained in a deed or other document in the chain of title of the property, and can be used to restrict land use, control land access, bind subsequent land owners, or place conditions on the land. Examples of proprietary controls include easements, covenants, restrictions, notices and reversionary interests. Governmental controls are restrictions imposed by governmental entities, and can be used to limit land access, prohibit disturbance of the land, control land use, and protect quality or use of land resources. Examples of governmental controls include zoning, siting restrictions, regulatory controls and groundwater restrictions.

In assessing options for remediation of the Seaway Site, USACE evaluated current and long-term land use controls currently in place at Seaway and their adequacy in assuring that any remedial action option selected would be effective. The findings of the evaluation are included in Appendix D, Evaluation of Land Use Controls (LUCs). The evaluation in Appendix D assumed, at that time, that the Partial Excavation alternative, Alternative 4, would involve only the removal of the top 4 feet from Areas A, B and C. Since the development of the descriptions in Appendix D, USACE has revised Alternative 4 to include removal of all of the MED/AEC-related materials from Area A necessary to meet the cleanup criteria in that area. The LUCs discussed in Appendix D are still applicable for Areas B and C.

The evaluation focused on potential remedial action options that would involve leaving some of the MED/AEC-related contamination in place at the Seaway Site. These options, identified as Alternative 4, Partial Excavation with Off-Site Disposal and Alternative 6, Containment, are described in detail in Section 4 and would involve capping some of the MED/AEC-related material in place at the Seaway Site. The other alternatives identified in Section 4, Alternative 1, No Action and Alternative 2, Complete Excavation, would not involve LUCs and are not evaluated in Appendix D.

In assessing current and potential needs for LUCs, the evaluation considered the ARARs for the Seaway Site and determined that any remedial action at Seaway involving leaving MED/AEC-related contamination above cleanup criteria in place must be protective in isolating the material from the public and the environment for up to 1,000 years to the extent reasonably achievable and, in any case, for at least 200 years. ARARs are further addressed in Section 3 and the remedial action objectives for site remediation are also further addressed in Section 3. Specifically, the evaluation assumed that any cap to be placed over Seaway Areas A, B and C must be maintained; that the existing cap over the remaining portions of the Seaway Site must be maintained to preclude overloading the leachate collection system, which could result in the potential subsequent failure of the cap and/or release of leachate to the environment; that the existing leachate collection system must be maintained in an operational condition until the leachate generation rate drops to almost zero; and, that safety controls must be implemented to preclude contact with the MED/AEC-related contaminated material in the event it is necessary to repair the leachate collection system.

The evaluation found that meeting the remedial action objectives for Alternatives 4 and 6 would require LUCs and both administrative and legal mechanisms were evaluated. The LUCs envisioned would be layered to provide overlapping assurances of protection from contaminates. The Seaway Site is already currently restricted by a number of LUCs as described in the foregoing sections of this report and USACE has determined that these LUCs are adequate and that the federal government does not need to add any additional land use controls. These restrictions are the LUCs recommended for Seaway and include the following:

1. Deed covenant as required by the State of New York's regulation for Solid Waste Management Facilities.
2. Administrative LUCs currently contained in the State of New York's regulations for Solid Waste Facilities.
3. CERCLA monitoring requirements.
4. Local zoning.
5. Notices from various environmental lists.
6. Notices from the Seaway Landfill FUSRAP Site's Administrative Record.

The details of these recommended LUCs are included in Appendix D.

If either Alternative 4 or 6 is selected, USACE would also need to prepare a Land Use Control Plan that, at a minimum, documents (1) which controls are necessary for protectiveness and why, (2) under what conditions would changes to the land use controls be warranted, (3) which federal, state, or local entities are responsible for maintaining the controls during given time frames, (4) frequency of reviewing current conditions to assess whether changes to either the land use controls or to the Land Use Control Plan are necessary for ensuring continued protectiveness, and (5) the necessary data needs for assisting in reviews of the continued adequacy of controls and of continued protectiveness. The federal government would be responsible for maintaining the Land Use Control Plan.

Safety controls for monitoring and possibly maintaining the Site will be part of the Site's Administrative Record. Permanent maintenance of the Administrative Record is required by CERCLA. It must be maintained at designated locations available to the public and at archival depositories. The State's regulations, also, allow the State to impose safety requirements as part of the Site's operation and maintenance.

USACE also assessed the real estate interests the federal government or other governmental entities need to acquire to implement Alternative 4 or Alternative 6. The report of USACE's findings is included in Appendix E, Real Estate Plan.

The real estate plan indicates the federal government does not intend to acquire a real estate interest on the Site such as a restrictive easement because the Site is already restricted by a number of LUC's based on its status as a regulated solid waste management facility. The plan also states that the value of the Seaway property is not discussed in the plan since the federal government will not be acquiring a real estate interest in the property.

3. REMEDIAL ACTION OBJECTIVES, CLEANUP STANDARDS AND GUIDELINES FOR THE SEAWAY SITE

The site cleanup guidelines identified in the 1993 FS for radiologically contaminated soils at the Tonawanda Site are the DOE generic guidelines for residual radionuclide contamination at FUSRAP and Surplus Facilities Management Program (SFMP) sites as authorized in DOE's Order 5400.5 (DOE 1990). The DOE Orders are not applicable to USACE. USACE's cleanup standards and guidelines for the Seaway Site and the rationale USACE used in adopting cleanup standards and guidelines are addressed in this section.

3.1 Introduction

Potential remedial actions at the Seaway Site are being addressed in accordance with CERCLA and CERCLA's implementing regulations, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Details regarding the development of the remedial action objectives for the Tonawanda Sites, which includes the Seaway Site, are provided in Section 3.2 of the 1993 Feasibility Study. The remedial action objectives for the Seaway Site developed in the 1993 FS are summarized below:

- ensure protection of human health and the environment from exposure at unacceptable levels to MED/AEC-related radiological contaminants of concern that are eligible for FUSRAP remediation;
- ensure that the remedial action complies with the selected ARARs;
- prevent or mitigate the release of MED/AEC-related COCs to adjacent areas and surface water by surface runoff; and, reduce risks to human health associated with direct external exposure to, direct contact with, and inhalation and incidental ingestion of MED/AEC-related radiological contaminants in the surface and subsurface soils at the site.

As further described in the following sections and detailed in Appendix F, a review of potential ARARs for the Seaway Site indicates that there are ARARs available that are considered protective of human health and the environment. The cleanup ARARs specify the residual contamination levels to which soil must be remediated to ensure that RAOs are met if removal of the MED/AEC-related material is conducted. These cleanup RAOs/ARARs are further described in Sections 3.1.1 and 3.2, below.

ARARs are also available for remedial options that involve leaving some of the MED/AEC-related material at the site. For these options, which involve capping of the MED/AEC-related material, the RAOs include ensuring that the MED/AEC-related material is isolated from the public and the environment for a period of up to 1,000 years and, as was described in greater detail in Section 2.6.3, include the following:

1. Any proposed cap over Areas A, B and C must be maintained.
2. The existing cap over the remaining portions of the Seaway Site must be maintained to preclude overloading the leachate collection system.
3. The existing leachate collection system must be maintained in an operational condition.
4. Safety controls must be implemented to preclude contact with the MED/AEC-related contaminated material.

ARARs and remedial action alternative are further described in the following section.

CERCLA specifies two "threshold criteria" to be used in evaluating each alternative:

- The remedial action must afford adequate overall protection of human health and the environment.
- The remedial action must comply with federal and state ARARs.

A remedial alternative must satisfy these "threshold criteria" to be eligible for selection.

How USACE considered these CERCLA threshold criteria in adopting cleanup criteria and guidelines for achieving the remedial action objectives for the Seaway Site is addressed in the following sections:

3.1.1 ARAR Based Cleanup Standards

USACE found that there are ARARs available that are considered sufficiently protective because they address the presence of multiple contaminants at a site, as discussed below, and therefore, the development of site-specific risk based cleanup criteria (using cancer limits specified in the NCP) are not necessary. Agencies responsible for remedial actions under CERCLA must ensure that selected remedies meet ARARs. On July 24, 2000, August 29, 2000 and August 31, 2000, EPA, NYSDOH and NYSDEC, respectively, identified a number of state and federal regulations that USACE should consider as potential ARARs. The listing of these potential ARARs and the USACE evaluation and conclusions are contained in Appendix F. The following sections define ARARs and describe the ARARs adopted by USACE for cleanup of the Seaway Site.

3.1.1.1 ARARs – Definitions (42 U.S.C. 9621(d)(2)(A))

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance or pollutant or contaminant or the circumstances of a release at a CERCLA site. An applicable requirement is legally applicable to the hazardous substance or pollutant or contaminant at the site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not “applicable” to a hazardous substance or pollutant or contaminant, are relevant and appropriate under the location or other circumstances of the release at a CERCLA site. They address problems or situations sufficiently similar to those of the release encountered at the CERCLA site that their use is suited to the particular site based on criteria provided in the NCP.

In accordance with CERCLA and the NCP, only those state laws or regulations that are promulgated, are identified by the state in a timely manner, and are more stringent than federal requirements may be applicable or relevant and appropriate.

USACE has determined that the following are the cleanup ARARs for the remedial activities at the Seaway Site.

3.1.1.2 Cleanup ARARs and Standards for the Seaway Site

The 40 CFR Part 192 standards are not considered applicable because the regulation is only applicable to specific sites designated under the Uranium Mill Tailings Radiation Control Act (UMTRCA).

However, USACE has determined that 40 CFR Part 192 is relevant and appropriate to the cleanup of the Seaway Site. This determination was made based on the similarity of the uranium processing at Linde and the resulting radionuclides found in the waste, transported to Ashland 1 and subsequently relocated, in part, to Seaway Areas A, B and C. In addition, the requirements are well suited to the site because the purpose of the regulations is to manage residual radioactive materials at inactive mill tailings sites similar in nature to the Seaway Site. (See Sections 2.1 and 2.2.)

Subpart A of 40 CFR Part 192 is considered relevant and appropriate to the Seaway Site. It establishes standards for control of residual radioactive materials at UMTRCA Sites and requires that designs for control must:

- be effective for up to one thousand years, to the extent reasonably achievable, and, in any case, for at least 200 years, and
- provide reasonable assurance that releases of radon-222 (Rn-222) from residual radioactive material to the atmosphere will not exceed an average release rate of 20 picocuries per square meter per second (pCi/m2/s), or increase the annual average concentration of Rn-222 in air at or above any location outside the disposal area by more than one-half pCi/l.

As stated in Section 2.4, USACE has concluded that the groundwater at the Seaway Site is not being impacted by MED/AEC-related contamination, and will not be impacted in the next 1000 years (USACE 2002). Also, groundwater at the site is not being used as a source of drinking water at or near the site. No ARARs are necessary for protection of the public or environment. Therefore, the remaining parts of Subpart A regarding groundwater protection are not relevant and appropriate.

Subpart B of 40 CFR Part 192 addresses cleanup of land contaminated with residual radioactive material from inactive uranium processing sites, and sets standards for residual concentrations of Ra-226 in soil. It requires that radium concentrations shall not exceed background by more than

5 pCi/g in the top 15 cm of soil or 15 pCi/g in any 15 cm layer below the top layer, averaged over an area of 100 m^2. These Subpart B requirements are considered relevant and appropriate to the cleanup of the Seaway Site.

10 CFR Part 40, Appendix A, is the NRC regulation that establishes technical, financial, ownership and long-term site surveillance criteria relating to the siting, operation, decontamination, decommissioning and reclamation of licensed uranium and thorium mills and tailings. The regulation contains some substantive criteria pertaining to the hazardous substances or the circumstances of their release at the Seaway site. However, it only applies to NRC licensed sites. Seaway is not an NRC licensed site. Therefore, the regulation is not applicable.

USACE has determined that parts of 10 CFR Part 40, Appendix A, specifically the substantive requirements of Criterion 6(6), are relevant and appropriate to the cleanup at the Seaway site. The determination was based on the similarity of the uranium processing at Linde and the resulting radionuclides found in the waste transported to Ashland 1 and subsequently relocated, in part, to Seaway Areas A, B, C as well as those found on the south side of the site. In addition, the requirements are well suited to the site because the purpose of that criterion is to manage residual radioactive materials at the end of a milling operation at sites similar in nature to the Seaway Site.

10 CFR Part 40, Appendix A, Criterion 6(1) establishes performance criteria for covers to be placed over tailings or wastes at the end of milling operations. The performance standards for covers required by Criterion 6(1) are the same as those found in 40 CFR Part 192, Subpart A.

10 CFR Part 40, Appendix A, Criterion 6(6) requires that residual radioactive materials remaining after remediation will not result in a total effective dose equivalent (TEDE), considering all radionuclides present (e.g., radium, thorium, and uranium) to the average member of the critical group exceeding a benchmark dose established based on cleanup to the radium standards of 5 pCi/g in the top 15 centimeters and 15 pCi/g in subsequent 15 centimeter layers below the top layer and must be as low as reasonably achievable (ALARA). This benchmark dose is then used to establish allowable soil and surface concentration levels for the various radionuclides present other than radium. The concentration limits for each of those radionuclides is based on maintaining the benchmark dose for that radionuclide. The criterion states if more than one residual radionuclide is present in the same 100-square-meter area, the sum of the ratios (SOR) for each radionuclide of concentration present to the associated benchmark dose concentration limit will not exceed "1" (unity). Use of Criterion 6(6) increases the overall protectiveness of 40 CFR Part 192 by addressing other radiological contaminants and their associated dose that may be present at the site.

In 1992, a Waterfront Region Master Plan was written to address revitalization of the Town of Tonawanda waterfront area. This Master Plan defined a planning region, set goals and objectives, outlined a plan for future development, and recommended strategies for plan implementation in phases. This plan concluded that the landfill, once closed, could be redeveloped and used for low-intensity recreational uses such as ball fields, walking trails, or open space. This is consistent with the way other closed landfills are being used. Therefore, USACE has determined that the most likely expected future site use of the Seaway Site is recreational, which is consistent with plans for the area.

The areas all around the Seaway site are planned for industrial land uses. Due to the heavy presence of industrial land use surrounding the Seaway site and uncertainties in the future regarding re-use of the entire property, USACE considered the possibility that portions of the site might be used for industrial uses. USACE concluded that there is a possibility that in the future, portions of the might be used in a manner similar to the industrial receptor scenario. So, in Appendix C, both recreational and industrial scenarios were evaluated. Although USACE has determined that the most likely future use is recreational, industrial workers are selected as members of the critical group for the Seaway Site. All action alternatives considered were found to be effective for both the recreational and industrial scenarios.

USACE computed surface soil benchmark doses for the group of individuals reasonably expected to receive the greatest exposure to Seaway Site contamination (i.e., the critical group). The critical group for the landfill is industrial receptors. Using the industrial scenario, USACE computed the surface soil benchmark dose to be 8.8 mrem/y (see USACE 2000c and Appendix C) while evaluating the external gamma, dust inhalation, and incidental soil ingestion pathways. The benchmark dose allowable concentration limits for each of the radionuclides for use in the SOR calculation are also documented in the technical memorandum addressing 10 CFR Part 40, Appendix A, Criterion 6(6) (USACE 2000c). For the key radionuclides, Ra-226, Th-230, and U_{total}, the associated concentration limits for the surface soil benchmark dose are 5 pCi/g, 15 pCi/g, and 110 pCi/g, respectively. (Note the U_{total} value of 110 pCi/g includes contributions from decay products Pa-231 and Ac-227, as described in Appendix C.) During remediation, the actual radionuclide concentrations within a 100-m^2 area will be divided by its corresponding concentration limit. These ratios are then added and must be equal to or less than 1.0 (unity). If the SOR exceeds unity, additional soil removal is necessary. A subsurface soil benchmark dose of 4.1 mrem/y was also calculated for the industrial receptor. Associated concentration limits are 15 pCi/g, 44 pCi/g, and 1000 pCi/g for Ra-226, Th-230, and U_{total}, respectively. The SOR, 100-m^2 area limits, and decay product relationships between uranium, Pa-231, and Ac-227 also apply to the subsurface values.

The remaining parts of 10 CFR Part 40, Appendix A are not relevant and appropriate because they do not provide substantive criteria pertaining to the hazardous substances or circumstances of their release at the site. In addition, they do not address circumstances sufficiently similar to the Seaway Site.

3.2 Cleanup Criteria for the Seaway Site

To be consistent with the CERCLA process, USACE established a cleanup guideline to ensure compliance with the cleanup standards contained in the ARARs for the Seaway Site. As described above, 40 CFR Part 192 includes numeric standards as well as performance standards and 10 CFR Part 40, Appendix A includes both performance standards and a mechanism to establish cleanup standards for various radionuclides present on the site. USACE evaluated the criteria in 10 CFR Part 40, Appendix A, Criterion 6(6) to develop a cleanup criteria that would satisfy both cleanup ARARs, 40 CFR 192, Subpart B and 10 CFR Part 40, Appendix A, Criterion 6(6) (USACE 2000c). As indicated earlier, USACE has identified the industrial worker as the average member of the critical group and is used to define criteria that would satisfy both the numeric standards in 40 CFR Part 192, Subpart B and the benchmark dose criteria of 10 CFR Part 40, Appendix A, Criterion 6(6). A recreational scenario is also evaluated as the more likely receptor for Seaway though not a member of the critical group. Based on the results of the USACE evaluation (USACE 2000c), the soil removal cleanup criteria for Seaway that would meet both cleanup criteria ARARs would be to limit the residual radionuclide concentrations remaining in soils within a 100-m^2 area to concentrations that results in unity or less for the SOR of these radionuclide concentrations to the associated concentration limits, above background, of 110 pCi/g for U_{total}, 5 pCi/g for Ra-226 and 15 pCi/g for Th-230 for surface cleanups and 1,000 pCi/g of U_{total}, 15 pCi/g of Ra-226 and 44 pCi/g of Th-230 for the subsurface.

In addressing compliance with the ARARs for remediation alternatives envisioning leaving soils exceeding the 40 CFR Part 192 and 10 CFR Part 40, Appendix A standards in place, the performance requirements of 40 CFR Part 192, Subpart A and 10 CFR Part 40, Appendix A, Criterion 6(1) would be utilized.

4. REMEDIAL ACTION ALTERNATIVES FOR SEAWAY – UPDATE

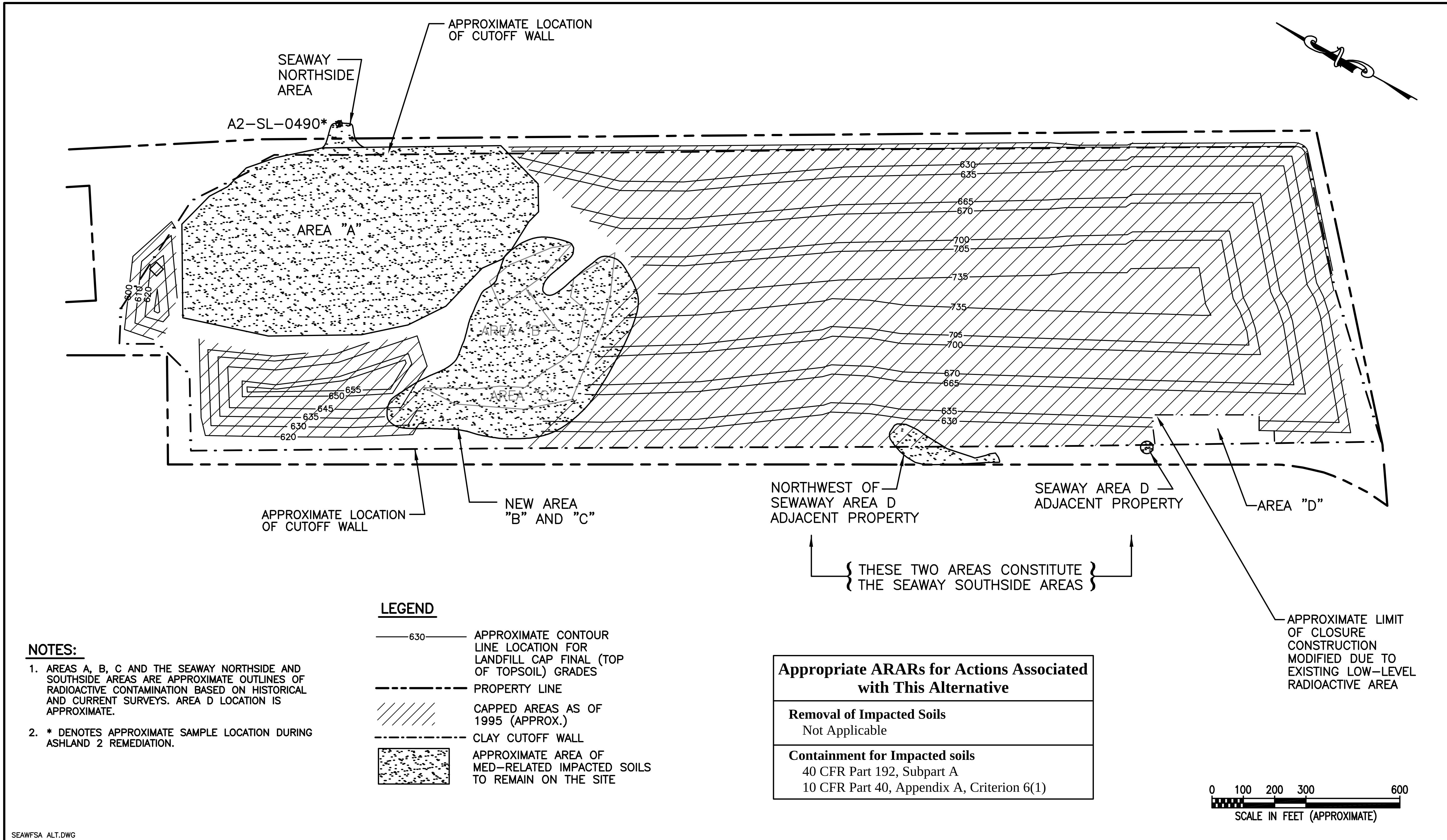
4.1 Remedial Action Alternatives Evaluated in the 1993 FS and PP Updated Description of Seaway Alternatives

Detailed descriptions of the remedial alternatives can be found in the 1993 FS (DOE 1993b), which is available in the administrative record file. A total of 6 alternatives were considered in the FS for their effectiveness in remediating the Tonawanda Site properties. The following sections describe the 1993 alternatives and update the descriptions of alternatives being considered by USACE.

4.1.1 Seaway Site Remediation Alternatives

Alternative 1: No Action. The no-action alternative is required under CERCLA regulations to provide a baseline for comparison with other alternatives. Under this alternative, no action is taken to implement remedial activities. This alternative was evaluated in the 1993 FS, and is the baseline for comparison with other alternatives for the Seaway Site. A conceptualization of this alternative with the appropriate ARARs identified is shown in Figure 4-1.

Alternative 2: Complete Excavation with Off-Site Disposal. This alternative was evaluated in the 1993 FS. Complete excavation of MED/AEC-related contaminated soils containing radionuclides above guidelines and off-site disposal would remove the source of elevated levels of radionuclides from the site. After removal, Areas A, B and C, Seaway Northside and Seaway Southside would be covered with a 1-foot layer of clean fill. Also, those areas of the closed portion of the landfill impacted by the removal activities would be restored to the original design configuration that existed prior to remediation. Section 3 describes the cleanup standards being proposed by USACE for Seaway. A conceptualization of this alternative with the appropriate ARARs identified is shown in Figure 4-2.



Appropriate ARARs for Actions Associated with This Alternative
Removal of Impacted Soils Not Applicable
Containment for Impacted soils 40 CFR Part 192, Subpart A 10 CFR Part 40, Appendix A, Criterion 6(1)

FIGURE 4-1
CONCEPTUALIZATION OF ALTERNATIVE 1: NO ACTION

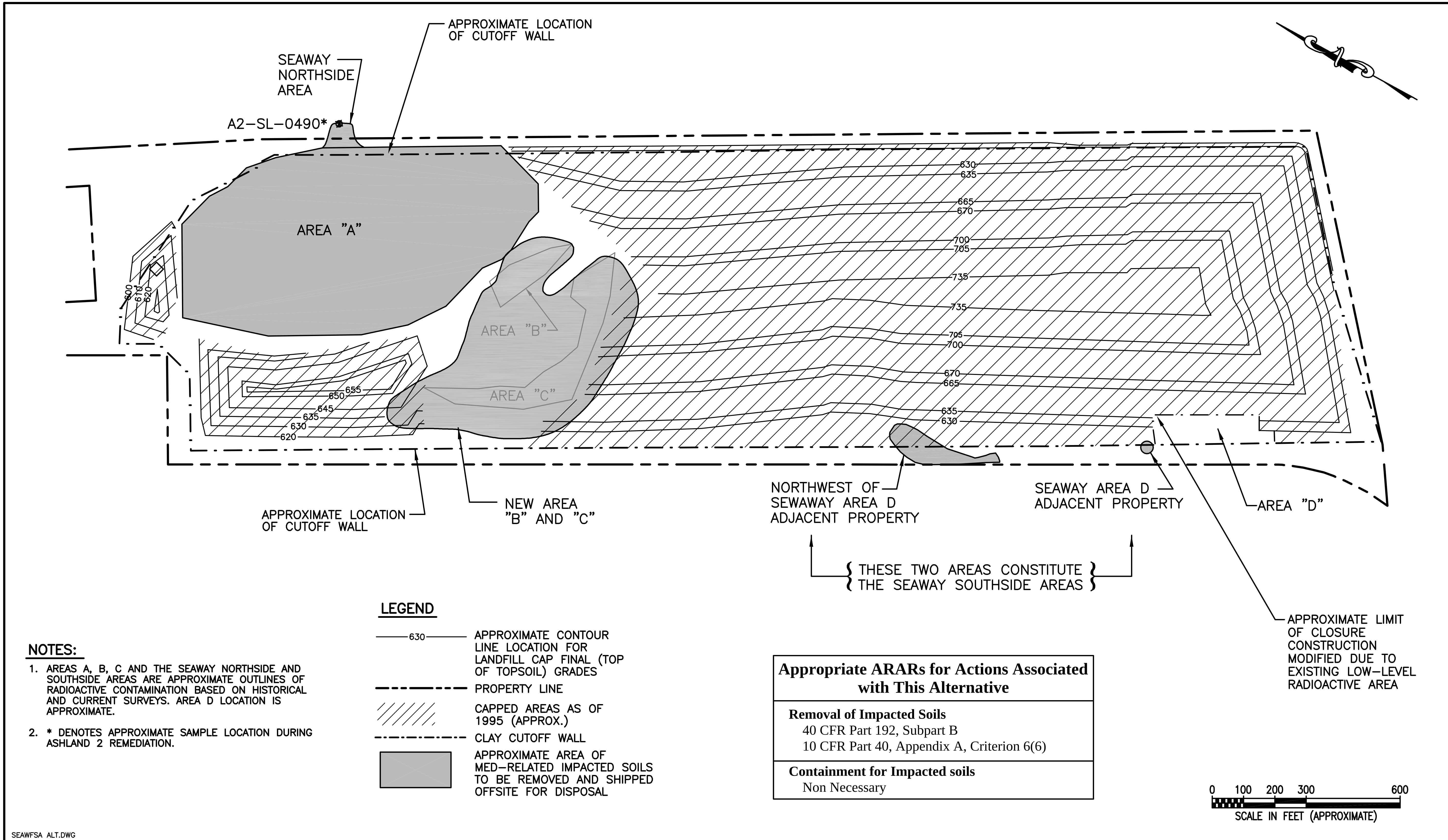


FIGURE 4-2
CONCEPTUALIZATION OF ALTERNATIVE 2: COMPLETE EXCAVATION WITH OFFSITE DISPOSAL

Alternative 3: Complete Excavation with Onsite Disposal. This alternative is similar to Alternative 2 regarding excavation of soils, however, all excavated soils from remediation of all of the Tonawanda Sites would be placed in an on-site engineered disposal cell to be located on Ashland 1, Ashland 2 or Seaway, which would have been used for disposal of contaminated soils from all of the Tonawanda Sites. Land use controls would be imposed to control access to the onsite engineered disposal cell and the cell would be designed to minimize future exposures or releases to the environment. This alternative is no longer relevant since the other Tonawanda Sites have been or are in the process of being remediated under separate CERCLA actions and all excavated wastes are being shipped off-site for disposal.

Alternative 4: Partial Excavation with Off-Site Disposal. In the 1993 FS and PP, this alternative envisioned the removal and off-site disposal of MED/AEC-related contaminated soils from Area A exceeding DOE's cleanup guidelines and leaving MED/AEC-related contaminates in Area B and C in place. USACE evaluated options for redefining Alternative 4 in light of new information on contamination in Areas B and C (USACE 1999a, USACE 2002), Seaway Northside and Seaway Southside and the cleanup standards and guidelines now being proposed by USACE for Seaway cleanup. One option that was evaluated but not considered further was to redefine Alternative 4 to involve the removal of all materials that exceeded the cleanup levels from Areas A, B and C without impacting the integrity of the existing closed portions of the landfill. The USACE evaluation concluded that (1) the total volume of materials to be removed and shipped offsite for disposal was almost the same as the volumes associated with Alternative 2, Complete Excavation with Offsite Disposal, (2) land use controls would still be necessary since MED/AEC-related materials in excess of the cleanup criteria would remain under areas not accessible without impacting the closed portion of the landfill, and (3) the total present value costs was within 5% of the costs associated with Alternative 2. Therefore, this option was not considered further since it was similar to the existing Alternative 2.

Alternative 4, as redefined, would involve removal and off-site disposal of all MED/AEC-related contaminated soils exceeding the cleanup levels from Area A, and MED/AEC-related contaminated soils from Area C and areas located outside of the leachate collection system, such as areas within Seaway Southside and Seaway Northside, that are accessible and that exceed USACE's proposed cleanup levels. Accessible soils are defined as MED/AEC-related contaminated soils that are:

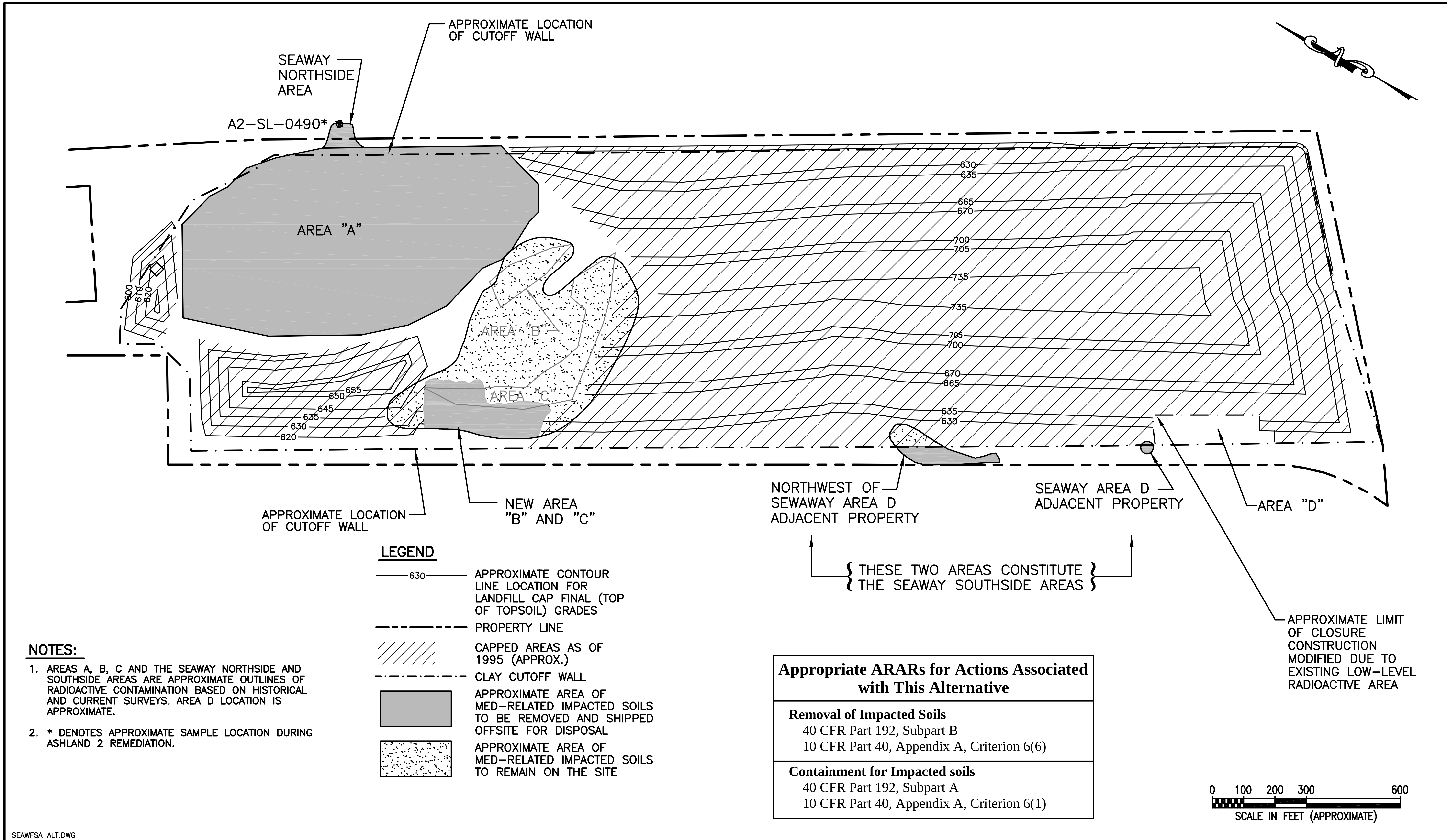
- Not located under 10 feet or more of non-MED/AEC-related contaminated refuse or other non MED/AEC-related contaminated landfill material, and removal of such soil would not impact the integrity of the closed portions of the landfill, or
- Soils located outside of the leachate collection system.

All of the soil in Area A is accessible since most of the MED/AEC-related contaminated soils are at or near the surface. A small plateau area in the south-west corner of Area C also has MED/AEC-related contaminated soils at or near the surface and is also considered to be accessible. The MED/AEC-related contaminated soils in this area are not located under 10 ft or more of non-MED/AEC-related contaminated refuse or other non MED/AEC-related contaminated landfill material. In order to maintain the integrity of the existing closed portions of the landfill and remove the accessible soils in this lower plateau of Area C, excavation is assumed to begin 5 ft from the rip-rap dividing the closed portions of the landfill to the north and south of Areas A, B and C and then proceed downward at a 1:1.5 slope to reach depths where the

MED/AEC-related contaminated soils are located. The remaining MED/AEC-related contaminated soils located in Areas B and C are considered inaccessible since, prior to placement of any cover over these areas, they are already under 10 feet or more of non-MED/AEC-related contaminated refuse or other non MED/AEC-related contaminated landfill material. Following excavation and grading, as required, in Area C, Areas B and C would be capped by USACE, where necessary, with a landfill cover at least 4 feet thick. This type cover would not be necessary for Area A since that Area would involve complete removal. The removal of MED/AEC-related contaminated soils located outside of the leachate collection system from Seaway Southside might involve minor impacts to portions of the closed cap. This might be necessary to remove any MED/AEC-related contaminated soils that exceed the cleanup criteria located at the slurry wall located under the toe of the closed cap. After removal of the materials from Seaway Southside, the impacted areas of the closed cap would be restored to the original design configuration that existed prior to remediation. A conceptualization of this alternative with the appropriate ARARs identified is shown in Figure 4-3. The proposed USACE cleanup standards are described in Section 3.

Alternative 5: Partial Excavation with Onsite Disposal. This alternative was evaluated in the 1993 FS. For the Seaway Site, this alternative is the same as Alternative 3, except that excavated soils from the Tonawanda Sites would be disposed in an on-site engineered disposal cell located on Ashland 1, 2 or Seaway, which would have also been used for disposal of contaminated soils from all the Tonawanda Sites. This alternative is no longer relevant since the other Tonawanda sites have been or are in the process of being remediated under separate CERCLA actions and all excavated wastes are being shipped off-site for disposal.

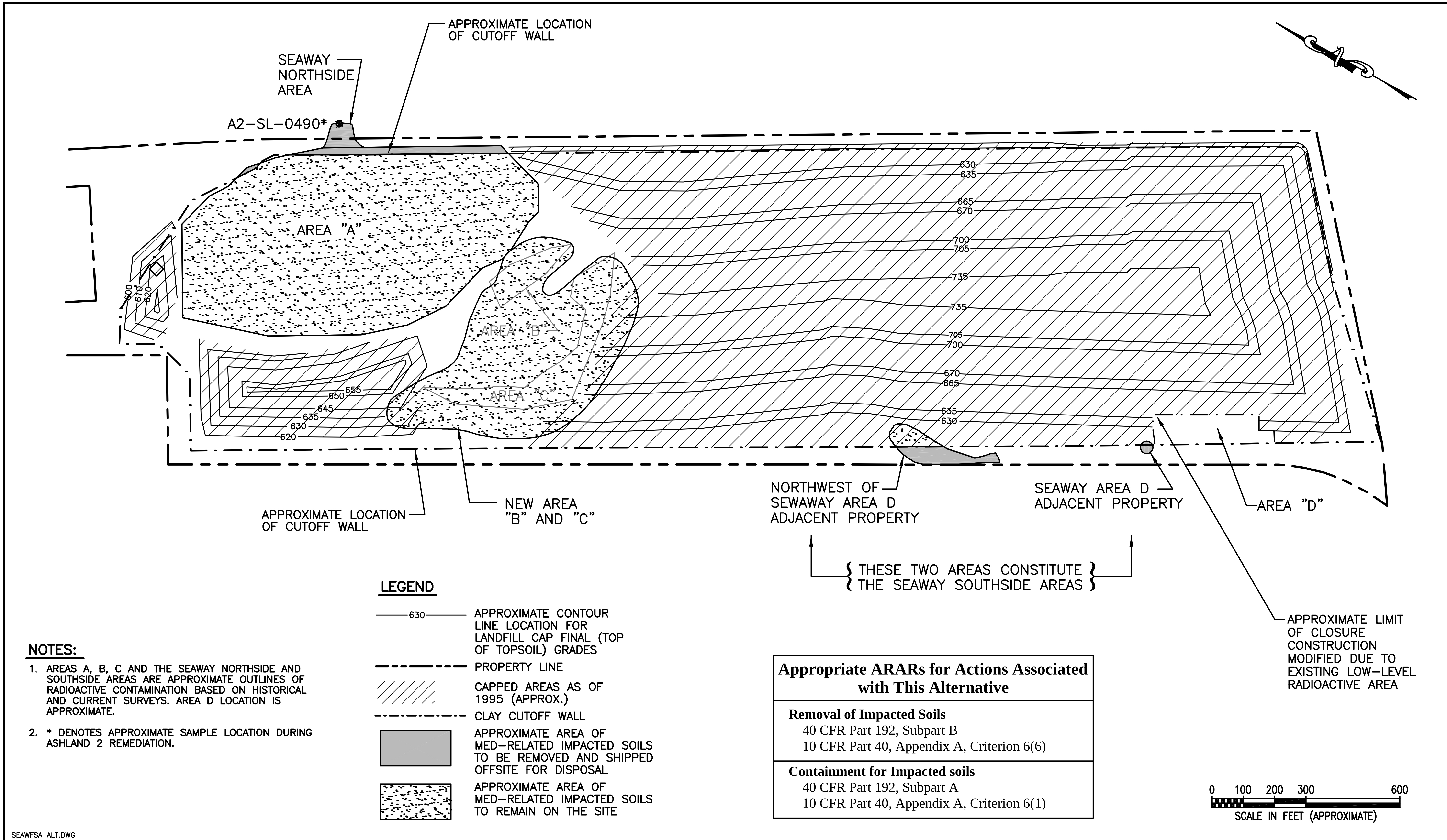
Alternative 6: Containment. This alternative was also evaluated in the 1993 FS. USACE has reviewed alternative 6 as defined in 1993 and has redefined alternative 6 to reflect updated information on contamination at the Seaway Site (USACE 1999a, USACE 2002) and the USACE assessment of risk at Seaway (USACE 2000a). Alternative 6, as redefined, would involve grading, as required, and USACE capping of Areas A, B, and C with a landfill cover at least 4 to $5^1/_2$ ft thick. New York State regulations issued in 2000 were intended to prevent placement of materials with radioactivity in any landfill in the state. Although CERCLA Section 121(d)(2)(C)(ii) provides that state laws or regulations effectively imposing a statewide prohibition on land disposal are not applicable to CERCLA remedial actions and may not be considered as ARARs, it is likely there would be questions raised differentiating the placement of materials on-site in a new containment area as opposed to using a pre-existing and now closed hazardous waste landfill as a disposal location of FUSRAP materials for purposes of containment. Since the volume of materials to be moved in this alternative is relatively small, this alternative would allow for those materials to be disposed off-site. Therefore, in order to proceed with completion of this remedy in a more timely manner, MED/AEC-related contaminated materials located outside of the landfill containment system (i.e., outside of the leachate collection system), such as within Seaway Southside and Northside, that exceed the cleanup criteria would be excavated and shipped off-site for disposal. Any impacts to the closed cap would be restored to the original design configuration that existed prior to remediation. Any MED/AEC-related contaminated materials that must be moved due to grading would be shipped off-site for disposal. A conceptualization of this alternative with the appropriate ARARs identified is shown in Figure 4–4.



Appropriate ARARs for Actions Associated with This Alternative
Removal of Impacted Soils
40 CFR Part 192, Subpart B
10 CFR Part 40, Appendix A, Criterion 6(6)
Containment for Impacted soils
40 CFR Part 192, Subpart A
10 CFR Part 40, Appendix A, Criterion 6(1)

FIGURE 4-3

CONCEPTUALIZATION OF ALTERNATIVE 4: PARTIAL EXCAVATION WITH OFFSITE DISPOSAL



Appropriate ARARs for Actions Associated with This Alternative
Removal of Impacted Soils
40 CFR Part 192, Subpart B
10 CFR Part 40, Appendix A, Criterion 6(6)
Containment for Impacted soils
40 CFR Part 192, Subpart A
10 CFR Part 40, Appendix A, Criterion 6(1)

FIGURE 4-4
CONCEPTUALIZATION OF ALTERNATIVE 6: CONTAINMENT

4.2 Summary of Current Alternatives

As described above, the remedial alternatives currently being considered by USACE for the Seaway Site are:

- Alternative 1 - No Action
- Alternative 2 - Complete Excavation with Off-Site Disposal
- Alternative 4 - Partial Excavation with Off-Site Disposal
- Alternative 6 – Containment

5. EVALUATION OF ALTERNATIVES – UPDATE

As described in Section 4, above, the 1993 FS evaluated six (6) remedial action alternatives, numbered 1 through 6. As also described in Section 4, alternatives (referred to as Alternative 3 and 5) involving the consolidation of all MED/AEC-related waste from the four Tonawanda sites and disposal of the waste in an on-site engineered disposal facility have been dropped from consideration since the other Tonawanda sites have been or are in the process of being remediated under separate CERCLA actions and all excavated wastes are being shipped off-site for disposal. The remaining alternatives evaluated in the 1993 FS Report include:

- Alternative 1 - No Action
- Alternative 2 - Complete Excavation with Off-Site Disposal
- Alternative 4 - Partial Excavation with Off-Site Disposal
- Alternative 6 - Containment

The results of the evaluation of these alternatives are provided in the 1993 FS Report (DOE 1993b).

5.1 CERCLA Criteria Used in the Evaluation of Alternatives

The remedial action alternatives for Seaway Areas A, B and C as redefined by USACE were re-evaluated using CERCLA criteria. These CERCLA criteria ensure that selected remedies are protective of human health and the environment, meet regulatory requirements, are cost effective and utilize permanent solutions and treatment to the maximum extent practicable. The CERCLA criteria used in the evaluation are described below.

Glossary of Evaluation Criteria

The following two criteria are threshold criteria and must be met:

- **Overall Protection of Human Health and the Environment** - addresses whether an alternative provides adequate protection and describes how exposure to the contaminants of concern is eliminated, reduced, or controlled.

- **Compliance with Federal and State Environmental Regulations** - addresses whether an alternative will satisfy the ARARs appropriate for that alternative.

The following five (5) criteria are considered balancing criteria and are used to weigh major tradeoffs among the alternatives being evaluated:

- **Long-Term Effectiveness and Permanence** - addresses the remaining risk and the ability of an alternative to protect human health and the environment over time, once cleanup goals have been met.

- **Short-Term Effectiveness and Environmental Impacts** - addresses the impacts to the environment during implementation, and impacts to all affected members of the public including those along transportation routes and those at or near off-site disposal facilities.

- **Reduction in Toxicity, Mobility, or Volume through Treatment** - addresses treatment that permanently and significantly reduces toxicity, mobility, or volume of waste.

- **Implementability** - addresses the technical and administrative feasibility of an alternative, including the availability of materials and services required for cleanup.

- **Cost** - compares the differences in cost, including capital, operation, and maintenance costs.

The following criteria are considered modifying criteria and are generally taken into account after public comments are received.

- **State Acceptance** - This criterion will be formally evaluated following receipt of comments from the New York State Department of Environmental Conservation.

- **Community Acceptance** - This criterion will be formally evaluated following receipt of comments from members of the public.

The updated evaluation incorporated the updated radiological contamination data presented in Sections 2.2.2, 2.2.3, 2.2.4 and 2.2.5, and the findings of the USACE radiological risk and radon assessments summarized in Sections 2.2.7 and 2.2.8. The results of the evaluation are summarized in the following sections.

5.2 Protectiveness of Human Health and Environment

5.2.1 Alternative 1 – No Action

The No Action alternative assumes that Areas A, B and C, Seaway Northside and the Seaway Southside areas will remain in place and no cover material beyond that which is already present would be added. Therefore, no additional actions would be taken to reduce existing risks.

This alternative provides no controls for precluding individuals from being exposed directly to the radiological materials or from the inhalation and ingestion of any airborne radiological materials from the materials being suspended in air from disturbing the materials located at the surface, or from precluding the contaminants from being transported off the site and into the environment through various means such as erosion or leaching into the surface waters. As indicated in Section 2.2.7, the current situation without any further controls provides an unacceptable threat to the human health and the environment. Therefore, this alternative is not considered to be protective and does not meet this threshold criterion.

5.2.2 Alternative 2 – Complete Excavation With Off-Site Disposal

This alternative assumes that all contaminated soil in Areas A, B and C, Seaway Northside and Seaway Southside in excess of the cleanup criteria specified in Section 3.2 would be excavated and removed for off-site disposal. The total disposal volume for this alternative is estimated to be approximately 140,000 yd^3 of contaminated material. Alternative 2 includes the placement of 1 foot of clean soil over Areas A, B and C, Seaway Northside and Seaway Southside to preclude contact with remaining soils that would be at the sub-surface cleanup criteria. This alternative eliminates the potential for unacceptable threats to the human health and the environment by removal of the material. Therefore, this alternative is considered to be protective and does meet this threshold criterion

5.2.3 Alternative 4 – Partial Excavation With Off-Site Disposal

This alternative assumes that all soils in Area A and accessible contaminated soil in Area C, Seaway Northside and Seaway Southside exceeding the cleanup criteria specified in Section 3.2 would be excavated and disposed off-site. The total disposal volume for this alternative is estimated to be approximately 105,000 yd^3 of contaminated material. After excavation, Areas B and C would be capped by USACE, where necessary, with a landfill cap at least 4 ft thick. Area A would not require the same type cover since all soils exceeding cleanup levels would have been removed. Unacceptable threats to human health and the environment would be eliminated at the Seaway Site under this alternative through the removal and off-Site disposal of accessible soils exceeding the site-specific guideline in Areas A, B and C, Seaway Northside and Seaway Southside. A further level of protection would be obtained through the placement of a cap over any excavated areas to eliminate possible exposure to residual soils and to minimize the potential for further releases to the environment and adjacent properties. Similar to Alternative 2, the measures would mitigate exposures via direct radiation through the removal and subsequent covering of soils in disturbed areas. Additional protection would be afforded through the land use controls discussed in Section 2.6.3 that would control future uses of the site. Therefore, this alternative is considered to be protective and does meet this threshold criterion.

5.2.4 Alternative 6 – Containment

This alternative was evaluated in the 1993 FS. It was re-evaluated based on USACE's assessment of radiological risks (USACE 2000a) summarized in Section 5 of this Addendum report. This alternative assumes that the contaminated material in Areas A, B and C of the Seaway Site would be capped by USACE using a cap at least 4-5½ ft thick and that the material outside the leachate collection system (i.e., Seaway Southside and Seaway Northside) would be remediated to remove all soils exceeding the cleanup criteria. Land use controls, as discussed in Section 2.6.3, are assumed. These would include prohibitions to excavation and building construction. A 1000-year post-closure monitoring and maintenance program is also included in this alternative. Under this alternative, potential threats to human health and the environment would be reduced by the placement of a cap over Areas A, B and C that is at least 4 to 5½ ft thick. These measures would mitigate exposures via direct radiation through the placement of soils over the soils contaminated above the guideline at the Site. Additional protection would be afforded through land use controls, as discussed in Section 2.6.3, controlling future uses of the facility. This alternative is considered to be protective since the MED/AEC-related materials would be isolated from the public and the environment.

5.3 Ability to Meet ARARs

Agencies responsible for remedial actions under CERCLA must ensure that selected remedies meet ARARs. As described in detail in Section 3, USACE has determined through a comprehensive evaluation that the substantive standards and requirements of 40 CFR Part 192 and 10 CFR Part 40, Appendix A are relevant and appropriate in considering remediation of the Seaway Site. The following sections evaluate the Seaway remedial alternatives in terms of compliance with 40 CFR Part 192 and 10 CFR Part 40, Appendix A, Criterion 6(1) and Criterion 6(6).

Alternative 1, No Action is non-compliant with 40 CFR Part 192, Subpart A and 10 CFR Part 40, Appendix A, Criterion 6(1). If no action is taken, radon release rates from Seaway Area A would exceed radon standards 40 CFR Part 192, Subpart A as discussed in Section 2.2.8.. Also, no action to control the residual radioactive material in accordance with 40 CFR Part 192 Subpart A and 10 CFR Part 40, Appendix A, Criterion 6(1) would be taken.

Alternative 2 is considered to be compliant with the substantive standards and requirement of 40 CFR Part 192 and 10 CFR Part 40, Appendix A. MED/AEC-related contaminated soils in Areas A, B and C, Seaway Northside and Seaway Southside would be removed using the cleanup criteria identified in Section 3.2.

Alternatives 4 and 6 are also considered to be compliant with the substantive standards and requirements of 40 CFR Part 192 and 10 CFR Part 40, Appendix A. In order to ensure the integrity of the caps that would be placed by USACE, where necessary, over Areas A, B and C, Seaway Northside and Seaway Southside and continued compliance with the ARARs, implementation of Alternatives 4 or 6 would include using existing land use controls to ensure integrity of the capped areas. As described in Section 2.2.7, USACE's radiological assessment (USACE 2000a) confirms that the 40 CFR Part 192, Subpart A and 10 CFR Part 40, Appendix A, Criterion 6(1) standards are met, limiting radon emissions from the capped areas. Similarly, in the event that landfill gas venting or landfill gas collection is required in association with the capping contemplated under Alternatives 4 or 6, impacts from radon present in landfill gas would comply with the radon impact standards of 40 CFR Part 192, Subpart A (USACE 2000b).

5.4 Long-Term Effectiveness and Permanence

Alternative 1, No Action, has low long-term effectiveness because the post-implementation threats to human health and the environment equal those now at the site, which are not acceptable.

Alternative 2, Complete Excavation with Off-Site Disposal, has a high degree of long-term effectiveness and permanence because all soils containing radionuclides above the guideline are excavated and removed from the site and isolated from the public and environment in an off-site disposal facility.

Alternatives 4 and 6, Partial Excavation with Off-Site Disposal and Containment have the same high degree of long-term effectiveness and permanence as Alternative 2 since the residual materials would be isolated from the public and environment in the current disposal facility.

5.5 Short-Term Effectiveness and Environmental Impacts

Alternative 1, No Action, is most effective in protecting the community and workers and controlling impacts during implementation since no actions that could create additional short-term risks are undertaken. Alternative 1 requires no time to implement, because no action is taken.

Alternative 2, Complete Excavation with Off-Site Disposal, is low in short-term effectiveness because of increased risk to the community and remediation workers related to the need to remove significant quantities of refuse and cover material to gain access to the soils in Areas B and C, Seaway Northside and Seaway Southside that exceed the site-specific guideline. The material landfilled in Areas B and C, Seaway Northside and Seaway Southside may include a wide range of industrial wastes and debris along with municipal refuse. These wastes may present a significant but unknown hazard to workers and the public and excavation into this material may create a hazard due to unstable embankment conditions. Methane gas and other gases present in the landfill may also present hazards if waste is excavated or cover or caps are disturbed. The transportation of an estimated 140,000 yd^3 of contaminated material to an off-site disposal location is required as part of this alternative, which presents transportation-related risks. There are also additional risks associated with handling and disposal activities at the off-site disposal facility.

Alternative 4, Partial Excavation with Off-Site Disposal, is relatively low in short-term effectiveness because significant quantities of material will be removed from the landfill which may include industrial waste and debris. As in the case of Alternative 2, these wastes may present a significant but unknown hazard to workers and the public and may create a hazard to unstable embankment conditions, although deep excavation is not anticipated. Methane gas and other gases present in the landfill may present hazards as waste is excavated and existing covers or caps are disturbed. The transportation of approximately 105,000 yd^3 of contaminated material to an off-site disposal location is required as part of this alternative, which presents transportation-related risks. Local transportation of capping material to the Site presents some additional transportation-related risks. There are also additional risks associated with handling and disposal activities at the off-site disposal facility.

Alternative 6, Containment, is relatively high in effectiveness because the amount of material to be disturbed is limited to grading and shaping of the landfilled area to facilitate capping. Hazards to workers and the community are limited because major excavation of materials which may include industrial waste and debris is limited. The transportation of approximately 7,200 yd^3 of contaminated material to an off-site disposal location is required as part of this alternative, which presents transportation-related risks. Local transportation of capping material to the site presents some transportation-related risks. The amount of material being shipped off-site for disposal is significantly less than the amounts associated with Alternatives 2 and 4. Therefore, the potential short-term impacts would also be less than these other two alternatives.

5.6 Reduction in Toxicity, Mobility or Volume Through Treatment

The 1993 Feasibility Study evaluated currently available treatment technologies for treatment in the course of removal and found none that are economical and technologically feasible at this time. Accordingly, none of the alternatives provide treatment as a principal element of remediation.

Alternative 1, No Action, provides no reduction in toxicity, mobility or volume of site contaminants through treatment.

Alternative 2, Complete Excavation with Off-Site Disposal, does not provide reduction in toxicity, mobility or volume of site contaminants through treatment at the Site. This alternative would include containment at the final disposal location.

Alternative 4, Partial Excavation with Off-Site Disposal, does not provide reduction in toxicity, mobility or volume of site contaminants through treatment at the Site. This alternative would include containment at the final disposal location.

Alternative 6, Containment, provides no reduction in toxicity, mobility, or volume of site contaminants through treatment.

5.7 Implementability

Alternative 1, No Action, is easily implementable because no action is taken.

Implementing Alternative 2, Complete Excavation with Off-Site Disposal, would involve a high degree of difficulty due to the need to remove a large volume of refuse currently covering the B and C areas. Additionally, this removal would have to ensure the integrity of the existing covered and capped landfill and associated containment system, which was constructed under NYSDEC approvals and includes a 24-inch clay layer, 6 inches of topsoil, seeding and a gas collection system or gas venting. Excavated refuse and cover material would have to be stockpiled and returned to the landfill, and the cover and cap restored. Additional engineering measures, such as use of sheet piling, will be necessary to ensure the integrity of the slurry walls as excavations in the Seaway Southside and Northside areas proceed up to the containment slurry wall surrounding the landfill. These actions, although implementable, are technically difficult from an engineering perspective.

Implementing Alternative No. 4, Partial Excavation with Off-Site Disposal, would be moderately difficult since substantial quantities of material would be excavated and removed from the Site, but excavation would be limited to relatively shallow depths (~10 to 12 ft). As in the case for Alternative 2, this removal would have to ensure the integrity of the existing covered and capped landfill and associated containment system. This alternative is dependent on a number of current land use controls imposed by the New York State solid and hazardous waste regulations for the landfill. USACE has concluded that no additional land use controls are necessary. However, if this alternative is selected, USACE would prepare a Land Use Control Plan that, at a minimum, documents (1) which controls are necessary for protectiveness and why, (2) under what conditions would changes to the land use controls be warranted, (3) which federal, state, or local entities are responsible for maintaining the controls during given time frames, (4) frequency of reviewing current conditions to assess whether changes to either the land use controls or to the Land Use Control Plan are necessary for ensuring continued protectiveness, and (5) the necessary data needs for assisting in reviews of the continued adequacy of controls and of continued protectiveness. The federal government would be responsible for maintaining the Land Use Control Plan. Use of land use controls is considered feasible based on the fact that they already exist and that USACE would prepare a Land Use Control Plan should this remedy be selected.

Alternative 6, Containment, would be relatively easy to implement from an engineering and design and administrative standpoint. Complete containment of all of the MED/AEC-related materials located on the Seaway Site would be technically feasible and implementable and would provide the same level of protection whether the materials outside the landfill containment system were placed in the landfill or shipped off-site for disposal. New York State regulations adopted in 2000 apply to the FUSRAP wastes in the Seaway landfill. Under 6 NYCRR Part 380, such wastes cannot be placed in a landfill unless a variance to Part 380 is obtained. Although CERCLA Section 121(d)(2)(C)(ii) provides that state laws or regulations effectively imposing a statewide prohibition on land disposal are not applicable to CERCLA remedial actions and may not be considered as ARARs, it is likely there would be questions raised differentiating the placement of materials on-site in a new containment area as opposed to using a pre-existing and now closed hazardous waste landfill as a disposal location of FUSRAP materials for purposes of containment. Since the volume of materials to be moved in this alternative is relatively small, this alternative would allow for those materials to be disposed off-site. Therefore, in order to proceed with completion of this remedy in a more timely manner and with greater certainty with respect to implementability, this alternative includes the excavation and shipment off-site for disposal the impacted MED/AEC-related materials outside of the landfill containment system for an incremental cost of approximately $2M. As in the case for Alternative 2, this removal would have to ensure the integrity of the existing covered and capped landfill and associated containment system. This alternative is dependent on a number of current land use controls imposed by the New York State solid and hazardous waste regulations for the landfill. USACE has concluded that no additional land use controls are necessary. However, if this alternative is selected, USACE would prepare a Land Use Control Plan that, at a minimum, documents (1) which controls are necessary for protectiveness and why, (2) under what conditions would changes to the land use controls be warranted, (3) which federal, state, or local entities are responsible for maintaining the controls during given time frames, (4) frequency of reviewing current conditions to assess whether changes to either the land use controls or to the Land Use Control Plan are necessary for ensuring continued protectiveness, and (5) the necessary data needs for assisting in reviews of the continued adequacy of controls and of continued protectiveness. The federal government would be responsible for maintaining the Land Use Control Plan. Use of land use controls is considered feasible based on the fact that they already exist and that USACE would prepare a Land Use Control Plan should this remedy be selected.

5.8 Costs

In accordance with USEPA and USACE guidance (USEPA 2000), the present value costs of each of the remedial alternatives were estimated based on a discount rate of seven (7) percent (%).

In addition to one-time design and remedial action costs, the present value costs estimates for Alternative 1 (No Action), Alternative 4 (Partial Excavation with Off-site Disposal) and Alternative 6 (Containment) include the annual costs for land use controls, five-year reviews, environmental monitoring and other recurring costs for a period of 1,000 years. Details regarding the cost estimates are included in Appendix G. The present value costs of the remedial alternatives are estimated as follows (rounded to the nearest $1,000,000):

Alternative	Present Value Cost (7 percent discount)
Alternative 1 – No Action	$0
Alternative 2 – Excavation with Off-Site Disposal	$113,000,000
Alternative 4 – Partial Excavation with Off-Site Disposal	$80,000,000
Alternative 6 – Containment	$30,000,000

5.9 State Acceptance

This criterion will be formally evaluated following receipt of comments from the New York State Department of Environmental Conservation.

5.10 Community Acceptance

This criterion will be formally evaluated following receipt of comments from members of the public.

6. COMPARISON OF REMEDIAL ACTION ALTERNATIVES

A comparison of the remedial action alternatives evaluated in this Addendum, considering the nine CERCLA evaluation criteria, is provided below.

Overall Protection of Human Health and the Environment. Alternative 1 provides no increased protection over the current site conditions and would not be protective of human health and the environment over the long-term for foreseeable future land uses. The overall levels of protectiveness for Alternatives 2, 4, and 6 are considered to be the same because each provide for long-term disposal and control of the MED/AEC-related material. Alternatives 2, 4 and 6 all involve the isolation, either onsite (Alternative 4 and 6) or off-site (alternatives 2 and 4), of MED/AEC-related materials in facilities designed to preclude releases to the environment and preclude the public from coming into contact with it.

Compliance with ARARs. Alternative 2 meets the 40 CFR Part 192 and 10 CFR Part 40, Appendix A, Criterion 6(6) ARARs because all soil containing radionuclides exceeding the cleanup guideline would be excavated and permanently isolated in an off-site disposal cell or facility. Alternatives 4 and 6, which involve leaving in place some soil containing radionuclides above the guideline, but would comply with the 40 CFR Part 192, Subpart A and 10 CFR Part 40, Appendix A, Criterion 6(1) ARARs through the use of barriers that will be maintained through use of land use controls. Alternative 1, however, is noncompliant with the ARARs because all of the waste containing radionuclides above the 40 CFR 192 and 10 CFR Part 40, Appendix A, Criterion 6(6) standards are left in place and no barriers currently exist to ensure adequate control of the residual radioactive material.

Long-term Effectiveness and Permanence. Alternatives 2, 4 and 6 all provide equal long-term protection and reliability since they all include the disposal of the MED/AEC-related material either at an off-site disposal facility or at the Seaway landfill. All disposal alternatives, including at the site, will be subject to long-term governmental controls related to a permanently closed waste disposal facility. The site closure standards at the Seaway landfill, and those at any possible off-site disposal location, are considered to be equivalent in their long-term reliability and protective design standards designed to preclude releases to the environment and protect the public from contact with the materials.

Alternative 1, no action, has low long-term effectiveness because the post-implementation remedial risks equal those now at the site, which are not acceptable.

Reduction in Toxicity, Mobility, or Volume through Treatment. None of the alternatives provides treatment on site for the materials to be removed. Alternatives 2, 4 and 6, which provide for some degree of off-site disposal, will include containment at the final disposal location. These alternatives thus will achieve reduction in mobility, toxicity and volume consistent with requirements of the disposal facility. The remaining alternatives would provide either no removal of materials, or disposal onsite, which would also limit mobility through design of the disposal facility. The 1993 Feasibility Study evaluated currently available treatment technologies for treatment in the course of removal and found none are economically and technologically feasible at this time.

Short-term Effectiveness and Environmental Impacts. Short-term effectiveness is measured with respect to protection of community and workers as well as short-term environmental impacts during remedial actions and time until remedial action objectives are achieved. An increase in the complexity of an alternative typically results in a decrease in short-term effectiveness because of increased handling and processing. Also, alternatives involving off-site disposal of wastes would result in a decrease in short-term effectiveness because of the increased time required and transportation-related risks. Also, the transportation of the significant amount of materials associated with complete excavation and subsequent handling of these materials at the off-site disposal facility pose additional risks beyond those presented by Alternative 6.

Alternative 1, no action, is not effective in the short-term due to the continued presence of unacceptable exposures at baseline conditions. The no action alternative does not increase the short-term threats from the baseline conditions since no actions that could create impacts are undertaken. Alternative 1 requires the shortest time to implement. The short-term effectiveness of the other alternatives rank in the following order: Alternative 6 (containment), Alternative 4 (partial excavation and off-site disposal), and Alternative 2 (complete excavation and off-site disposal). Alternative 2 provides the least short-term effectiveness because of the increased risk to the community and remediation workers related to the need to remove significant quantities of refuse and cover to gain access to the soils in Areas B and C, Seaway Northside and Seaway Southside that exceed the site-specific guideline. As described in Section 2, the material landfilled in these areas may include a wide range of industrial wastes and debris along with municipal refuse. These wastes may present a significant but unknown hazard to workers and the public and excavation into this material may create a hazard due to unstable embankment conditions. Methane gas and other gases present in the landfill may also present hazards if waste is excavated or cover or caps are disturbed.

Implementability. In considering implementability, the alternatives were evaluated with respect to the following:

- ability to construct and operate the technology,
- reliability of the technology,
- ease of undertaking additional remedial actions,
- ability to monitor effectiveness,
- ability to obtain approvals and coordinate with regulatory agencies,
- availability of off-site disposal services and capacity, and
- availability of necessary equipment and specialists.

The degree of difficulty in implementing an alternative increases with the complexity of the remediation activity. The design, engineering, and administrative requirements of Alternative 1, no action, are essentially negligible. The remaining alternatives are all technically and administratively feasible. The engineering, design, and administrative requirements increase with the complexity of the alternatives in the following order: Alternative 6 (containment); Alternative 4 (partial excavation and off-site disposal); and Alternative 2 (complete excavation and off-site disposal). Implementing Alternative 2 would involve a high degree of difficulty due to the need to remove a large volume of refuse currently covering the B and C area and portions of Seaway Southside. For Alternative 2, the complete removal would also have to ensure the integrity of the existing covered and capped landfill, which was constructed under NYSDEC approvals and includes a 24-inch clay layer, 6 inches of topsoil, seeding and a gas collection system or gas venting, as described in Section 2. Excavated refuse would have to be stockpiled and returned to the landfill, and the cover and cap restored. Alternatives 4 and 6 would also have to ensure the integrity of the existing covered and capped landfill and associated containment system during removal actions in Seaway Southside and Northside. These actions, although implementable, are technically difficult from an engineering perspective.

The implementation of land use controls (Alternatives 4 and 6) is considered to be feasible and implementable. If either of these alternative is selected, USACE would prepare a Land Use Control Plan that, at a minimum, documents (1) which controls are necessary for protectiveness and why, (2) under what conditions would changes to the land use controls be warranted, (3) which federal, state, or local entities are responsible for maintaining the controls during given time frames, (4) frequency of reviewing current conditions to assess whether changes to either the land use controls or to the Land Use Control Plan are necessary for ensuring continued protectiveness, and (5) the necessary data needs for assisting in reviews of the continued adequacy of controls and of continued protectiveness. The federal government would be responsible for maintaining the Land Use Control Plan.

The landfill has been closed, except in Areas A, B, C and D and areas between Areas A, B, and C, in accordance with NYSDEC's solid waste regulations, 6 NYCRR Part 360. The landfill has also been designated as an inactive hazardous waste disposal site pursuant to 6 NYCRR Part 375, Inactive Hazardous Waste Disposal Sites, and is listed in the Registry maintained by NYSDEC. As a location subject to 6 NYCRR Part 360 and 6 NYCRR Part 375, the Seaway Site is subject to land use controls enforceable by NYSDEC. Any modification to the Site for implementation of any of the alternatives will require close coordination with NYSDEC.

Cost. The comparative analysis of costs compares the present value costs of each alternative as described in Section 5.8.

State and Community Acceptance. The state and community acceptance criteria will be addressed in the ROD once formal comments on this Addendum and the PP have been received and a final remedy selection decision is being made.

Table 6-1 presents a comparative summary of the four alternatives being considered for the Seaway Site.

Table 6-1 - Comparison of Remedial Action Alternatives

CERCLA Criterion	Alternative 1 No Action	Alternative 2 Complete Excavation with Off-Site Disposal	Alternative 4 Partial Excavation with Off-Site Disposal	Alternative 6 Containment
Overall Protectiveness of Human Health and the Environment	Not protective of human health and the environment because no action would be taken to eliminate or control potential exposure pathways.	Protective of human health and the environment because residual radioactive material would be removed and isolated in an off-Site disposal facility.	Protective of human health and the environment, relying on land use controls to control potential exposure pathways in the future.	Protective of human health and the environment, relying on land use controls to control potential exposure pathways.
Compliance with ARARs	Not compliant with ARARs because MED/AEC-related wastes containing radionuclides above ARAR-based concentrations would be left in place and no land use controls would be established to control access to or releases of the residual radioactive material.	Compliant with ARARs because residual radioactive material would be removed to the concentrations required by the ARARs.	Compliant with ARARs because implementation of this alternative would be in accordance with the substantive standards and requirements of 40 CFR Part 192 and 10 CFR Part 40, Appendix A.	Compliant with ARARs because implementation of this alternative would be in accordance with the substantive standards and requirements of 40 CFR Part 192 and 10 CFR Part 40, Appendix A.
Long-Term Effectiveness and Permanence	Long-term effectiveness and permanence for this alternative is low because no action would be taken and risks, which are deemed unacceptable, would remain.	This alternative has a high degree of long-term effectiveness because all soils containing radionuclides above the ARAR requirements and guidelines would be removed from the Site and placed in a disposal facility that would be subject to long-term governmental land use controls related to a permanently closed waste disposal facility.	This alternative has the same high degree of long-term effectiveness and permanence as Alternative 2 since the residual materials would be isolated from the public and environment in the current disposal facility that will be subject to long-term governmental land use controls related to a permanently closed waste disposal facility.	This alternative has the same high degree of long-term effectiveness and permanence as Alternative 2 since the residual materials would be isolated from the public and environment in the current disposal facility that will be subject to long-term governmental land use controls related to a permanently closed waste disposal facility.

Table 6-1 - Comparison of Remedial Action Alternatives (Cont'd)

CERCLA Criterion	Alternative 1 No Action	Alternative 2 Complete Excavation with Off-Site Disposal	Alternative 4 Partial Excavation with Off-Site Disposal	Alternative 6 Containment
Short-Term Effectiveness and Environmental Impacts	No increase in short-term risk.	This alternative is ranked low in short-term effectiveness because of increased risk to the community and remediation workers related to the need to remove significant quantities of refuse and cover material to gain access to the soils in Areas B and C and Seaway Southside. There is also an incremental risk associated with the transportation of the waste and the subsequent handling at the disposal facility.	This alternative is ranked relatively low in short-term effectiveness because significant quantities of material would be removed from the landfill which may include industrial waste and debris and these wastes may present a significant but unknown hazard to workers and the public. There is also an incremental risk associated with the transportation of the waste and the subsequent handling at the disposal facility.	This alternative is ranked relatively high in effectiveness because the amount of material to be disturbed is limited to grading and shaping of the landfilled area to facilitate capping and relatively minor quantities of material in areas such as Seaway Southside. Hazards to workers and community are limited because major excavation of materials which may include industrial waste and debris is limited.
Reduction in Toxicity, Mobility, or Volume Through Treatment	This alternative provides no reduction in toxicity, mobility or volume of site contaminants through treatment.	This alternative does not provide reduction in toxicity, mobility or volume of site contaminants through treatment at the Site but would include containment at the final disposal location.	This alternative does not provide reduction in toxicity, mobility or volume of site contaminants through treatment at the Site. It would include containment of the materials removed from the Site at the final disposal location.	This alternative does not provide reduction in toxicity, mobility or volume of site contaminants through treatment at the Site. It would include containment of the materials removed from the Site at the final disposal location.
Implementability	This alternative is easily implementable because no action is taken.	This alternative would involve a high degree of difficulty due to the need to remove a large volume of refuse currently covering the B and C areas, while ensuring the integrity of	This alternative would be moderately difficult since substantial quantities of material would be excavated and removed from the Site, but excavation would be limited to relatively	This alternative would be relatively easy to implement from an engineering and design and administrative standpoint. During removal of

Table 6-1 - Comparison of Remedial Action Alternatives (Cont'd)

CERCLA Criterion	Alternative 1 No Action	Alternative 2 Complete Excavation with Off-Site Disposal	Alternative 4 Partial Excavation with Off-Site Disposal	Alternative 6 Containment
		the existing covered and capped landfill. These actions, although implementable, are technically difficult from an engineering perspective. Additionally, implementing this alternative is potentially difficult due to the need to stockpile a significant volume of refuse removed to gain access to the MED/AEC-related contaminated materials.	shallow depths. During the removal of contaminated material from the Site, the integrity of the existing covered and capped landfill would need to be ensured or restored. Ensuring that land use controls are in place to protect the integrity of the cap to be constructed under this alternative, is considered feasible since land use controls are currently in place at the Site under New York State solid and hazardous waste regulations; USACE has concluded that no additional land use controls are necessary; USACE will prepare a Land Use Control Plan that, at a minimum, documents (1) which controls are necessary for protectiveness and why, (2) under what conditions would changes to the land use controls be warranted, (3) which federal, state, or local entities are responsible for maintaining the controls during given time frames, (4) frequency of reviewing current conditions to assess whether changes to either the land use controls or to the Land Use Control Plan are necessary for ensuring continued protectiveness, and (5) the necessary data needs	contaminated materials from the site, the integrity of the existing covered and capped landfill would need to be ensured or restored. Ensuring that land use controls are in place to protect the integrity of the cap to be constructed under this alternative is considered feasible since land use controls are currently in place at the Site under New York State solid and hazardous waste regulations; USACE has concluded that no additional land use controls are necessary; USACE will prepare a Land Use Control Plan that, at a minimum, documents (1) which controls are necessary for protectiveness and why, (2) under what conditions would changes to the land use controls be warranted, (3) which federal, state, or local entities are responsible for maintaining the controls during given time frames, (4) frequency

Table 6-1 - Comparison of Remedial Action Alternatives (Cont'd)

CERCLA Criterion	Alternative 1 No Action	Alternative 2 Complete Excavation with Off-Site Disposal	Alternative 4 Partial Excavation with Off-Site Disposal	Alternative 6 Containment
			for assisting in reviews of the continued adequacy of controls and of continued protectiveness; and the federal government will be responsible for maintaining the Land Use Control Plan.	of reviewing current conditions to assess whether changes to either the land use controls or to the Land Use Control Plan are necessary for ensuring continued protectiveness, and (5) the necessary data needs for assisting in reviews of the continued adequacy of controls and of continued protectiveness; and the federal government will be responsible for maintaining the Land Use Control Plan.
Present Value Cost ($)	**$0**	**$113,000,000**	**$80,000,000**	**$30,000,000**

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APPENDIX A

SEAWAY SOUTHSIDE EVALUATION

SEAWAY SOUTHSIDE EVALUATION

1.0 Background

During the Ashland 1 Site and Seaway Area D remediation efforts covered by the April 1998 Record of Decision for the Ashland 1 (including Seaway Area D) and Ashland 2 Sites (USACE 1998), MED/AEC-related soil contamination was found to extend onto the Seaway Property and under the closed portion of the landfill. The contamination was found in the vicinity of Area D, particularly at the north-west end of the Area D excavations and found to extend beyond the Seaway property line just east of an area northwest of Area D, known as Survey Unit Areas 24 and 31, and under the road surrounding the landfill, known as Stone Road. USACE did not find any elevated areas (i.e., radiological readings were not above typical background) at the Rattlesnake Creek drainage pipe inlet that opens to the east side of the landfill (Shaw 2003). During the Ashland 1 remediation efforts, USACE conducted further investigations of these two areas, Seaway Area D Adjacent Property (property adjacent to Area D in the northwest direction) and Northwest of Seaway Area D Adjacent Property, which are collectively referred to Seaway Southside, to determine, to the maximum extent possible, the extent of the remaining MED/AEC-related soil contamination that may extend into the closed portion of the landfill. The following sections discuss the investigation results for these two areas.

2.0 Seaway Southside Investigations

As described above, there were two areas on the Seaway property that were investigated to determine, to the maximum extent possible, the nature and extent of the remaining MED/AEC-related soil contamination. The following sections discuss the results of those investigations.

2.1 Seaway Area D Adjacent Property

Excavation in Area D began in March 2000 and continued through August 2000. Excavation in Area D proceeded in a lateral direction both to the northwest and southeast. The excavations were terminated when the potential for impacts to the closed portion of the landfill occurred in an area adjacent to Area D in the northwest direction. At that time, there remained a lens (~ 8 inches thick) of radiological materials along the north end of the excavation as shown in Figure 1 that exceeded the 40 pCi/g Th-230 cleanup criteria being used during the Ashland 1 remediation, which is also the principal cleanup criterion for Seaway. USACE decided to perform additional field sampling activities, which included benching, Geoprobe sampling, and soil sampling, in an effort to determine the extent of the remaining materials. These efforts began in August 2001 and were completed in November 2001 and the results were documented in January 2002 (USACE 2002).

The results of the further investigations found that the radiological materials found in the lens face did not extend much further than the present location. As shown in Figure 2, the sampling results found that the lens of contaminated soil exceeding 40 pCi/g Th-230 did not extend perpendicularly out into the Seaway landfill, but may extend further to the north under the closure cap. Test pits were developed to the north of the area. The results of analysis of soil samples from the test pits, as shown in Figure 3, indicate that the lens of radiological material does not extend to the north. Results from sampling of the lens itself are included in Table 1. The results from sampling in the test pits are summarized in Table 2. Results from samples taken from the Geoprobe locations showed Th-230 concentrations of <14 pCi/g, U-238 <3 pCi/g, and Ra-226 <0.3 pCi/g (USACE 2002). Also, the results of the sampling conducted in the two trenches are included in Table 3, which also includes a computation of the sum of the ratios (SOR) for the results to evaluate whether the soil would also meet the 10 CFR Part 40, Appendix A, Criterion 6(6) criteria. As indicated in Table 3, all of the samples that are below the 40 pCi/g Th-230 cleanup criteria also meet the SOR criteria. Based on this data, it appears that the contamination in this area is limited to the old face of the excavation where the samples from the lens were taken and does not extend under the landfill cap.

2.2 Northwest of Seaway Area D Adjacent Property

During the Ashland 1 remediation efforts, a lens of MED/AEC-related soil contamination was discovered on the Seaway property located under the Stone Road surrounding the Seaway landfill. These areas were identified east of Ashland 1 Final Status Survey Units 24 and 31 (see Figure 3 for relative location to Seaway Area D and the Area D adjacent property). Sampling of material from this lens as well as on the landfill side of Stone Road was performed mostly in March and April 2002. The results of these efforts were documented in the February 2003 report, *"Compilation of Surface Soil Sample Data Seaway Southside Area (East of Ashland 1 Final Status Survey Units 24 and 31)"* (USACE 2003). Figure 1 from that report (see Figure 4) summarizes soil sample locations and the results of the gamma walkover scans conducted. The only sample located east of Stone Road is sample A1-SL-TP-0065. Stone Road is located approximately along the upper boundary line for Units 24 and 31 (see Figure 4) with all of the samples, except the one noted above, located along the road and to the west.

The investigation found that the lens of radiological material was approximately 12 to 18 inches thick and did extend underneath the Stone Road and towards the closed portion of the landfill. The soil sample from the test pit on the east side of Stone Road (i.e., the side next to the landfill) showed a Th-230 concentration at 4 to 5 feet below the surface of approximately 603 pCi/g, which exceeded the 40 pCi/g Th-230 cleanup criteria being used for the Ashland 1 remediation efforts. The radiological results for all of the soil samples are summarized in Table 4.

2.3 Evaluation of Findings

The results of the investigations of Seaway Southside were evaluated and compared to historical information to assess the extent and potential volume of radiologically contaminated materials remaining on the Seaway property. The results were also evaluated to assess potential radiological risks compared to the risks posed by MED/AEC-related radiological materials present at the Seaway Site in Areas A, B and C. The evaluation is summarized in the following sections.

2.3.1 Extent of Contamination - Seaway Area D Adjacent Property

Using photographs taken during the construction of the tanks at Ashland 1 (approximately the mid to late 1970's), it appears that the material found in the northern area of Area D may have been associated with what appears to be a break in a diked area containing soil residuals in the Ashland 1 area as shown in Figure 5. Figure 5 shows the results of the Ashland 1 investigations relative to site conditions during the tank construction activities. As evidenced by the figure, the radiological contamination appears to be limited to the area where the soil material broke through the diked area. Also, as shown in the figure, most of the material that broke through the diked area appears to have flowed to the south towards Area D and therefore would have been remediated as part of the Seaway Area D remediation. Also, based on the data results of the investigations in this area, the material exceeding the 40 pCi/g Th-230 criteria does not appear to extend further towards the landfill perpendicularly by more than 1 to 2 feet or towards the north end of the landfill by more than 7 feet. Using the distances between the clean samples and the elevated readings of the lens area (~28 feet) and assuming an average thickness of 8 inches, the remaining radiological materials in this area are estimated to be less than 3 yd^3.

2.3.2 Extent of Contamination - Northwest of Seaway Area D Adjacent Property

The results further northwest from Area D along the landfill were evaluated using an historical photograph taken approximately in the 1960's and the gamma walkover results performed by ORNL (ORNL 1978). Figure 6 shows the Th-230 results from the Ashland 1 remediation efforts along the Seaway property projected on the historical photograph and the ORNL gamma walkover survey results. A closer view is shown in Figure 7. As indicated in Figures 6 and 7, the lens found adjacent to Survey Unit 31 during Ashland 1 remediation appears to fall within the area ORNL found to have elevated readings during their gamma walkover surveys in the mid-1970's.

Using the photograph as shown in Figure 7, an estimate was visually made of the possible extent of contamination and is shown in Figure 8. The estimation of the extent of contamination using the historical photographs was done by comparing the locations of the elevated radiological results to visual features on the photograph. A correlation was found between elevated results and areas on the photograph where there appears to be little or no vegetation and where there appears to be material spread out over an area due to manually spreading or due to erosion. This same type of correlation was found during the Seaway Areas A, B and C investigations conducted by USACE in 2001. Using this correlation, the areal extent amounts to approximately 5,520 sq. ft. and assuming an average lens thickness of 12 inches would amount to approximately 200 yd^3 of radiologically-contaminated soils. The approximate location of the leachate collection system slurry wall is about 50 to 59 feet from the Seaway property boundary (CH2M Hill 1983). As shown in Figure 9, all of the radiological materials are outside of the leachate collection system. However, removal of the material would impact the cover system over the closed portion of the landfill.

The results in Figure 7 were also projected on an earlier photograph taken before the tanks were constructed in the Ashland 1 area to assess whether there may be another possibility as to the extent of contamination. The elevated Th-230 results correlated better with the earlier photograph to what appears to be an area of material that has been spread due possibly to surface water runoff or erosion. The results projected onto that photograph and the visual estimate of the areal extent of contamination are shown in Figure 10. The areal extent of contamination is approximately 19,800 sq. ft. which amounts to approximately 733 yd^3 of material assuming an average thickness of 12 inches. Also, as shown in Figure 11, approximately 47% (~9,230 sq. ft.) of the material is located within the area covered by the leachate collection system while 53% (~10,570 sq. ft.) is located outside the leachate collection system. Also, the assumed lens of material is projected out approximately 100 feet from the slurry wall into the landfill area. As evidenced in Figure 11, removal of this material would impact the closed portion of the landfill and would have to be factored into the costs associated with any removal remedial alternatives.

2.3.3 Radiological Risks

Radiological risks were previously assessed for the Seaway Site using radiological data available at the time for Seaway Areas A, B, and C and using a set of exposure scenarios and assumptions. The results of those evaluations and the input parameters used are documented in *"Technical Memorandum: Modeling of Radiological Risks From Residual Radioactive Materials Following Implementation of Remedial Alternatives for Seaway Landfill Areas A, B and C"* (USACE 2000). As discussed above, subsequent investigations indicate that there are two areas in the Seaway Southside that have radiological contamination remaining that exceeded the Ashland 1 remediation soils cleanup criteria. The following material discusses the nature of the radiological materials found in those two areas and the associated radiological risks.

2.3.3.1 Seaway Area D Adjacent Property

The radiological concentrations found in the lens in this area adjacent to Seaway Area D were about the same or lower than the concentrations used in assessing the radiological risks associated with Seaway Areas A, B and C. The maximum Th-230, U-238 and

Ra-226 concentrations found in the Seaway Area D adjacent property lens were 152.24 pCi/g, 13.44 pCi/g, and 2.25 pCi/g, respectively. Whereas, the UCL_{95} values used in the radiological assessment for Seaway Areas A for these same isotopes were 160 pCi/g, 12 pCi/g, and 8.8 pCi/g, respectively (USACE 2000). The UCL_{95} values for Seaway Areas B and C for these same isotopes were 280 pCi/g, 15 pCi/g, and 15 pCi/g, respectively (USACE 2000). Therefore, the material in this area of Seaway Southside poses no additional radiological risks than those already addressed for Seaway Areas A, B and C for the various remedial alternatives, including containment.

2.3.3.2 Northwest of Seaway Area D Adjacent Property

The radiological concentrations found in the lens in this area were much higher than the concentrations found in Seaway Areas A, B and C and evaluated to assess the radiological doses and risks for various scenarios, particularly the Th-230 concentrations. There were twelve samples taken from the face of the lens in this area. The Th-230 concentrations ranged from10.5 pCi/g to 1,761 pCi/g. Using the results from the twelve samples only, the UCL_{95} values for Th-230, U-238 and Ra-226 were 1,050 pCi/g, 112 pCi/g, and 8.09 pCi/g, respectively. The Th-230 and U-238 values are much greater than those used for the radiological assessment of Seaway Areas A, B and C. Therefore, the results of the radiological assessment do not address the situation in this area of Seaway Southside, particularly for the material located outside of the leachate collection system that is near the surface. Using the same input parameters as used for the Seaway Areas A, B and C radiological assessment except for the source term and the area and thickness of contamination, a RESRAD analysis was conservatively performed for the Industrial/Commercial scenario for containment with a minimum cover of one foot remaining at year 1,000. Using default RESRAD erosion rates, the initial cover would need to be 4 to 5 foot thick to have a cover of one foot remaining after 1,000 years.. This scenario represents worst-case exposure conditions under the defined alternatives (excluding no action). The results of the analysis for the first possible contaminated area, as shown in Figure 8, found that the material, which is all located outside of the leachate collection system, presented an unacceptable risk (i.e., the risk exceeds $1x10^{-4}$). The maximum dose and risk occurred at year 1,000 with the estimated dose to the commercial/industrial worker being ~12 mrem/yr with an associated risk of $2x10^{-4}$. These results would also be applicable to the second possibility of contamination as presented in Figures 10 and 11 for the material that is projected to be outside of the area covered by the leachate collection system and near the surface. The materials located within the landfill area (i.e., that area on the landfill side of the slurry wall where refuse was placed) that is covered by the leachate collection system and beneath as much as 10 to 30 feet of landfill material would not present an unacceptable dose and risk for the various remedial alternatives since it would not present a reasonable exposure scenario. Therefore, the material outside of the area covered by the leachate collection system (~ 200 to 360 yd^3) would need to be remediated to provide for acceptable residual risks based on the current land use scenario of commercial/industrial use. The material on the landfill side of the slurry wall would not require remediation to provide for acceptable risks associated with residual materials remaining on the site.

3.0 UNCERTAINTIES

As with any remedial investigation, there is a certain degree of uncertainty associated with the data and the conclusions. For the Seaway Southside, there is some uncertainty associated with the actual location and extent of contamination in the area northwest of Seaway Area D, east of Ashland 1 Survey Units 24 and 31. The uncertainty is associated with the lack of data defining the actual extent of the contamination since most of it was on the Seaway property and would most likely involve extensive sampling into the landfill and through the closure cover for the landfill. However, the use of historical photographs coupled with the existing data does provide an estimate that can be used for evaluating various remedial alternatives, even with the uncertainties. As illustrated above, there were two possibilities for what the extent of contamination may be for this area and both estimates were within a factor of four of each other, not orders of magnitude. Therefore, the uncertainty associated with the extent of contamination in this area is not as large as would be expected with limited characterization data. For further evaluations of alternatives, the second, more conservative model projecting material out into the landfill beyond the slurry wall (see Figures 10 and 11), will be used. For the area known as Seaway Area D Adjacent Property, there is relatively little uncertainty since there is data to demonstrate that the area of contamination does not extend further.

REFERENCES

CH2M Hill 1983. *Peripheral Leachate Collector System, Seaway Industrial Park, Seaway Landfill, Town of Tonawanda, New York*, Sheet 19 of 23, dated 11-28-83 (Record Drawing by CH2M Hill/H&A).

ORNL 1978. *Radiological Survey of the Seaway Industrial Park, Tonawanda, New York.* Oak Ridge National Laboratory, DOE/EV-0005/6, Oak Ridge, TN (May).

Shaw 2003. Memorandum from Joseph M. Ross, Shaw Environmental & Infrastructure, Inc. to Jim Boyle, US Army Corps of Engineers, "RE: Summary of Radiological Conditions Recorder During the Construction of the Closed Loop Drainage System," dated January 2, 2003.

USACE 1998. *Record of Decision for the Ashland 1 (including Seaway Area D) and Ashland 2 Sites, Tonawanda, New York*, U.S. Army Corps of Engineers. April.

USACE 2000. *Technical Memorandum: Modeling of Radiological Risks From Residual Radioactive Materials Following Implementation of Remedial Alternatives For Seaway Landfill Areas A, B, and C, Tonawanda, New York, Rev. 2.,* U.S. Army Corps of Engineers, June.

USACE 2002. *Reports of Findings Seaway Area D and Vicinity, FUSRAP Ashland 1 Remediation Action, Tonawanda, New York*, U.S. Army Corps of Engineers, January.

USACE 2003. *Compilation of Surface Soil Sample Data Seaway Southside Area (East of Ashland 1 Final Status Survey Units 24 and 31), FUSRAP Ashland 1 Remediation Action, Tonawanda, New York*, U.S. Army Corps of Engineers, February.

FIGURES

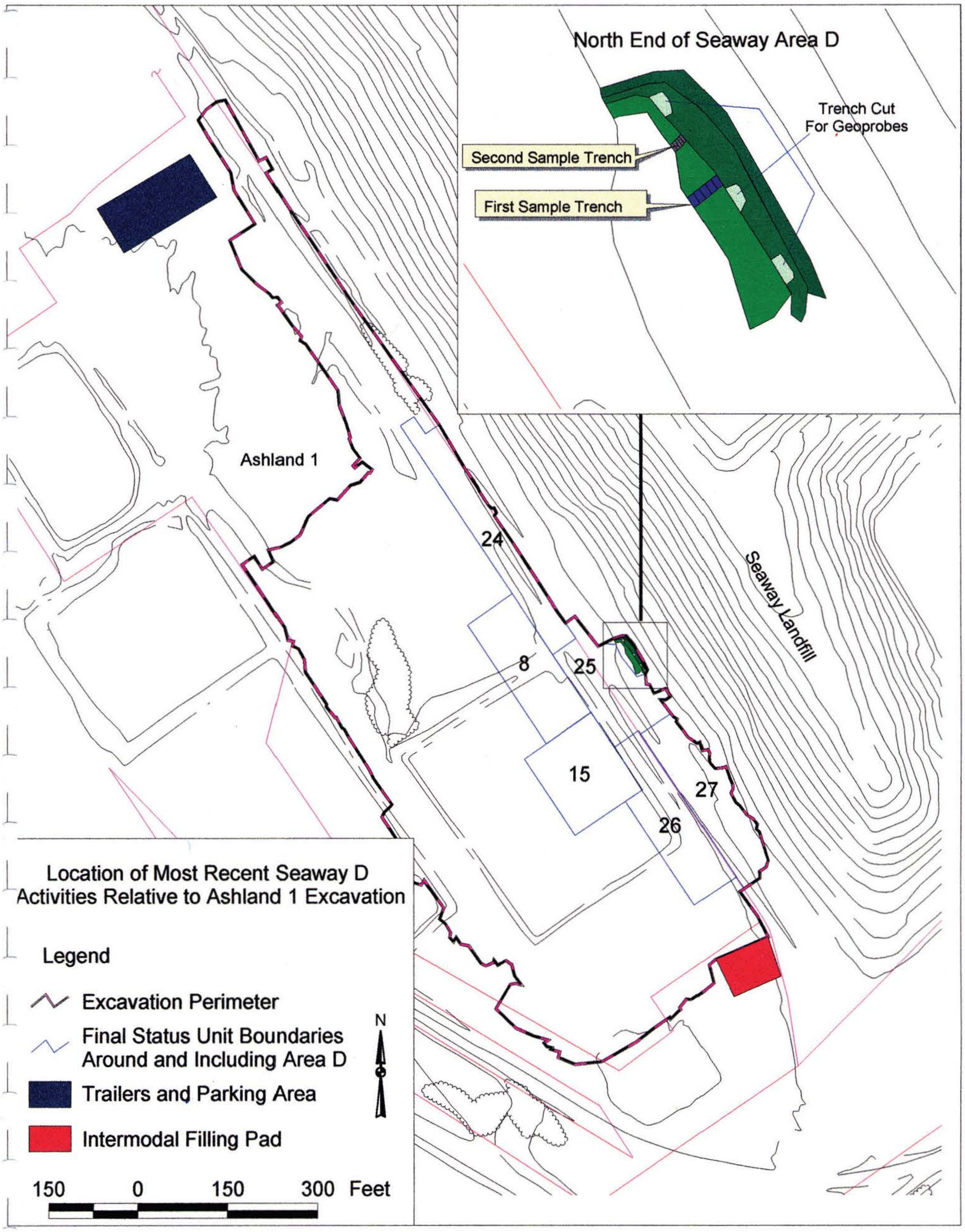


Figure 1: Location of Northwest Property Adjacent to Seaway Area D (figure taken from USACE 2002)

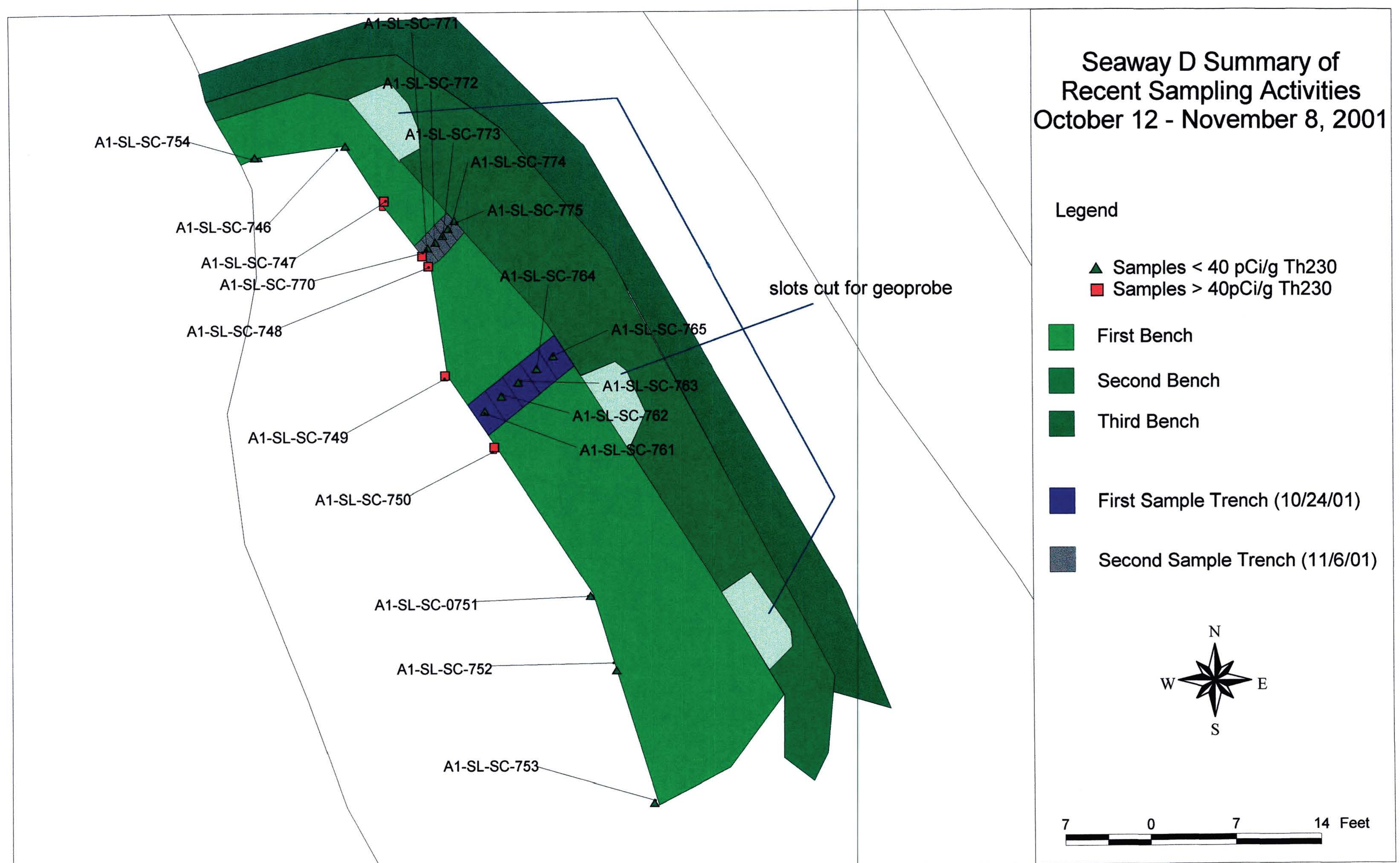


Figure 2: Seaway Area D Adjacent Property Summary of Sampling Activities (figure taken from USACE 2002)

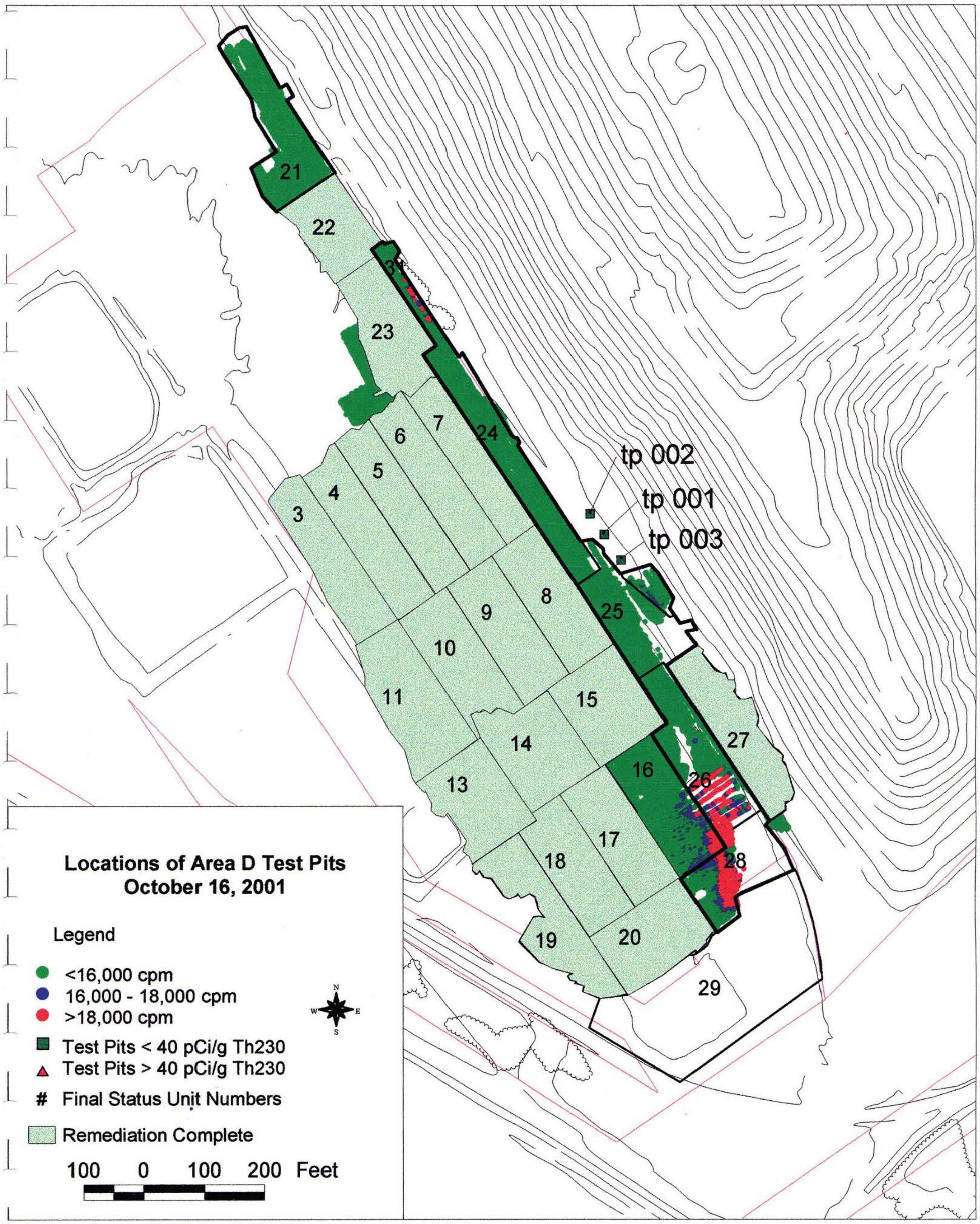


Figure 3: Location of Test Pits Near Area D Adjacent Property (figure taken from USACE 2002)

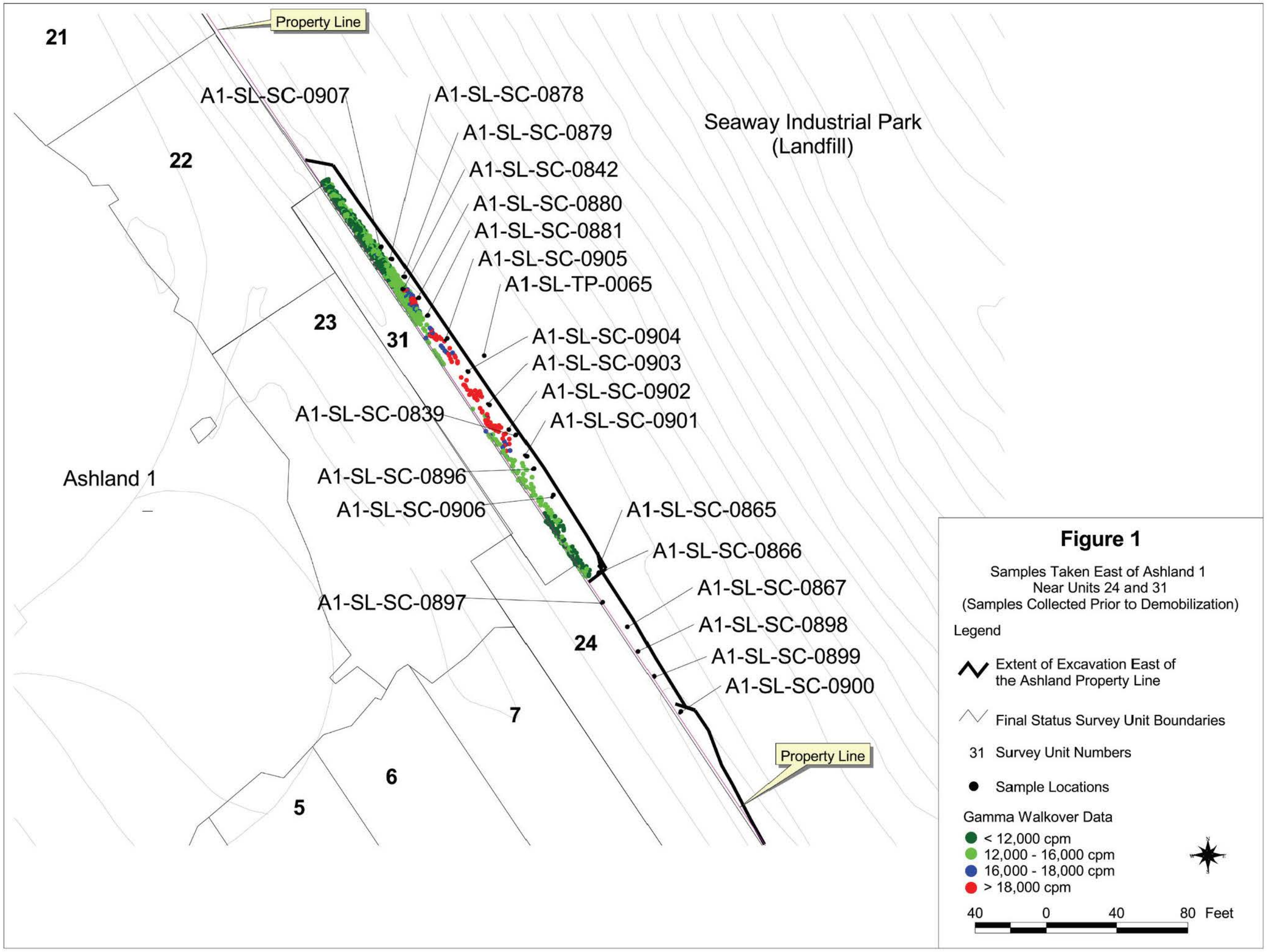


Figure 4: Location of Soil Samples and Gamma Walkover Results Adjacent to Survey Units 24 and 31 (Figure 1 taken from USACE 2003)

Figure 5: Seaway Area D Remediation Results Relative to Historical Photograph of Site During Tank Construction

Figure 6: Radiological Lens Results Projected onto Historical Photo Along with ORNL Gamma Walkover Results

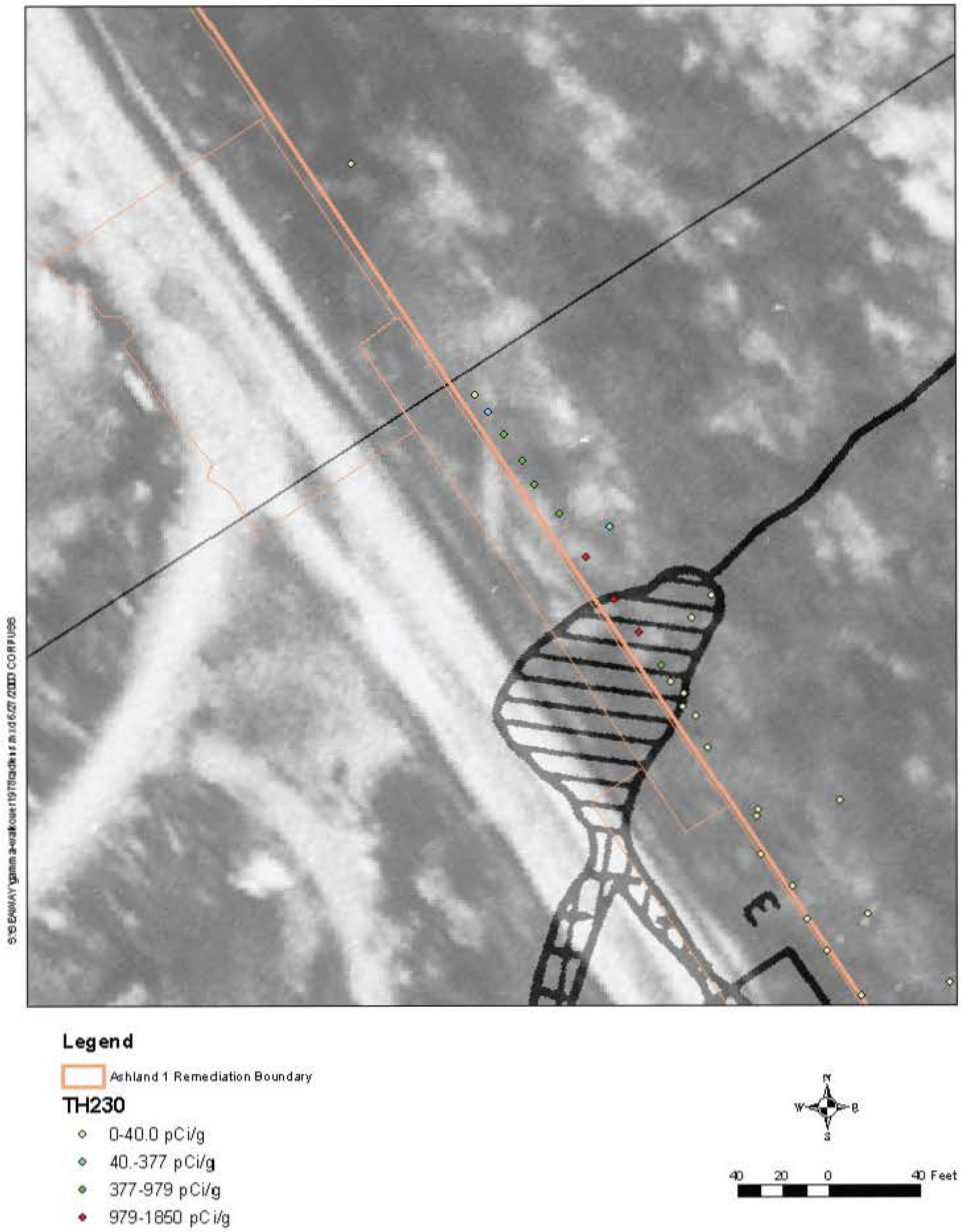


Figure 7: Zoom In of Radiological Lens Results Projected onto Historical Photo Along with ORNL Gamma Walkover Results

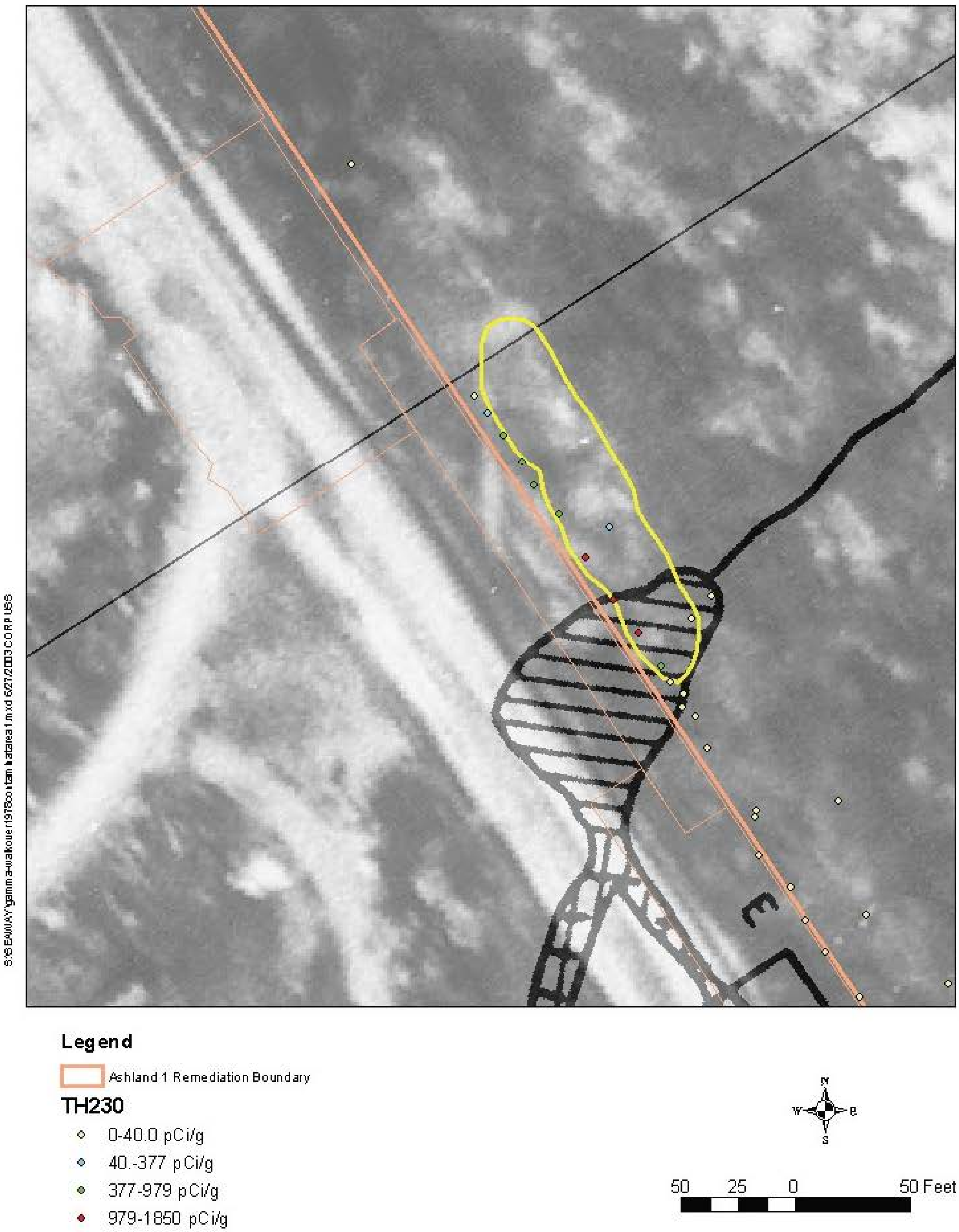


Figure 8: Visual Projection of One Possibility of Contamination Area

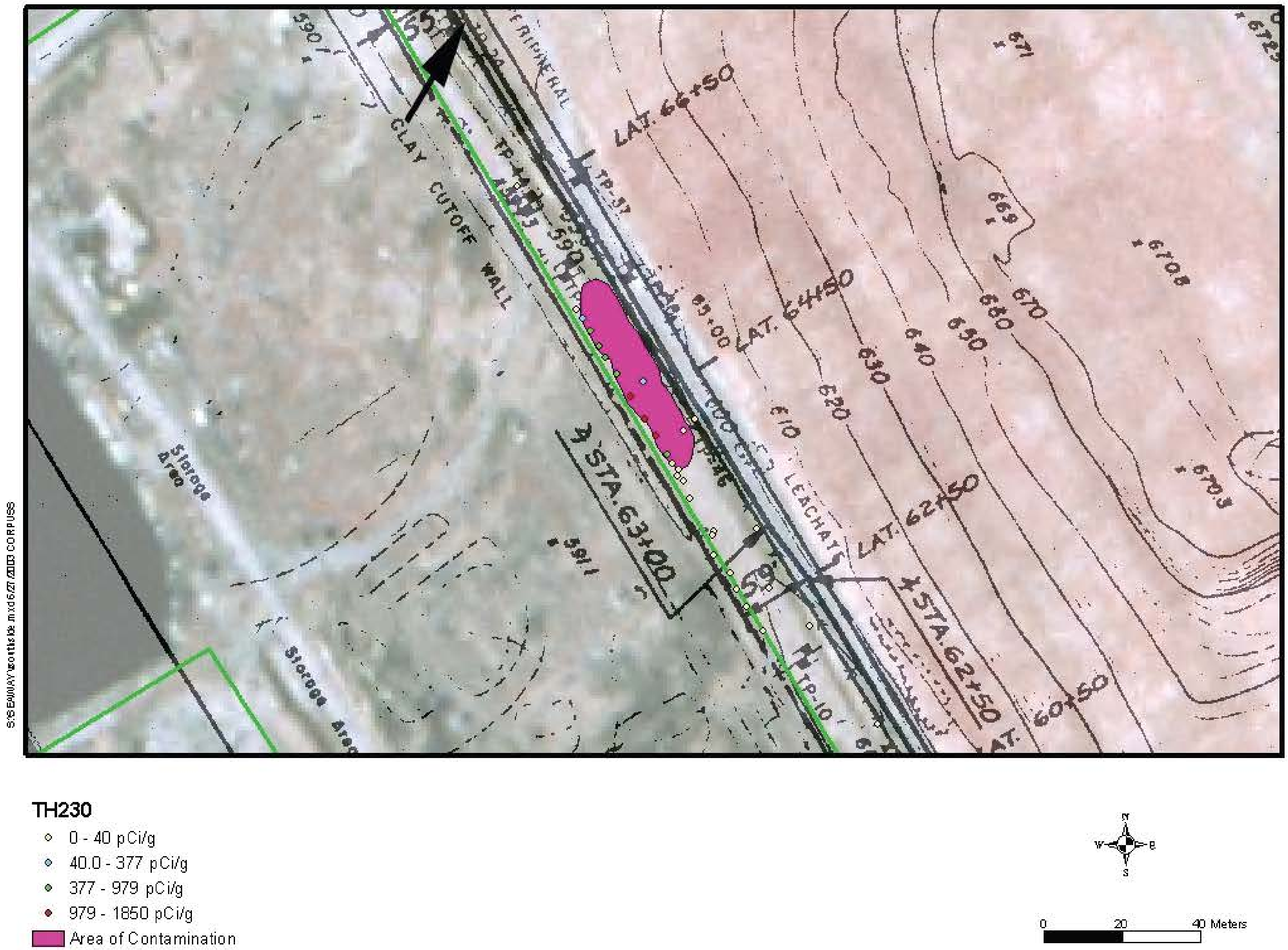


Figure 9: Projection of One Possibility of Contamination Area and Leachate Collection System onto Current Site Photo

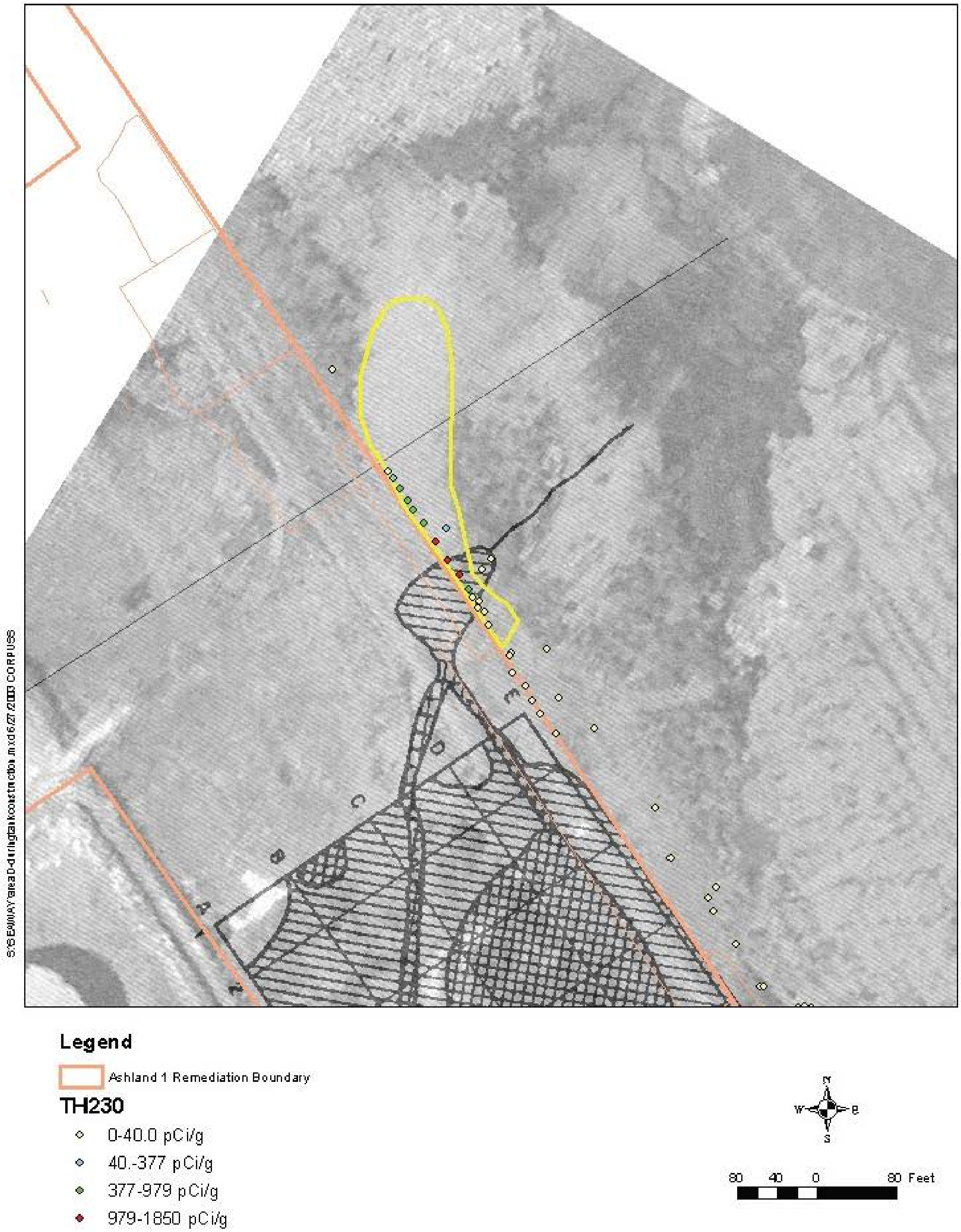


Figure 10: Visual Estimate of Second Possibility of Contamination Area

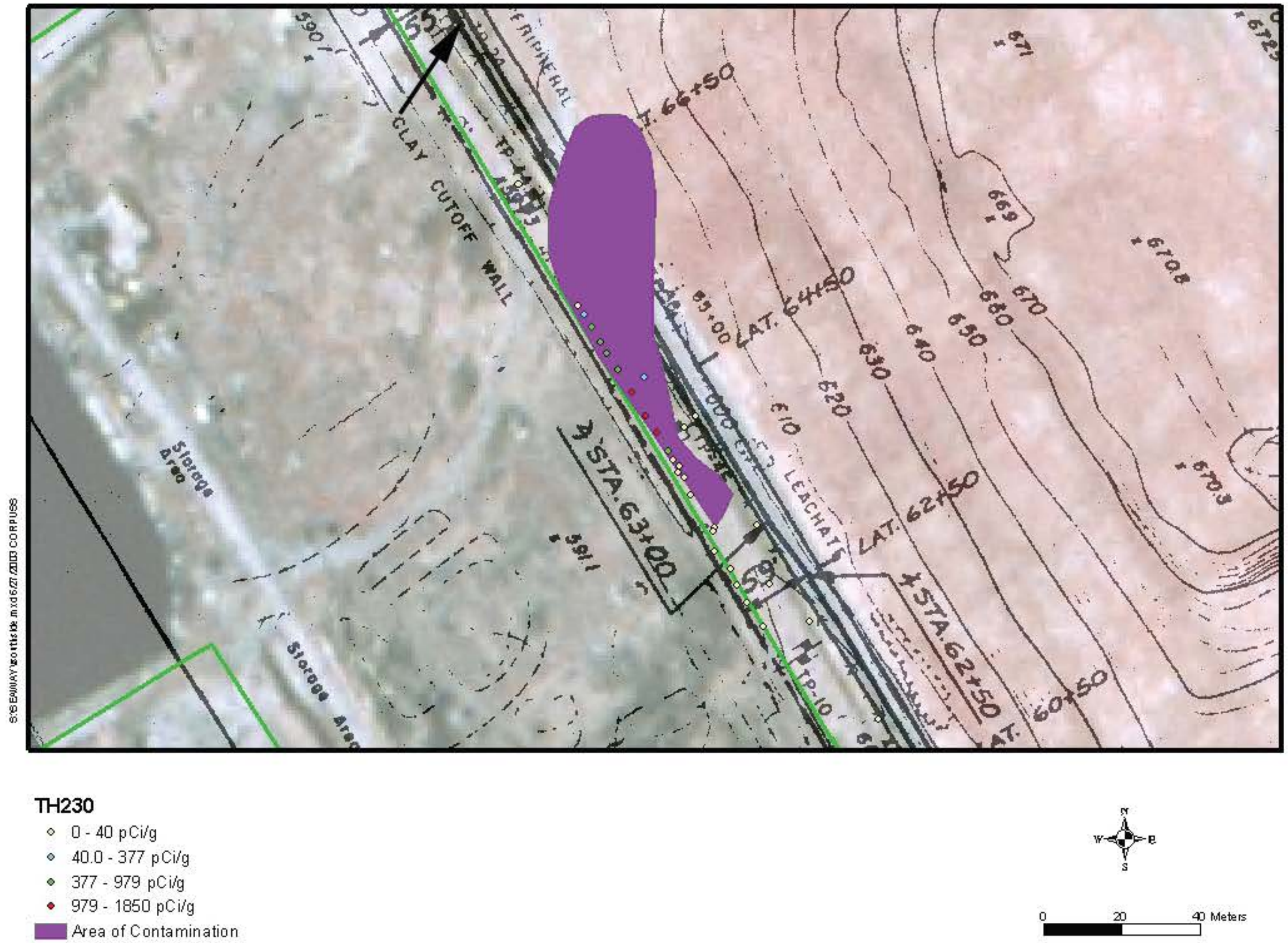


Figure 11: Projection of Second Possibility of Contamination Area and Leachate Collection System onto Photo of Existing Landfill

TABLES

Table 1: Results of Samples Collected from Lens Face (10/12/01)

Sample ID	Y	X	Th230*	U238*	Ra226*	CPM with 2x2
Al -SL-SC-746	1090391	410363	18.84	2.81	0.66	21,725
Al-SL-SC-747	1090386	410366	69.14	13.44	1.32	30.117
Al-SL-SC-748	1090381	410370	137.95	12.34	1.57	24,173
Al -SL-SC-749	1090372	410371	98.22	7.33	1.05	18,712
Al -SL-SC-750	1090366	410375	152.24	13.13	2.25	26,225
Al -SL-SC-751	1090354	410383	12.53	3.02	0.44	11,501
Al -SL-SC-752	1090348	410385	3.84	2.96	0.38	16,491
Al-SL-SC-753	1090337	410388	14.40	1.57	0.29	16,387
AL-SL-SC-754	1090390	410356	13.40	2.68	0.33	17,211

* Analysis by on-site gamma spectroscopy reported in pCi/g

Source: Table 4 from Reference USACE 2002

Table 2: Sample Analysis of Radiological Parameters for Test Pits

SAMPLE NUMBER	LOCATION	Analysis On-site by SEC (Gamma Spec.)			
		Depth (ft)[1]	Ra-226[3] Result (pCi/g)[2]	Th-230[4] Result (pCi/g)[2]	U-238[5] Result (pCi/g)[2]
Al-SL-TP-072	TP Location I	11	0.4	<14.0	2.2
Al-SL-TP-073	TP Location 1	13	0.6	<16.8	2.59
Al-SL-TP-074	TP Location 1	15	0.8	<18.8	2.27
Al-SL-TP-075	TP Location 2	8	0.5	<16.3	3.6
Al-SL-TP-076	TP Location 2	9	0.4	<14.1	2.2
Al-SL-TP-077	TP Location 2	12	0.3	<7.7	1.6
Al-SL-TP-078	TP Location 3	11	0.4	<14.3	1.95
Al-SL-TP-079	TP Location 3	12.5	0.7	7.3	2.7
Al-SL-TP-080	TP Location 3	14	0.4	<9.8	2.7

[1] Feet
[2] picoCuries per gram
[3] radium-226
[4] thorium-230
[5] uranium-238

Source: Table 3 from Reference USACE 2002

Table 3: Sample Results for Two Trenching Efforts and Comparison to SOR Criteria (SOR<1)

	Sample Results (pCi/g)*			
Sample	Ra-226	U-238	Th-230	SOR
Trench 1				
A1SC0761	0.40	1.58	7.60	0.20
A1SC0762	0.40	1.16	8.51	0.22
A1SC0763	0.31	1.33	8.22	0.21
A1SC0764	0.44	2.39	22.14	0.53
A1SC0765	0.38	1.73	13.20	0.33
Trench 2				
A1-SL-SC-770	0.69	4.54	53.43	1.26
A1-SL-SC-771	0.25	1.18	12.60	0.30
A1-SL-SC-772	0.51	1.52	8.41	0.23
A1-SL-SC-773	0.46	2.47	13.55	0.34
A1-SL-SC-774	0.71	2.80	39.11	0.94
A1-SL-SC-775	0.27	1.84	12.90	0.31

* Sampling results came from USACE 2002

Table 4 Seaway Southside Area East of FSS Units 24 & 31

SAMPLE ID	DATE	NORTH	EAST	DEPTH	CPM	Th-230 (pCi/g)	U-238 (pCi/g)	Ra-226 (pCi/g)	Comment
A1-SL-SC-0839	2/25/2002	1090821	410021	0-6"	120421	1853.7	154.5	10.6	
A1-SL-SC-0842	3/6/2002	1090904	409957	0-6"	15239	82.5	27.8	1.3	
A1-SL-SC-0865	3/20/2002	1090746	410069	0-6"	16388	<6.0	2	0.2	
A1-SL-SC-0866	3/20/2002	1090743	410068	0-6"	15388	13	3	0.3	
A1-SL-SC-0867	3/20/2002	1090712	410084	0-6"	16278	25	3	0.4	
A1-SL-SC-0878	4/2/2002	1090921	409951	0-6"	20246	149	23	1.9	From Lens*
A1-SL-SC-0879	4/2/2002	1090911	409958	0-6"	25173	753	62	4.7	From Lens*
A1-SL-SC-0880	4/2/2002	1090899	409966	0-6"	20246	629	68	4.1	From Lens*
A1-SL-SC-0881	4/2/2002	1090889	409971	0-6"	53096	742	69	4.8	From Lens*
A1-SL-SC-0896	4/23/2002	1090802	410031	0-6"	18030	<10.5	2	0.2	From Lens*
A1-SL-SC-0897	4/23/2002	1090726	410070	0-6"	6283	<6.1	<0.9	0.1	
A1-SL-SC-0898	4/23/2002	1090698	410090	0-6"	8633	<6.5	1.6	0.2	
A1-SL-SC-0899	4/23/2002	1090684	410099	0-6"	6255	<10.4	1.2	0.2	
A1-SL-SC-0900	4/23/2002	1090664	410114	0-6"	8654	<8.9	<1.1	0.1	
A1-SL-SC-0901	4/23/2002	1090809	410027	0-6"	75742	979	89	9.1	From Lens*
A1-SL-SC-0902	4/23/2002	1090824	410017	0-6"	76475	1762	136	9.3	From Lens*
A1-SL-SC-0903	4/23/2002	1090838	410006	0-6"	79502	1563	167	14.0	From Lens*
A1-SL-SC-0904	4/23/2002	1090857	409994	0-6"	80308	1442	220	13.7	From Lens*
A1-SL-SC-0905	4/23/2002	1090876	409982	0-6"	76224	648	69	4.1	From Lens*
A1-SL-SC-0906	4/23/2002	1090787	410042	0-6"	13971	<10.5	2	0.2	From Lens*
A1-SL-SC-0907	4/23/2002	1090928	409945	0-6"	13602	<10.0	2	0.2	From Lens*
A1-SL-TP-0065	6/4/2001	1090866	410003	0-6"	*31823	603	49	4.5	East of Seaway Rd.

* - Soil sample collected approximately 6” horizontally into lens.
Table taken from USACE 2003

APPENDIX B

SEAWAY NORTHSIDE DATA

IT CORPORATION
A Member of The IT Group

Letter of Transmittal

I T Corporation
Tonawanda Field Office
4545 River Road
Tonawanda, NY 14150-0410
716-873-1074

DATE: June 14, 2000

TO: Bryan Miner
US Army Corps of Engineers

FROM: Mark T. Schwippert
I T Corporation
Construction Quality Control Manager

RE: Ashland 2 Data – FSS Unit 2b – Boundary with Seaway Landfill

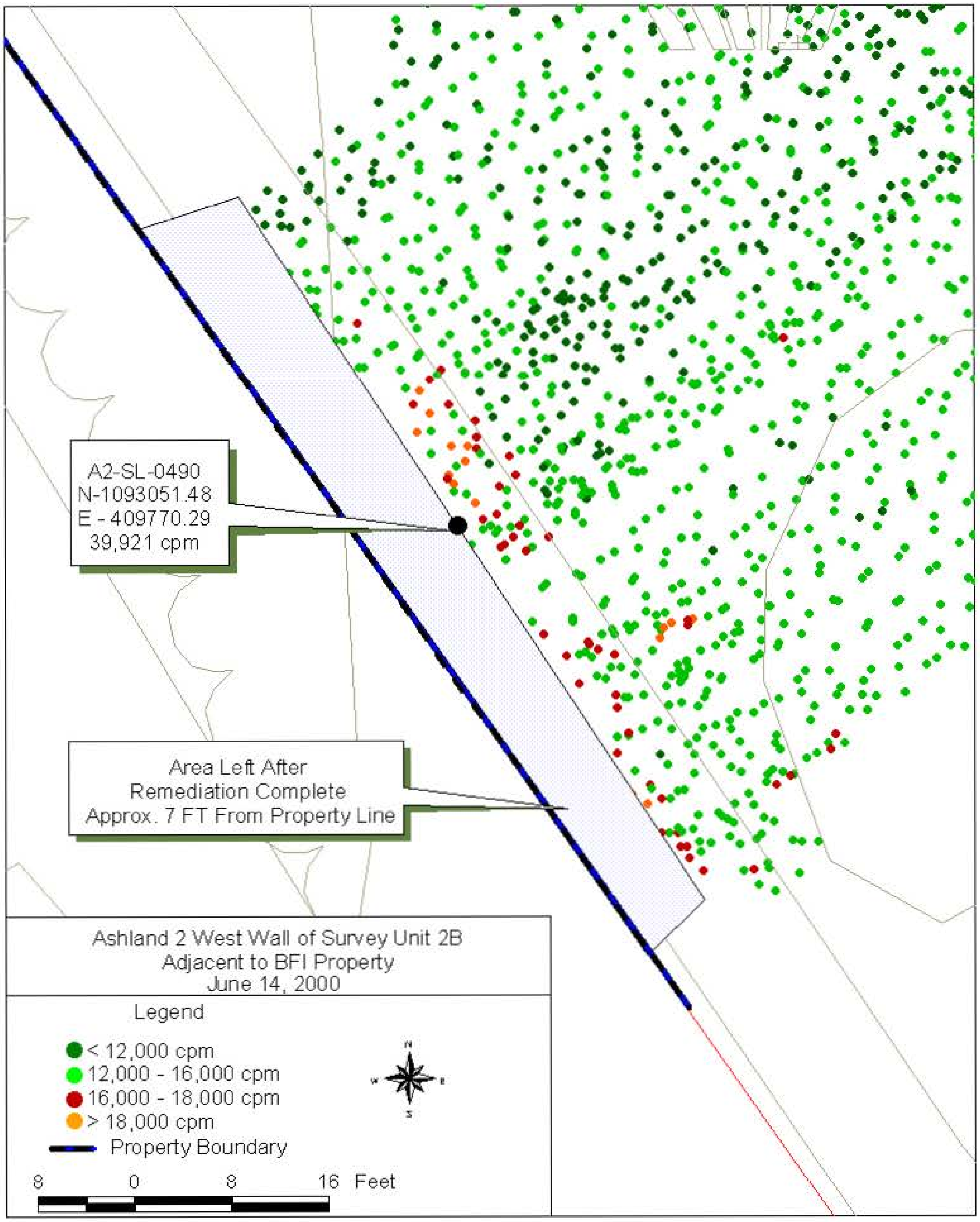
Dear Mr. Miner:

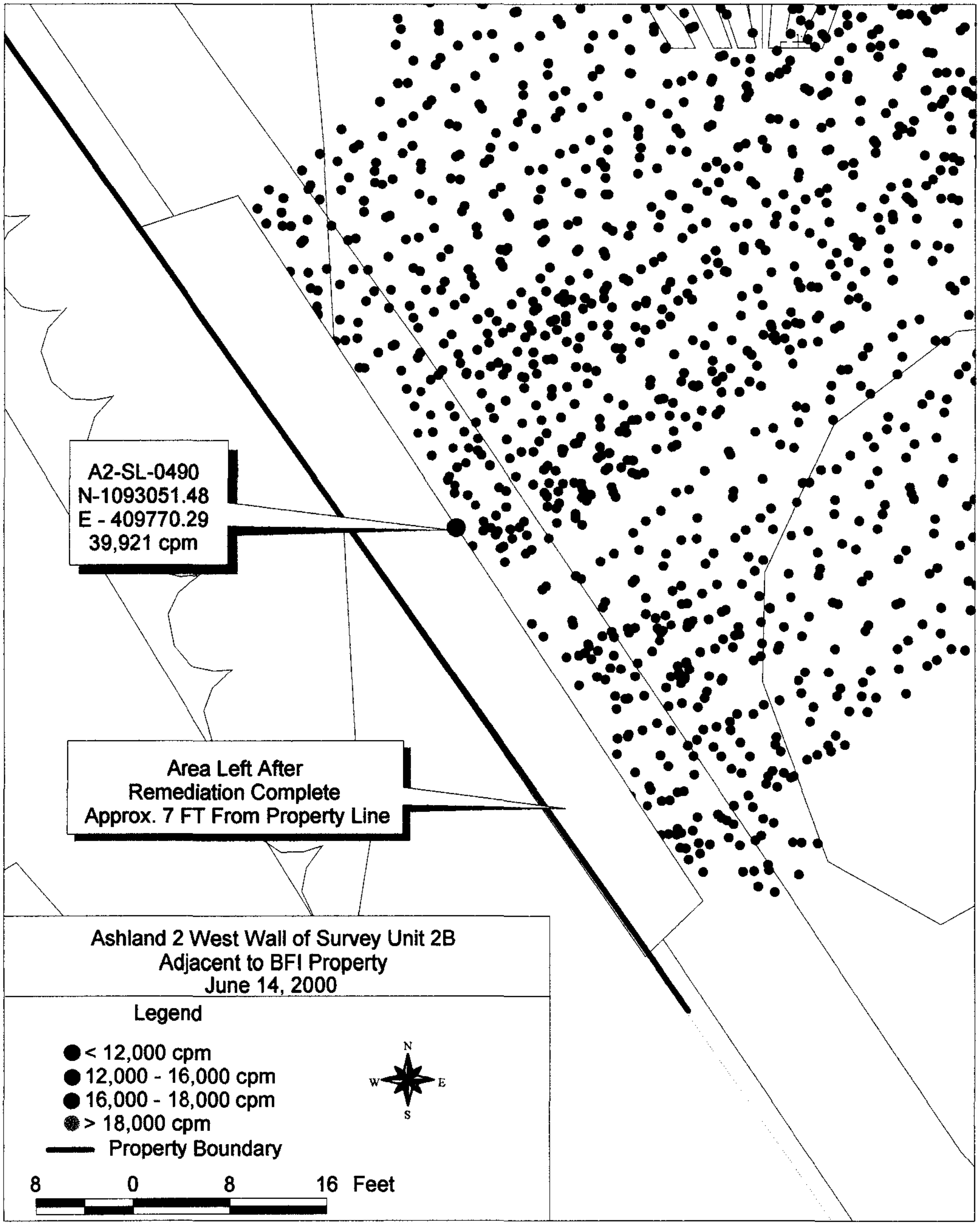
As requested by Debra Howell, attached is gamma spectroscopy data and gamma walkover data collected at the Ashland 2 site. The data is relative to an area of elevated activity encountered along the western edge of FSS Unit 2b where it abuts with the adjacent property (Seaway). An electronic copy of the data is also provided.

Very truly yours,
I T Corporation

Mark T. Schwippert

Mark T. Schwippert
Quality Control Manager


A2-SL-0490
N-1093051.48
E - 409770.29
39,921 cpm
Area Left After
Remediation Complete
Approx. 7 FT From Property Line
Ashland 2 West Wall of Survey Unit 2B
Adjacent to BFI Property
June 14, 2000
Legend
< 12,000 cpm
12,000 - 16,000 cpm
16,000 - 18,000 cpm
> 18,000 cpm
Property Boundary
8
0
8
16
Feet


A2-SL-0490
N-1093051.48
E - 409770.29
39,921 cpm
Area Left After
Remediation Complete
Approx. 7 FT From Property Line
Ashland 2 West Wall of Survey Unit 2B
Adjacent to BFI Property
June 14, 2000
Legend
< 12,000 cpm
12,000 - 16,000 cpm
16,000 - 18,000 cpm
> 18,000 cpm
Property Boundary
N
W
E
S
8
0
8
16
Feet

Sample ID	Date Collected	Date Analyzed	SDG ID	LAB ID	Vol.	W/D	Sample Type	Analyte	Result	Error	Units	Analytical Method	MDA
A2SL0490	09/28/98	09/29/98	98ASH046		576.5	DRY	SOIL	K-40	20.41	1.16	PCI/G	GAMMASPEC	1.33
A2SL0490	09/28/98	09/29/98	98ASH046		576.5	DRY	SOIL	CS-137	0.22	0.02	PCI/G	GAMMASPEC	0.08
A2SL0490	09/28/98	09/29/98	98ASH046		576.5	DRY	SOIL	RA-226	13.87	0.29	PCI/G	GAMMASPEC	0.21
A2SL0490	09/28/98	09/29/98	98ASH046		576.5	DRY	SOIL	AC-227	11.62	0.32	PCI/G	GAMMASPEC	0.61
A2SL0490	09/28/98	09/29/98	98ASH046		576.5	DRY	SOIL	RA-228	1.26	0.07	PCI/G	GAMMASPEC	0.29
A2SL0490	09/28/98	09/29/98	98ASH046		576.5	DRY	SOIL	TH-228	1.26	0.07	PCI/G	GAMMASPEC	0.29
A2SL0490	09/28/98	09/29/98	98ASH046		576.5	DRY	SOIL	TH-232	1.26	0.07	PCI/G	GAMMASPEC	0.29
A2SL0490	09/28/98	09/29/98	98ASH046		576.5	DRY	SOIL	TH-230	395.86	18.93	PCI/G	GAMMASPEC	54.40
A2SL0490	09/28/98	09/29/98	98ASH046		576.5	DRY	SOIL	PA-231	12.37	0.67	PCI/G	GAMMASPEC	2.65
A2SL0490	09/28/98	09/29/98	98ASH046		576.5	DRY	SOIL	U-238	21.52	1.33	PCI/G	GAMMASPEC	5.63
A2SL0490	09/28/98	09/29/98	98ASH046		576.5	DRY	SOIL	AM-241	0.68	0.00	PCI/G	GAMMASPEC	0.68

```
*****************************************************************************
*****        G A M M A   S P E C T R U M   A N A L Y S I S              *****
*****************************************************************************
```

Filename: C:\PCNT2K\CAMFILES\SOIL\SL00820.CNF

Report Generated On	:	9/29/98 9:31:03 AM
Sample Title	:	SOIL SAMPLES
Spectrum Description	:	A' dig West Wall under fence 39,921 cpm
Sample Identification	:	A2SL0490
Sample Type	:	SL
Sample Geometry	:	500 MARINELLI
Peak Locate Threshold	:	3.00
Peak Locate Range (in channels)	:	1 - 4096
Peak Area Range (in channels)	:	1 - 4096
Identification Energy Tolerance	:	1.500 keV
Sample Size	:	5.765E+002 GRAM
Sample Taken On	:	9/28/98 10:00:00 AM
Acquisition Started	:	9/29/98 8:30:02 AM
Live Time	:	3600.0 seconds
Real Time	:	3643.6 seconds
Dead Time	:	1.20 %

Energy Calibration Used Done On	:	7/20/98
Efficiency Calibration Used Done On	:	7/20/98
Efficiency Geometry ID	:	500 MARINELLI

****
***** P E A K A N A L Y S I S R E P O R T *****
****

Detector Name: DET001
Sample Title: SOIL SAMPLES
Peak Analysis Performed on: 9/29/98 9:31:02 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 4096

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
	1	50-	57	54.36	24.98	1.00E+003	71.96	1.37E+003
M	2	94-	108	97.88	46.78	4.86E+002	50.18	3.12E+003
m	3	94-	108	105.00	50.35	4.78E+002	50.35	2.62E+003
M	4	127-	143	131.39	63.58	1.22E+003	60.53	4.47E+003
m	5	127-	143	140.03	67.90	2.41E+003	76.98	4.98E+003
M	6	150-	183	154.33	75.07	1.85E+003	68.45	4.74E+003
m	7	150-	183	158.84	77.33	3.32E+003	79.08	4.76E+003
m	8	150-	183	166.75	81.29	3.35E+003	78.73	4.81E+003
m	9	150-	183	172.19	84.02	6.13E+003	98.70	5.54E+003
m	10	150-	183	179.50	87.68	7.18E+002	59.91	4.89E+003
M	11	185-	203	189.91	92.90	2.10E+003	69.16	4.73E+003
m	12	185-	203	193.82	94.85	2.20E+003	67.93	4.84E+003
m	13	185-	203	200.08	97.99	4.22E+002	50.06	3.75E+003
	14	226-	234	230.36	113.16	3.69E+002	101.56	3.03E+003
	15	244-	253	249.03	122.52	4.11E+002	107.82	3.17E+003
	16	288-	296	292.46	144.28	2.01E+003	108.86	3.02E+003
M	17	308-	335	312.70	154.42	2.08E+003	63.07	2.23E+003
m	18	308-	335	321.83	158.99	2.71E+002	37.58	2.10E+003
m	19	308-	335	330.82	163.50	1.66E+002	37.04	2.00E+003
	20	371-	380	376.24	186.25	4.56E+003	113.43	2.37E+003
	21	420-	429	425.05	210.71	4.81E+002	84.59	1.89E+003
M	22	471-	492	475.79	236.13	3.34E+003	63.95	1.46E+003
m	23	471-	492	481.09	238.79	1.30E+003	44.34	1.39E+003
m	24	471-	492	487.75	242.13	2.41E+003	55.71	1.31E+003
	25	511-	521	516.38	256.47	1.68E+003	92.60	1.81E+003
M	26	537-	551	542.55	269.59	3.34E+003	64.04	1.05E+003
m	27	537-	551	546.12	271.37	2.60E+003	58.45	1.13E+003
M	28	568-	580	570.94	283.81	4.12E+002	31.58	7.24E+002
m	29	568-	580	575.87	286.28	4.21E+002	31.33	7.90E+002
M	30	588-	617	593.96	295.35	5.09E+003	74.59	8.46E+002
m	31	588-	617	603.49	300.12	1.28E+003	41.04	7.31E+002
m	32	588-	617	608.64	302.70	6.58E+002	32.92	7.73E+002
m	33	588-	617	612.29	304.53	2.74E+002	26.43	6.67E+002
M	34	623-	638	628.87	312.84	1.55E+002	22.55	7.24E+002
m	35	623-	638	632.94	314.88	1.42E+002	22.46	7.31E+002
M	36	646-	685	651.07	323.96	7.60E+002	33.36	6.03E+002
m	37	646-	685	663.02	329.95	8.68E+002	35.09	6.52E+002
m	38	646-	685	671.52	334.20	2.13E+002	23.64	6.84E+002
m	39	646-	685	679.93	338.42	6.64E+002	33.10	8.04E+002
	40	701-	712	706.87	351.92	1.14E+004	117.72	8.33E+002
	41	741-	751	746.65	371.85	1.32E+002	42.95	6.02E+002

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
m	43	801-	818	812.64	404.92	6.68E+002	30.96	5.51E+002
	44	851-	862	857.02	427.15	2.56E+002	47.57	6.68E+002
	45	887-	897	892.50	444.93	1.41E+002	38.85	4.81E+002
	46	970-	979	976.51	487.02	5.58E+001	30.00	3.16E+002
	47	1018-	1029	1023.83	510.73	1.90E+002	36.57	3.82E+002
	48	1064-	1073	1070.46	534.10	1.55E+001	28.27	2.92E+002
	49	1135-	1147	1141.28	569.58	8.61E+001	35.61	3.69E+002
	50	1165-	1174	1168.41	583.17	2.82E+002	34.07	3.25E+002
	51	1214-	1226	1220.39	609.22	6.26E+003	85.10	3.09E+002
M	52	1318-	1338	1324.89	661.58	1.90E+002	17.79	2.00E+002
m	53	1318-	1338	1332.55	665.42	9.79E+001	14.11	2.03E+002
	54	1379-	1385	1381.84	690.11	3.80E+000	17.75	1.43E+002
	55	1437-	1443	1440.59	719.55	7.95E-001	18.28	1.50E+002
	56	1531-	1544	1537.88	768.30	6.55E+002	41.17	3.10E+002
	57	1566-	1579	1572.75	785.77	1.76E+002	32.18	2.58E+002
	58	1584-	1597	1590.80	794.82	7.80E+001	28.22	2.15E+002
	59	1608-	1619	1612.88	805.88	1.59E+002	26.77	1.86E+002
M	60	1657-	1684	1664.47	831.73	4.15E+002	22.13	1.74E+002
m	61	1657-	1684	1678.36	838.68	1.09E+002	13.65	1.79E+002
	62	1815-	1829	1822.40	910.86	2.27E+002	32.97	2.45E+002
	63	1861-	1874	1868.34	933.87	2.99E+002	31.82	2.14E+002
M	64	1921-	1944	1928.55	964.04	6.69E+001	12.03	1.71E+002
m	65	1921-	1944	1938.06	968.81	1.57E+002	15.22	1.76E+002
	66	1999-	2008	2001.96	1000.83	1.31E+002	23.91	1.56E+002
	67	2119-	2133	2126.54	1063.25	6.21E+001	27.53	1.98E+002
	68	2232-	2246	2239.54	1119.87	1.31E+003	42.55	1.73E+002
	69	2301-	2316	2309.02	1154.68	1.60E+002	26.23	1.76E+002
	70	2467-	2481	2474.64	1237.66	4.91E+002	32.00	1.85E+002
	71	2552-	2567	2560.11	1280.49	1.18E+002	23.81	1.49E+002
	72	2745-	2760	2752.86	1377.07	3.50E+002	25.71	1.03E+002
M	73	2793-	2820	2800.77	1401.07	9.34E+001	11.46	7.95E+001
m	74	2793-	2820	2813.25	1407.32	1.59E+002	14.19	8.96E+001
	75	2911-	2926	2918.67	1460.15	1.11E+003	39.30	1.45E+002
	76	3010-	3022	3015.25	1508.54	1.44E+002	20.50	1.05E+002
	77	3078-	3090	3082.92	1542.44	3.38E+001	16.42	8.92E+001
	78	3314-	3324	3319.09	1660.78	6.96E+001	12.31	3.44E+001
	79	3446-	3462	3454.46	1728.60	2.37E+002	18.88	3.82E+001
	80	3516-	3532	3524.29	1763.59	1.04E+003	34.91	5.75E+001
	81	3681-	3697	3689.56	1846.40	1.34E+002	15.92	3.83E+001

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.000 sigma

****
***** N U C L I D E   I D E N T I F I C A T I O N   R E P O R T *****
****

Sample Title: SOIL SAMPLES
Nuclide Library Used: C:\GENIE2K\CAMFILES\ASHLAND.NLB

.... IDENTIFIED NUCLIDES ....

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/GRAM)	Activity Uncertainty
K-40	0.969	1460.81*	10.67	2.04095E+001	1.15824E+000
CS-137	1.000	661.65*	85.21	2.23317E-001	2.27239E-002
RA-226	0.992	186.21*	3.28	4.81182E+001	2.60001E+000
		295.21*	19.20	1.19902E+001	5.85715E-001
		351.92*	37.20	1.60633E+001	7.57149E-001
		609.31*	46.30	1.24040E+001	5.43884E-001
		1120.29*	15.10	1.43386E+001	5.87501E-001
		1764.49*	15.80	1.40754E+001	1.15423E+000
AC-227	0.998	236.00*	11.50	1.12367E+001	5.75568E-001
		256.20*	6.30	1.08581E+001	7.88696E-001
		329.70*	2.90	1.48648E+001	9.12525E-001
		401.81*	6.50	1.01815E+001	5.76740E-001
		404.84*	2.90	1.38605E+001	8.99886E-001
AC-228	0.998	338.32*	11.40	2.95931E+000	2.00921E-001
		583.14*	30.25	7.92197E-001	1.04439E-001
		911.07*	27.70	1.12889E+000	1.67327E-001
		969.11*	16.60	1.37565E+000	1.38879E-001
TH-230	0.996	67.67*	0.37	3.95864E+002	1.89300E+001
PA-231	0.999	283.67*	1.60	1.13117E+001	1.01476E+000
		302.65*	2.30	1.32142E+001	9.02452E-001
U-238	0.995	63.29*	3.80	2.13178E+001	1.39581E+000
		1001.03*	0.84	2.34695E+001	4.31462E+000

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

****
***** I N T E R F E R E N C E   C O R R E C T E D   R E P O R T *****
****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/GRAM)	Wt mean Activity Uncertainty
K-40	0.969	2.040946E+001	1.158239E+000
CS-137	1.000	2.233172E-001	2.272386E-002
RA-226	0.992	1.386735E+001	2.906729E-001
AC-227	0.998	1.161573E+001	3.151524E-001
AC-228	0.998	1.262546E+000	7.001147E-002
TH-230	0.996	3.958643E+002	1.892999E+001
PA-231	0.999	1.237406E+001	6.743547E-001
U-238	0.995	2.152168E+001	1.328048E+000

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000 sigma

********** U N I D E N T I F I E D P E A K S **********

Peak Locate Performed on: 9/29/98 9:31:02 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 4096

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
	1	24.98	2.6098E-001	15.36
M	2	46.78	1.3253E-001	21.09
m	3	50.35	1.3281E-001	21.06
M	6	75.07	5.1051E-001	7.45
m	7	77.33	9.2017E-001	4.78
m	8	81.29	9.2973E-001	4.70
m	9	84.02	1.7017E+000	3.22
m	10	87.68	1.9950E-001	16.68
M	11	92.90	5.7167E-001	6.74
m	12	94.85	6.1035E-001	6.18
m	13	97.99	1.1727E-001	23.71
	14	113.16	1.0262E-001	54.98
	15	122.52	1.1412E-001	52.49
	16	144.28	5.5839E-001	10.83
M	17	154.42	5.7856E-001	6.06
m	18	158.99	7.5204E-002	27.76
m	19	163.50	4.6189E-002	44.55
	21	210.71	1.3365E-001	35.16
m	23	238.79	3.5223E-001	7.06
m	24	242.13	6.6982E-001	4.62
M	26	269.59	9.2671E-001	3.84
m	27	271.37	7.2252E-001	4.49
m	29	286.28	1.1695E-001	14.88
m	31	300.12	3.5441E-001	6.43
m	33	304.53	7.6100E-002	19.30
M	34	312.84	4.2956E-002	29.17
m	35	314.88	3.9421E-002	31.66
M	36	323.96	2.1114E-001	8.78
m	38	334.20	5.9192E-002	22.19
	41	371.85	3.6769E-002	64.90
	44	427.15	7.1195E-002	37.12
	45	444.93	3.9045E-002	55.27
	46	487.02	1.5509E-002	107.45
	47	510.73	3.2109E-002	63.86
	48	534.10	4.3071E-003	364.64
	49	569.58	-9.4882E-004	-2098.7
m	53	665.42	2.7207E-002	28.81
	54	690.11	1.0544E-003	935.15
	55	719.55	2.2075E-004	4601.51
	56	768.30	1.8208E-001	12.56
	57	785.77	4.8982E-002	36.50
	58	794.82	2.1667E-002	72.36
	59	805.88	4.4280E-002	33.59
M	60	831.73	1.1538E-001	10.66
m	61	838.68	3.0216E-002	25.09
	63	933.87	8.3070E-002	21.28

69	1154.68	4.4454E-002	32.78

Peak No.	Energy (keV)	Channel	Peak Size in Counts per Second	Peak CPS % Uncertainty
70	1237.66		1.3626E-001	13.05
71	1280.49		3.2876E-002	40.24
72	1377.07		9.7315E-002	14.68
M 73	1401.07		2.5952E-002	24.53
m 74	1407.32		4.4227E-002	17.82
76	1508.54		4.0084E-002	28.41
77	1542.44		9.3829E-003	97.20
78	1660.78		1.9335E-002	35.38
79	1728.60		6.5780E-002	15.94
81	1846.40		3.7153E-002	23.80

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

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****************************************************************************
*****                N U C L I D E   M D A   R E P O R T              *****
****************************************************************************
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Detector Name: DET001
Sample Geometry: 500 MARINELLI
Sample Title: SOIL SAMPLES
Nuclide Library Used: C:\GENIE2K\CAMFILES\ASHLAND.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/GRAM)	Nuclide MDA (pCi/GRAM)
+	K-40	1460.81*	10.67	1.33E+000	1.33E+000
+	CS-137	661.65*	85.21	8.04E-002	8.04E-002
+	RA-226	186.21*	3.28	3.21E+000	2.12E-001
		295.21*	19.20	3.25E-001	
		351.92*	37.20	2.37E-001	
		609.31*	46.30	2.12E-001	
		1120.29*	15.10	8.31E-001	
		1764.49*	15.80	6.40E-001	
+	AC-227	236.00*	11.50	6.09E-001	6.09E-001
		256.20*	6.30	1.79E+000	
		329.70*	2.90	2.08E+000	
		401.81*	6.50	1.01E+000	
		404.84*	2.90	2.32E+000	
+	AC-228	338.32*	11.40	6.00E-001	2.92E-001
		583.14*	30.25	2.92E-001	
		911.07*	27.70	4.93E-001	
		969.11*	16.60	5.66E-001	
+	TH-230	67.67*	0.37	5.44E+001	5.44E+001
+	PA-231	283.67*	1.60	3.51E+000	2.65E+000
		302.65*	2.30	2.65E+000	
+	U-238	63.29*	3.80	5.63E+000	5.63E+000
		1001.03*	0.84	1.28E+001	
	AM-241	59.54	35.90	6.84E-001	6.84E-001

+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

APPENDIX C

STREAMLINED RE-BASELINE FOR SEAWAY SOILS AND ASSESSMENT OF CONCENTRATION-BASED REMEDIATION GOALS FOR RADIOLOGICAL CONTAMINANTS OF CONCERN

C1. INTRODUCTION

The July 2000 technical memorandum titled *Application of 10 CFR Part 40, Appendix A, Criterion 6(6) and Derivation of Benchmark Doses for the Seaway Landfill Areas A, B, and C, Tonawanda, New York* (USACE 2000b) established cleanup goals for radiological constituents in soil. This memorandum was prepared following the June 2000 technical memorandum titled *Modeling of Radiological Risks from Residual Radioactive Materials following Implementation of Remedial Alternatives for Seaway Landfill Areas A, B, and C, Final Rev. 2* (USACE 2000a), which used RESRAD Version 5.82 to assess residual risk after the implementation of various remedial alternatives. Both memoranda utilized analytical data available at that time, including only limited results for Ac-227 and no results for Pa-231, two contaminants that can impact receptor risk if present at significant concentrations.

Since these memoranda were issued significant additional data have become available, as reported in the *Technical Memorandum for the Seaway Summer 2001 Subsurface Investigation* (USACE 2001). Both Ac-227 and Pa-231 were reported in all 165 samples thus eliminating uncertainties associated with the characterization of these potential contaminants, while also providing a significantly different view of residual contamination in the Seaway landfill[1], and a large new dataset for consideration. The RESRAD code has also gone through a number of changes that could produce different overall risk results.

Based on the availability of new data, some of the uncertainty in risk-based decisions as noted in prior documents may be mitigated using the updated dataset. Conversely, the evolution of the RESRAD code introduces uncertainty. More specifically, the RESRAD code has gone through eight revisions since the benchmark calculations (USACE 2000b) with some minor changes to the calculation methods. Some of these revisions, such as with the dose integration technique, may or may not impact risk-based decisions. Therefore, an updated version (Version 6.3) is utilized here to assess impacts, if any, from code revisions. The uncertainties associated with new data and code changes are the focus of this appendix.

C1.1 OBJECTIVES

The objectives of this appendix are as follows:

1. Utilize analytical data from the 2001 characterization to confirm the prior risk-based conclusions or to quantify differences, if any;

2. Determine conclusively the list of contaminants of concern (COCs) for Seaway[2]; and

3. Establish remediation goals (RGs) for radium, thorium and uranium radioisotopes, using correlations where necessary to include traditionally secondary contaminants such as Ac-227 and Pa-231.

The latter objective is intended to simplify the future risk-based decisions using traditional COCs consistently evaluated at Seaway under the Formerly Utilized Site Remedial Action Program (FUSRAP).

---

[1] The 2001 study identified a relatively uniform lens extending across Areas B and C, contradicting the historical view that the areas represent separate blocks of contamination.

[2] The Tonawanda site's Baseline Risk Assessment (BRA; DOE 1993) identified only the traditional Formerly Utilized Site Remedial Action Program COCs Ra-226, Th-230 and U-238, although Th-232 was retained for further assessment. The June 2000 technical memorandum (USACE 2000a) includes other analytes, but not using direct measurement data.

C1.2 BACKGROUND

C1.2.1 Benchmark Dose

The applicable or relevant and appropriate requirements (ARARs) for radiological COCs in soil at Seaway are 40 Code of Federal Regulations (CFR) Part 192 and 10 CFR Part 40, Appendix A, Criterion 6(6) [henceforth referred to as Criterion 6(6)]. Appendix A of 10 CFR Part 40 was developed to provide the Nuclear Regulatory Commission licensees with a clear and consistent regulatory basis for remediating soils and buildings from thorium mills and uranium recovery facilities. Appendix A states that site operations including decommissioning must meet a level of protection for the public health equivalent to, or more stringent than, the standards promulgated in, 40 CFR Part 192 Subparts D and E. The most relevant Part 192 standards are defined as follows:

> *The concentration of radium-226 in land averaged over any area of 100 square meters shall not exceed the background level by more than –*
>
> *(1) 5 pCi/g, averaged over the first 15 cm of soil below the surface, and*
>
> *(2) 15 pCi/g, averaged over 15 cm thick layers of soil more than 15 cm below the surface.*

40 CFR Part 192 sets radium cleanup standards but does not provide specific cleanup goals for non-radium radionuclides such as uranium and thorium. Criterion 6(6) provides a means to derive cleanup goals for site-related non-radium radionuclides through the benchmark dose. Criterion 6(6) specifically states:

> *Byproduct material containing concentrations of radionuclides other than radium in soil … must not result in a total effective dose equivalent (TEDE) exceeding the dose from the cleanup of radium contaminated soil to the above standard (benchmark dose), and must be at levels which are as low as reasonably achievable. If more than one residual radionuclide is present in the same 100-square-meter area, the sum of the ratios for each radionuclide of concentration present to the concentration limit will not exceed "1" (unity). A calculation of the potential peak annual TEDE within 1000 years to the average member of the critical group that would result from the standard (not including radon) on the site must be submitted for approval.*

In other words, radium shall be limited in soil to 5 pCi/g above background in the top 15 cm or 15 pCi/g above background below 15 cm. If other radionuclides are present, the cleanup goal is the concentration of that radionuclide that would produce the same (benchmark) dose as 5 pCi/g of radium in the top 15 cm or 15 pCi/g of radium below 15 cm. The unity rule applies when multiple contaminants are present. The USACE 2000a memorandum calculates the concentrations of FUSRAP-related radionuclides in site soils that correspond to the surface and subsurface benchmark doses. Benchmark doses were calculated using the RESRAD computer code Version 5.82. Receptor-specific and depth-specific benchmark doses for the Seaway site are as follows (USACE 2000b):

- Industrial Worker (surface soil benchmark dose) – 8.8 mrem/yr
- Industrial Worker (subsurface soil benchmark dose) – 4.1 mrem/yr
- Recreational Receptor (surface soil benchmark dose) – 0.89 mrem/yr
- Recreational Receptor (subsurface soil benchmark dose) – 0.41 mrem/yr

The term “critical group” mentioned in Criterion 6(6) is defined as the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances. Industrial workers have been identified as the critical group for Seaway, though recreational-related exposures are more plausible. Because there are multiple COCs, the sum-of-ratios (SOR) rule applies as expressed in the following two depth-dependent equations for the critical group:

$$SOR_{SS} = \frac{^{227}Ac - B_k}{22} + \frac{^{231}Pa - B_k}{110} + \frac{^{226}Ra - B_k}{5.0} + \frac{^{230}Th - B_k}{15} + \frac{^{232}Th - B_k}{3.5} + \frac{U_{Total} - B_k}{605} \qquad \textbf{Eq. 1}$$

$$SOR_{SB} = \frac{^{227}Ac - B_k}{180} + \frac{^{231}Pa - B_k}{1{,}900} + \frac{^{226}Ra - B_k}{15} + \frac{^{230}Th - B_k}{44} + \frac{^{232}Th - B_k}{9.6} + \frac{U_{Total} - B_k}{3{,}039} \qquad \textbf{Eq. 2}$$

Where:

SOR_{SS} is the surface soil SOR,

SOR_{SB} is the subsurface soil SOR,

B_k is the average background concentration,

^{226}Ra is in secular equilibrium with its long-lived decay product ^{210}Pb,

^{232}Th is in secular equilibrium with long-lived decay products ^{228}Ra and ^{228}Th,

U_{Total} represent the total uranium concentration for isotopes ^{238}U, ^{235}U and ^{234}U assumed to present in the natural abundance concentration ratio of 1.0-to-0.046-to-1.0, respectively.

Soils that exceed the concentration-based criteria for SOR greater than 1.0 over the respective depth interval also exceed concentration-based limits. The U_{Total} ratio in Equations 1 and 2 may be replaced, if preferred, with the expression for individual isotopes, as shown in Equations 3 and 4:

$$SOR_{SS}\ (U_{Total}) = \frac{^{234}U - B_k}{5{,}200} + \frac{^{235}U - B_k}{74} + \frac{^{238}U - B_k}{390} \qquad \textbf{Eq. 3}$$

$$SOR_{SB}\ (U_{Total}) = \frac{^{234}U - B_k}{6{,}600{,}000} + \frac{^{235}U - B_k}{770} + \frac{^{238}U - B_k}{1{,}600} \qquad \textbf{Eq. 4}$$

Seaway concentration-based RGs are also presented with depth and surface area criteria in Table C-1. Note that average background concentrations are also provided, as are other details associated with Equations 1 and 2. Also note that the ARARs specify a surface area of 100 m^2, although benchmark doses were conservatively calculated for larger areas.

C1.2.2 Contaminants of Potential Concern

The radionuclides Pa-231 and Ac-227 are contaminants of potential concern (COPCs) that are site-related contaminants because 1) they are present in uranium ores (they are actually ubiquitous, but are present in elevated concentrations in ore, like uranium), and 2) they were present in the waste product of the uranium extraction process. In brief, the raw ores went through a radium extraction and a uranium extraction. Radionuclides that were not removed from the feed material (ore) remained in the process

Table C-1. Summary of Concentration-Based Remediation Goals for the Seaway Site

COPC	Units	BKG	Criteria	Depth[a]	Area[a]	Comment
Surface Soils – Industrial Receptor						
Ac-227	pCi/g	0.14	22	Top 15 cm (surface) of soil	Average over 100 m^2	As calculated
Pa-231	pCi/g	0.14	110			As calculated
Ra-226	pCi/g	1.1	5.0			Secular equilibrium with Pb-210 assumed
Th-230	pCi/g	1.4	15			1,000 years of Ra-226 ingrowth assumed
Th-232	pCi/g	1.2	3.5			Secular equilibrium with Ra-228 and Th-228 assumed
U_{Total}	pCi/g	6.3	605			Assuming natural abundance
U-234	pCi/g	3.1	5,200			Use with other U isotopic values in place of U_{Total}
U-235	pCi/g	0.14	74			Use with other U isotopic values in place of U_{Total}
U-238	pCi/g	3.1	390			Use with other U isotopic values in place of U_{Total}
Subsurface Soils – Industrial Receptor						
Ac-227	pCi/g	0.14	180	Any subsequent 15-cm below the surface interval	Average over 100 m^2	As calculated
Pa-231	pCi/g	0.14	1,900			As calculated
Ra-226	pCi/g	1.1	15			Secular equilibrium with Pb-210 assumed
Th-230	pCi/g	1.4	44			1,000 years of Ra-226 ingrowth assumed
Th-232	pCi/g	1.2	9.6			Secular equilibrium with Ra-228 and Th-228 assumed
U_{Total}	pCi/g	6.3	3,039			Assuming natural abundance
U-234	pCi/g	3.1	6.6E+06			Use with other U isotopic values in place of U_{Total}
U-235	pCi/g	0.14	770			Use with other U isotopic values in place of U_{Total}
U-238	pCi/g	3.1	1,600			Use with other U isotopic values in place of U_{Total}

[a]Depth and surface requirements as specified in 40 CFR Part 192 and Criterion 6(6).
Sum-of-ratios approach applies to surface and subsurface soils using net (above average background) concentrations and either. U_{Total} or values for individual uranium isotopes.
BKG = average background concentration.
COPC = contaminant of potential concern.
NA = not applicable or not available.

stream and were eventually discarded with other filter cake (waste) constituents. Because the two extractions did not remove significant quantities of Pa-231 and Ac-227, they passed through with other radionuclides like Th-230, and now contribute to environmental contamination.

The Seaway historical database contained no results for Pa-231 until after an "Additional Surface Characterization of Areas B and C at the Seaway Site" (ca. 1998). During this characterization, Pa-231 concentrations were detected as high as 51 pCi/g. The 2001 characterization detected Pa-231 as high as 39 pCi/g and many times in the 10s of pCi/g range. While these results are below the single-nuclide criteria listed in Table C-1, they do represent a significant fraction using the SOR approach, thus should be considered. Similarly, the historical dataset contains many Ac-227 results in the 10s of pCi/g range and a maximum of 144 pCi/g. The 2001 results for Ac-227 paralleled those for Pa-231, with a maximum of 25 pCi/g, thus Ac-227 could also contribute significantly to SOR calculations.

The baseline risk assessment (BRA) states that Th-232 was not identified as a COC but was retained for further evaluation. Thorium series contaminants have consistently been evaluated as described in the 2000 and 2001 USACE memoranda. This appendix, however, re-evaluates the necessity of retaining Th-232 and other contaminants on the COC list.

C2. METHODS

C2.1 RE-BASELINE CALCULATIONS

Two factors contribute to re-baselining at the Seaway site:

- Factor 1 – the availability of significant additional analytical data, and
- Factor 2 – the evolution of the RESRAD code since the 2000 technical memoranda were issued.

To address Factor 1, the 2001 data were segregated into Seaway Areas A, B, and C, as has been the practice for assessing Seaway exposures. These divisions were subdivided into on-site only analytical results[3] and the combined dataset including on-site and off-site results. For the on-site dataset, results are for gamma spec only, thus non-gamma emitting radionuclides like U-234 were not reported. The off-site dataset includes a combination of gamma spec and isotope-specific analyses, specifically isotopic uranium and isotopic thorium. For the combined dataset, off-site data were preferentially used when available, otherwise the on-site data were used. For some contaminants multiple values may have been reported per sample, such as for U-238 when analyzed by gamma-spec on-site and off-site (through proxies) and by alpha spec. In such cases the off-site method involving chemical separation was given highest weight, followed by off-site gamma spec, followed by on-site gamma spec. This hierarchy produces a single result per analyte per sample using the most sensitive analytical method. Other rules used in data processing include:

- Uranium-234 was analyzed in some off-site samples but not always, thus is assumed present in secular equilibrium with U-238.

- Lead-210 was not reported for any sample, thus is assumed present in secular equilibrium with Ra-226.

Re-baseline risk and dose calculations were performed using net exposure point concentrations (EPCs), where the EPC is the smaller of the 95% upper confidence limit on the mean concentration and the maximum reported value. Net values were calculated by subtracting average background (see Table C-1), although calculated negative net EPC values were assigned a concentration value of zero. Attachment C1 presents summary statistics for data utilized in dose and risk calculations.

The Factor 2 is easily addressed – "runs" are repeated using identical input parameters but utilizing the new RESRAD version and 2001 data. Runs were completed using Version 6.3 and the parameters listed in USACE 2000a. The parameters are not repeated here, but do represent recreational and industrial receptors for the dust inhalation, soil ingestion, and external gamma pathways. Note that of the USACE 2000a parameters, surface area (in m^2) was allowed to vary but was fixed at 10,000 m^2 for re-baselining. This has negligible impact on results.

Re-baseline risk and dose calculations were performed using both the on-site and combined datasets. This was accomplished by entering unit concentrations of all COPCs into the RESRAD code then extracting dose-to-source ratios (DSRs) and risk-to-source ratios (RSR) from the RESRAD output. DSR and RSR values were then copied into a spreadsheet and multiplied by area-specific net EPCs to produce COPC-specific dose and risk results. These values were summed to produce the total dose and total risk results per area and receptor. Because some COPCs produce maximum exposures at different times, dose and

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[3] The BEGe gamma spectrometer was utilized in an on-site lab to quantify gamma-emitting contaminants. Samples were field homogenized and were not dried or otherwise manipulated prior to analysis.

risk calculations were produced for years 0 and 1000. It is noted that some potential COCs such as Th-232 produces maximum exposure after 10s of years due to the ingrowth of long-lived decay products. However, when considering natural combinations in series (such as the thorium series), the maximum exposure falls at year 0 or 1000. Therefore, the utilized approach is reasonable and conservative.

COCs were identified based on re-baseline risk results. If the calculated total risk for any receptor and assessment year is greater that 1×10^{-4}, then any COPC with an individual risk greater than 1×10^{-6} is a COC. There is no corollary for radiological dose, although total doses above benchmarks are noteworthy.

C2.1 REGRESSION ANALYSIS

A regression analysis was performed to determine whether Pa-231 and/or Ac-227 concentrations could be predicted by the characterization of traditional FUSRAP contaminants. The Pa-231 detected results were plotted against reported values of other COPCs: uranium isotopes, Th-230, and Ra-226. The fitted regression equation, R-squared[4] values, and p-values[5] were produced to assess, with visual inspection, the fitted regression equation. The same approach was used for Ac-227. The dataset including the combination of off-site and on-site data were used in this study. If significant regressions are revealed, the SOR equations could be restated using the relationships between the isotopes in the regression equations to include only the traditional FUSRAP contaminants.

C3. RESULTS

C3.1 RISK ASSESSMENT

Tables C-2 and C-3 present risk and dose results considering only on-site analytical data, and Tables C-4 and C-5 present risk and dose results for the combined (on-site and off-site) dataset. Although the subsurface soil benchmark dose of 0.41 mrem/yr for the recreational receptor is exceeded in all Area/year/dataset combinations, the total risk of $1\text{x}10^{-4}$ is within the CERCLA acceptable risk range. The maximum dose estimate is 20.0 mrem/yr in Area A (year 1000/on-site data) and the minimum dose is 0.466 mrem/yr in Area B (year 0/combined data). The surface soil benchmark dose of 0.89 for the recreational receptor is exceeded in all Area-year combinations except Area B (year 0/combined data). The greatest recreational risk estimate is 1×10^{-4} only for Area A and only for year 1000, but considering both datasets. As stated above, this maximum risk estimate of 1×10^{-4} is within the CERCLA acceptable risk range and therefore there are no COCs identified due to the recreational receptor scenario.

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[4] The R^2 for a fitted model provides an indication of the goodness of fit; it explains how much of the total variation is explained by the fitted model. R^2 ranges from 0 (no variation attributable to the model; not a good fit) to 1.0 (100% of the variation attributable to the model; a very good fit). As a rule of thumb, an $R^2 \geq 0.7$ indicates a good fit.

[5] A p-value is a statistical parameter measuring the significance of the fitted regression model. A p-value of 1.0 shows there is no significance while a p-value approaching zero indicates a significant relationship between parameters in the fitted regression model. As a rule-of-thumb, a p-value of 0.05 or less indicates a significant regression model.

Table C-2. Re-baseline Risk and Dose Results for the Recreational Receptor – On-site Dataset Only

			On-site EPC (pCi/g)			BKG	Total	Net Dose (mrem/yr)			Total	Net Risk (lifetime^{-1})		
Receptor	**Year**	**Nuclide**	**Area A**	**Area B**	**Area C**	**(pCi/g)**	**DSR**	**Area A**	**Area B**	**Area C**	**RSR**	**Area A**	**Area B**	**Area C**
Recreational	0	Ac-227	8.60	3.07	6.01	0.14	4.79E-02	4.1E-01	1.4E-01	2.8E-01	1.90E-07	2E-06	6E-07	1E-06
Recreational	0	Pa-231	9.58	4.01	6.79	0.14	1.18E-02	1.1E-01	4.6E-02	7.8E-02	5.06E-08	5E-07	2E-07	3E-07
Recreational	0	Pb-210	11.7	5.3	3.6	1.1	4.57E-03	4.8E-02	1.9E-02	1.1E-02	1.75E-08	2E-07	7E-08	4E-08
Recreational	0	Ra-226	11.7	5.3	3.6	1.1	1.80E-01	1.9E+00	7.5E-01	4.4E-01	1.22E-06	1E-05	5E-06	3E-06
Recreational	0	Ra-228	1.00	0.80	0.74	1.2	1.16E-01	0.0E+00	0.0E+00	0.0E+00	9.34E-07	0E+00	0E+00	0E+00
Recreational	0	Th-228	1.00	0.80	0.74	1.2	1.38E-01	0.0E+00	0.0E+00	0.0E+00	3.31E-07	0E+00	0E+00	0E+00
Recreational	0	Th-230	288	100	157	1.4	7.45E-04	2.1E-01	7.3E-02	1.2E-01	3.50E-09	1E-06	3E-07	5E-07
Recreational	0	Th-232	1.00	0.80	0.74	1.2	1.01E-02	0.0E+00	0.0E+00	0.0E+00	5.20E-07	0E+00	0E+00	0E+00
Recreational	0	U-234	18.8	6.3	11.3	3.1	3.20E-04	5.0E-03	1.0E-03	2.6E-03	7.78E-10	1E-08	3E-09	6E-09
Recreational	0	U-235	3.14	1.34	1.69	0.14	1.25E-02	3.7E-02	1.5E-02	1.9E-02	7.43E-08	2E-07	9E-08	1E-07
Recreational	0	U-238	18.8	6.3	11.3	3.1	2.70E-03	4.2E-02	8.7E-03	2.2E-02	1.61E-08	3E-07	5E-08	1E-07
							Totals	2.8E+00	1.1E+00	9.7E-01	Totals	2E-05	6E-06	5E-06
Recreational	1000	Ac-227	8.60	3.07	6.01	0.14	6.68E-16	5.7E-15	2.0E-15	3.9E-15	2.64E-21	2E-20	8E-21	2E-20
Recreational	1000	Pa-231	9.58	4.01	6.79	0.14	5.50E-02	5.2E-01	2.1E-01	3.7E-01	2.21E-07	2E-06	9E-07	1E-06
Recreational	1000	Pb-210	11.7	5.3	3.6	1.1	1.07E-16	1.1E-15	4.5E-16	2.6E-16	4.11E-22	4E-21	2E-21	1E-21
Recreational	1000	Ra-226	11.7	5.3	3.6	1.1	1.17E-01	1.2E+00	4.9E-01	2.9E-01	7.91E-07	8E-06	3E-06	2E-06
Recreational	1000	Ra-228	1.00	0.80	0.74	1.2	0.00E+00	0.0E+00	0.0E+00	0.0E+00	0.00E+00	0E+00	0E+00	0E+00
Recreational	1000	Th-228	1.00	0.80	0.74	1.2	0.00E+00	0.0E+00	0.0E+00	0.0E+00	0.00E+00	0E+00	0E+00	0E+00
Recreational	1000	Th-230	288	100	157	1.4	6.36E-02	1.8E+01	6.3E+00	9.9E+00	4.28E-07	1E-04	4E-05	7E-05
Recreational	1000	Th-232	1.00	0.80	0.74	1.2	2.57E-01	0.0E+00	0.0E+00	0.0E+00	1.74E-06	0E+00	0E+00	0E+00
Recreational	1000	U-234	18.8	6.3	11.3	3.1	3.36E-05	5.3E-04	1.1E-04	2.7E-04	2.26E-10	4E-09	7E-10	2E-09
Recreational	1000	U-235	3.14	1.34	1.69	0.14	7.21E-05	2.2E-04	8.7E-05	1.1E-04	2.90E-10	9E-10	3E-10	5E-10
Recreational	1000	U-238	18.8	6.3	11.3	3.1	5.79E-09	9.1E-08	1.9E-08	4.7E-08	3.87E-14	6E-13	1E-13	3E-13
							Totals	2.0E+01	7.0E+00	1.1E+01	Totals	1E-04	5E-05	7E-05

BKG = average background taken from the Seaway risk memorandum (USACE 2000a).
DSR = dose-to-source ratio taken from RESRAD Version 6.3 output.
EPC = exposure point concentration; smaller of 95% upper confidence limit on the mean and maximum detected value.
Net Dose = (EPC - BKG) times radionuclide-specific DSR.
Net Risk = (EPC - BKG) times radionuclide-specific RSR.
RSR = risk-to-source ratio taken from RESRAD Version 6.3 output.

Table C-3. Re-baseline Risk and Dose Results for the Industrial Receptor – On-site Dataset Only

Receptor	Year	Nuclide	On-site EPC (pCi/g)			BKG	Total	Net Dose (mrem/yr)			Total	Net Risk (lifetime^{-1})		
			Area A	Area B	Area C	(pCi/g)	DSR	Area A	Area B	Area C	RSR	Area A	Area B	Area C
Industrial	0	Ac-227	8.60	3.07	6.01	0.14	4.05E-01	3.4E+00	1.2E+00	2.4E+00	4.11E-06	**3E-05**	**1E-05**	**2E-05**
Industrial	0	Pa-231	9.58	4.01	6.79	0.14	8.64E-02	8.2E-01	3.3E-01	5.7E-01	2.43E-06	**2E-05**	**9E-06**	**2E-05**
Industrial	0	Pb-210	11.7	5.3	3.6	1.1	3.10E-02	3.3E-01	1.3E-01	7.6E-02	2.63E-07	**3E-06**	**1E-06**	6E-07
Industrial	0	Ra-226	11.7	5.3	3.6	1.1	1.78E+00	1.9E+01	7.4E+00	4.4E+00	3.37E-05	**4E-04**	**1E-04**	**8E-05**
Industrial	0	Ra-228	1.00	0.80	0.74	1.2	1.15E+00	0.0E+00	0.0E+00	0.0E+00	1.53E-05	0E+00	0E+00	0E+00
Industrial	0	Th-228	1.00	0.80	0.74	1.2	1.37E+00	0.0E+00	0.0E+00	0.0E+00	3.42E-06	0E+00	0E+00	0E+00
Industrial	0	Th-230	288	100	157	1.4	4.19E-03	1.2E+00	4.1E-01	6.5E-01	2.02E-07	**6E-05**	**2E-05**	**3E-05**
Industrial	0	Th-232	1.00	0.80	0.74	1.2	8.41E-02	0.0E+00	0.0E+00	0.0E+00	3.05E-05	0E+00	0E+00	0E+00
Industrial	0	U-234	18.8	6.3	11.3	3.1	1.77E-03	2.8E-02	5.7E-03	1.4E-02	1.14E-08	2E-07	4E-08	9E-08
Industrial	0	U-235	3.14	1.34	1.69	0.14	1.23E-01	3.7E-01	1.5E-01	1.9E-01	1.81E-06	**5E-06**	**2E-06**	**3E-06**
Industrial	0	U-238	18.8	6.3	11.3	3.1	2.56E-02	4.0E-01	8.3E-02	2.1E-01	3.84E-07	**6E-06**	**1E-06**	**3E-06**
							Totals	**2.5E+01**	9.7E+00	8.5E+00	Totals	**5E-04**	**2E-04**	**2E-04**
Industrial	1000	Ac-227	8.60	3.07	6.01	0.14	5.64E-15	4.8E-14	1.7E-14	3.3E-14	5.72E-20	5E-19	2E-19	3E-19
Industrial	1000	Pa-231	9.58	4.01	6.79	0.14	4.52E-01	4.3E+00	1.7E+00	3.0E+00	6.02E-06	**6E-05**	**2E-05**	**4E-05**
Industrial	1000	Pb-210	11.7	5.3	3.6	1.1	7.27E-16	7.7E-15	3.0E-15	1.8E-15	6.17E-21	7E-20	3E-20	2E-20
Industrial	1000	Ra-226	11.7	5.3	3.6	1.1	1.16E+00	1.2E+01	4.8E+00	2.8E+00	2.16E-05	**2E-04**	**9E-05**	**5E-05**
Industrial	1000	Ra-228	1.00	0.80	0.74	1.2	0.00E+00	0.0E+00	0.0E+00	0.0E+00	0.00E+00	0E+00	0E+00	0E+00
Industrial	1000	Th-228	1.00	0.80	0.74	1.2	0.00E+00	0.0E+00	0.0E+00	0.0E+00	0.00E+00	0E+00	0E+00	0E+00
Industrial	1000	Th-230	288	100	157	1.4	6.24E-01	1.8E+02	6.1E+01	9.7E+01	1.18E-05	**3E-03**	**1E-03**	**2E-03**
Industrial	1000	Th-232	1.00	0.80	0.74	1.2	2.53E+00	0.0E+00	0.0E+00	0.0E+00	4.78E-05	0E+00	0E+00	0E+00
Industrial	1000	U-234	18.8	6.3	11.3	3.1	3.29E-04	5.2E-03	1.1E-03	2.7E-03	6.23E-09	1E-07	2E-08	5E-08
Industrial	1000	U-235	3.14	1.34	1.69	0.14	5.92E-04	1.8E-03	7.1E-04	9.2E-04	7.89E-09	2E-08	9E-09	1E-08
Industrial	1000	U-238	18.8	6.3	11.3	3.1	5.67E-08	8.9E-07	1.8E-07	4.6E-07	1.06E-12	2E-11	3E-12	9E-12
							Totals	**2.0E+02**	**6.8E+01**	**1.0E+02**	Totals	**4E-03**	**1E-03**	**2E-03**

BKG = average background taken from the Seaway risk memorandum (USACE 2000a).
DSR = dose-to-source ratio taken from RESRAD Version 6.3 output.
EPC = exposure point concentration; smaller of 95% upper confidence limit on the mean and maximum detected value.
Net Dose = (EPC - BKG) times radionuclide-specific DSR.
Net Risk = (EPC - BKG) times radionuclide-specific RSR.
RSR = risk-to-source ratio taken from RESRAD Version 6.3 output.
Totals and radionuclide-specific results of interest are bolded.

Table C-4. Re-baseline Risk and Dose Results for the Recreational Receptor – Combined Dataset

Receptor	Year	Nuclide	Combined EPC (pCi/g)			BKG	Total	Net Dose (mrem/yr)			Total	Net Risk (lifetime^{-1})		
			Area A	Area B	Area C	(pCi/g)	DSR	Area A	Area B	Area C	RSR	Area A	Area B	Area C
Recreational	0	Ac-227	8.89	3.62	6.46	0.14	4.79E-02	4.2E-01	1.7E-01	3.0E-01	1.90E-07	2E-06	7E-07	1E-06
Recreational	0	Pa-231	12.6	2.78	8.71	0.14	1.18E-02	1.5E-01	3.1E-02	1.0E-01	5.06E-08	6E-07	1E-07	4E-07
Recreational	0	Pb-210	27.8	2.3	4.6	1.1	4.57E-03	1.2E-01	5.4E-03	1.6E-02	1.75E-08	5E-07	2E-08	6E-08
Recreational	0	Ra-226	27.8	2.3	4.6	1.1	1.80E-01	4.8E+00	2.1E-01	6.2E-01	1.22E-06	3E-05	1E-06	4E-06
Recreational	0	Ra-228	1.00	0.80	0.74	1.2	1.16E-01	0.0E+00	0.0E+00	0.0E+00	9.34E-07	0E+00	0E+00	0E+00
Recreational	0	Th-228	1.14	0.80	0.81	1.2	1.38E-01	0.0E+00	0.0E+00	0.0E+00	3.31E-07	0E+00	0E+00	0E+00
Recreational	0	Th-230	236	55	137	1.4	7.45E-04	1.7E-01	4.0E-02	1.0E-01	3.50E-09	8E-07	2E-07	5E-07
Recreational	0	Th-232	1.20	0.96	0.84	1.2	1.01E-02	3.5E-05	0.0E+00	0.0E+00	5.20E-07	2E-09	0E+00	0E+00
Recreational	0	U-234	19.0	4.1	12.1	3.1	3.20E-04	5.1E-03	3.1E-04	2.9E-03	7.78E-10	1E-08	7E-10	7E-09
Recreational	0	U-235	0.80	0.79	1.30	0.14	1.25E-02	8.3E-03	8.1E-03	1.4E-02	7.43E-08	5E-08	5E-08	9E-08
Recreational	0	U-238	19.0	4.1	12.1	3.1	2.70E-03	4.3E-02	2.6E-03	2.4E-02	1.61E-08	3E-07	2E-08	1E-07
							Totals	5.7E+00	4.7E-01	1.2E+00	Totals	4E-05	3E-06	7E-06
Recreational	1000	Ac-227	8.89	3.62	6.46	0.14	6.68E-16	5.8E-15	2.3E-15	4.2E-15	2.64E-21	2E-20	9E-21	2E-20
Recreational	1000	Pa-231	12.6	2.78	8.71	0.14	5.50E-02	6.8E-01	1.5E-01	4.7E-01	2.21E-07	3E-06	6E-07	2E-06
Recreational	1000	Pb-210	27.8	2.3	4.6	1.1	1.07E-16	2.9E-15	1.3E-16	3.7E-16	4.11E-22	1E-20	5E-22	1E-21
Recreational	1000	Ra-226	27.8	2.3	4.6	1.1	1.17E-01	3.1E+00	1.4E-01	4.1E-01	7.91E-07	2E-05	9E-07	3E-06
Recreational	1000	Ra-228	1.00	0.80	0.74	1.2	0.00E+00	0.0E+00	0.0E+00	0.0E+00	0.00E+00	0E+00	0E+00	0E+00
Recreational	1000	Th-228	1.14	0.80	0.81	1.2	0.00E+00	0.0E+00	0.0E+00	0.0E+00	0.00E+00	0E+00	0E+00	0E+00
Recreational	1000	Th-230	236	55	137	1.4	6.36E-02	1.5E+01	3.4E+00	8.6E+00	4.28E-07	1E-04	2E-05	6E-05
Recreational	1000	Th-232	1.20	0.96	0.84	1.2	2.57E-01	8.9E-04	0.0E+00	0.0E+00	1.74E-06	6E-09	0E+00	0E+00
Recreational	1000	U-234	19.0	4.1	12.1	3.1	3.36E-05	5.3E-04	3.2E-05	3.0E-04	2.26E-10	4E-09	2E-10	2E-09
Recreational	1000	U-235	0.80	0.79	1.30	0.14	7.21E-05	4.8E-05	4.7E-05	8.4E-05	2.90E-10	2E-10	2E-10	3E-10
Recreational	1000	U-238	19.0	4.1	12.1	3.1	5.79E-09	9.2E-08	5.6E-09	5.2E-08	3.87E-14	6E-13	4E-14	3E-13
							Totals	1.9E+01	3.7E+00	9.5E+00	Totals	1E-04	2E-05	6E-05

BKG = average background taken from the Seaway risk memorandum (USACE 2000a).
DSR = dose-to-source ratio taken from RESRAD Version 6.3 output.
EPC = exposure point concentration; smaller of 95% upper confidence limit on the mean and maximum detected value.
Net Dose = (EPC - BKG) times radionuclide-specific DSR.
Net Risk = (EPC - BKG) times radionuclide-specific RSR.
RSR = risk-to-source ratio taken from RESRAD Version 6.3 output.

Table C-5. Re-baseline Risk and Dose Results for the Industrial Receptor – Combined Dataset

			Combined EPC (pCi/g)			BKG	Total	Net Dose (mrem/yr)			Total	Net Risk (lifetime^{-1})		
Receptor	**Year**	**Nuclide**	**Area A**	**Area B**	**Area C**	**(pCi/g)**	**DSR**	**Area A**	**Area B**	**Area C**	**RSR**	**Area A**	**Area B**	**Area C**
Industrial	0	Ac-227	8.89	3.62	6.46	0.14	4.05E-01	3.5E+00	1.4E+00	2.6E+00	4.11E-06	**4E-05**	1E-05	**3E-05**
Industrial	0	Pa-231	12.6	2.78	8.71	0.14	8.64E-02	1.1E+00	2.3E-01	7.4E-01	2.43E-06	**3E-05**	6E-06	**2E-05**
Industrial	0	Pb-210	27.8	2.3	4.6	1.1	3.10E-02	8.3E-01	3.7E-02	1.1E-01	2.63E-07	**7E-06**	3E-07	9E-07
Industrial	0	Ra-226	27.8	2.3	4.6	1.1	1.78E+00	4.8E+01	2.1E+00	6.2E+00	3.37E-05	**9E-04**	4E-05	**1E-04**
Industrial	0	Ra-228	1.00	0.80	0.74	1.2	1.15E+00	0.0E+00	0.0E+00	0.0E+00	1.53E-05	0E+00	0E+00	0E+00
Industrial	0	Th-228	1.14	0.80	0.81	1.2	1.37E+00	0.0E+00	0.0E+00	0.0E+00	3.42E-06	0E+00	0E+00	0E+00
Industrial	0	Th-230	236	55	137	1.4	4.19E-03	9.8E-01	2.2E-01	5.7E-01	2.02E-07	**5E-05**	1E-05	**3E-05**
Industrial	0	Th-232	1.20	0.96	0.84	1.2	8.41E-02	2.9E-04	0.0E+00	0.0E+00	3.05E-05	1E-07	0E+00	0E+00
Industrial	0	U-234	19.0	4.1	12.1	3.1	1.77E-03	2.8E-02	1.7E-03	1.6E-02	1.14E-08	2E-07	1E-08	1E-07
Industrial	0	U-235	0.80	0.79	1.30	0.14	1.23E-01	8.1E-02	7.9E-02	1.4E-01	1.81E-06	**1E-06**	1E-06	**2E-06**
Industrial	0	U-238	19.0	4.1	12.1	3.1	2.56E-02	4.1E-01	2.5E-02	2.3E-01	3.84E-07	**6E-06**	4E-07	**3E-06**
							Totals	**5.5E+01**	4.1E+00	1.1E+01	Totals	**1E-03**	**7E-05**	**2E-04**
Industrial	1000	Ac-227	8.89	3.62	6.46	0.14	5.64E-15	4.9E-14	2.0E-14	3.6E-14	5.72E-20	5E-19	2E-19	4E-19
Industrial	1000	Pa-231	12.6	2.78	8.71	0.14	4.52E-01	5.6E+00	1.2E+00	3.9E+00	6.02E-06	**7E-05**	**2E-05**	**5E-05**
Industrial	1000	Pb-210	27.8	2.3	4.6	1.1	7.27E-16	1.9E-14	8.6E-16	2.5E-15	6.17E-21	2E-19	7E-21	2E-20
Industrial	1000	Ra-226	27.8	2.3	4.6	1.1	1.16E+00	3.1E+01	1.4E+00	4.0E+00	2.16E-05	**6E-04**	**3E-05**	**7E-05**
Industrial	1000	Ra-228	1.00	0.80	0.74	1.2	0.00E+00	0.0E+00	0.0E+00	0.0E+00	0.00E+00	0E+00	0E+00	0E+00
Industrial	1000	Th-228	1.14	0.80	0.81	1.2	0.00E+00	0.0E+00	0.0E+00	0.0E+00	0.00E+00	0E+00	0E+00	0E+00
Industrial	1000	Th-230	236	55	137	1.4	6.24E-01	1.5E+02	3.3E+01	8.5E+01	1.18E-05	**3E-03**	**6E-04**	**2E-03**
Industrial	1000	Th-232	1.20	0.96	0.84	1.2	2.53E+00	8.7E-03	0.0E+00	0.0E+00	4.78E-05	2E-07	0E+00	0E+00
Industrial	1000	U-234	19.0	4.1	12.1	3.1	3.29E-04	5.2E-03	3.2E-04	3.0E-03	6.23E-09	1E-07	6E-09	6E-08
Industrial	1000	U-235	0.80	0.79	1.30	0.14	5.92E-04	3.9E-04	3.8E-04	6.9E-04	7.89E-09	5E-09	5E-09	9E-09
Industrial	1000	U-238	19.0	4.1	12.1	3.1	5.67E-08	9.0E-07	5.5E-08	5.1E-07	1.06E-12	2E-11	1E-12	1E-11
							Totals	**1.8E+02**	**3.6E+01**	**9.3E+01**	Totals	**3E-03**	**7E-04**	**2E-03**

BKG = average background taken from the Seaway risk memorandum (USACE 2000a).
DSR = dose-to-source ratio taken from RESRAD Version 6.3 output.
EPC = exposure point concentration; smaller of 95% upper confidence limit on the mean and maximum detected value.
Net Dose = (EPC - BKG) times radionuclide-specific DSR.
Net Risk = (EPC - BKG) times radionuclide-specific RSR.
RSR = risk-to-source ratio taken from RESRAD Version 6.3 output.
Totals and radionuclide-specific results of interest are bolded.

The subsurface soil benchmark dose of 4.1 mrem/yr for the industrial receptor is exceeded in all Area/year/dataset combinations. The maximum dose estimate is 195 mrem/yr in Area A (year 1000/on-site data) and the minimum is 4.11 mrem/yr in Area B (year 0/combined data). The surface soil benchmark dose of 8.8 for the industrial receptor is exceeded in all Area-year combinations except Area B (year 0/combined data) and Area C (year 0/on-site data). The industrial risk estimate exceeds 1×10^{-4} for all Area/year/dataset combination except Area B (year 0/combined data). The maximum risk estimate is 3.7×10^{-3} and the COCs identified in both datasets are Ac-227, Pa-231, Pb-210, Ra-226, Th-230, U-235, and U-238.

It is noted that thorium-series radionuclides are not identified as COCs for any Area/year/dataset combination. This is because the EPCs were almost always below the average background concentrations. In fact, the maximum reported Th-232 result in either dataset, including all 165 samples, is 2.5 pCi/g compared to average background of 1.2 pCi/g. While the BRA (DOE 1993) retains Th-232 for future consideration, the evidence supports the conclusion that neither Th-232 nor associated decay products are COCs for the Seaway site.

Uranium-234 is not identified as a COC for any Area/year/dataset combination. Based on these results U-234 could be excluded from the final COC list. However, the three naturally occurring uranium isotopes (U-234, U-235 and U-238) are traditionally considered as a group, such as when expressing RGs for total uranium. U-234 is, therefore, conservatively retained as a COC, resulting in lower than required total uranium RGs (see Equation 3 and 4 as examples).

As a final re-baselining measure, the results presented in Tables C-2 through C-5 were compared to corresponding results presented in USACE 2000a. Recalling that the USACE 2000a calculations were performed using RESRAD Version 5.82 and the historical dataset, the updated code and dataset are found to produce similar results. For example, the baseline doses for the industrial worker are reported as 110 mrem/yr, 2.0 mrem/yr and 4.6 mrem/yr for Areas A, B, and C and using RESRAD Version 5.82. Doses using the Version 6.3 are 114 mrem/yr (rounded to 110 mrem/yr), 2.1 mrem/yr and 4.6 mrem/yr, respectively.

Results from this re-baseline effort support prior risk-based decisions relative to the industrial receptor scenario and confirm the presence of FUSRAP-related contaminants above risk-based and dose-base thresholds. The results from this re-baseline effort found that the lifetime risk for the recreational scenario is within the CERCLA risk range and is considered to be acceptable. This effort also confirms the BRA assessment that Th-232 is not a COC but confirms the inclusion of Ac-227 and Pa-231, as reported in USACE 2000b.

C3.2 REGRESSION ANALYSIS

The regression analysis demonstrates that Ac-227 is best fitted with U-235 and Pa-231 is best fitted with U-238. Figure C-1 is a log-log plot of Ac-227 results versus U-235 results. The R-squared value is ~0.8 (a relatively good fit) and the p-value is less than 0.05 (the fitted equation is significant). The fitted regression equation for Ac-227 is as follows:

$$^{227}Ac\ (pCi/g) = 5.0623\times\left(^{235}U\right)^{0.914}, \qquad \textbf{Eq. 5}$$

where "^{235}U" is the soil concentration in pCi/g. Using this relationship, U-235 RGs may be recalculated to account for Ac-227, as shown below (rounded to two significant digits):

- Industrial Worker (surface soil U-235 RG) – 4.7 pCi/g
- Industrial Worker (subsurface soil U-235 RG) – 47 pCi/g

- Recreational Receptor (surface soil U-235 RG) – 4.0 pCi/g
- Recreational Receptor (subsurface soil U-235 RG) – 47 pCi/g

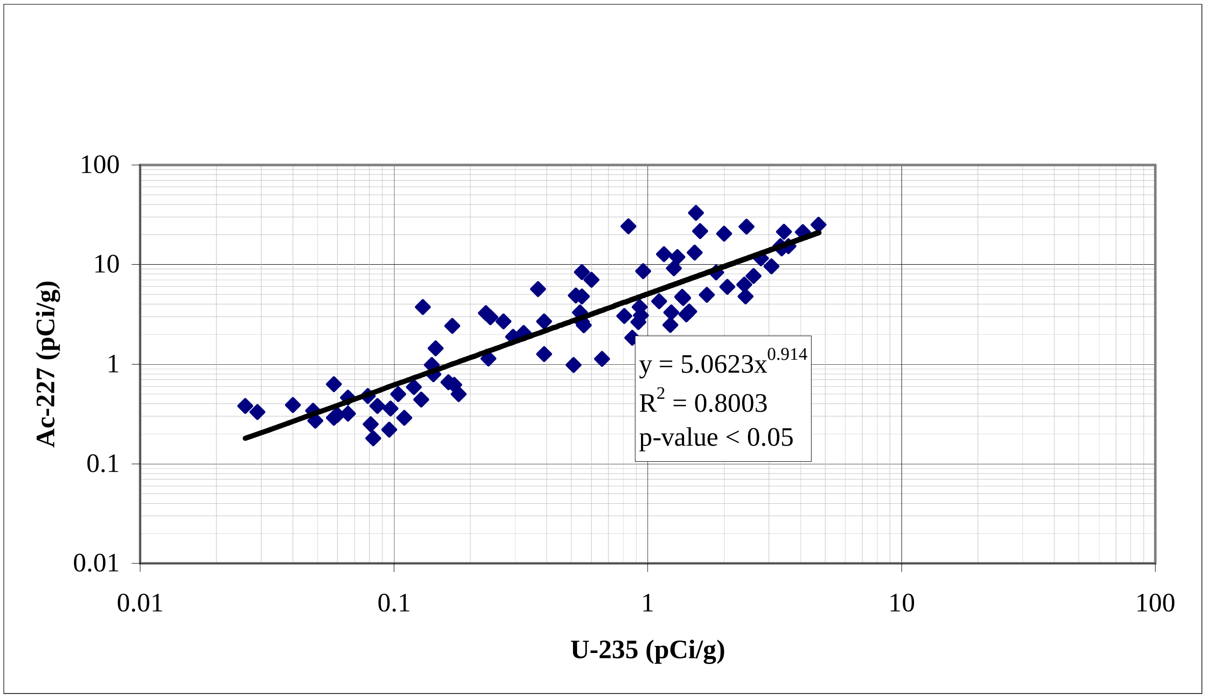

Figure C-1. Seaway Site-wide Soil Concentration Correlation between Ac-227 and U-235

Similarly, Figure C-2 is a log-log plot of Pa-231 results versus U-238 results. The R-squared value is ~0.81 (a relatively good fit) and the p-value is less than 0.05 (the fitted equation is significant). The fitted regression equation for Pa-231 is as follows:

$$^{231}Pa\ (pCi/g) = 0.5996 \times \left(^{238}U\right)^{1.0348}, \qquad \textbf{Eq. 6}$$

where "^{238}U" is the soil concentration in pCi/g. Using this relationship, RGs for U-238 may be recalculated to account for Pa-231, as shown below (rounded to two significant digits):

- Industrial Worker (surface soil U-238 RG) – 110 pCi/g
- Industrial Worker (subsurface soil U-238 RG) – 980 pCi/g
- Recreational Receptor (surface soil U-238 RG) – 90 pCi/g
- Recreational Receptor (subsurface soil U-238 RG) – 970 pCi/g

Regression analysis results can also be integrated into new total uranium RGs, using the previous stated 1.0-to-0.046-to-1.0 relationship between uranium isotopes (see Equations 1 and 2), and conservatively retaining U-234 as a COC. Total uranium RGs are, thusly, expressed as follows:

- Industrial Worker (surface soil U_{Total} RG) – 110 pCi/g
- Industrial Worker (subsurface soil U_{Total} RG) – 1,000 pCi/g
- Recreational Receptor (surface soil U_{Total} RG) – 89 pCi/g
- Recreational Receptor (subsurface soil U_{Total} RG) – 1,000 pCi/g

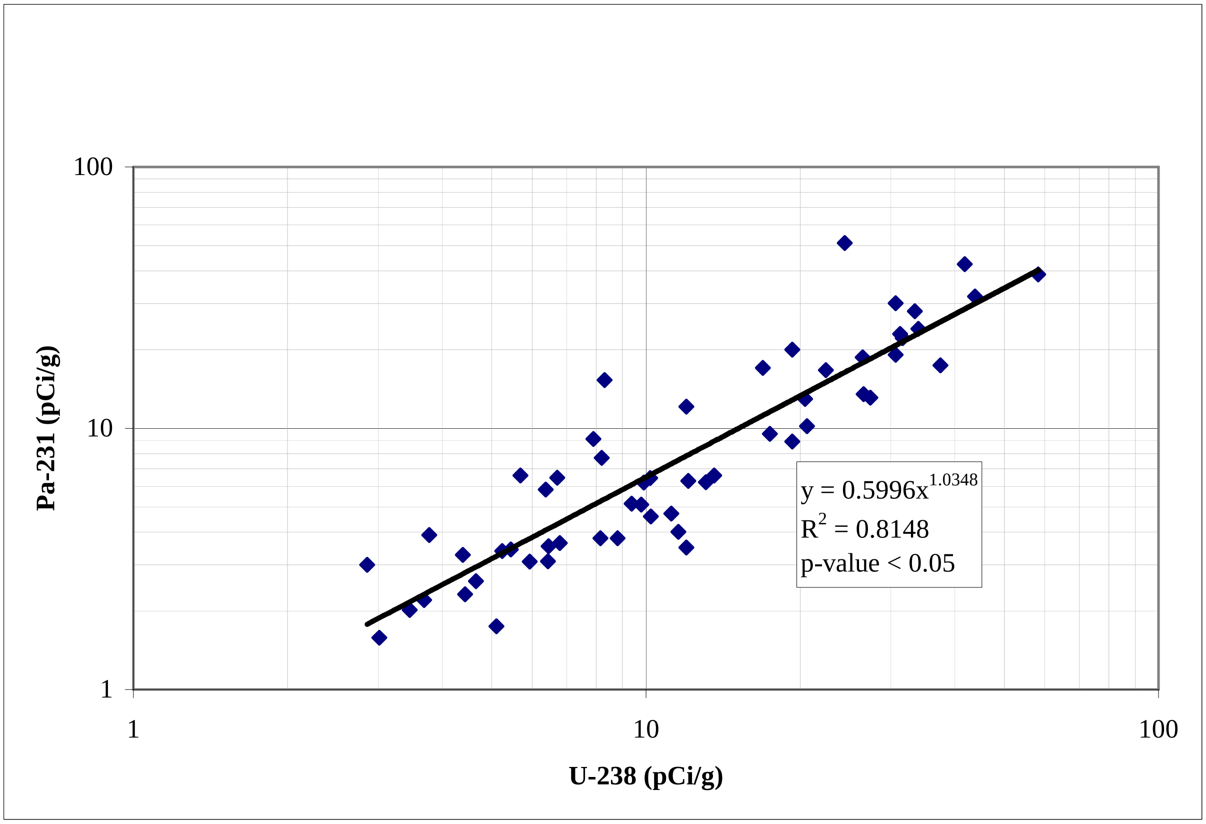

Figure C-2. Seaway Site-wide Soil Concentration Correlation between Pa-231 and U-238

Using the regression analysis described above, Equations 1 and 2 are restated as follows, showing two significant digits, for the average member of the critical group (industrial):

$$SOR_{SS} = \frac{^{226}Ra - B_k}{5.0} + \frac{^{230}Th - B_k}{15} + \frac{U_{Total} - B_k}{110} \qquad \textbf{Eq. 7}$$

$$SOR_{SB} = \frac{^{226}Ra - B_k}{15} + \frac{^{230}Th - B_k}{44} + \frac{U_{Total} - B_k}{1{,}000} \qquad \textbf{Eq. 8}$$

Where:

SOR_{SS} is the surface soil SOR,

SOR_{SB} is the subsurface soil SOR,

B_k is the average background concentration,

^{226}Ra is in secular equilibrium with its long-lived decay product Pb-210,

U_{Total} represent the total uranium concentration for isotopes U-234, U-235 and U-238 assumed to present in the natural abundance concentration ratio of 1.0-to-0.046-to-1.0, respectively, plus the addition of Ac-227 and Pa-231 using regression relationships as established herein.

Note that Th-232 has been removed from Equations 1 and 2 (now expressed as Equations 7 and 8), as thorium series radionuclides are not COCs.

It is noted that the process of combining Ac-227 with U-235 and Pa-231 with U-238 into RGs was iterative. This iterative process utilized established relationships (see Eq. 5 and Eq. 6), DSR values, and benchmark doses in a spreadsheet, as described below:

Combining Ac-227 with U-235

1. Link the Ac-227 concentration to U-235 using Eq. 5;
2. Multiply Ac-227 concentration and U-235 concentration by respective DSRs;
3. Sum products from Step 2 for total dose estimate; and
4. Adjust U-235 concentration until the total dose estimate is equal to the benchmark dose.

When the linked concentrations of Ac-227 and U-235 produced the benchmark dose (within three significant digits), the U-235 concentration was assigned as the RG. These steps were repeated for each soil depth and receptor combination.

Combining Pa-231 with U-238

1. Link the Pa-231 concentration to U-238 using Eq. 6;
2. Multiply Pa-231 concentration and U-238 concentration by respective DSRs;
3. Sum products from Step 2 for total dose estimate; and
4. Adjust U-238 concentration until the total dose estimate is equal to the benchmark dose.

When the linked concentrations of Pa-231 and U-238 produced the benchmark dose (within three significant digits), the U-238 concentration was assigned as the RG. These steps were repeated for each soil depth and receptor combination.

C4. CONCLUSIONS

This assessment confirms the risk-based overall conclusions drawn by the USACE 2000a technical memorandum regarding the industrial receptor, but not the recreational receptor. The results of this re-baseline effort found that the lifetime risk for the recreational receptor was within the CERCLA acceptable risk range. Unacceptable risk is demonstrated for the industrial receptor using either the historical dataset plus RESRAD Version 5.82 or the 2001 dataset (considering both on-site and combined on-site and off-site data) plus RESRAD Version 6.3. Risk results demonstrate that Th-232 and decay products are not COCs based on established rules, a conclusion also reached by the 1993 BRA. Pa-231 and Ac-227 are COCs based on established rules, but both can be considered indirectly by lowering the uranium RGs according to relationships established in the regression analysis. The SOR equations for the Seaway site using industrial RGs are expressed as follows:

$$SOR_{SS} = \frac{{}^{226}Ra - B_k}{5.0} + \frac{{}^{230}Th - B_k}{15} + \frac{U_{Total} - B_k}{110}$$

$$SOR_{SB} = \frac{{}^{226}Ra - B_k}{15} + \frac{{}^{230}Th - B_k}{44} + \frac{U_{Total} - B_k}{1{,}000}$$

These simplified equations take into account all relevant radiological COCs while satisfying benchmark dose standards for the critical group.

C5. REFERENCES

DOE (United States Department of Energy) 1993. *Baseline Risk Assessment for the Tonawanda Site, Tonawanda, New York*, DOE/OR-21950-003, Oak Ridge Operations Office, August.

USACE (United States Army Corps of Engineers) 2000a. *Modeling of Radiological Risks from Residual Radioactive Materials following Implementation of Remedial Alternatives for Seaway Landfill Areas A, B, and C, Final Rev. 2,* Technical Memorandum prepared by SAIC for the Buffalo District, June.

USACE 2000b. *Application of 10 CFR Part 40, Appendix A, Criterion 6(6) and Derivation of Benchmark Doses for the Seaway Landfill Areas A, B, and C, Tonawanda, New York*, Technical Memorandum prepared by SAIC for the Buffalo District, July, 21.

USACE 2001. *Technical Memorandum for the Seaway Summer 2001 Subsurface Investigation.* Technical Memorandum prepared by SAIC for the Buffalo District.

ATTACHMENT C1

ANALYTICAL DATA SUMMARY STATISTICS

Combined Dataset Summary Statistics

Contaminant	Number Sampled	Number Detected	Min. Detect	Max. Detect	Arith. Mean	St. Dev.	Dist.	95% UCL	EPC
Area A Soil									
Ac-227	29	29	1.80E-01	2.39E+01	3.76E+00	6.34E+00	X	8.89E+00	8.89E+00
Pa-231	29	9	3.90E+00	3.88E+01	4.33E+00	1.02E+01	D	1.26E+01	1.26E+01
Pb-210 (a)	0	--	--	--	--	--	--	--	2.78E+01
Ra-226	29	28	7.30E-01	8.70E+01	1.13E+01	2.03E+01	X	2.78E+01	2.78E+01
Ra-228	29	29	3.90E-01	1.54E+00	9.02E-01	2.99E-01	N	9.96E-01	9.96E-01
Th-228	29	29	5.10E-01	1.87E+00	1.01E+00	3.68E-01	L	1.14E+00	1.14E+00
Th-230	29	29	7.50E-01	6.59E+02	9.37E+01	1.76E+02	X	2.36E+02	2.36E+02
Th-232	29	29	4.62E-01	2.00E+00	1.05E+00	4.15E-01	L	1.20E+00	1.20E+00
U-234 (b)	29	29	6.60E-01	5.42E+01	7.95E+00	1.27E+01	X	1.83E+01	1.83E+01
U-235	29	29	2.60E-02	2.45E+00	4.21E-01	5.99E-01	L	8.04E-01	8.04E-01
U-238	29	29	6.30E-01	5.83E+01	8.19E+00	1.34E+01	X	1.90E+01	1.90E+01
Area B Soil									
Ac-227	31	19	4.70E-01	7.80E+00	1.90E+00	2.20E+00	X	3.62E+00	3.62E+00
Pa-231	31	4	1.75E+00	6.45E+00	1.14E+00	2.10E+00	D	2.78E+00	2.78E+00
Pb-210 (a)	0	--	--	--	--	--	--	--	2.28E+00
Ra-226	31	28	1.20E-01	8.82E+00	1.28E+00	2.20E+00	L	2.28E+00	2.28E+00
Ra-228	16	16	5.30E-01	1.05E+00	7.43E-01	1.29E-01	N	8.00E-01	8.00E-01
Th-228	16	16	5.30E-01	1.05E+00	7.43E-01	1.29E-01	N	8.00E-01	8.00E-01
Th-230	31	23	7.80E-01	2.01E+02	1.92E+01	4.51E+01	X	5.46E+01	5.46E+01
Th-232	31	31	5.10E-01	1.65E+00	8.75E-01	2.94E-01	L	9.64E-01	9.64E-01
U-234 (b)	15	15	1.02E+00	2.60E+00	1.67E+00	4.72E-01	N	1.88E+00	1.88E+00
U-235	31	5	1.30E-01	2.06E+00	3.56E-01	5.51E-01	D	7.88E-01	7.88E-01
U-238	31	26	8.80E-01	1.02E+01	2.16E+00	2.43E+00	X	4.06E+00	4.06E+00
Area C Soil									
Ac-227	104	72	2.20E-01	3.29E+01	3.82E+00	6.19E+00	X	6.46E+00	6.46E+00
Pa-231	105	43	1.58E+00	5.11E+01	4.91E+00	8.92E+00	D	8.71E+00	8.71E+00
Pb-210 (a)	0	--	--	--	--	--	--	--	4.55E+00
Ra-226	105	98	1.60E-01	2.11E+01	2.89E+00	3.72E+00	L	4.55E+00	4.55E+00
Ra-228	80	79	2.40E-01	1.41E+00	7.02E-01	1.98E-01	N	7.39E-01	7.39E-01
Th-228	81	80	3.60E-01	1.41E+00	7.50E-01	2.21E-01	L	8.06E-01	8.06E-01
Th-230	105	83	5.30E-01	5.47E+02	8.06E+01	1.33E+02	X	1.37E+02	1.37E+02
Th-232	105	104	3.60E-01	2.50E+00	7.83E-01	2.93E-01	L	8.35E-01	8.35E-01
U-234 (b)	46	46	6.00E-01	4.71E+01	8.63E+00	1.10E+01	X	1.57E+01	1.57E+01
U-235	104	52	4.90E-02	4.71E+00	8.46E-01	1.06E+00	X	1.30E+00	1.30E+00
U-238	105	93	5.00E-01	4.38E+01	7.74E+00	1.02E+01	X	1.21E+01	1.21E+01

(a) No direct-measurement Pb-210 data available; "--" indicates no data then Ra-226 EPC assigned for exposure calculations.
(b) Although some U-234 data are available, the U-238 values are systematically assigned to eliminate possible bias and inconsistencies.
EPC - Exposure point concentration is lesser of 95% UCL and maximum detection.
D - Distribution not determined due to less than 50% frequency of detection. 95% UCL calculated using Chebyshev Theorem.
L - Distribution is lognormal. 95% UCL calculated using Land's H method.
N - Distribution is normal. 95% UCL calculated using Student's t-statistic.
X - Distribution is nonparametric. 95% UCL calculated using Chebyshev Theorem.

On-site Dataset Summary Statistics

Contaminant	Number Sampled	Number Detected	Min. Detect	Max. Detect	Arith. Mean	St. Dev.	Dist.	95% UCL	EPC
Area A Soil									
Ac-227	29	12	2.60E-01	2.33E+01	3.27E+00	6.58E+00	D	8.60E+00	8.60E+00
Pa-231	29	8	3.30E+00	2.19E+01	4.32E+00	6.49E+00	D	9.58E+00	9.58E+00
Pb-210 (a)	0	--	--	--	--	--	--	--	1.17E+01
Ra-226	29	29	5.80E-01	3.17E+01	5.19E+00	8.06E+00	X	1.17E+01	1.17E+01
Ra-228	29	29	3.90E-01	1.54E+00	9.02E-01	2.99E-01	N	9.96E-01	9.96E-01
Th-228	29	29	3.90E-01	1.54E+00	9.02E-01	2.99E-01	N	9.96E-01	9.96E-01
Th-230	29	11	1.08E+01	7.77E+02	1.15E+02	2.13E+02	D	2.88E+02	2.88E+02
Th-232	29	29	3.90E-01	1.54E+00	9.02E-01	2.99E-01	N	9.96E-01	9.96E-01
U-234 (b)	0	--	--	--	--	--	--	--	3.14E+00
U-235	29	6	1.73E+00	6.14E+00	1.33E+00	2.24E+00	D	3.14E+00	3.14E+00
U-238	29	24	1.32E+00	5.24E+01	8.29E+00	1.30E+01	X	1.88E+01	1.88E+01
Area B Soil									
Ac-227	16	7	4.70E-01	5.98E+00	1.01E+00	1.88E+00	D	3.07E+00	3.07E+00
Pa-231	16	4	1.75E+00	6.45E+00	1.97E+00	1.87E+00	D	4.01E+00	4.01E+00
Pb-210 (a)	0	--	--	--	--	--	--	--	5.26E+00
Ra-226	16	16	5.70E-01	8.82E+00	2.30E+00	2.71E+00	X	5.26E+00	5.26E+00
Ra-228	16	16	5.30E-01	1.05E+00	7.43E-01	1.29E-01	N	8.00E-01	8.00E-01
Th-228	16	16	5.30E-01	1.05E+00	7.43E-01	1.29E-01	N	8.00E-01	8.00E-01
Th-230	16	8	8.06E+00	2.01E+02	3.56E+01	5.90E+01	X	9.99E+01	9.99E+01
Th-232	16	16	5.30E-01	1.05E+00	7.43E-01	1.29E-01	N	8.00E-01	8.00E-01
U-234 (b)	0	--	--	--	--	--	--	--	1.34E+00
U-235	16	2	1.42E+00	2.06E+00	5.78E-01	7.03E-01	D	1.34E+00	1.34E+00
U-238	16	11	8.80E-01	1.02E+01	2.73E+00	3.31E+00	X	6.33E+00	6.33E+00
Area C Soil									
Ac-227	80	50	3.20E-01	2.51E+01	3.41E+00	5.34E+00	X	6.01E+00	6.01E+00
Pa-231	80	38	1.02E+00	2.81E+01	3.94E+00	5.83E+00	D	6.79E+00	6.79E+00
Pb-210 (a)	0	--	--	--	--	--	--	--	3.56E+00
Ra-226	80	78	2.80E-01	1.44E+01	2.70E+00	2.91E+00	L	3.56E+00	3.56E+00
Ra-228	80	79	2.40E-01	1.41E+00	7.02E-01	1.98E-01	N	7.39E-01	7.39E-01
Th-228	80	79	2.40E-01	1.41E+00	7.02E-01	1.98E-01	N	7.39E-01	7.39E-01
Th-230	80	51	8.17E+00	5.47E+02	8.99E+01	1.37E+02	X	1.57E+02	1.57E+02
Th-232	80	79	2.40E-01	1.41E+00	7.02E-01	1.98E-01	N	7.39E-01	7.39E-01
U-234 (b)	0	--	--	--	--	--	--	--	1.69E+00
U-235	80	28	5.10E-01	4.71E+00	1.12E+00	1.18E+00	D	1.69E+00	1.69E+00
U-238	80	63	6.40E-01	3.75E+01	6.97E+00	8.84E+00	X	1.13E+01	1.13E+01

(a) No direct-measurement Pb-210 data available; "--" indicates no data then Ra-226 EPC assigned for exposure calculations.
(b) No direct-measurement U-234 data available; "--" indicates no data then U-238 EPC assigned for exposure calculations.
EPC - Exposure point concentration is lesser of 95% UCL and maximum detection.
D - Distribution not determined due to less than 50% frequency of detection. 95% UCL calculated using Chebyshev Theorem.
L - Distribution is lognormal. 95% UCL calculated using Land's H method.
N - Distribution is normal. 95% UCL calculated using Student's t-statistic.
X - Distribution is nonparametric. 95% UCL calculated using Chebyshev Theorem.

APPENDIX D

EVALUATION OF LAND USE CONTROLS

DEPARTMENT OF THE ARMY
DETROIT DISTRICT, CORPS OF ENGINEERS
BOX 1027
DETROIT, MICHIGAN 48231-1027
voice: (313)226-2510
fax: (313)226-2118

IN REPLY REFER TO
CELRE-ET-RE (1110-2-1150a) 28 April 2004

MEMORANDUM FOR CELRB-PM-F
ATTN: Janna Hummel
1776 Niagara Street,
Buffalo, NY 14207

SUBJECT: Seaway Landfill FUSRAP Site (FUSRAP Site) – Land Use Controls (LUCs); Recommendations for Feasibility Study

1. References are attached.

2. The containment and partial excavation alternatives for remediating the FUSRAP Site require imposition of LUCs to accomplish the remediation goals. These alternatives leave some MED-contaminated material on-site, mitigating radiation exposures through the placement of clean soil over the soil contaminated above the Site guidelines.

3. The Seaway Site refers to the entire 89-acre landfill site. The FUSRAP Site refers to Areas A, B, C, and the Southside area all containing the MED-contaminated material. The FUSRAP Site is part of the larger Seaway Site.

4. The Seaway Site is partially capped and contained within an existing leachate collection system. The capped area encompasses approximate 75% of the 89 acres but excludes the FUSRAP Site Areas A, B, and C. The Southside area is within the capped area.

5. The containment alternative requires grading, as needed, removing, for offsite disposal, MED-contaminated material that must be moved as part of the grading, and capping of Areas A, B, and C with a landfill cover at least 4 to 5½ feet thick. These Areas cannot be segregated from the remaining portions of the existing capped area and its associated leachate collection system. MED-contaminated material outside of the leachate collection system will be excavated and shipped off-site for disposal.

6. The partial excavation alternative involves removal and off-site disposal of accessible MED-contaminated soil from Areas A and C that exceeds USACE's proposed cleanup levels. Accessible material is defined as soils not commingled with landfill refuse. Following excavation and grading, as required, Areas A, B, and C will be capped with a landfill cover at least 4 to 5½ feet thick. The total disposal volume for this alternative is estimated at 80,000 yards.

7. Both alternatives are dependent on maintaining the cover and precluding future contact with the remaining MED-contaminated materials. To achieve the objective of isolating the material from the public and environment, the following objectives must be accomplished over the 1,000-year period:

a. The proposed cap over Areas A, B, and C must be maintained and not disturbed/penetrated. The existing cap over the remaining portions of the Seaway Site must be maintained to preclude overloading the leachate collection system resulting in the potential subsequent failure of the cap and/or release of leachate to the environment.
b. The existing leachate collection system must be maintained in an operational condition until the leachate generation rate drops to almost zero. This ensures the MED-contaminated material does not impact the system.
c. Safety controls are needed to preclude contact with the MED-contaminated material should necessary leachate collection system repairs require portions of the cap to be removed to gain access to the leachate collection system.[1]

8. To accomplish these objectives, LUCs, including institutional controls must be imposed. "LUCs include any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, real property to prevent or reduce risks to human health and the environment."[2] The referenced engineering regulation and memorandum state institutional controls "are a subset of LUCs and are primarily legal mechanisms…" Administrative controls, such as zoning, building restrictions etc., are treated as a separate category of LUCs.

9. In discussing the recommendations for LUCs at the Seaway Site, both administrative and legal mechanisms will be discussed. The physical mechanisms are not included, since these "encompass a variety of engineered remedies to contain or reduce contamination and/or physical barriers intended to limit access to property, such as berms, walls, fences or signs." Although important, experts in engineering need to determine which physical controls are appropriate.

10. To be effective, LUCs need to be "layered…to provide overlapping assurances of protection from contamination."[3] Corps Districts are directed to:

> [U]se a layering strategy or a system of mutually reinforcing controls to effectively implement LUCs… For example, fully implementing a prohibition on groundwater use may entail a deed restriction, a zoning ordinance, a local ordinance restricting use of the groundwater, limitations on well drilling permits, and notice to the local community to ensure that a restriction remains protective and prevents inappropriate uses of the property."

11. Different types of LUCs/institutional controls are identified in the USEPA Fact Sheet *Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups*. The four types of controls are proprietary controls, governmental controls, informational devices, and enforcement and permit tools with institutional controls components. Proprietary controls are based upon real property law and create legal property interests. Examples are easements and deed covenants. These controls are the legal mechanisms, i.e., institutional controls, contained in the definition of LUCs. Examples of governmental controls are zoning, planned use development, and master plans. Informational devices provide information or notification that residual or capped contamination may remain on site. Common examples include state registries, deed notices, and advisories. State and Federal agencies use enforcement or permitting tools to restrict land use. The USEPA has a variety of enforcement tools, such as, administration orders of consent and unilateral administrative orders. Enforcement and permitting, governmental, and informational institutional controls are examples of administrative mechanisms contained in the definition of LUCs.

12. For the proposed remedy to be protective of human health and the environment, the MED-contaminated material must be isolated from the environment for 1,000 years. This requires long-term monitoring and maintenance of the engineered mechanisms. When LUCs "must be effective for a long period, either proprietary or governmental controls should be considered, because they generally run with the land and are enforceable." Likewise, use of enforcement and permit tools LUCs are effective, if they impose permanent restrictions on land use.

13. USACE is responsible for the successful implementation of the selected remedy for the FUSRAP Site. When the remedy contains LUCs, this responsibility includes the long-term success of the LUCs in restricting land use inconsistent with the remedy. This requires developing close working relationships with State and local governments, since they enforce many LUCs, especially governmental mechanisms. Typically LUCs, such as zoning restrictions, site development, and ordinances, are enforced by local governments. Examples of LUCs enforced by States are the regulation of wetlands, point source discharges, and, regarding the Seaway Site, solid waste landfills.

14. The Seaway Site is already restricted by a number of LUCs consisting of a combination of physical, legal, and administrative mechanisms. The Seaway Site, because it is a solid waste landfill, is subject to the State of New York's regulation of Solid Waste Management Facilities. 6 NYCRR Part 360. The State imposes a comprehensive regulatory scheme on these facilities concerning construction, operation, closure and post-closure operation and management. These regulations incorporate a variety of physical, legal, and administration LUCs. Other administrative

LUCs consist of zoning restrictions and various types of notices. In addition, the proposed alternatives will impose a number of physical mechanisms either restricting use of or limiting access to the FUSRAP Site.

15. The legal mechanism LUC is the deed covenant required by the Solid Waste Management Facilities regulations. As part of the post-closure operation and maintenance of solid waste landfills:

> [A] provision must be included in the property deed indicating the period of time during which the property has been used as a landfill, describing the wastes contained within and noting that records of the facility have been filed with the department. The deed must also reference a map which shall be filed with the county clerk and which will clearly indicate the limits of the landfilled areas within the property boundary. The deed must also indicate that the use of the site is restricted pursuant to the provisions of paragraph (9) of this subdivision.[4]

16. These provisions are:

> A description of the planned uses of the property during and after the post-closure period is required. Use of the property shall not disturb the integrity of the final cover, liners, or any other components of the containment system, or the function of the monitoring or environmental control systems, unless necessary to comply with the requirements of section 360-2.20 of this Subpart. The department will approve any other disturbance if the owner or operator demonstrates that disturbance of the final cover, liner or other component of the containment system, including any removal of waste, will not increase the potential threat to human health or the environment.[4]

17. The deed covenant provides the State with the ability to prevent uses inconsistent with the Seaway Site's status as a solid waste landfill and specifically prevents disturbing the "integrity of the final cover, liners, or any other components of the containment system, or the function of the monitoring or environmental control systems". The deed covenant, also, runs with the land in perpetuity. Consequently, it survives conveyance of the Site to other owners.

18. The State's Solid Waste Management Facilities regulations provide a number of administrative LUCs. These consist of various reporting and monitoring requirements during the post-closure period, which is a "minimum of 30 years".[5] The owner or operator of the landfill must deposit funds in a trust fund to guarantee the performance of these requirements.[6] In addition, violating these requirements subjects any "person…to all applicable civil,

administrative and criminal sanctions…”[7]

19. One of these requirements is that the during the post-closure period “[M]aintenance and operation of the leachate collection system are required…and the method of leachate treatment and disposal must be addressed for as long as leachate is capable of adversely impacting the environment.”[8] This requires operation of the leachate system longer than the minimum 30-year period, if the leachate is an environmental threat.

20. Another requirement is the necessity to develop and file a comprehensive post-closure monitoring and maintenance operations manual, which includes an inventory of the waste in the landfill and a description of the planned uses of the Site during the post-closure period.[9] In addition, “[q]uarterly inspections and inspections after major rainfall events (5-year storms) shall be performed on all facility components during the minimum 30-year post-closure period”.[10] The regulations contain numerous other requirements providing a comprehensive monitoring program during the post-closure period.

21. Local governments can impose administrative LUCs consistent with local zoning, master plans, and planning boards. The current zoning designation of industrial allows Site uses in harmony with those identified in the alternatives. In addition, the master plan anticipates future uses compatible with the Site’s past use as a solid waste landfill. These LUCs, however, need to be modified to clearly identify the Seaway Site as containing MED-contaminated materials. Modifying the industrial zoning designation so that the Site’s past use as a solid waste management facility and FUSRAP Site will add an additional layer of protection to prevent inappropriate uses. These types of local controls have been successfully used as part of a remedy requiring long-term LUCs when there is acceptance and an ability to implement the controls by the local government.[11]

22. Another type of administrative LUCs is an informational device. A number of informational devices already are in place on the Seaway Site. Both the State of New York and the United States list Seaway as a contaminated site. It is on the State’s Priority List of contaminated sites and its *Registry of Inactive Hazardous Waste Disposal Sites in the New York State April 2003*.[12] The Site is found on the federal CERCLIS (Comprehensive Environmental Response, Compensation and Liability Act Information System) and FINDS (Facility Index System) lists. Both the Department of Energy and the Corps list the Site as a FUSRAP site on the Internet.[13]

23. These various State and federal lists do need modifying to provide better notification. The lists generally identify the Seaway Site as a solid waste landfill but not a FUSRAP site. By adding this

information, these lists provide better notification of the nature of contaminants found on the Site. This has already been done with regards to the Ashland II and Luckey, OH FUSRAP sites on the CERCLIS and FINDS lists.

24. As noted, both the Department of Energy and Corps maintain a listing of FUSRAP sites on the Internet. It is recommended these lists be maintained in a permanent format. At a minimum, these permanent lists must include the sites addresses, location of the administrative records and the EPA ID for the sites.[14] The permanent lists, also, need to use the same name for the Seaway Landfill FUSRAP Site. The DOE list identifies the Site as the Seaway Industrial Park and the Corps' identifies the site as the Seaway FUSRAP Site.

25. The following LUCs are recommended for the FUSRAP Site:

   a. Deed covenant as required by the State of New York's regulations for Solid Waste Management Facilities. This will allow the State to prevent disturbance of the cap covering the landfill including the FUSRAP Site areas. The covenant, also, prevents use of the Site, which negatively impacts the operation of the containment system and function of the monitoring and environmental control systems. This includes the leachate collection system. These requirements can be enforced by legal action and they survive the conveyance of the site to a new owner.
   b. Administrative LUCs contained in the State of New York's regulations for Solid Waste Management Facilities. Two of the most important administrative LUCs are the requirement for operating and maintaining the leachate collection system for as long as it is a threat to human health or the environment and the requirement for monitoring which imposes a number of obligations. The majority of these LUCs are enforceable by applicable civil, administrative and criminal sanctions.
   c. CERCLA monitoring requirements. Under CERCLA, the federal government is required to monitor the Site as needed but at a minimum every five years. Given the 1,000-year duration of the remedy, this monitoring will be required for the foreseeable future. The draft proposed plan anticipates monitoring for the entire 1000 years.
   d. Local zoning. These can be effective additional LUCs, if the zoning and master plans are modified to properly identify the Site as a solid waste landfill and FUSRAP site.
   e. Notices from various environmental lists. The deed covenant contains various notices concerning the type of material deposited at the site. In addition, the various environmental lists provide an additional layer of protection, because even minimal due diligence will inform a potential owner or developer that various contaminants have been disposed on the Site and its use is severely limited.
   f. Notices from the Seaway Landfill FUSRAP Site's

Administrative Record. The Corps and DOE Internet information on the Site needs to be maintained in a permanent format and the location of the Site's administrative record given. These actions provide an additional notice of the Site's condition. It, also, will contain the safety requirements for monitoring and maintaining various elements of the Site's remedy. The State of New York will be able to impose additional safety requirements, since its regulations stipulate prior State approval if "the integrity of the final cover, liners, or any other components of the containment system or the function of the monitoring or environmental control systems" is disturbed.

26. These LUCs, along with the engineered remedies, are expected to obtain the objectives identified as necessary for accomplishing the goal of isolating the MED-contaminated material from the public and the environment. Maintaining the integrity of the engineered cap is accomplished by the layering of all the LUCs. The engineered cap is designed to function for a minimum of 1,000 years. The deed covenant required by New York State law imposes permanent restrictions on the use of the Site. Zoning and the various notice requirements, also, restrict land use.

27. Layering, likewise, accomplishes the objective of maintaining the leachate collection system in an operational condition until the leachate generation rate drops to zero. The State's regulations require operation and maintenance of the leachate system for as long as the leachate poses a threat to the environment. This obligation is enforced by financial requirements plus civil, administrative, and criminal penalties. In addition, the deed covenant restricts any use of the Site, which impacts the functioning of the leachate system.

28. Safety controls for monitoring and possibly maintaining the Site will be part of the Site's Administrative Record. Permanent maintenance of the Administrative Record is required by CERCLA. It must be maintained at designated locations available to the public and at archival depositories. The State's regulations, also, allow the State to impose safety requirements as part of the Site's operation and maintenance.

29. Like all remedy components, determining the types of LUCs needed to accomplish the objectives of the containment and partial excavation alternatives for the FUSRAP Site requires consideration of CERCLA's nine criteria for evaluation.[15] The threshold criteria of compliance with ARAR's and protective of human health and the environment will not be discussed, since these threshold criteria do not directly relate to LUCs. Likewise, the primary criteria of short-term effectiveness and reduction of toxicity, mobility, or volume through treatment, will not be addressed, since the alternatives being considered require neither treatment nor imposition of short-term LUCs. The balancing criterion of cost

has already been developed and found reasonable.

30. The two primary balancing criteria of long-term effectiveness and implementability plus the two modifying criteria of State and community acceptance will be discussed in some detail.

31. The recommended LUCs meet the criteria of long-term effectiveness.

a. The deed covenant creates permanent restrictions on the use of the Site. These restrictions "run with the land" which means they are imposed on the land and not an individual owner. The deed covenant, also, becomes, once it is recorded with the registrar of deeds, a part of the permanent record of title for the Site. The covenant is legally enforceable by the State of New York. Thus, if necessary, the State can require compliance with the covenant's restrictions.
b. The requirement for operation and maintenance of the leachate collection system plus other environmental systems remain in effect for as long as there is a threat to human health or the environment. This requirement is, also, enforceable by the State.
c. The various notice requirements become part of permanent records. The various environmental lists are permanently maintained and are crucial records needed to perform due diligence for real estate transactions plus for other purposes. They can be expected to be maintained in an accurate and readily available format. The notice requirements imposed the State's solid waste landfill regulations, also, are permanently maintained. The administrative record of the Site, likewise, is permanently maintained.

32. The recommended LUCs meet the criteria of implementability.

a. The Seaway Site is already subject to the State's Solid Waste Management Facilities regulations and the State is actively regulating the Site. This control can be expected to continue, since the State is responsible for regulating solid waste landfills and the FUSRAP Site in part of a regulated landfill.
b. The Site is already subject to zoning and other local land use controls. The local community is expected to desire use of the Site consistent with protection of human health and the environment. Thus, modifying its zoning and master plan to properly identify acceptable uses is expected.
c. The Site appears on various environmental lists. Since the purpose of these lists is to provide accurate information on the Site's environmental condition, modifying the lists is not expected to be a problem.

33. The modifying criteria of State and community acceptance currently

are not met. Both the State[16] and local governments have indicated the containment and partial excavation alternatives are unacceptable. The State further said "[i]t is the State's position that the responsibility for creating and maintaining institutional controls…lies with the Federal Government…" Further discussions with the State and local governments need to emphasize the federal government's acknowledgement of the government's responsibility to ensure success of the selected remedy.

34. For comments or questions, contact me at (313) 226-2510.

Don C. Erwin
Attorney/Advisor
Real Estate Division

REFERENCES:

[1] Draft Addendum to the Feasibility Study for the Seaway Site and Draft Proposed Plan for the Seaway Site.
[2] ER 200-1-2, Land Use Control Guidance for Formerly Utilized Sites Remedial Action Program, 26 September 2001; Memorandum for Assistant Secretary of the Army (Installation and Environment), Assistant Secretary of the Navy (Installation and Environment), Assistant Secretary of the Air Force (Manpower, Reserve Affairs, Installation and the Environment), Director, Defense Logistics Agency (D); Subject: Policy on Land Use Controls Associated with Environmental Restoration Activities; dated 17 January 2001. (The memorandum excludes civil works projects, but it is instructive on use of LUCs for environmental restoration projects.)
[3] Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups, OSWER 9355.0-74FS-P; EPA 540-F-00-005, September, 2000. ER 200-1-2 refers to the fact sheet in the definition of LUCs.
[4] 6 NYCRR 360-2.15(k) and 360-2.15(k)(9)
[5] 6 NYCRR 360-2.15(k)(4)
[6] 6 NYCRR 360-2.19
[7] 6 NYCRR 360-1.2(a)(117); 360-1.4(a)(2)
[8] 6 NYCRR 360-2.15(k)(5)
[9] 6 NYCRR 360-2.15(k)(7)
[10] 6 NYCRR 360-2.15(k)(8)
[11] Monticello Mill Tailing Site, Monticello, Utah (Vicinity Properties) http://www.gjo.doe.gov .
[12] *Registry of Inactive Hazardous Waste Disposal Sites in the New York State April* 2003, p. 9-131. The registry does identify the FUSRAP Site. The State of New York, however, may want to reevaluate its classification of the Site as a class 4 hazardous waste site given the existence of the MED-contaminated materials and the lack of proper closure of the landfill.
[13] http://www.em.doe.gov/and http://www.lrb.usace.army.mil/ .
[14] EPA ID: NYD094177292, Site ID: 0201652. VISTA ID: 1263669
[15] 40 CFR 300.430(e)(9)(iii).
[16] August 31, 2000 letter from the New York State Department of Environmental Conservation, Division of Solid and Hazardous Materials.

APPENDIX E

REAL ESTATE PLAN

REAL ESTATE PLAN
SEAWAY LANDFILL FUSRAP SITE
TONAWANDA, NEW YORK

AUTHORITY

FUSRAP was initiated by the AEC in 1974, under the Atomic Energy Act of 1954, for the purpose of remediating sites polluted with low-activity radioactive contaminants during the nation's early atomic energy program, i.e., Manhattan Engineering District (MED) contaminants. From 1981 to 1997, the DOE managed FUSRAP. The Energy and Water Development Appropriations Act of 1998 (105 P.L. 62) transferred management of FUSRAP to the USACE in October 1997. Congress gave further directions on program management in the Energy and Water Development Appropriations Act of 2000 (106 P.L. 60) which required USACE to follow CERCLA (42 U.S.C. 9601, et. seq.) and authorized the acquisition of real estate interests where necessary to achieve the objectives of approved remedial action plans.

The Feasibility Study discusses four remedial action alternatives, which are No Action, Complete Excavation with Off-Site Disposal, Partial Excavation with Off-Site Disposal, and Containment. The Real Estate Plan (REP) addresses the real estate interests the federal government or other governmental entities need to acquire in order to implement the Complete Excavation, Partial Excavation, and Containment alternatives. The No Action alternative is not discussed, since no real estate interests are needed to implement this alternative and it does not meet the ARAR's for the Seaway Landfill Site.

LOCATION

The Seaway Landfill Site is located in the Town of Tonawanda, a suburb of Buffalo, New York. The 89-acre Site has been used as a municipal landfill for approximately 60 years. (See figures 1-2 and 2-1 for property drawings) It is owned by Sands Mobile Park Corporation, which acquired the Site in 1989 through a merger with the Seaway Industrial Park Development Company, Inc. Browning, Ferris Industries, Inc. (BFI) operates the Landfill, through its subsidiary Niagara Landfill, Inc., under an agreement with Sands Mobile Park. The Landfill currently is not accepting waste, with all disposal activities ceasing in 1993.

Closure activities began in 1990 with construction of a low permeability landfill cap consisting of 24 inches of low-permeability clay covered by six inches of topsoil. The cap currently covers 75% of the Seaway Site. The FUSRAP Site is contained within the 89-acre Landfill Site and consists of Areas A, B and C plus the Southside area. The Southside area is under the cap but Areas A, B, and C are not. Other features of the Landfill are a leachate collection system and clay cutoff wall enclosing the entire 89-acre Seaway Site including the FUSRAP Site.

The Landfill Site encompasses two zoning categories, Waterfront Commercial District (W-2) and Waterfront Industrial District (WID). The portion zoned W-2 is a 1,000 ft wide strip of land fronting River Road. The rest of the Site, including most of the capped area, is zoned WID.

The purpose of the W-2 zoning is to "promote and accommodate the development of a mix of uses which are designed to recognize the unique and irreplaceable character of the Niagara shoreline, to encourage appropriate riverfront recreational or commercial use, and to encourage flexibility in design and use of sites within the shoreline area while preserving the unique environmental features and maintaining or reviving the aesthetic qualities of the waterfront area."

Land uses permitted with site plan approval in W-2 zoning include public and private parklands, trails, docks, fishing facilities, boat launching facilities, and picnic areas. Land uses requiring special permits include boatyard and storage facilities, visitor centers, hotels, general commercial, automotive stations, travel plazas, and business and professional offices.

The purpose of the WID zoning is to "accommodate industrial development of a manufacturing, processing and/or assembly nature, as well as, wholesale and warehousing activities without having an unreasonable adverse impact on surrounding land uses and the waterfront region in general, to promote uses that will provide job opportunities and strengthen the town's tax base, and to maintain design objectives of the waterfront region." Land uses permitted with site plan approval in WID zoning include public and private parklands and trails. Land uses requiring special permits include boat storage facilities, offices necessary to business or industry operating within this district, light manufacturing, assembly, wholesale business and storage, warehousing, truck terminals, service or repair of an industrial nature, public utilities, business offices, research facilities, and medical professional buildings. Prohibited land uses include residences, junkyards, hazardous/noxious uses, waste transfer or disposal, land mining, and stockyards.

REMEDIAL ACTION ALTERNATIVES

The Containment, Complete Excavation and Partial Excavation alternatives meet the threshold objectives of protecting human health and environment, complying with the ARAR's, and achieving reduction in toxicity. The containment alternative requires grading and consolidation of MED material and covering Areas A, B, and C with a landfill cover at least 4 to 5½ feet thick. Material outside of the area enclosed by the leachate collection system will be excavated and shipped off-site for disposal.

The partial excavation with off-site disposal alternative involves removal and off-site disposal of accessible MED-contaminated soil exceeding USACE's proposed cleanup levels. Accessible soil is defined as soil not commingled with landfill refuse. Test results indicate there are accessible soils in Areas A and C, but not Area B. Following excavation and grading, Areas A, B, and C will be covered with a landfill cover at least 4 to 5½ feet thick. The total disposal volume for this alternative is estimated at 75,500 yds. of MED contaminated soil.

Under both alternatives the existing landfill cap and leachate collection system must be maintained in order for the remedies to be effective, because cost and engineering concerns prevent the FUSRAP Site from being segregated from the remaining portions of the existing capped Landfill Site. A separate collection system for the FUSRAP Site, isolated from the rest of the landfill, is economically infeasible. In addition, failure in the existing landfill cap or collection system will negatively impact any separate collection system placed around Areas A, B, and C.

The complete excavation alternative requires complete excavation of MED-contaminated soils containing radionuclides above guidelines and offsite disposal. After removal Areas A, B and C, Seaway Northside, and Seaway Southside are covered with a 1-foot layer of clean fill. Also, those areas of the closed portion of the landfill, impacted by the removal activities, are restored to the original design configuration that existed prior to remediation. This alternative requires no long term maintenance, because all contaminants of concern are removed from the Site.

LANDS REQUIRED FOR ACCOMPLISHMENT OF ALTERNATIVES

The complete excavation alternative only requires temporary access to the Site for removal of contaminated soils. At other FUSRAP sites under active remediation a right-of-entry is used to obtain this access. A right-of-entry, also, can be used at the Seaway Site to provide temporary access, because the Site owner supports the remediation and all excavation, grading, and other remedial activities can be accomplished under a right-or-entry.

A right-of-entry, also, will be used to provide temporary access for the containment and partial excavation alternatives. However, these alternatives, also, require permanent access to the Site for monitoring, operation, and maintenance of the cap and leachate collection system. In addition, future Site uses must be restricted to those consistent with the remedy. Examples of such restrictions are no activities impacting the integrity of the cap or disturbing other components of the containment system.

To accomplish these long term objectives, land use controls (LUC's) must be imposed. Although the development and approval of a Land Use Control Plan for the Seaway Landfill FUSRAP Site will occur after execution of the Site's Record of Decision, the discussion of LUC's, especially those enforceable through legal action, need to be developed during the project feasibility phase. The Site's Feasibility Study contains an extensive discussion of LUC's and considers the cost of execution and long term monitoring in its cost estimate. Nevertheless, a brief discussion is needed since LUC's are crucial to the success of both the partial excavation and containment alternatives.

LUC's include any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, real property to prevent or reduce risks to human health and the environment. To be effective, LUC's must be layered to ensure long-term maintenance of the remedy. For example, although a zoning use consistent with the remedy may change to an inconsistent use, the layering of other LUC's, such as a deed covenant, restrictive easement or a deed notice, prevents land use inconsistent with the remedy. Likewise, inconsistent land use might be prevented when a potential purchaser discovers, during a routine environmental audit, that the Site appears on various lists of contaminated properties maintained by the federal, State, and local governments. Such a discovery will force the purchaser to engage in further due diligence to determine, if the proposed use of the Site is restricted.

Some LUC's, such as deed notices and Site registration on various environmental lists, do not require obtaining a real estate interest. The success of these LUC's depends, however, on the cooperation of the current Site owner, since these controls are not legally enforceable. In order for the federal government to assure achievement of the selected alternative, restriction on Site use and access for monitoring and maintenance must be enforceable through legal action.

ESTATES

The Feasibility Study emphasizes the United States Corps of Engineers, as the lead federal agency, will not acquire a real estate interest on the Site such as permanent access or restrictive easements. In addition, the Corps is not expected to implement other significant LUC's. This is because the Seaway Landfill Site is already restricted by sufficient LUC's to implement the remedies discussed in the Feasibility Study including providing access to the Site. Based on its status as a regulated Solid Waste Management Facility under New York State law the Site is subject to a comprehensive State regulatory plan under 6 NYCRR Part 360. (Applicable sections attached)

The State imposes a comprehensive regulatory scheme on Solid Waste Management Facilities addressing construction, operation, closure and post-closure operation and management. These regulations incorporate a variety of physical, legal, and administrative LUCs restricting use of the Site. Since the Seaway Landfill Site is a permitted solid waste management facility, the State can be expected to enforce its regulations. The federal government, as well, can rely on this expectation in considering the LUC's necessary for successful implementation of the selected remedy.

The lead federal agency is responsible for the remedy selected including the success of the land use controls. But this does not mean the agency must use land use controls only enforceable by the federal government. Guidance from the United States Environmental Protection Agency, Department of Energy, and the Department of Defense directs an agency to rely on both local and state governments to enforce applicable LUC's.[1] This guidance recognizes both local and state governments are likely in the best position to become aware of LUC's violations and take actions to enforce the controls. They, also, share the responsibility to protect the public health and welfare frequently taking the primary role in achieving these goals.[2]

The State's regulations impose a number of LUC's on the Seaway Landfill Site. One of the most important is a deed covenant, which the owner is required to place on the real property. As part of the post-closure operation and maintenance of solid waste landfills:

> [A] provision must be included in the property deed indicating the period of time during which the property has been used as a landfill, describing the wastes

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1. EPA fact sheet, September 29, 2000, Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups; Memorandum for Assistant Secretary of the Army, January 17, 2001, Subject: Policy on Land Use Controls Associated with Environmental Restoration Activities; Draft ER 200-1-2, September 26, 2001, Land Use Control Guidance for Formerly Utilized Sites Remedial Action Program (FUSRAP); DOE Draft Interim Policy, January 2001, Interim Policy for the Department of Energy's Use of Institutional Controls.
2. Id., Memorandum for Assistant Secretary of the Army, January 17, 2001, Subject: Policy on Land Use Controls Associated with Environmental Restoration Activities; Draft ER 200-1-2, September 26, 2001, Land Use Control Guidance for Formerly Utilized Sites Remedial Action Program (FUSRAP).

> contained within and noting that records of the facility have been filed with the department. The deed must also reference a map which shall be filed with the county clerk and which will clearly indicate the limits of the landfilled areas within the property boundary. The deed must also indicate that the use of the site is restricted pursuant to the provisions of paragraph (9) of this subdivision.[3] (Emphasis added)

These provisions are:

> A description of the planned uses of the property during and after the post-closure period is required. Use of the property shall not disturb the integrity of the final cover, liners, or any other components of the containment system, or the function of the monitoring or environmental control systems, unless necessary to comply with the requirements of section 360-2.20 of this Subpart. The department will approve any other disturbance if the owner or operator demonstrates that disturbance of the final cover, liner or other component of the containment system, including any removal of waste, will not increase the potential threat to human health or the environment.[4]

The deed covenant provides the State with the ability to prevent uses inconsistent with the Seaway Landfill Site's status as a solid waste management facility and specifically prevents disturbing the "integrity of the final cover, liners, or any other components of the containment system, or the function of the monitoring or environmental control systems".[5] The deed covenant, also, runs with the land in perpetuity. Consequently, it survives conveyance of the Site to other owners.

The regulations, also, include access to the site to assure compliance with the regulations and permit requirements including proper maintenance. Section 360-1-4 – Enforcement, inspection and reporting states "The construction or operation of a solid waste management facility… is deemed to constitute consent to such inspection." This inspection includes the right to "enter and inspect a solid waste management facility, any property, premises, books, papers, documents, or records".[6] (Emphasis added)

VALUE OF LAND

The value of the land will not be discussed, because the federal government will not be acquiring a real estate interest. In addition, since the deed restriction is placed on the land by the State as part of its regulatory scheme for solid waste management facilities, the State will not need to compensate the owner of the land.

3. NYCRR Part 360, Section 15(k).
4. Id., Section 15(k)(9).
5. Id.
6. NYCRR Part 360, Section 1.4(b)

ENVIRONMENTAL

The Site remediation is implemented under CERCLA. It has been performed in compliance with all environmental requirements. Extensive investigations of the Site's history and current condition have been performed. Additional investigations are likely needed in order to comply with the stipulations for developing the Record of Decision.

MISCELLANEOUS

The REP must include discussion of a number of topics, which are unrelated to the remedy for the Seaway Landfill FUSRAP Site Tonawanda, New York. The following is a brief discussion of these topics. The property is neither owned by the federal government nor been provided for another federal project. It, also, is not subject to the navigation servitude. No present or anticipated mineral activity is within the remediation project area. The project will not require displacement of persons or businesses. There are no historic properties within the proposed project area. There are no cemeteries or public facilities within the area requiring relocation. In addition, plans and specifications do not identify any relocation of public utilities or roadways.

REAL ESTATE MANAGEMENT PLAN

The Real Estate Division will monitor the real estate requirements throughout remediation of the Seaway Landfill FUSRAP Site. Given the changing requirements typical in environmental remediation projects, it may be determined the federal government needs to acquire a real estate interest. As necessary, this REP plan will be supplemented to allow acquisition of real estate interests to implement the selected remedy.

REAL ESTATE COST ESTIMATE

Document review	7,000	
Four rights-of-entry	24,000	
LUC's implementation	10,000	
Total:		$41,000

TITLE 6. DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAPTER IV. QUALITY SERVICES
SUBCHAPTER B. SOLID WASTES
PART 360. SOLID WASTE MANAGEMENT FACILITIES
SUBPART 360-1. GENERAL PROVISIONS

6 NYCRR § 360-1.4 (2005)

§ 360-1.4 Enforcement, inspection and reporting

(a) Enforcement. (1) Every solid waste management facility in this State is subject to every applicable requirement identified in this Part pertaining to the type of facility in question, subject to a demonstration to the department by its owner or operator that the facility is clearly exempt from regulation under or from the requirement in question that is contained in this Part.

(i) The department may disapprove a registration or withdraw registered status if the department determines that the activity to which a registration is applicable poses the potential for a significant adverse impact on public health, safety, or welfare, the environment or natural resources or violates a registration condition.

(ii) Owners or operators of registered solid waste management facilities must comply with the applicable operational requirements of a regulated facility of the same type or, if the same type does not exist, a similar type as determined by the department.

(iii) Owners and operators of registered solid waste management facilities shall allow inspection of such facilities by authorized department staff as allowed by law.

(iv) The owner or operator of a registered solid waste management facility shall not violate the conditions for qualification for such registration; violate any condition imposed by the department pursuant to its approval of such registration; violate any applicable operational requirement; or operate the registered activity in a manner which poses a significant adverse impact on public health, safety, or welfare, the environment or natural resources. Violations of applicable operational requirements by the owner or operator shall subject the owner or operator to penalties and other sanctions authorized pursuant to Environmental Conservation Law. In the event that the owner or operator fails to comply with the requirements of this Part, or operates the registered facility in a manner which poses a significant impact on public health, safety or welfare, the environment or natural resources, the owner and/or operator is subject to one or more of the following:

(a) withdrawal of registration, in which case the owner or operator shall be required to obtain a permit for the previously registered activity from the department before such activity may be continued;

(b) assessment of penalties for any identified violations, including violations of the qualifications for registration; and

(c) imposition of additional conditions on the registered activity, including, but not limited to imposition of financial assurance requirements.

(2) Any person who violates any provision of or who fails to perform any duty imposed by this Part; or any term or condition of any permit issued pursuant to this Part; or any final determination or order of the commissioner issued pursuant to any statutory authority under which this Part is promulgated is subject to all applicable civil, administrative and criminal sanctions set forth in ECL article 71 and, as appropriate, the Clean Water Act.

(b) Inspection. The commissioner or authorized department staff may enter and inspect a solid waste management facility, any property, premises, books, papers, documents, or records of that facility, at all reasonable times, locations, and hours, whether announced or unannounced, for the purpose of ascertaining compliance or noncompliance with a permit, the ECL, and this Title. The construction or operation of a solid waste management facility in this State is deemed to constitute consent to such inspection. The refusal to consent to such inspection, established after an opportunity for a hearing, shall result in revocation of any and all permits issued by the department under this Part pertaining to that facility as well as any other penalties the commissioner may impose under the circumstances. With respect to the issue of revocation, the hearing shall be limited to the following issues:

(1) whether the permittee was given sufficient warning in clear or unequivocal language before the refusal, that the refusal could result in revocation of those permits; and

(2) whether the permittee refused to consent to the inspection.

(c) Reporting. Any person owning or operating a solid waste management facility must submit to the department, within the time period specified by the department, any information which the department requires by regulation, permit, or order to determine whether cause exists to modify, suspend or revoke a permit or order, or to determine compliance with the permit, the ECL and this Title. In the case of a quarterly report, the report must provide information on activities occurring during the quarter in question (January 1st to March 31st, April 1st to June 30th, July 1st to September 30th, October 1st to December 31st) and must be submitted no later than 60 days after the last day in the quarter in question. In the case of an annual report, the report must be submitted no later than 60 days after the first day of January following each year of operation. Reports on forms acceptable to or provided by the department must be kept on the facility's premises and must be submitted at a frequency specified by the department. The department may at any time waive or modify standard reporting requirements under this Part under circumstances it deems appropriate and will notify the facility owner in writing of any such change.

Section statutory authority: Environmental Conservation Law, § A71

Statutory authority: Environmental Conservation Law, § § 1- 0101, *3-0301*, *8-0113*, *19-0301*, *19-0306*, *23-2305*, *23-2307*, *27-0101*, *27-0106*, *27-0107*, *27-0109*, *27-0305*, *27-0703*, *27-0704*, *27-0705*, *27-0911*, *27-1317*, *27-1515*, *52-0107*, *54-0505*, *70-0107*

Added 360-1.4 on 10/28/88; amended 360-1.4 on 8/25/93; amended 360-1.4(c) on 9/27/96.

6 NYCRR § 360-2.15 (2004)

§ 360-2.15 Landfill closure and post-closure criteria

In addition to the requirements of Part 208 of this Title, Subpart 360-1 of this Part, and sections 360-2.13 and 360-2.17 of this Subpart, all landfills subject to regulation under this Part must conform to the requirements for closure and post-closure care set forth in this section. For existing sites where this information is known through previous efforts (such as monitoring of the facility during its operating life), some or all of the requirements of subdivision (a) of this section may be waived upon approval of the department. For landfills subject to the requirements of Part 208 of this Title, some or all of the requirements of subdivisions (d) through (g) of this section may be waived upon approval of the department.

(a) Closure site investigation. To ensure that an adequate final closure plan is developed, the nature and extent of current and potential release or migration of contaminants from the site must be defined. The minimum elements of a site investigation are as follows:

(1) A hydrogeologic investigation performed using the methods described in section 360-2.11 of this Subpart that must, at a minimum:

(i) define the geologic and hydrogeologic conditions of the uppermost aquifer, and, as required by the department, any other units in the critical stratigraphic section which may be impacted by the facility;

(ii) establish a long-term monitoring well network in the uppermost aquifer, and other units necessary to protect public health and the environment, to monitor the effects of facility closure or remediation; and

(iii) analyze the initial round of samples in each monitoring point for baseline parameters. If contamination is detected the department may require additional sampling and analysis as specified in section 360-2.11 of this Subpart.

(2) An explosive gas investigation must be performed to determine whether the site meets the requirements of subdivision 360-2.17(f) of this Subpart. The explosive gas investigation must include at least three rounds of subsurface explosive gas monitoring. This must be performed along a perimeter outside the waste mass but within the property boundary. Monitoring must be performed at 100 foot maximum intervals, if temporary sampling locations are used, or at 400 foot maximum intervals, if permanent gas monitoring wells are constructed. Initial monitoring should be performed when atmospheric pressure and wind velocity are low and ideally when the ground surface has been wet or frozen for several days and monitoring must be done below the wet or frozen zone. The intent of this investigation must be to:

(i) identify the presence and concentration of explosive gases at or near the landfill, including at the property line, in all on-site structures, and in potentially impacted off-site structures;

(ii) determine the extent of actual or potential gas migration offsite; and

(iii) identify the applicable soil stratigraphy beneath and around the landfill.

(3) A surface leachate investigation must be performed. This investigation must identify the presence of uncontrolled leachate at, or emanating from, the landfill; document any instances where fugitive leachate from the landfill is discharging into local surface waters; and characterize the chemical constituents of surface leachate for baseline parameters. The surface leachate investigation must be performed when groundwater levels are at seasonal high elevations or at such other times as specified by the department.

(4) A vector investigation must be performed to identify the presence of any vectors at the landfill, including but not limited to, rodents, insects, and birds.

(5) Upon completion of the closure site investigation, the data must be compiled and presented in a closure investigation report. The report, which must be completed and submitted to the department at least 180 days before last receipt of waste, must include a summary that describes the environmental conditions, including but not limited to, general site conditions, land use, soil conditions, hydrogeologic characteristics, surface and ground water quality, presence and migration of explosive gas and surface leachate and vector populations. Landfill owners or operators or their consultants should have preliminary discussions with the appropriate regional solid waste engineer to review the specific landfill considerations and findings of the closure investigation.

(b) Conceptual closure plan. Complete applications to construct and operate a new landfill, or an expansion to an existing landfill; and complete renewal applications must contain a conceptual closure plan prepared in conformance with the provisions of this subdivision. Landfills that are active on the effective date of this Part must submit the information described in paragraphs (3) and (4) of this subdivision to the department on the effective date of this Part. The conceptual closure plan will describe the steps necessary to close the landfill at any point during its active life, in accordance with the requirements of subdivisions (b) and (c) of this section. It shall, at a minimum, include the following:

(1) a site plan which shows proposed final contours, property lines, storm water drainage systems, streams and water courses, roads, structures and, if applicable, groundwater and leachate treatment systems, air pollution control and landfill gas recovery systems;

(2) typical details of cap components and facility structures which comply with requirements set forth in this section;

(3) an estimate of the largest active portion of the landfill that will require a final cover at any time during the active life of the landfill;

(4) an estimate of the maximum inventory of waste ever on site during the active life of the landfill;

(5) sufficient information upon which to base closure and post-closure monitoring and maintenance cost estimates as required in subdivisions 360-2.19(b) and (c) of this Subpart. This information shall include:

(i) estimates of material, quantities and costs;

(ii) estimates of cost of each major final cover component and structure; and

(iii) estimates of post-closure monitoring and maintenance costs based on the requirements set forth in subdivision (k) of this section.

(c) Final closure plan. An approvable final closure plan must be submitted to the department within 60 days before the last receipt of waste, within 60 days before the last day of the operating permit, or in accordance with permit requirements, whichever is earlier, and must be in compliance with this subdivision.

(1) The plan must:

(i) meet the requirements of paragraphs (b)(1) and (2), and subdivisions (d)-(j) of this section;

(ii) meet the requirements of subdivision (k) of this section, including the post-closure monitoring and maintenance operations manual prepared in accordance with paragraph (k)(7) of this section;

(iii) address unacceptable environmental impacts identified in the closure investigation report required in paragraph (a)(5) of this section;

(iv) provide an estimate of the landfill area to be covered;

(v) provide an estimate of the inventory of wastes in the landfill;

(vi) provide a closure construction schedule which conforms with the requirements of subdivision (d) of this section; and

(vii) provide amended closure and post-closure monitoring and maintenance cost estimates, prepared in accordance with subdivisions 360-2.19(b) and (c) of this Subpart.

(2) Financial assurance for closure monitoring and maintenance are to be amended in accordance with subdivisions 360-2.19(b) and (c) of this Subpart.

(d) Final cover system. At a minimum, the final cover must consist of a layered system meeting the following requirements:

(1) the bottom layer of a final cover system must consist of a gas venting layer meeting the requirements of subdivision 360-2.13(p) of this Subpart; and

(2) the gas venting layer shall be overlain by the following:

(i) for landfills that meet the requirements of section 360-1.7(a)(3)(viii)(a) of this Part either a low permeability soil cover barrier layer meeting the requirements of subdivision 360-2.13(q) of this Subpart, or geomembrane cover meeting the requirements of subdivision 360-2.13(r) of this Subpart, or a cover meeting the requirements of subparagraph (ii) of this paragraph; or

(ii) for landfills meeting the requirements of section 360-1.7(a)(3)(viii)(b) of this Part, a composite cover consisting of a low permeability soil barrier cover layer and geomembrane cover meeting the requirements of subdivisions 360-2.13(s) of this Subpart;

(3) the low permeability soil barrier cover layer, geomembrane cover, or composite cover layer shall be overlain by either a barrier protection layer meeting the requirements of subparagraph 360-2.13(q)(2)(iii), or subparagraph 360-2.13(r)(2)(iii) of this Subpart; and

(4) the barrier protection layer shall be overlain by a topsoil layer meeting the requirements of subdivision 360-2.13(t) of this Subpart;

(5) alternative individual components of the final cover system that meet the equivalent design provisions of subdivision 360-2.13(w) of this Subpart may also be used;

(6) The owner or operator must complete landfill closure activities in accordance with the final closure plan prepared in accordance with subdivision (c) of this section within 210 days following last receipt of waste, or within a time frame deemed acceptable by the department;

(7) Closure construction certification report. A construction certification report must be submitted to the department within 45 days after the completion of landfill closure construction for approval and file record. This report must include the results of all construction quality assurance and construction quality control testing required in subdivisions 360-2.13(p)-(t) of this Subpart and documentation of any failed test results, descriptions of procedures used to correct the improperly installed material, and statements of all retesting performed. In addition, the construction certification report must contain as-built drawings noting any deviation from the approved final closure plans.

(e) Landfill gas control. Landfill gas control systems must be designed to prevent the migration of concentrated amounts of landfill gases off-site. Gas venting systems are necessary for all landfills upon closure and must be designed and constructed in accordance with the requirements of subdivision 360-2.13(p) of this Subpart. These systems must prevent the accumulation of gas at greater than 25 percent of the lower explosive limit in structures on-site and off-site; prevent damage to vegetation both on the final cover and off-site; and control objectionable odors due to any gas emissions.

(f) Perimeter gas collection systems. Perimeter gas collection systems must be installed if landfill gases are found to pose a hazard to health, safety, or property. Perimeter gas collection systems must be designed and constructed in accordance with the requirements of this subdivision along with any other provisions required by the department. A perimeter gas collection system must consist of either:

(1) trenches keyed into a low permeability soil, a bedrock layer, or the seasonally low ground water table, which can effectively cut off the lateral migration of gas; or

(2) gas wells screened in the unsaturated zone to the seasonably low water table or low permeability soil/bedrock layer that are spaced along the perimeter of the landfill to sufficiently prevent gas migration.

(g) Gas control using flares. All gas control systems which utilize flares must be designed in accordance with any applicable requirements of Parts 201 and 212 of this Title.

(h) Condensate from gas processing or control systems. Condensate generated and collected from gas processing or control systems must not be recirculated into the landfill unless it is demonstrated that the landfill has a department approved liner and leachate collection and removal system, and providing it is demonstrated that the landfill is operating in compliance with the provisions of section 360-2.17 of this Subpart, and prior written approval is obtained from the department. Otherwise, the condensate must be appropriately disposed of by other means.

(i) Leachate collection system. If required by the department, a leachate collection system must be constructed to control leachate outbreaks that could adversely affect the landfill cover or threaten surface waters. If the collection system includes the construction and operation of a leachate storage facility, such facility must be designed, constructed, and operated in accordance with the requirements of Subpart 360-6 of this Part.

(j) Vectors. If, through the site closure investigation report, vector problems are identified, an appropriate remediation program must be implemented. The vector remediation program must be implemented to mitigate vector problems before cessation of waste disposal occurs at the landfill.

<u>(k) Post-closure operation and maintenance. For a landfill subject to closure, a provision must be included in the property deed indicating the period of time during which the property has been used as a landfill, describing the wastes contained within and noting that records of the facility have been filed with the department. The deed must also reference a map which shall be filed with the county clerk and which will clearly indicate the limits of the landfilled areas within the property boundary. The deed must also indicate that the use of the site is restricted pursuant to the provisions of paragraph (9) of this subdivision.</u>

(1) For landfills that are without a department approved plan for closure where the maximum slope of 33 percent was exceeded before December 31, 1988, the landfill may be closed with slopes exceeding 33 percent if supported by a slope stability analysis, which must be submitted to the department, and providing the following are met:

(i) final grades must not exceed 5O percent for more than a 2O feet vertical rise; and

(ii) for longer slopes, run-off diversion terraces must be constructed at vertical intervals not exceeding 20 feet. The terraces must be designed to intercept run-off for diversion to appropriately spaced drainage ways leading off the landfill slopes. All terrace and drainage way slopes must be at least four percent.

(2) Drainage control structures must be designed, graded, and maintained to prevent ponding and erosion to the cover. The surface drainage system must be designed and constructed to protect the cover from, at a minimum, the peak discharge of a 24-hour, 25-year frequency storm.

(3) Soil cover integrity, slopes, cover vegetation, drainage structures, and gas venting structures must be maintained during the period of post-closure monitoring and maintenance, or as required by the department.

(4) Environmental and facility monitoring points including gas monitoring points must be maintained and sampled during the post-closure period for a minimum of 30 years. Post closure explosive gas monitoring must be performed at least quarterly to determine if the facility meets the requirements of 360-2.17(f) of this Subpart. If this monitoring shows explosive gas levels in excess of the lower explosive limit at the property boundary or in excess of the 25 percent of the lower explosive limit within any structures, appropriate actions must be taken and the department must be notified. Annual summary reports must be submitted to the department describing the results of the maintenance, monitoring and/or sampling for the environmental and facility monitoring points. Annual baseline and quarterly routine monitoring must be performed on ground water, surface water and leachate samples for a minimum period of five years. After this five-year period, the permittee may request that the department modify the sampling and analysis requirements.

(5) Maintenance and operation of the leachate collection system are required during the post-closure period and the method of leachate treatment or disposal must be addressed for as long as leachate is capable of adversely impacting the environment. The department may waive this requirement when the owner demonstrates that leachate no longer poses a threat to human health or the environment.

(6) A vegetative cover must be established and maintained on all exposed final cover material within four months after placement. If this cannot be achieved due to seasonal constraints, measures must be taken to ensure the integrity of the final cover system before the establishment of vegetative cover.

(7) A comprehensive post-closure monitoring and maintenance operations manual is required. This document shall provide all information needed to effectively monitor and maintain the facility for the entire postclosure period. Minimum components of this manual include:

(i) description of type, location, sampling and sample preservation methodology, and recordkeeping and reporting requirements for all environmental monitoring activities. The monitoring plan shall conform to paragraph (4) of this subdivision;

(ii) description of all environmental control systems including:

(a) process control monitoring types, locations, recordkeeping and reporting requirements. Leachate management activities shall include recording of the total volume of leachate stored and removed from the facility, sampling and analysis, and proper maintenance;

(b) environmental control maintenance requirements including description, type, frequency, and recordkeeping;

(iii) description of types, location and frequency of all other facility maintenance activities including:

(a) maintaining the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, maintaining the appropriate vegetative cover, and preventing run-on and run-off from eroding or otherwise damaging the final cover;

(b) maintaining the leachate collection system in accordance with subdivision (i) of this section;

(c) maintaining and operating the gas control and monitoring systems in accordance with the requirements of section 360-2.17(f) of this Subpart; and

(d) recordkeeping and reporting requirements;

(iv) description of resource requirements including:

(a) minimum personnel qualifications and numbers; and

(b) minimum equipment needs;

(v) a contingency plan which shall include:

(a) responses to problems that have a reasonable likelihood of occurrence including, but not limited to, major erosion problems, significant differential settlement, and fire;

(b) action levels above which identified environmental monitoring, environmental control, or maintenance problems require prompt action by the owner and notification to the department; and

(c) a summary of any corrective measures that must be done to be in accordance with section 360-2.20 of this Subpart;

(vi) name, address and telephone number of the person or office to contact on post-closure monitoring and maintenance, and corrective measure concerns during the post-closure period;

(vii) a summary of financial assurance criteria concerns that must be addressed to remain in compliance with the provisions of sections 360-2.19(c) and (d) of this Subpart. This includes:

(a) submittal to the department of annual adjustments to cost estimates of post-closure care and corrective measures; and

(b) notification to the department of increases in post-closure care costs and corrective measure costs; and

(viii) a description of the planned uses of the property during the post-closure period.

Planned uses shall be in compliance with paragraph (9) of this subdivision.

(8) Quarterly inspections and inspections after major rainfall events (5-year storms) shall be performed on all facility components during the minimum 30-year post-closure period, unless specific department approval is given to eliminate some or all of these requirements, to ensure that the facility is functioning as intended. The results of those inspections shall be submitted to the department as part of a registration renewal report as described in paragraph (1)(4) of this section, or more frequently, if deemed appropriate by the department.

(9) A description of the planned uses of the property during and after the post-closure period is required. Use of the property shall not disturb the integrity of the final cover, liners, or any other components of the containment system, or the function of the monitoring or environmental control systems, unless necessary to comply with the requirements of section 360-2.20 of this Subpart. The department will approve any other disturbance if the owner or operator demonstrates that disturbance of the final cover, liner or other component of the containment system, including any removal of waste, will not increase the potential threat to human health or the environment.

(1) Closure and post-closure registration report.

(1) The owner or operator of a closing facility must register with the department at least one year before the facility is scheduled to cease accepting waste. The owner or operator must register on a form prescribed by the department.

(2) The registration must be renewed every five years until the department determines that the post-closure monitoring and maintenance period for the facility has ended.

(3) The initial registration report must include: the facility's name, address and telephone number; the owner's name, address and telephone number, and the name, address and telephone

number of the person who will be responsible for closure and post-closure care of the facility, and other information deemed necessary by the department.

(4) Subsequent registration reports must also include the following information:

(i) a certification that the facility complies with all applicable closure and post-closure criteria contained in this section, financial assurance criteria contained in section 360-2.19, and corrective measures report criteria contained in section 360-2.20 of this Subpart; and

(ii) any other information which the department determines to be necessary to protect the public health and welfare and the environment or natural resources.

(5) A registration issued pursuant to this subdivision is transferable only upon prior written approval of the department and a demonstration that the prospective transferee will be able to comply with all applicable laws, regulations and requirements.

Statutory authority: Environmental Conservation Law, § § 1-0101, 3-0301, 8-0113, 19-0301, 19-0306, 23-2305, 23-2307, 27-0101, 27-0106, 27-0107, 27-0109, 27-0305, 27-0703, 27-0704, 27-0705, 27-0911, 27-1317, 27-1515, 52-0107, 54-0505, 70-0107

Added 360-2.15 on 10/28/88; amended 360-2.15 on 8/25/93; amended 360-2.15 opening paragraph on 10/07/98; amended 360-2.15 opening paragraph on 8/30/02; amended 360-2.15(a)(2) on 11/24/99; amended 360-2.15(k)(7)(iii)(a) on 9/27/96.

APPENDIX F

USACE EVALUATION OF POTENTIAL ARARs IDENTIFIED BY REGULATORS

COMMENT RESPONSE MATRIX

Documents: **Feasibility Study Addendum and Proposed Plan for the Seaway Site, Areas A, B, and C, Tonawanda, New York**
Version: **June 2000 drafts of both documents**
Matrix Date: **December 6, 2004 (Responses to ONLY comments regarding what should be considered as ARARs)**

Commentator	Comment No.	Comment	Response
EPA/NYSDEC/ NYSDOH	General	Explain the USACE approach to developing ARARs and rationale for what ARARs are included in the CERCLA documentation.	Pursuant to 40 CFR 300.400 (g)(1), USACE identifies all promulgated and legally enforceable federal environmental laws or regulations or state environmental or facility siting laws or regulations. They must contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. If the laws or regulations do not contain such criteria but are instead more general or procedural in nature, they are not ARARs. However, any substantive requirements of the regulation pertaining to other matters that may apply will be complied with during the course of the CERCLA action. The laws and regulations that contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site are then evaluated to see if they specifically address the contamination or its release at the site. If a regulatory agency could impose the standard through a permit or regulatory approval process but for the permit waiver provision of CERCLA, the law or regulation is considered "applicable". If the law or regulation cannot be enforced in that way at the site, it is not considered applicable. If the identified laws and regulations are not applicable, USACE analyzes them using the factors discussed in 40 CFR 300.400(g)(2), in order to determine if they are "relevant and appropriate". Fundamentally, the laws and regulations must address situations sufficiently similar to the circumstances of the release or remedial action and be well suited to the site. After undertaking the above analysis, USACE found that there are

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			no laws or regulations "applicable" to the Seaway site. Specifically, no regulatory agency could impose the standards found in the Federal or state laws that contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, after applying the factors discussed in the NCP, several Federal regulations were found to be "relevant and appropriate".
The following are specific comments regarding what should be considered as potential ARARs			
EPA (7/24/00)	#7 (Comments 1 through 6 and 8 through 44 do not apply to ARAR considerations and are therefore not included in this response matrix)	(7) It has not been sufficiently demonstrated that the remedial alternatives, including the preferred remedy, meet the Attainment of ARARs criteria -- one of two Threshold Criteria which each alternative must meet to get carried forward through comparative analysis: • The ARARs discussion focuses on soil cleanup standards which would be applicable for Alternatives 2 and 4. The NYSDEC has requested, but thus far have not received, the calculations that support the development of the soil cleanup numbers which would be used for Alternative 2 (complete excavation and offsite disposal) and Alternative 4 (partial excavation and offsite disposal). The values stated in the *Proposed Plan* are similar to the ones EPA - Region 2 had	Not associated with whether something should or should not be considered as an ARAR and therefore no response included in this matrix.

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		issues with in the Linde ROD. Thus EPA likely will have similar issues with the Seaway site soil cleanup criteria. The *FS Addendum* and the *Proposed Plan* should provide a rationale for why meeting a cleanup "guideline" of 40 pCi/g for Th-230 (the number developed by DOE in 1993) will result in complying with the other soil cleanup levels. • The containment structure should meet standards in 10 CFR40, Appendix A as well as the ARAR for radon emissions. • The ARARs should include all the ARARs that will be used at the site during remedial action as well as final cleanup criteria. This will include the rad-NESHAP 10 mrem/yr number as an ARAR.	10 CFR 40 Appendix A is considered to be relevant and appropriate for the site. Therefore, all substantive elements of the regulation that pertain to the remedy selected must be met unless waived. The revised FSA will include all ARARs that have been identified in the process described above. Laws or regulations of a procedural nature or which do not include any standard, requirement, criteria or limitation that concerns a hazardous substance, pollutant or contaminant or the release of any of these will not be included because they do not meet the definition of an ARAR provided in CERCLA or the NCP. 40 CFR 61 Subparts H or I are not considered "relevant and appropriate" for the site. The regulations do not address situations sufficiently similar to the circumstances of the release or remedial action and are not well suited to the site. Specifically: 1. The Seaway site does not and will not contain a "facility" similar in nature to those Subpart H and I regulates; 2. Subpart H only regulates sites that will emit something other than radon-222 or radon-220 and it is not anticipated that any potential alternative for

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		• ARARs for non-MED wastes should be included in the development of remedial alternatives • Although the *Proposed Plan* lists the maximum contaminant limits in 40 CFR192, Subpart A, for gross alpha, radium and uranium in groundwater as relevant and appropriate, there is no information to support the claim that "existing controls provide sufficient protection to prevent any MED material from adversely impacting the ground water outside of the capped landfill structure." There needs to be data and analysis that demonstrate the ground water will not be impacted in excess of the MCLs.	Seaway will involve such emissions; and 3. Both subparts exempt tailings piles regulated by 40 CFR 192 and if the selected alternative for the Seaway site involves leaving residual radioactive materials at the site the material left will be of the nature and the circumstances will be very similar to inactive mill tailings sites regulated by 40 CFR 192. USACE is only authorized to address MED/AEC materials under FUSRAP. Therefore, it is only necessary to select laws and regulations that contain substantive criteria pertaining to the MED/AEC materials and the circumstances of their release at the site. However, as stated above, the substantive requirements of all laws that may apply to other matters will be complied with during the course of the CERCLA action . Not associated with whether something should or should not be considered as an ARAR and therefore no response included in this matrix.
NYSDEC (8/31/00)	General #1	With respect to the proposed remedy, we note that the Corps has not considered as relevant and appropriate requirements almost all of the criteria in 10 CFR 40, Appendix A, *Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes*	10 CFR 40 Appendix A is considered to be "relevant and appropriate" for the site. Therefore, all substantive elements of the regulation that pertain to the remedy selected must be met unless waived. Because the radium levels at Seaway are not as elevated as those associated with a tailings pile regulated under 10 CFR Part

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		Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content (underlining added). It is true that Appendix A applies to new disposal sites for uranium mill tailings; however, it also applies to mill tailings where milling operations are not active (see section 40.2(b) of 10 CFR 40, *Coverage of inactive tailings sites*). If the radioactive wastes in the Seaway landfill are covered and left in place, the result will be a closed uranium mill tailings pile, to which many of the criteria in Appendix A are clearly relevant and appropriate. We expect that containment meeting the criteria for permanent disposal of uranium mill tailings would entail greater costs than would the 5.5 foot cover now proposed.	40, Appendix A, if an alternative is selected that leaves some or all of the mill tailings in place, the alternative may not meet each specific requirement of the regulation. However, in accordance with 40 CFR § 300.430(f)(1)(ii)(C) it may attain a standard of performance that is equivalent to the ARAR through use of another method or approach. Therefore, the 5.5-foot thick cover and its attendant cost is appropriate.
NYSDEC (8/31/00)	General #2	However, 10 CFR 40 affects more than the costs of this remedy. Comparison of the closure requirements in 10 CFR 40, Appendix A, with those in 6 NYCRR 3 60 leads to the conclusion that uranium mill tailings and municipal solid wastes are incompatible waste streams that should not be disposed of in the same landfill. For example, Part 360 requires an engineered cap that is actively maintained for 30 years. The requirement in 10 CFR 40 is for an earthen cover that will be effective, without maintenance, for 1,000 years, to the extent reasonably achievable, and for at least 200 years. Part 360 requires active venting of landfill gases or a gas recovery	Uranium mill tailings such as those found at Seaway and municipal solid wastes are not incompatible waste streams that should not be disposed of in the same landfill The radium levels present at Seaway are not as elevated as those associated with a tailings pile regulated under 10 CFR Part 40, Appendix A, thus the radon levels are not as elevated either. Evaluations have been conducted regarding the radon emissions to assess whether the radon emissions standards posed under 40 CFR Part 192, which is also relevant and appropriate, are met and whether the gas venting systems associated with a solid waste landfill posed any unacceptable risks associated with releases of radon from the residual tailings remaining in the landfill. The evaluations indicated that the 40 CFR 192, Subpart A standard of 0.5 pCi/L is not exceeded if the landfill gas from the FUSRAP area is conveyed

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		facility; 10 CFR 40 calls for a barrier to prevent the escape of radon gas through the cover. Each set of requirements is based on the unique nature of the particular waste. It will be extremely difficult, if not impossible, to satisfy both requirements simultaneously. The logical approach is to remove the uranium mill tailings, to avoid the inherent conflicts in the cap design. Other ARARs are listed in our enclosed comments.	to either the existing landfill gas flare, which is no longer in operation, or the passive vents at the landfill property line as long as the design of the vents include proper setback from the property line, which is about 80 meters (m) or more.. Therefore, both the ARARs and the requirements of Part 360 can be met.
NYSDEC (8/31/00)	#1	In 1994, the State's position on the remediation of the Tonawanda FUSRAP sites was that, wherever possible, the sites should be cleaned up to a level whereby the dose to the maximally exposed member of the general public, per conservative modeling, will be less than 10 mrem/yr (DEC TAGM 4003); and that the waste materials be disposed of in an out-of-state DOE or commercial disposal site. Where attaining the 10 mrem/yr is not possible, a restricted use should be placed on the site until eventual remediation can meet TAGM 4003 cleanup levels. (Re: letter from DEC Commissioner Jorling to DOE Assistant Secretary Tara O'Toole, dated January 26, 1994.)	A State of New York TAGM is not a promulgated regulation, and therefore falls within the category of a potential "to-be-considered" (TBC) document. TBCs are relied on when no ARARs are available to provide standards that are protective of human health and the environment. An ARAR is available for the Seaway site. Therefore, it is not necessary for the State TAGM to be considered.
NYSDEC (8/31/00)	#2	U-238 has a half-life of 4.5 x 10E+8 years, Ra-226 one of 1,599 years, and Th-230 one of 8.0 x 10E+4 years. These extremely long periods of radiological risk necessitate a very conservative approach to resolving their disposal.	Agree. A cap designed to meet the performance objectives of 40 CFR Part 192 and substantive elements of 10 CFR 40 App. A, to be effective for 1,000 years to the extent reasonably achievable, and for 200 years at a minimum, and to limit radon-222 to 20 pCi/m^2/sec provides an adequately conservative approach for long-

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			term control of hazards associated with uranium mill tailings.
NYSDEC (8/31/00)	#3	Per amendments to Part 380, which became effective on July 31, 2000, no radioactive materials from the remediation of the Seaway site, above background concentrations, may be disposed of in solid waste or hazardous waste disposal facilities in New York State.	The FUSRAP material was disposed in the Seaway Landfill in 1974. While the Part 380 requirements would prevent any radioactive remediation materials from the Seaway site from being disposed in a solid waste landfill from the effective date of the regulation, the rule does not address the radioactive material already at the Seaway site.
NYSDEC (8/31/00)	#4	Atomic Energy Act, Section 83. Section 83 of the Atomic Energy Act (AEA) is relevant and appropriate. It requires ownership of uranium mill tailings piles to be transferred to the Federal Government or the state (at the state's option) once the pile has been closed (42 USC 2113). The Federal Government should take possession of this uranium mill tailings pile, if it is to be left in New York State.	After reviewing the contents of the law USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. Rather, it is procedural in nature pertaining to the requirements for the issuance, content and termination of a NRC license. However, if the selected remedy involves leaving the MED/AEC material in place, the government will be required to review the remedial action no less often than each five years after the initiation of the remedial action to assure that human health and the environment are being protected by the remedial action.
NYSDEC (8/31/00)	#5	10 CFR 40.28, *General license for custody and long-term care of uranium or thorium by-product materials disposal sites*. The substantive requirements in this regulation are relevant and appropriate for the Seaway site. A long-term surveillance plan, meeting the requirements of sections 40.28(b)(1) - (5) should be developed, submitted to the State for concurrence, and implemented in accordance with section 40.28 (c). Notifications to the United States Nuclear Regulatory	The more appropriate section for the USACE to consider is 10 CFR § 40.27, *General License for custody and long-term care of residual radioactive material disposal site.* After reviewing the contents of the section USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. Rather it is procedural in nature. However, if the selected remedy involves leaving the

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		Commission (NRC) required in this section should instead be sent to the state.	MED/AEC material in place, an operations and maintenance plan will be a required part of the remedy and the government will be required to review the remedial action no less often than each five years after the initiation of the remedial action to assure that human health and the environment are being protect ed by the remedial action.
NYSDEC (8/31/00)	#6	10 CFR 40, Appendix A - We agree that 40 CFR 192 is a relevant and appropriate requirement, ". . . based on the similarity of uranium processing activities at Linde and the resulting radionuclides found in the waste eventually transported to Seaway, to that of uranium mill sites where the regulation is applicable" (draft Proposed Plan, page 14). However, we disagree with the conclusion, presented in the draft Addendum to the Feasibility Study, that most of the standards in 10 CFR 40, Appendix A, are not relevant and appropriate. 10 CFR 40, Appendix A is the regulation adopted by the NRC to implement the standards promulgated by the United States Environmental Protection Agency (EPA) in 40 CFR 192. The draft Addendum to the Feasibility Study incorrectly concludes, "… most of the standards in 10 CFR 40 Appendix A pertain to the siting, construction, and closure of new tailings piles, a different circumstance	10 CFR 40 Appendix A is considered to be "relevant and appropriate" for the site. Therefore, all substantive elements of the regulation that pertain to the remedy selected must be met unless waived.

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		than what is present at the Seaway Site" (draft Addendum to Feasibility Study, page 38). It is true that Appendix A includes siting and construction criteria for new tailings piles, but Section 40-2(b) of 10 CFR 40, *Coverage of inactive tailings sites*, refers to mill tailings at sites where milling operations are no longer active, and states, "The criteria in Appendix A of this pail will be applied to such sites." If the radioactive wastes in the Seaway landfill are covered and left in place, the result will be a closed uranium mill tailings pile, to which many of the criteria in Appendix A are clearly relevant and appropriate. The following criteria are relevant and appropriate for the closure and long-term surveillance of a uranium mill tailings disposal site in New York State. It does not appear that the Corps has fully addressed these criteria, nor accounted for the cost of meeting them in the cost estimate for the preferred alternative. Those two steps should be taken and the results presented in a revised Feasibility Study and Proposed Plan.	
NYSDEC (8/31/00)	#6-1	Criterion I presents the general goal in siting and designing mill tailings sites, which is the "… permanent isolation of tailings and associated contaminants by minimizing disturbance and dispersion by natural forces, and to do so **without ongoing maintenance."** The site features described in Criterion 1 are relevant and appropriate for "judging the adequacy of existing sites" (see 10 CFR 40, Appendix A, Criterion 1, first	Criterion 1 is not "relevant and appropriate" because it does not provide substantive criteria pertaining to the hazardous substances or pollutants and contaminants or circumstances of their release at the site. The Criterion is procedural in nature and contains a broad statement of goals and objectives for siting a tailings pile well before any disposal has taken place or pile has been created. In addition, the criterion does not address circumstances sufficiently similar to the Seaway site where disposal has already taken place.

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		paragraph). The Seaway site should be evaluated against those site features before a decision is made to leave the uranium mill tailings in place.	
NYSDEC (8/31/00)	#6-2	Criterion 2 calls for disposing of small waste volumes at existing large mill tailings disposal sites, to avoid proliferation of small waste disposal sites and thereby reduce perpetual surveillance obligations. The Seaway site is small, compared to other existing uranium mill tailings sites; therefore, this requirement is relevant and appropriate. Leaving the wastes in Tonawanda will result in long-term surveillance obligations for the Federal Government, which should be weighed against the costs of removing the waste to a uranium mill tailings disposal facility.	Criterion 2 is not "relevant and appropriate" because it does not provide substantive criteria pertaining to the hazardous substances or pollutants and contaminants or circumstances of their release at the site. The Criterion discusses general policy considerations regarding the desire to limit creation of new small waste disposal sites at remote extraction sites. In addition, the criterion does not address circumstances sufficiently similar to the Seaway site where disposal has already taken place.
NYSDEC (8/31/00)	#6-3	Criterion 3 states, "The 'prime option' for disposal of tailings is placement below grade . . . ." The Seaway site should be evaluated against this goal, when considering the suitability of the site for permanent disposal of this radioactive waste.	Criterion 3 is not "relevant and appropriate" because it does not provide substantive criteria pertaining to the hazardous substances or pollutants and contaminants or circumstances of their release at the site. The Criterion is procedural in nature and contains general considerations for determining where to create a tailings pile before one exists. In addition, the criterion does not address circumstances sufficiently similar to the Seaway site where disposal has already taken place.
NYSDEC (8/31/00)	#6-4	Criterion 4 presents six design criteria, regarding upstream catchment areas, topographic features, cover slopes (the minimum being 5h: 1v), the need for a self-sustaining vegetative cover, seismic stability of the	Criterion 4 is not "relevant and appropriate" for the site because it does not provide substantive criteria pertaining to the hazardous substances or pollutants and contaminants or circumstances of their release at the site. The criterion merely provides general siting and

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		site, and promotion of deposition on the cover. These should be considered for application to the containment proposed for Seaway.	design criteria for the creation of a tailings pile. In addition, the criterion does not address circumstances sufficiently similar to the Seaway site where disposal has already taken place.
NYSDEC (8/31/00)	#6-5	Criterion 5 addresses protection of groundwater during closure operations and is relevant and appropriate for the conduct of the preferred alternative.	Criterion 5 is not "relevant and appropriate" because it does not provide substantive criteria pertaining to the hazardous substances or pollutants and contaminants or circumstances of their release at the site. The Criterion provides ground water protection criteria for the management of active mill sites. Seaway is not an active mill site.
NYSDEC (8/31/00)	#6-6	Criterion 6, paragraphs I through 5 describe the need for a cover which provides reasonable assurance of control of radiological hazards to be effective for 1,000 years, to the extent reasonably achievable, and in any case, for at least 200 years. The cover also must limit the release of radon from the tailings. The specifies of a radon barrier are described, along with testing requirements once the radon barrier is in place. These are relevant and appropriate for the Seaway site, particularly because the production of radon by radioactive decay will increase over time.	Criterion 6 is considered to be "relevant and appropriate" for the site. The criterion addresses closure of a tailings piles and remediation of soils that contain radioactive materials similar in nature to those found at the Seaway site. In addition it addresses circumstances sufficiently similar – the closure of an existing tailings pile – to those existing at the Seaway site. Therefore, all substantive elements of the regulation that pertain to the remedy selected must be met unless waived.
NYSDEC (8/31/00)	#6-7	Criterion 11 addresses the transfer of title to the Federal Government following closure of a uranium mill tailings pile. This transfer should take place at Seaway, if the preferred alternative is implemented.	Criterion 11 is not "relevant and appropriate" because it does not provide substantive criteria pertaining to the hazardous substances or pollutants and contaminants or circumstances of their release at the site. The Criterion is procedural in nature. However, if MED/AEC materials are left in place at the Seaway site the government will be required to review the remedial action no less often than each five years after the initiation of the remedial action to assure that human health and the environment are being

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			protected by the remedial action.
NYSDEC (8/31/00)	#6-8	Criterion 12 calls for the government custodial agency to conduct annual inspections of the disposal site. We expect the Federal Government to meet this obligation if the waste is left in the landfill.	Criterion 12 is not "relevant and appropriate" because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. Rather it is procedural in nature. However, if the selected remedy involves leaving the MED/AEC material in place, an operations and maintenance plan will be a required part of the remedy.
NYSDEC (8/31/00)	#6-9	Criterion 13 lists the hazardous constituents of uranium mill tailings. This should be reviewed for relevance to the uranium mill tailings at the Seaway site.	Criterion 13 is not "relevant and appropriate" because it does not provide substantive criteria pertaining to the hazardous substances or pollutants and contaminants or circumstances of their release at the site. The Criterion provides ground water protection criteria for the management of active mill sites. Seaway is not an active mill site.
NYSDEC (8/31/00)	#7	6 NYCRR Part 360 - Solid Waste Management Facility Regulations.	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, any substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#8	Environmental Conservation Law. The State Environmental Conservation Law is applicable, relevant, and appropriate to this remedial action.	After reviewing the contents of the law USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants

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			contaminants or the circumstances of their release at the site. However, any substantive requirements the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-1	State Regulations, The following State Regulations may be applicable or relevant and appropriate to the preferred remedy, depending on the details and the types of waste encountered during the remedial action: 6 NYCRR Part 375 - Inactive Hazardous Waste Disposal Site Remedial Program	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. Instead, the regulation pertains to hazardous waste. MED/AEC materials are not hazardous waste. However, any of substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-2	6 NYCRR Part 370 - Hazardous Waste Management System: General	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. Instead, the regulation pertains to hazardous waste. MED/AEC materials are not hazardous waste. However, any of the substantive requirements of the regulation that may apply other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-3	6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site.

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			Instead, the regulation pertains to hazardous waste. MED/AEC materials are not hazardous waste. However, any of the substantive requirements of the regulation that may apply will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-4	6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-5	6 NYCRR Part 376 - Land Disposal Restrictions	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. Instead it is procedural in nature. However, any of the substantive requirements of regualtion that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-6	6 NYCRR Subpart 373-1 - Hazardous Waste Treatment, Storage and Disposal Facility Permitting Requirements	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. Instead it is procedural in nature. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.

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Commentator	Comment No.	Comment	Response
NYSDEC (8/31/00)	#9-7	6 NYCRR Subpart 373-2 - Final Status Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-8	6 NYCRR Subpart 373-3 - Interim Status Standards for Owners and Operators of Hazardous Waste Facilities	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. Instead, the regulation pertains to hazardous waste. MED/AEC materials are not hazardous waste. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-9	6 NYCRR Part 380 - Rules and Regulations for the Prevention and Control of Environmental Pollution from Radioactive Materials	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. None of the proposed alternatives for Seaway involve the disposal of material at the site. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC	#9-10	6 NYCRR Part 702.15(a), (b), (c), (d), (e), & (f)	After reviewing the contents of the regulation USACE determined

COMMENT RESPONSE MATRIX

Documents: **Feasibility Study Addendum and Proposed Plan for the Seaway Site, Areas A, B, and C, Tonawanda, New York**
Version: **June 2000 drafts of both documents**
Matrix Date: **December 6, 2004 (Responses to ONLY comments regarding what should be considered as ARARs)**

Commentator	Comment No.	Comment	Response
(8/31/00)			it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-11	6 NYCRR Part 700-706 - NYSDEC Water Quality Regulations for Surface Waters and Groundwater	After reviewing the contents of the regulation USACE determined it is not an ARAR because there is no MED-related surface or groundwater contamination at Seaway. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-12	6 NYCRR Part 608 - Use and Protection of Waters	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-13	6 NYCRR Part 200 (200.6) - General Provisions	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course

COMMENT RESPONSE MATRIX

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Commentator	Comment No.	Comment	Response
			of the CERCLA action.
NYSDEC (8/31/00)	#9-14	6 NYCRR Part 211 (211.1) - General prohibitions	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-15	6 NYCRR Part 364 - Waste Transporter Permits	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-16	Environmental Conservation Law Article 23 Title 27, Land Reclamation Law and 6 NYCRR Parts 420 - 426 (may apply to mining clay for the cover)	After reviewing the contents of the law USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, any of the substantive requirements of the law that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-17	10 NYCRR Part 5 - Drinking Water Supplies	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined

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Commentator	Comment No.	Comment	Response
			in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-18	10 NYCRR Part 170 - Water Supply Sources	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#9-19	19 NYCRR Part 600 - Department of State, Waterfront Revitalization and Coastal Resources Act Regulations	After reviewing the contents of the regulation USACE determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP, because it does not contain substantive criteria pertaining to the hazardous substances or pollutants and contaminants or the circumstances of their release at the site. However, any of the substantive requirements of the regulation that may apply to other matters will be complied with during the course of the CERCLA action.
NYSDEC (8/31/00)	#10 thru #22	These comments are not specific to ARARs that need to be included in the FSA and PP and therefore are not addressed in this response matrix.	No responses provided in this matrix.
NYSDOH (8/29/00)	General	Most of the comments were with respect to the protectiveness of the preferred alternative and not	No responses provided in this matrix.

COMMENT RESPONSE MATRIX

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Commentator	Comment No.	Comment	Response
		specific as to what should or should not be included as ARARs. Only one comment deals with potential ARAR issues and is included below. The other comments are not addressed in this response matrix.	
NYSDOH (8/29/00)	ARAR-1	Addendum to the Feasibility Study Page 23 & 24 addresses releases to the leachate collection system and subsequently to the Town of Tonawanda sanitary sewer system. While the MED waste is not licensed by the NRC and DEC Part 380 regulations do not directly apply, it is not known what the isotopic mix of the leachate is and therefore the sum of fractions rule cannot be utilized. Also, Part 380 allows, through Section 380-4.2 (4c)(2) that restrictions on release may be imposed to minimize or avoid adverse environmental impacts if the material is found to concentrate in the ash or sludge. (At this time the Tonawanda Sewage Treatment plant incinerates sludge) It is also unknown, if after 30 years the leachate will be monitored or released directly to the environment.	DEC Part 380 permit requirements cover licensed material. The FUSRAP material at Seaway is not licensed material. Furthermore, it has not been demonstrated that any significant levels of radionuclide material are being discharged from the leachate materials into the Town of Tonawanda sanitary sewer system. Also, USACE conducted additional leachate sampling in August 2000, January 2001, April 2001 and July 2001, which included isotopic results for Ra, Th and U. The results from those sampling events all indicate that the concentrations in the leachate are near groundwater protection standards or much less, and significantly less than the allowable NRC discharge limits for sewer discharges. , There are no background levels of radionuclides in landfill leachate to compare the results to assess if there is an impact and if so, to what extent.
The End			

APPENDIX G

COST ESTIMATE BASIS AND SUMMARY

Alternative 2 (Complete Excavation with Off-Site Disposal)
Alternative 4 (Partial Excavation with Off-Site Disposal) and
Alternative 6 (Containment)

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LIST OF TABLES

G.1. INTRODUCTION

This appendix provides information regarding the cost estimate for the detailed analysis of alternatives for the Addendum to the Feasibility Study (FSA). These cost estimates are intended to form a basis for comparing alternatives and support remedy selection. The costs used in this analysis are based on existing United States Army Corps of Engineers (USACE) contracts, vendor quotes, estimating reference manuals, and engineering estimates. These cost estimates are expected to provide an accuracy of -30 percent to +50 percent and are prepared in accordance with USEPA guidelines using data available from the original FS and this FS Addendum Report.

The format for the cost estimate is based on guidance from the USEPA and the USACE, *Guide to Developing and Documenting Cost Estimates During a Feasibility Study*, July 2000. Section G.2 provides general organization of the cost estimates, Work Breakdown Structure (WBS), the project schedules, and estimating methodology. Section G.3 summarizes total 2003 costs for each alternative. Section G.4 provides the scope of work, detailed assumptions, and basis of estimate for each alternative.

G.2. GENERAL COST INFORMATION

G.2.1 Estimate Scope

The Seaway FS Addendum developed four alternatives for remediating soil. The No Action alternative, Alternative 1, contains no cost. The alternatives included in the detailed cost estimate are listed below:

- Soil Media Alternatives
- Alternative 2: Complete Excavation with Offsite Disposal
- Alternative 4: Partial Excavation with Offsite Disposal
- Alternative 6: Containment

The cost estimates have been organized using the HTRW WBS template provided in MII version 2.3. The HTRW template was version 2. The cost estimate consists of six hierarchical levels and uses a 2-digit number at each level below the project level. The numbers for title levels 1, 2, and 3 are input to the HTRW WBS. Additional detail items are at levels 4 through 6. The WBS elements for the Seaway Site alternative cost estimates are described in Section B.3.

- Level 1– WBS Level 1 (Account) e.g.,33101 Remedial Action - Seaway Alternative 4
- Level 2– WBS Level 2 (System) e.g., 3310108 Solids Collect And Containment
- Level 3– WBS Level 3 (Subsystem) e.g., 331010801 Contaminated Soil Collection
- Level 4– WBS Level 4 (Assembly Category) e.g. 33101080101 Excavation
- Level 5– User Defined (Assembly) e.g. 33101080101 Dust Control
- Level 6- User defined e.g. 3310108010101 Dust Control Area A, B, and C

The cost estimates include (1) capital cost, including both direct and indirect cost, (2) USACE Management and Integration cost, and (3) annual operation and maintenance (O&M) cost. The cost are presented using both a “no discounting” scenario and a “discounting” scenario using net present value analysis. The detailed estimates presenting the non-discounted cost for each alternative are included as an attachment to this appendix. These detailed estimates provide additional parameters and assumptions used to develop the cost.

G.2.1.1 Schedule

Remediation activities (RA) for the Seaway site are estimated to be complete within 2 to 4 years. O&M activities for alternatives where contaminants are left onsite in Alternatives 2 and 4 are assumed to require a 1,000-year O&M period due to the long life of metal contaminants present at the site. For this reason, the period of analysis when contaminants are left onsite is based on a maximum 1,000-year project life cycle. Alternatives 6 assumes no O&M period since it includes full excavation. The duration for each alternative is calculated using historical productivity factors or based on engineering judgment. The remedial design, remedial action, post RA documentation, and O&M time periods are estimated in Table G.1.

G.2.1.2 Estimating Methodology

The primary methodology used is a quantity take-off method whereby costs are calculated based on unit cost multiplied by quantity or other input parameters. Unit cost data used in the relationship is primarily drawn from existing USACE contracts, vendor quotes, *R.S. Means Construction Cost Data(Both from current RS Means database and the MII database), ECHOS (Environmental Cost Handling Options and Solutions) cost database,* Local Davis Bacon Wages, or engineering estimates. The primary source of cost data was from RS Means, Local Davis Bacon Wages, and USACE contract/client data. This should provide an estimate with a moderate degree of certainty, provided the quantities do not change.

Excavation, Backfill, and Capping WBS elements incorporate a productivity adjustment process as part of the estimating methodology. This process is accomplished through the use of factors, which are applied to equipment and crew performance measures in order to account for degradation in the productivity, performance, or output levels of the equipment resulting from site-specific conditions. Productivity factors exist for three conditions: site, soil, and safety. Site adjustments are made to account for temporary work interruptions and delays resulting from poor weather, unsafe work conditions, and other similar unforeseen events. Soil adjustments are made to account for varying levels of difficulty associated with excavating different types of soil or rubble. A safety adjustment is made to adjust productivity levels due to safety procedures associated with the nature of impacted materials.

G.2.1.3 Cost Elements

Federal construction programs have traditionally distinguished between capital and O&M costs. The remedial action alternatives for this FS Addendum consist of those activities required to prevent or mitigate the migration of waste into the environment. The remedial action may include activities considered to be O&M in situations where construction alone will not achieve the health and environmental protection criteria.

The remedial action will have a schedule with a defined completion date. The post-closure or O&M phase occurs after the completion of the remedial action and includes those activities necessary to confirm closure of the remedial action or the activities necessary to monitor and maintain controls on releases of hazardous waste into the environment for an indefinite period.

G.2.1.3.1 Capital Costs

Capital costs are those expenditures required to implement a remedial action and consist of both direct and indirect costs. Capital costs do not include the costs required to maintain or operate the action throughout its lifetime.

G.2.1.3.2 Direct Capital Costs

Direct capital costs include equipment, labor, and material necessary for implementing the remedial action. These typically include costs for:

- land use controls during remedial action;
- monitoring, sampling, and analysis during remedial action;
- site work;
- surface water and groundwater collection/controls;
- soils collection/containment;
- treatment;
- transportation and disposal (see Table G.2); and
- site restoration.

G.2.1.3.3 Indirect Capital Costs

Indirect capital costs consist of engineering, supervision, management, administration, financial, and other services necessary to implement a remedial action. These costs are not incurred as part of actual remedial actions but are ancillary to direct or construction costs. Indirect costs typically include:

- general conditions;
- home office overhead and profit;
- remedial design;
- project management;
- construction management; and
- USACE program management cost.

G.2.1.4 Operations and Maintenance Costs

O&M costs are those post-remedial action costs necessary for monitoring and ensuring hazardous waste will not migrate into the environment. These costs typically include:

- maintaining land use controls and site database;
- monitoring, sampling and analysis after remedial action;
- five-year reviews;
- maintenance and monitoring of site facilities.
- site management/technical support in support of O&M activities;

G.3. REMEDIAL ACTION ALTERNATIVE COST SUMMARIES

Table G.3 provides a cost breakdown of capital cost and O&M cost for each alternative without a present value analysis. Table G.4 provides a cost summary of the discounted and non-discounted capital and O&M cost for each alternative. The costs have been escalated to December 2006 dollars. The present value analysis is a method to evaluate expenditures, either capital or O&M, which occur over different time periods. Present value calculations allows for cost comparisons of different remedial alternatives on the basis of a single cost figure for each alternative. This single number, referred to as present value, is the amount needed to be set-aside at an initial point in time (base year) to assure that funds will be available in the future as they are needed. The Present Value estimates involve four basic steps; (1) define the period of analysis, (2) calculate the cash outflow for each year, (3) select a discount rate (i.e. interest rate), and (4) calculate present value using standard economic formulas. The Seaway alternatives were evaluated using a 0-1,000 period of analysis. The "real" discounted rates used to calculate present values were based on OMB Circular No. A-94 memorandum dated January 2006. The real Interest Rate used was 3.0%. The capital costs have not been discounted due to their relatively short implementation duration. The detailed cost estimates are included at the end of this appendix.

G.4. BASIS OF COST ESTIMATE

G.4.1 Remedial Action (Soils Media)

G.4.1.1 Mobilization and Preparatory Work

Provides for the mobilization of equipment, preparation of the site, and related improvements such as utilities. This includes, haul road construction, staging and loading areas, and erosion control measures. The total area to be impacted is estimated to be 24 to 27 acres. Haul roads would be required in some areas to access the site.

G.4.1.2 Monitoring, Sampling, Testing, Analysis

Provides for all work during remedial action associated with air, water, sediment and soil sampling, monitoring, testing and analysis. Includes industrial hygiene/health physics (IH/HP) technicians and associated survey equipment required to monitor personnel and equipment, collection and analysis of samples, and the purchase of an onsite mobile laboratory.

An evaluation of available data indicates Thorium-230 may effectively be used as a remedial surrogate for other radiological constituents of concern (COCs) at the Seaway Site. This conclusion is based on considering that removal of significantly elevated concentrations of Thorium-230 would result in the removal of Uranium-238, Radium-226 and the rest of the MED related radionuclides.

Periodic sampling of contaminated media would be conducted during Remedial Action activities in Alternatives 2, 4, and 6 to monitor levels of contamination and verify areas have met the clean-up criteria. A duration of 2-4 years is estimated for the completion of actual excavation, loading, and consolidation. Sampling during remedial action activities would be performed by IH/HP technicians and analyzed in the onsite laboratory. After all excavation and loading activities have been completed, verification sampling and analysis by an offsite laboratory would be conducted prior to backfill of the site to confirm that cleanup criteria have been met.

G.4.1.3 Site Work

Provides for the required surveying services throughout the project. Includes initial design surveys, staking of areas to be excavated or capped, volume calculations for pay items, establish and reestablish control points for both excavation and landfill cap, and layout of landfill cap.

G.4.1.4 Surface Water Collection/Control

Provides for the collection and containment of contact water using pumps and above-ground holding tanks from the excavation areas. Contact water will be slowly discharged to the current leachate collection system or used for moisture conditioning soils prior to disposal. Since the majority of the rainfall occurs in the warmer months, most water requiring collection can be used for moisture conditioning soils.

G.4.1.5 Soil Excavation

Provides for excavation of contaminated soils. The total estimated volume of in situ soils to be excavated is 6,000 to 69,000 yds^3 depending on which alternative is being considered. An over-excavation volume was calculated based on excavation of walkover limits. An expansion (swell) factor of 1.2 was applied to the in situ volume to calculate the ex situ volume of 9,000 to 138,000 yds^3. Contaminated soils from the site would be excavated using hydraulic excavators and loaded directly into off road dump trucks for transportation to a onsite staging area. Staging will allow for soils to be covered in order to maintain a constant supply of dry soils. It also accommodates the large excavation production rates compared to the intermodal loading rates. A front-end loader would be located at the staging area to assist with loading intermodal containers. Soils will be transported directly to the rail staging area (Alternative 2, 4 and 6).

In Alternative 2, all contaminated soils would be transported to a staging area for loading into intermodals. The depth of excavation below the existing grade varies from 0 ft. to 75 ft. in some areas.

In Alternative 4, accessible soils would be transported to a staging area for loading into intermodals.

In Alternative 6, two minor areas of soil totaling 5,700 yds^3 would be transported to a staging area for loading into intermodals. The rest of the contaminated material would remain in place.

G.4.1.6 Capping of Contaminated Soils

This item is applicable to Alternatives 4 and 6. It provides for capping of contaminated soils. The total volume of in situ soils to be capped is 20,000 yds^3 for Alternative 4 and 69,000 yds^3 for Alternative 6. The cap footprint area would cover approximately 8 to 21 acres for Alternatives 4 and 6 respectively. For estimating purposes, it was assumed that the cap would be constructed to the normal slopes for the currently closed portion of the landfill.

A multi-layer cap approximately 5-6 ft thick would be constructed over the waste materials. A cap design based on New York State Regulation 6NYCRR part 360 is estimated:

- Vegetative layer — 6 inches
- Barrier protection layer — 24 inches
- HDPE geomembrane — 60 mils
- Clay low permeability layer — 18 inches
- Filter Fabric
- Gas Vent layer — 12 inches
- Filter fabric layer
- Leveling layer — 12 inches
- Filter fabric

G.4.1.7 Transportation and Disposal

Transportation and commercial disposal during remedial action provides for the shipment and final placement of contaminated soils at a third party commercial facility that charges a fee to accept waste depending on a variety of waste acceptance criteria. This item would be applicable to Alternatives 2, 4, and 6.

In Alternatives 2, 4, and 6, soils to be disposed would be transported to an approved and licensed disposal facility. The soils would be placed in intermodal containers having a 20-ton capacity (approximately 13 yd^3 based on a 1.6 tons/ yd^3 conversion). A truck designed to carry the intermodal containers would transport to a rail transfer facility. Intermodal containers would be loaded on rail cars and be transported to a disposal facility such as US Ecology in Idaho or the International Uranium Company mill in Blanding Utah.

The waste streams, transportation/disposal volumes, transport mode, transportation unit price, disposal facility, and disposal fee unit price are shown in Table G.2.

One aspect of disposal which is often overlooked is the disposal of equipment that can not be decontaminated to free release standards. This equipment could be transferred to facilities that process or dispose radioactive materials. The equipment could then be fully used before being disposed thus saving resources. Salvage or disposal of equipment has not been included as a line item in the estimate, but can be assumed to be included in the contingency.

G.4.1.8 Backfill

Site restoration during remedial action includes backfill, grading, and seeding, areas disturbed during site remediation.

Backfill and site restoration of the excavation would commence upon verification of the effective remediation in each survey unit and would run concurrently with excavation activities. For Alternatives 2 and 4, both overburden soils and imported fill from off site would be placed in 6 in. lifts of loose soils with a dozer. The areas would be graded and seeded to match the existing landfill cover. Backfill would be compacted to obtain the required soil densities.

G.4.1.9 General Requirements

General Requirements include the Project and Construction Management and Support staff required to staff the remediation activities. This element also provides for the installation of temporary utilities, support facilities such as trailers and decontamination areas, and land use control implementation. This item would be applicable to Alternatives 2, 4, and 6.

G.4.1.10 Project Management

Project management includes services that are not specific to remedial design, construction management, or technical support of O&M activities. Project management includes planning and reporting, community relations' support during construction or O&M, bid or contract administration, permitting (not already provided by the construction or O&M contractor), and legal services outside of land use controls (e.g., licensing). Project Management details are included in the cost estimate.

G.4.1.11 Construction Management

Construction management includes services to manage construction or installation of the remedial action. Activities include reviews of submittals, design modifications, construction observation or oversight, engineering survey for construction, preparation of O&M manual, documentation of quality control/quality assurance, and record drawings. For most of the Seaway site alternatives, this will include a full-time site manager, field engineer, clerical, safety and health officer, and waste management coordinator. It also includes health physics, quality assurance, and engineering during construction. These costs have been included in the estimate.

G.4.1.12 Land Use Controls

Provides for the development of a long term management plan and a site information database. The long term management plan would be developed to address administrative or legal measures to reduce or minimize exposure to contaminants left on site in Alternatives 4 and 6. The site information database would be a central repository of information required to assess and monitor contaminants left on site. Land use controls are included under the general requirements.

G.4.2 FUSRAP Program Management. & Integration

USACE oversight cost includes program management, project management, construction management, design reviews, quality assurance, HP Support, cooperative agreements with others, engineering during construction, etc. The cost was estimated by USACE Buffalo in 2000 and includes design, construction, and post-remediation phases of the work. These costs have been escalated to December 2006.

G.4.2.1 O&M

The O&M includes the long term management, maintenance, and reporting required under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and applies to Alternatives 4, and 6.

G.4.2.2 Land Use Controls

This item includes maintaining the long term management, administrative controls, site inspections, database management, and reporting. The long term management plan would be revised to address administrative or legal measures to reduce or minimize exposure to contaminants left on site. This would include future coordination with stakeholders. The site information database would be a central repository of information required to assess and monitor contaminants left on site. CERCLA five-year reviews and report preparation are also included under land use controls reporting. Land use control measures are conducted over a 1,000-year period of analysis due to the long life of metal contaminants present at the site.

G.4.2.3 Monitoring, Sampling, and Analysis

Monitoring, sampling, and analysis of the soils apply to Alternatives 4 and 6, and include sample collection, shipping samples, and sample analysis to monitor leachate from the landfill collection system.

G.4.2.4 Cap and/or Facility Maintenance

Cap and facility maintenance of the soils applies to Alternative 4 and 6. This includes maintenance of structures to restrict access and mitigate migration of contaminants left on site. Under Alternatives 4 and 6, limited maintenance would be provided to perform site inspections, prevent erosion and offsite migration, repair and maintain the leachate collection system, and repair the site signage and fence lines.

G.5. SUBCONTRACTOR, PRIME CONTRACTOR, FEDERAL GOVERNMENT (USACE), AND MISCELLANEOUS MARKUPS AND OTHER FACTORS

G.5.1 Subcontractor Markups

The following overhead markups have been applied to the Subcontractor's direct cost.

Subcontractor Markup - The subcontractor includes the following markups: (1) Field Overhead (General Conditions) 10%; (2) Small Tools 2% (only on labor); (3) Profit 9%; and (4) Bonds 2.75%.

G.5.2 Prime Contractor Markups

The following Overhead Markups have been applied to the Prime Contractor's direct cost.

Professional Labor - A 120% markup was applied to professional labor for fringe benefits, paid vacation, medical insurance, holidays, retirement accounts, etc. A 12% markup for G&A expenses and 9% markup for profit were also included. A 3% markup for managing transportation and disposal services was also included.

G.5.3 Federal Government (USACE) Markups

G.5.3.1 Contingency

Contingencies are shown for both design contingencies and construction contingencies. USEPA Guidance (USEPA 2000), was used as a reference in developing design and construction contingencies. A construction contingency of 25% is being applied due to the potential for increases in soil volumes that have been common at other FUSRAP sites. This would also include cost overruns, modifications, and change orders.

G.5.3.2 Design and Technical Support

Remedial design applies to capital cost and O&M cost and includes services to design the remedial action. Activities that are part of remedial design include pre-design collection and analysis of field data, engineering survey for design, treatability study (e.g., pilot-scale), and the various design components such as design analysis, plans, specifications, cost estimate, and schedule at the preliminary, intermediate, and final design phases including post RA documentation. Remedial Design has been included as a 10% lump sum of the total remedial action costs less the transportation and disposal costs.

G.5.3.3 Miscellaneous Markups and Other Factors

G.5.3.3.1 Sales Tax

Sales tax rates of 8.75% are included on material purchases.

G.5.3.3.2 Escalation

Prices from the USACE Unit Price Book, MEANS, RACER, and historical rates were adjusted to December 2006 pricing.

G.5.3.3.3 Craft Labor Rates

Craft labor rates were based on the 2/16/07 Department of Labor, Davis Bacon Rates and a 10% premium was added to account for employers paying more for employee retention.

Table G.1. Summary of Remedial Alternative Implementation Timelines

Alternatives	Remedial Design (yrs)	Remedial Action (yrs)	Post RA Documentation (yrs)	O & M Period (yrs)
Soil Media Alternatives				
2. Complete Excavation and Disposal	2	3.8	1	0
4. Partial Excavation and Capping	1	2.8	1	1,000
6. Capping and Minor Excavation	1	1.4	1	1,000

Table G.2. Summary of Soil Media Waste Transportation and Disposal Information

Waste Stream	Transport & Disposal Volume	Transport Mode	Transport Unit Price	Disposal Facility	Disposal Fee
Alt 2. MED soil	124,000 yd^3 160,000 tons	Intermodal and Rail	$128/ton	IUC Utah	$90/ yd^3
Alt 2. MED soil with RCRA constituents	14,000 yd^3 18,000 tons	Intermodal and Rail	$128/ton	IUC Utah	$175.40/ yd^3
Alt 4. MED Soil	105,000 yd^3 135,000 tons	Intermodal and Rail	$128/ton	IUC Utah	$90/ yd^3
Alt 6. MED Soil	9,000 yd^3 11,000 tons	Intermodal and Rail	$128/ton	IUC Utah	$90/ yd^3

Table G.3. Seaway Site Remedial Alternatives Cost Summary (Discounted Cost in Thousands, December 2006 Dollars)

WBS Number	Activity	Soil Media Alternatives		
		Alt. 2 Complete Excavation with offsite Disposal	**Alt. 4 Partial Excavation with Offsite Disposal**	**Alt. 6 Containment**
33101	**HTRW REMEDIAL ACTION (CONSTRUCT)**	105,136.9	74,539.9	24,185.5
3310101	Mobilize and Preparatory Work	233.7	233.2	211.6
3310102	Monitoring, Sampling, Testing, Analysis	9,423.0	3,627.5	363.1
3310103	Site Work	81.1	62.8	54.9
3310105	Surface Water Collect & Control	421.7	200.4	18.8
331010801	Contaminated Soil Collection	10,568.4	5,244.6	581.7
331010805	Capping Contaminated Areas/Waste Pile	1,231.5	4,379.9	12,284.1
331011921	Transport to Storage/Disposal Facility	35,339.7	27,296.5	2,348.5
331011922	Disposal Fees and Taxes	28,240.5	19,850.0	1,629.5
3310120	Site Restoration	3,826.5	1,489.4	230.4
3310122	Gen Requirements (Opt Breakout)	15,770.8	12,155.6	6,462.9
3330101	**FUSRAP Program Management & Integration**	7,610.3	3,463.0	2,853.5
33401	**HTRW REMEDIAL ACTION (O&M)**[1]	0.0	1892.3	2,450.5
334010101	O&M Home Office Support	0.0	716.2	716.2
334010102	Warning Signs	0.0	18.7	56
334010103	Fence Repair	0.0	157.9	157.9
334010104	Surveillance	0.0	417.2	416.6
334010105	Annual Inspection	0.0	262.8	372.7
334010106	Five-Year Status Report	0.0	87.5	87.5
334010107	Cap Maintenance and Repair	0.0	232.0	643.7
	TOTAL RA AND O&M TOTAL[2]	**112,747.2**	**79,895.2**	**29,489.5**

[1] The "real" discounted rates used to calculate present values will be based on OMB Circular No. A-94 memorandum dated January 2006. The real Interest Rate used was 3.0%.
[2] Includes project overhead, profit, and owner cost

Table G.4. Seaway Site Remedial Alternatives Cost Summary (Discounted and Non-Discounted Cost in Thousands, December 2006 Dollars)

Remedial Alternatives		Capital and O&M Cost without Present Value[a]				
		Capital Cost	Duration (yr)	O&M Cost[a]	Duration (yr)	Total Cost[a]
2	Complete Excavation With Offsite Disposal	$113,000	3.8	$0	1,000	$113,000
4	Partial Excavation With Offsite Disposal	$78,000	2.8	$57,000	1,000	$135,000
6	Containment	$27,000	1.4	$74,000	1,000	$101,000

Remedial Alternatives		Capital and O&M Cost with Present Value[a]				
		Capital Cost	Duration (yr)	O&M Cost[b]	Duration (yr)	Total Cost
2	Complete Excavation With Offsite Disposal	$113,000	3.8	$0	1,000	$113,000
4	Partial Excavation With Offsite Disposal	$78,000	2.8	$1,900	1,000	$80,000
6	Containment	$27,000	1.4	$2,500	1,000	$30,000

[a] The O&M and Total Cost presented will not exactly match the costs shown in Table G.3 due to rounding.

[b] The "real" discounted rates used to calculate present values are based on OMB Circular No. A-94 memorandum dated January 2006. The real Interest Rate used was 3.0%.

APPENDIX G

ATTACHMENT

DETAILED COST ESTIMATES

Alternative 2 (Complete Excavation with Off-Site Disposal)
Alternative 4 (Partial Excavation with Off-Site Disposal) and
Alternative 6 (Containment)

APPENDIX G

ATTACHMENT (Cont'd)

DETAILED COST ESTIMATE FOR

Alternative 2 (Complete Excavation with Off-Site Disposal)

ALTERNATIVE 2 - FULL EXCAVATION WITH OFFSITE DISPOSAL
SEAWAY AREA A, B, C, NORTHSIDE, AND SOUTHSIDE

Estimated by	D. Cobb, R. Tucker, Mike Poligone
Designed by	SAIC
Prepared by	Mike Poligone
Preparation Date	7/31/2007
Effective Date of Pricing	12/11/2006
Estimated Construction Time	726 Days

Description	Page

Designed by	
SAIC	
Estimated by	
D. Cobb, R. Tucker, Mike Poligone	
Prepared by	
Mike Poligone	

Design Document	ADDENDUM TO THE FEASIBILITY STUDY - SEPTEMBER 2006
Document Date	
District	USACE BUFFALO DISTRICT
Contact	JANNA HUMMEL (PM)
Budget Year	2007
UOM System	English

Direct Costs
LaborCost
EQCost
MatlCost
SubBidCost

Timeline/Currency

Preparation Date	7/31/2007
Escalation Date	12/11/2006
Eff. Pricing Date	12/11/2006
Estimated Duration	726 Day(s)
Currency	US dollars
Exchange Rate	1.000000

Costbook CB04aEB: MII English Cost Book 2004b Final

Labor : MII English Cost Book 2004b Final
Note: System.Data.DataRow

Labor Rates
LaborCost1
LaborCost2
LaborCost3
LaborCost4

Equipment : Eq Rates EP 1110-1-8, Aug. 1995

Sales Tax	8.75
Working Hours per Year	1,600
Labor Adjustment Factor	1.00
Cost of Money	8.13
Cost of Money Discount	6.50
Tire Recap Cost Factor	1.50
Tire Recap Wear Factor	1.80
Tire Repair Factor	0.15
Equipment Cost Factor	1.00
Standby Depreciation Factor	0.50

Fuel

Electricity	0.060
Gas	3.100
Diesel Off-Road	2.500
Diesel On-Road	2.800

Shipping Rates

Over 0 CWT	12.05
Over 240 CWT	9.64
Over 300 CWT	7.23
Over 400 CWT	5.79
Over 500 CWT	4.45
Over 700 CWT	3.62
Over 800 CWT	4.29

Currency in US dollars

Date	Author	Note
12/11/2006	Mike Poligone	The purpose of this estimate is to provide the an order-of-magnitude cost for Alternative No. 2 for the Seaway Landfill in Tonawanda, New York, as part of Addendum To The Feasibility Study - September 2006. Under this alternative, the full excavation of MED soil will be performed in Area A, B, C, Northside (NS), and Southside (SS) within the Seaway Landfill. Material depths range from 4 feet to possibly up to 75 feet depending on the specific area of site. Upon removal and disposal of all contaminated material, the excavated areas will be backfilled with onsite overburden soils removed to get at the contaminated material and clean fill. This alternative include full excavation, so no O&M costs have been included.

The elements of this alternative include the excavation of 394,000 cubic yards (cy) of in place MED and clean overburden soils and the transportation, and disposal of approximately 118,000 cy of exsitu impacted radioactive MED soils as identified during site gamma walkover surveys and later investigations. It was assumed that 10% of the total MED soil would be mixed hazardous waste. The excavated MED soils will be stockpiled onsite, containerized in intermodals, and transported offsite by rail for disposal at an approved facility. The estimated schedule for this alternative assumes a start date for field activities of March after the design is complete. A 9-month construction schedule was assumed from March to November due to expected winter conditions that prohibit completion of site work. Based on this assumption and the anticipated site production rates, the entire project will take approximately 3.5 to 4 construction seasons. It is assumed that the excavation/loading and capping activities run concurrently in the last year. The professional staff and capital overhead is assumed to be required for 45 months unless otherwise noted.

To complete the excavation activities in areas A, B, and C, NS, and SS, the following sequence was assumed. Area A having the largest surface area and assumed maximum depth of 8 feet to MED soil, would be excavated first. The estimated volume of contaminated material removed from Area A is 75,700 cubic yards. A minimal amount of overburden material may be generated during the completion of Area A, but for the purposes of estimating, none was assumed. Upon receipt of satisfactory confirmation sample results, sections of Area A would be backfilled with clean overburden material from the excavation of other areas (Area B-C) in an effort to minimize stockpile space requirements and double handling. The excavation of the remainder of Area B-C would follow the completion of Area A because of the potential of generating large amounts of clean overburden material to access the MED soil. Upon completion of the excavation of Areas B-C sections and receipt of clean confirmation results, the resulting excavations will be backfilled to the appropriate elevation. The NS and SS areas are relatively smaller and could be done during or after Areas A, B, and C. The volumes and mass of soils to be excavated and disposed are provided in the Alternative 2 Key Parameters and Assumptions worksheet.

This alternative includes excavation of MED and overburden soils and consolidating in a stockpile on the Seaway site. The soils will be directly loaded from the stockpile into intermodals for transportation to the railcar staging and loading area. The intermodal containers will be loaded onto railcars for transport to a licensed and permitted disposal facility. Actual off-site disposal production rates may be affected by available intermodal containers and railcars, which can result in substantial daily delays.

All work is assumed to be managed by the prime contractor. Transportation and disposal will be subcontracted by the prime contractor and a 3% handling charge has been included. The prime contractor will perform all professional services and subcontract all field activities. The project schedule is based on 8 hours per day and 5 days per week. Overtime costs have not been included.

The professional labor assigned to the prime contractor includes the following markups: (1) Overhead 120%; (2) G&A 12%; (3) Profit 9%; and S/C Markup 3%.

The subcontractor includes the following markups: (1) Field Overhead (General Conditions) 10%; (2) Small Tools 2% (only on labor); (3) Profit 9%; and (3) Bonds 2.75%.

An 8.75% sales tax is included on material purchases. Prices from the USACE Unit Price Book, MEANS, RACER, and historical rates were adjusted to December 2006 pricing. A location factor of 0.94 was designated by RSMeans however the Davis Bacon Rates were higher than average rates listed in RSMeans, so no adjustment was made. Vendor quotes, USACE quotes, and engineering estimates were not adjusted for location or adjusted for price escalation. Labor rates were based on the 2/16/07 Department of Labor, Davis Bacon Rates and a 10% premium was added to account for employers paying more for employee retention.

A 10% Design markup has been included on all field work except transportation and disposal. A 25% contingency was applied to the entire estimate for design and construction contingency.

HTRW productivity factors, as established in the USACE Engineering Instructions, were also included for the remediation effort where applicable as noted in the estimate. This includes a 0.63 safety and contaminated materials productivity factor on all contaminated material handling activities. Additionally a weather delay factor of 0.8 and a radiological survey factor of 0.8 were included to account for delays in delineating areas of contamination.

FUSRAP Management and Integration costs have been included as of Revision 2 of this alternative (March, 2000). No Contractor or USACE cost for O&M activities are included. Costs incorporated into estimate are based on costs provided by USACE. This estimate is based on items presented in the Feasibility Study addendum entitled "Addendum to the Feasibility Study for the Seaway Site, Areas A, B, and C - Tonawanda, New York". The actual project budget may vary depending upon such factors as design parameters, scheduling, differing assumptions, revisions to the existing feasibility study, and other project specific requirements.

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Direct Cost Markups	**Category**	**Method**
Sales Tax	TaxAdj	Running % on Selected Costs
MatlCost		
Productivity (63%)	Productivity	Productivity
Productivity (85%)	Productivity	Productivity
Price Adjust Cost Book (4.6%)	TaxAdj	Running % on Selected Costs
LaborCost		
EQCost		
MatlCost		
SubBidCost		
USACE Labor Adj. (9.6%)	TaxAdj	Running % on Selected Costs
SubBidCost		
Buffalo Location Factor (-6%)	TaxAdj	Running % on Selected Costs
LaborCost		
EQCost		
MatlCost		
SubBidCost		

Contractor Markups	**Category**	**Method**
Prime OH	HOOH	Running %
Prime G&A	Allowance	Running %
Prime Profit	Allowance	Running %
Craft HOOH	Allowance	Running %
Craft FOOH	Allowance	Running %
Craft Profit	Profit	Running %
Craft Small Tools (Small Tools)	JOOH	% of Labor
Craft Small Tools	JOOH	JOOH (Calculated)
Craft Bond	Bond	Bond Table
HTRW (Other), Banded, 24 months, 1.00% Surcharge		

Contract Price	*Bond Rate*
0	*4.40*
3,000,000	*3.85*
5,000,000	*3.30*
7,500,000	*2.75*

Craft Insurance	MiscContract	Running %
Small TOols (Small Tools)	JOOH	% of Labor
Transport & Disposal Handlinf	Allowance	Running %

Owner Markups	**Category**	**Method**
Design	MiscOwner	Running %
Conting (Running%)	Contingency	Running %
Cost Book Calc	Escalation	Escalation

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

StartDate	StartIndex	EndDate	EndIndex	Escalation
1/28/2004	*3,703.10*	*12/31/2006*	*3,874.40*	*4.63*

USACE Labor Calc   Escalation   Escalation

StartDate	StartIndex	EndDate	EndIndex	Escalation
3/11/2000	*3,536.00*	*12/11/2006*	*3,874.00*	*9.56*

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
Seaway Alt 2			**35,966.05**		**15,787,135.90**	**5,887,985.10**	**2,111,045.94**	**50,588,455.51**	**74,374,622.46**	**82,234,271.77**	**88,322,471.77**	**112,747,271.55**
			0.2602		*72.1631*	*42.6048*	*15.2753*	*364.2435*	*494.2867*	*595.0381*	*595.0381*	*760.7599*
1 331XX HTRW REMEDIAL ACTION (CONSTRUCT)	**CY**	**138,200.0000**	**35,966.05**		**9,972,935.90**	**5,887,985.10**	**2,111,045.94**	**50,338,455.51**	**68,310,422.46**	**82,234,271.77**	**82,234,271.77**	**105,137,021.55**
			0.0000		*41,438.1269*	*24,516.6066*	*58,707.0000*	*0.0000*	*124,661.7336*	*169,979.9037*	*169,979.9037*	*233,722.3675*
1.1 331XX01 Mobilize and Preparatory Work	**EA**	**1.0000**	**0.00**		**41,438.13**	**24,516.61**	**58,707.00**	**0.00**	**124,661.73**	**169,979.90**	**169,979.90**	**233,722.37**
			0.0000		*6,795.0000*	*15,750.0000*	*0.0000*	*0.0000*	*22,545.0000*	*27,962.3944*	*27,962.3944*	*38,448.2923*
1.1.1 331XX0101 Mob Construction Equip & Fac	**EA**	**1.0000**	**0.00**		**6,795.00**	**15,750.00**	**0.00**	**0.00**	**22,545.00**	**27,962.39**	**27,962.39**	**38,448.29**
			0.0000		*6,795.0000*	*15,750.0000*	*0.0000*	*0.0000*	*22,545.0000*	*27,962.3944*	*27,962.3944*	*38,448.2923*
1.1.1.1 331XX010107 Const Equip Ownership/Oper	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**6,795.00**	**15,750.00**	**0.00**	**0.00**	**22,545.00**	**27,962.39**	**27,962.39**	**38,448.29**
(Note: Mob/Demob of heavy equipment is based on the estimated equipment reuirements for excavation, loading, backfill, and capping requirements. This element includes mob/demob of 15 pieces of equipment per season. Actual number of mob/demob required will depend on scheduling of project.)												
1.1.1.1.1 331XX01010701 Mobilization/Demobilization - Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**6,795.00**	**15,750.00**	**0.00**	**0.00**	**22,545.00**	**27,962.39**	**27,962.39**	**38,448.29**
			0.0000		*75.5000*	*175.0000*	*0.0000*	*0.0000*	*250.5000*	*310.6933*	*310.6933*	*427.2032*
1.1.1.1.1.1 RSM 015436500100 Mobilization or demobilization, dozer, loader, backhoe or excavator, above 250 H.P., up to 50 miles	EA	90.0000	0.00	1.2 CL Craft Labor	6,795.00	15,750.00	0.00	0.00	22,545.00	27,962.39	27,962.39	38,448.29
(Note: Cost Based on MEANS 2006, 4th quarther, US Natl Average.)												
			0.0000		*16,962.1269*	*7,407.6066*	*48,160.0000*	*0.0000*	*72,529.7336*	*104,176.3556*	*104,176.3556*	*143,242.4890*
1.1.2 331XX0104 Setup/Construct Temp Facilities	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**16,962.13**	**7,407.61**	**48,160.00**	**0.00**	**72,529.73**	**104,176.36**	**104,176.36**	**143,242.49**
			0.0000		*2.2628*	*2.5543*	*15.4000*	*0.0000*	*20.2171*	*28.5948*	*28.5948*	*39.3178*
1.1.2.1 331XX010423 Aggregate Surfacing	**EA**	**400.0000**	**0.00**	**1.2 CL Craft Labor**	**905.12**	**1,021.74**	**6,160.00**	**0.00**	**8,086.86**	**11,437.92**	**11,437.92**	**15,727.13**
1.1.2.1.1 331XX01042301 MED Soil Staging Area - Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**905.12**	**1,021.74**	**6,160.00**	**0.00**	**8,086.86**	**11,437.92**	**11,437.92**	**15,727.13**
(Note: Assume the rail staging area is in place from the Ashland Project. Assume 20,000 sf of gravel is required to upgrade existing area for future loading operations. Assume 6" depth.)												
			0.0000		*2.2628*	*2.5543*	*15.4000*	*0.0000*	*20.2171*	*28.5948*	*28.5948*	*39.3178*

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.1.2.1.1.1 AF 027202001530 Aggregrate base course, for roadways and large paved areas, gravel, bank run, compacted, 6" deep	CY	400.0000	0.00	1.2 CL Craft Labor	905.12	1,021.74	6,160.00	0.00	8,086.86	11,437.92	11,437.92	15,727.13
			0.0000		*5,657.0060*	*6,385.8678*	*38,500.0000*	*0.0000*	*50,542.8738*	*71,486.9750*	*71,486.9750*	*98,294.5906*
1.1.2.2 331XX010425 Roads and Parking	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**5,657.01**	**6,385.87**	**38,500.00**	**0.00**	**50,542.87**	**71,486.97**	**71,486.97**	**98,294.59**
1.1.2.2.1 331XX01042501 Preparation Access Roads	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**5,657.01**	**6,385.87**	**38,500.00**	**0.00**	**50,542.87**	**71,486.97**	**71,486.97**	**98,294.59**
(Note: Assume roadways are 20 feet wide and thickness is 1.5 feet. Estimate is for 2,000 LF of temporary roads. Assume 10% compaction.)												
			0.0000		*2.2628*	*2.5543*	*15.4000*	*0.0000*	*20.2171*	*28.5948*	*28.5948*	*39.3178*
1.1.2.2.1.1 AF 027202001530 Aggregrate base course, for roadways and large paved areas, gravel, bank run, compacted, 6" deep	CY	2,500.0000	0.00	1.2 CL Craft Labor	5,657.01	6,385.87	38,500.00	0.00	50,542.87	71,486.97	71,486.97	98,294.59
			0.0000		*10,400.0000*	*0.0000*	*3,500.0000*	*0.0000*	*13,900.0000*	*21,251.4647*	*21,251.4647*	*29,220.7640*
1.1.2.3 331XX010430 Erosion Control	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**10,400.00**	**0.00**	**3,500.00**	**0.00**	**13,900.00**	**21,251.46**	**21,251.46**	**29,220.76**
1.1.2.3.1 331XX01043002 Erosion/Sediment Control - Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**10,400.00**	**0.00**	**3,500.00**	**0.00**	**13,900.00**	**21,251.46**	**21,251.46**	**29,220.76**
			0.0000		*2.0800*	*0.0000*	*0.7000*	*0.0000*	*2.7800*	*4.2503*	*4.2503*	*5.8442*
1.1.2.3.1.1 MIL 023707001120 Erosion control, silt fence, polypropylene, 3' high, includes 7.5' posts	LF	5,000.0000	0.00	1.2 CL Craft Labor	10,400.00	0.00	3,500.00	0.00	13,900.00	21,251.46	21,251.46	29,220.76
			0.0000		*17,681.0000*	*1,359.0000*	*10,547.0000*	*0.0000*	*29,587.0000*	*37,841.1536*	*37,841.1536*	*52,031.5862*
1.1.3 331XX0105 Construct Temporary Utilities	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**17,681.00**	**1,359.00**	**10,547.00**	**0.00**	**29,587.00**	**37,841.15**	**37,841.15**	**52,031.59**
1.1.3.1 331XX010501 Utility Installation - Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**17,681.00**	**1,359.00**	**10,547.00**	**0.00**	**29,587.00**	**37,841.15**	**37,841.15**	**52,031.59**
1.1.3.1.1 RAC RACER Temporary Trailer Utility Hookups	LS	1.0000	0.00	1.2 CL Craft Labor	10,590.00	834.00	8,317.00	0.00	19,741.00	25,387.22	25,387.22	34,907.43
(Note: Cost based on RACER 2006 cost model for Overhead Electrical Distribution based on 1000 lf run of 5kV, 3 phase, 160 amp service. Assume pole spacing at 250 ft.)												
1.1.3.1.2 USR Temp Telephone Install (5 lines)	LS	1.0000	0.00	1.2 CL Craft Labor	400.00	0.00	100.00	0.00	500.00	631.00	631.00	867.62
(Note: Cost based on an Engineering Estimate.)												

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.1.3.1.3 RAC RACER Utility Trench Excavation	LS	1.0000	0.00	1.2 CL Craft Labor	6,691.00	525.00	2,130.00	0.00	9,346.00	11,822.93	11,822.93	16,256.53
(Note: Cost based on RACER 2006 cost model for trenching and includes 1000 lf trench with 2" PVC water line. Trench is 4 ft deep and 3 ft wide.)												
			0.0000		*2,027,520.0000*	*198,000.0000*	*0.0000*	*2,969,245.0400*	*5,194,765.0400*	*6,853,052.8600*	*6,853,052.8600*	*9,422,947.6825*
1.2 331XX02 Monitoring, SampIng, Testing, Analysis	**EA**	**1.0000**	**0.00**		**2,027,520.00**	**198,000.00**	**0.00**	**2,969,245.04**	**5,194,765.04**	**6,853,052.86**	**6,853,052.86**	**9,422,947.68**
			0.0000		*2,027,520.0000*	*198,000.0000*	*0.0000*	*2,969,245.0400*	*5,194,765.0400*	*6,853,052.8600*	*6,853,052.8600*	*9,422,947.6825*
1.2.1 331XX0208 Sampling Radioactve Contam Media	**EA**	**1.0000**	**0.00**		**2,027,520.00**	**198,000.00**	**0.00**	**2,969,245.04**	**5,194,765.04**	**6,853,052.86**	**6,853,052.86**	**9,422,947.68**
			0.0000		*2,027,520.0000*	*198,000.0000*	*0.0000*	*2,969,245.0400*	*5,194,765.0400*	*6,853,052.8600*	*6,853,052.8600*	*9,422,947.6825*
1.2.1.1 331XX020805 Sub-Surface Soil	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**2,027,520.00**	**198,000.00**	**0.00**	**2,969,245.04**	**5,194,765.04**	**6,853,052.86**	**6,853,052.86**	**9,422,947.68**
1.2.1.1.1 1 3 1 1 1 Seaway MSA - Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**2,027,520.00**	**198,000.00**	**0.00**	**2,969,245.04**	**5,194,765.04**	**6,853,052.86**	**6,853,052.86**	**9,422,947.68**
(Note: Includes all monitoring, sampling, and analysis and verification testing.)												
			0.0000		*2,027,520.0000*	*198,000.0000*	*0.0000*	*0.0000*	*2,225,520.0000*	*3,170,320.5082*	*3,170,320.5082*	*4,359,190.6988*
1.2.1.1.1.1 331XX02080501 Rad Monitoring	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**2,027,520.00**	**198,000.00**	**0.00**	**0.00**	**2,225,520.00**	**3,170,320.51**	**3,170,320.51**	**4,359,190.70**
(Note: This element covers IH/HP technicians for the following areas: 3 at the excavation site to survey personnel, survey additional areas requiring excavation, and obtaining post RA samples for 30 months; 4 at the loading site to survey personnel and transport vehicles for 25 months; and 2 at the onsite lab to analyze samples/swipes and calibrate equipment for 25 months. The IH/HP technicians and equipment would be required for a total of 240 months duration at 176 hrs/month spanning approximately 4 years. Total hours is 42,240. Equipment pricing base on Vendor Quote and escalated to 12/2006 pricing.;Rates escalated from 2/2002)- The Beryllium and Radiological monitoring equipment includes the following: 1. Model 2929 dual channel scaler (2 @ $440/mo =$880/mo) 2. Alpha Survey Instrument, 43-5 or equal (3 @ 260/mo = $880/mo) 3. Ratemeter w/GM pancake, 44-9 or equal (2 @ $235/mo = $470/mo) 4. Alarming Frisker w/ GM pancake, 44-9 or equal (5 @ $160/mo = $800/mo) 5. Micro R Meter, Model 19 or equal (2 @ $160/mo = $320/mo) 6. Personal Air Sampling pumps (3 @ $100/mo = $300/mo) 7. Personal air sampling pump charger (2 @ $60/mo = $120/mo) 8. High Volume air samplers (8 @ $155/mo = $1,240/mo) Total = $5,010/month. Use $5,500/mo direct cost to account for other miscellaneous equipment or supplies. Assume technicians are permanate in area and no per diem or travel is required.)												
			0.0000		*0.0000*	*5,500.0000*	*0.0000*	*0.0000*	*5,500.0000*	*6,821.6087*	*6,821.6087*	*9,379.7120*
1.2.1.1.1.1.1 USR Rad Monitoring Equipment	MO	36.0000	0.00	1.2 CL Craft Labor	0.00	198,000.00	0.00	0.00	198,000.00	245,577.91	245,577.91	337,669.63
(Note: (4 seasons x 9 months/season))												
			0.0000		*48.0000*	*0.0000*	*0.0000*	*0.0000*	*48.0000*	*69.2411*	*69.2411*	*95.2065*
1.2.1.1.1.1.2 RAD H-RADPRTEC Radiation Protection Technicians	HR	42,240.0000	0.00	1.2 CL Craft Labor	2,027,520.00	0.00	0.00	0.00	2,027,520.00	2,924,742.59	2,924,742.59	4,021,521.07
			0.0000		*0.0000*	*0.0000*	*0.0000*	*17,888.0000*	*17,888.0000*	*22,186.3522*	*22,186.3522*	*30,506.2343*
1.2.1.1.1.2 331XX02080502 Bioassays	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**17,888.00**	**17,888.00**	**22,186.35**	**22,186.35**	**30,506.23**
(Note: Bioassays (2/yr x 4 yrs x 20 people))												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*111.8000*	*111.8000*	*138.6647*	*138.6647*	*190.6640*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.2.1.1.1.2.1 RAD 021055508154 Testing, rad analytical urine & feces, radium-226, 228, radon de-emanation, gas flow	EA	160.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	17,888.00	17,888.00	22,186.35	22,186.35	30,506.23
			0.0000		*0.0000*	*0.0000*	*0.0000*	*2,951,357.0400*	*2,951,357.0400*	*3,660,545.9995*	*3,660,545.9995*	*5,033,250.7494*
1.2.1.1.1.3 331XX02080503 Rad Lab Soils Analysis	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**2,951,357.04**	**2,951,357.04**	**3,660,546.00**	**3,660,546.00**	**5,033,250.75**

(Note: Since a MARSSIM analysis has not been performed, assume confirmation samples are obtained every 1,000 sf. The total area is 918,000 sf. Total samples collected are 918. Add 300% additional samples for sidewall samples and overburden delineation. Add 30% additional samples for hotspots. Total samples = 3,600 ea Samples will be analyzed for radionuclides. Assume 1% of rad samples will also have TCLP Test = 36 ea.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*65.9200*	*65.9200*	*81.7601*	*81.7601*	*112.4201*
1.2.1.1.1.3.1 HTW 021055506428 Documentation package, for Q.A. verification	EA	720.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	47,462.40	47,462.40	58,867.26	58,867.26	80,942.48
			0.0000		*0.0000*	*0.0000*	*0.0000*	*121.0000*	*121.0000*	*150.0754*	*150.0754*	*206.3537*
1.2.1.1.1.3.2 RAD 021055508236 Testing, rad analytical vegetation/sediment/soil, gamma spectroscopy, radium-226, 228	EA	3,600.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	435,600.00	435,600.00	540,271.41	540,271.41	742,873.19
			0.0000		*0.0000*	*0.0000*	*0.0000*	*98.6200*	*98.6200*	*122.3176*	*122.3176*	*168.1868*
1.2.1.1.1.3.3 RAD 021055508238 Testing, rad analytical vegetation/sediment/soil, gamma spectroscopy, uranium-total	EA	3,600.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	355,032.00	355,032.00	440,343.53	440,343.53	605,472.35
			0.0000		*0.0000*	*0.0000*	*0.0000*	*126.5700*	*126.5700*	*156.9838*	*156.9838*	*215.8528*
1.2.1.1.1.3.4 RAD 021055508216 Testing, rad analytical vegetation/sediment/soil, alpha spectroscopy, uranium isotopic	EA	3,600.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	455,652.00	455,652.00	565,141.76	565,141.76	777,069.92
			0.0000		*0.0000*	*0.0000*	*0.0000*	*123.4300*	*123.4300*	*153.0893*	*153.0893*	*210.4978*
1.2.1.1.1.3.5 RAD 021055508215 Testing, rad analytical vegetation/sediment/soil, alpha spectroscopy, thorium isotopic	EA	3,600.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	444,348.00	444,348.00	551,121.49	551,121.49	757,792.05
			0.0000		*0.0000*	*0.0000*	*0.0000*	*46.2700*	*46.2700*	*57.3883*	*57.3883*	*78.9090*
1.2.1.1.1.3.6 RAD 021055508252 Testing, rad analytical vegetation/sediment/soil, gross alpha & gross beta, total	EA	3,600.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	166,572.00	166,572.00	206,598.00	206,598.00	284,072.25
			0.0000		*0.0000*	*0.0000*	*0.0000*	*289.6700*	*289.6700*	*359.2755*	*359.2755*	*494.0039*
1.2.1.1.1.3.7 AFH 021055507120 Testing, TAL metals (6010/7000s)	EA	3,600.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	1,042,812.00	1,042,812.00	1,293,391.90	1,293,391.90	1,778,413.86

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*107.7400*	*107.7400*	*133.6291*	*133.6291*	*183.7400*
1.2.1.1.1.3.8 AFH 021055507427 Testing, RCRA evaluations, toxic characteristic leaching procedure, TCLP (RCRA) (EPA 1311)	EA	36.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	3,878.64	3,878.64	4,810.65	4,810.65	6,614.64
			0.0000		*31,049.7759*	*0.0000*	*5,500.0000*	*0.0000*	*36,549.7759*	*58,989.1688*	*58,989.1688*	*81,110.1071*
1.3 331XX03 Site Work	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**31,049.78**	**0.00**	**5,500.00**	**0.00**	**36,549.78**	**58,989.17**	**58,989.17**	**81,110.11**
			0.0000		*31,049.7759*	*0.0000*	*5,500.0000*	*0.0000*	*36,549.7759*	*58,989.1688*	*58,989.1688*	*81,110.1071*
1.3.1 331XX0303 Earthwork	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**31,049.78**	**0.00**	**5,500.00**	**0.00**	**36,549.78**	**58,989.17**	**58,989.17**	**81,110.11**
			0.0000		*31,049.7759*	*0.0000*	*5,500.0000*	*0.0000*	*36,549.7759*	*58,989.1688*	*58,989.1688*	*81,110.1071*
1.3.1.1 331XX030302 Excavation/Fill	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**31,049.78**	**0.00**	**5,500.00**	**0.00**	**36,549.78**	**58,989.17**	**58,989.17**	**81,110.11**
1.3.1.1.1 331XX03030201 Surveying Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**31,049.78**	**0.00**	**5,500.00**	**0.00**	**36,549.78**	**58,989.17**	**58,989.17**	**81,110.11**
(Note: This is a summary line item for required surveying services throughout the project. Includes staking of areas to be excavated or capped, volume calculations for pay items, establish and reestablish control points for both excavation and landfill cap, and layout of landfill cap.)												
1.3.1.1.1.1 331XX0303020101 Establish Site Control/Layout	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**10,000.14**	**0.00**	**2,500.00**	**0.00**	**12,500.14**	**19,986.95**	**19,986.95**	**27,482.05**
(Note: Assume 3 man crew for 4 weeks (60 days) and 22 days drafting to develop drawings. Assume 22 days/month.)												
			0.0000		*2,825.8621*	*0.0000*	*0.0000*	*0.0000*	*2,825.8621*	*4,703.2591*	*4,703.2591*	*6,466.9812*
1.3.1.1.1.1.1 MIL 013107000640 Field Personnel, surveyor	MO	2.7200	0.00	1.2 CL Craft Labor	7,686.34	0.00	0.00	0.00	7,686.34	12,792.86	12,792.86	17,590.19
			0.0000		*2,313.7931*	*0.0000*	*0.0000*	*0.0000*	*2,313.7931*	*3,822.0376*	*3,822.0376*	*5,255.3017*
1.3.1.1.1.1.2 MIL 013107000650 Field Personnel, draftsman	MO	1.0000	0.00	1.2 CL Craft Labor	2,313.79	0.00	0.00	0.00	2,313.79	3,822.04	3,822.04	5,255.30
1.3.1.1.1.1.3 USR Miscellaneous Materials and Supplies	LS	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	2,500.00	0.00	2,500.00	3,372.05	3,372.05	4,636.56
(Note: Cost based on an Engineering Estimate.)												
1.3.1.1.1.2 331XX0303020102 Reestablish Site Control/Layout	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**7,225.48**	**0.00**	**1,000.00**	**0.00**	**8,225.48**	**13,348.58**	**13,348.58**	**18,354.30**
(Note: Assume 20 visits of a 2 man crew (40 days) and 20 days drafting to develop drawings. Assume 22 days/month.)												
			0.0000		*2,825.8621*	*0.0000*	*0.0000*	*0.0000*	*2,825.8621*	*4,703.2591*	*4,703.2591*	*6,466.9812*
1.3.1.1.1.2.1 MIL 013107000640 Field Personnel, surveyor	MO	1.8200	0.00	1.2 CL Craft Labor	5,143.07	0.00	0.00	0.00	5,143.07	8,559.93	8,559.93	11,769.91
			0.0000		*2,313.7931*	*0.0000*	*0.0000*	*0.0000*	*2,313.7931*	*3,822.0376*	*3,822.0376*	*5,255.3017*
1.3.1.1.1.2.2 MIL 013107000650 Field Personnel, draftsman	MO	0.9000	0.00	1.2 CL Craft Labor	2,082.41	0.00	0.00	0.00	2,082.41	3,439.83	3,439.83	4,729.77

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.3.1.1.1.2.3 FOP Materials and Supplies	LS	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	1,000.00	0.00	1,000.00	1,348.82	1,348.82	1,854.62
1.3.1.1.1.3 331XX0303020103 Volume Surveys	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**10,861.36**	**0.00**	**1,000.00**	**0.00**	**11,861.36**	**19,386.69**	**19,386.69**	**26,656.69**
(Note: Assume 1 visit per month for 30 months of 2 man crew (60 days) and 30 days drafting to develop drawings. Assume 22 days/month.)												
			0.0000		*2,825.8621*	*0.0000*	*0.0000*	*0.0000*	*2,825.8621*	*4,703.2591*	*4,703.2591*	*6,466.9812*
1.3.1.1.1.3.1 MIL 013107000640 Field Personnel, surveyor	MO	2.7300	0.00	1.2 CL Craft Labor	7,714.60	0.00	0.00	0.00	7,714.60	12,839.90	12,839.90	17,654.86
			0.0000		*2,313.7931*	*0.0000*	*0.0000*	*0.0000*	*2,313.7931*	*3,822.0376*	*3,822.0376*	*5,255.3017*
1.3.1.1.1.3.2 MIL 013107000650 Field Personnel, draftsman	MO	1.3600	0.00	1.2 CL Craft Labor	3,146.76	0.00	0.00	0.00	3,146.76	5,197.97	5,197.97	7,147.21
1.3.1.1.1.3.3 USR Miscellaneous Materials and Supplies	LS	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	1,000.00	0.00	1,000.00	1,348.82	1,348.82	1,854.62
(Note: Cost based on an Engineering Estimate.)												
1.3.1.1.1.4 331XX0303020104 Post Restoration Survey	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**2,962.79**	**0.00**	**1,000.00**	**0.00**	**3,962.79**	**6,266.95**	**6,266.95**	**8,617.06**
(Note: Assume 3 man crew for 5 days (15 days) and 10 days drafting to develop drawings. Assume 22 days/month.)												
			0.0000		*2,825.8621*	*0.0000*	*0.0000*	*0.0000*	*2,825.8621*	*4,703.2591*	*4,703.2591*	*6,466.9812*
1.3.1.1.1.4.1 MIL 013107000640 Field Personnel, surveyor	MO	0.6800	0.00	1.2 CL Craft Labor	1,921.59	0.00	0.00	0.00	1,921.59	3,198.22	3,198.22	4,397.55
			0.0000		*2,313.7931*	*0.0000*	*0.0000*	*0.0000*	*2,313.7931*	*3,822.0376*	*3,822.0376*	*5,255.3017*
1.3.1.1.1.4.2 MIL 013107000650 Field Personnel, draftsman	MO	0.4500	0.00	1.2 CL Craft Labor	1,041.21	0.00	0.00	0.00	1,041.21	1,719.92	1,719.92	2,364.89
1.3.1.1.1.4.3 USR Miscellaneous Materials and Supplies	LS	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	1,000.00	0.00	1,000.00	1,348.82	1,348.82	1,854.62
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*3,790.0168*	*0.0000*	*56,845.7200*	*171,676.0800*	*232,311.8168*	*306,723.1499*	*306,723.1499*	*421,744.3311*
1.4 331XX05 Surface Water Collect & Control	**EA**	**1.0000**	**0.00**		**3,790.02**	**0.00**	**56,845.72**	**171,676.08**	**232,311.82**	**306,723.15**	**306,723.15**	**421,744.33**
			0.0000		*3,790.0168*	*0.0000*	*56,845.7200*	*171,676.0800*	*232,311.8168*	*306,723.1499*	*306,723.1499*	*421,744.3311*
1.4.1 331XX0509 Lagoons/Basins/Tanks/Dikes	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**3,790.02**	**0.00**	**56,845.72**	**171,676.08**	**232,311.82**	**306,723.15**	**306,723.15**	**421,744.33**
			0.0000		*3,790.0168*	*0.0000*	*56,845.7200*	*171,676.0800*	*232,311.8168*	*306,723.1499*	*306,723.1499*	*421,744.3311*
1.4.1.1 331XX050901 Excavation Dewatering	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**3,790.02**	**0.00**	**56,845.72**	**171,676.08**	**232,311.82**	**306,723.15**	**306,723.15**	**421,744.33**
			0.0000		*0.0581*	*0.0000*	*0.8719*	*2.6331*	*3.5631*	*4.7043*	*4.7043*	*6.4685*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.4.1.1.1 331XX05090101 Surface Water Collection and Containment - Area A, B, C, Northside, and Southside	**GAL**	**65,200.0000**	**0.00**	**1.2 CL Craft Labor**	**3,790.02**	**0.00**	**56,845.72**	**171,676.08**	**232,311.82**	**306,723.15**	**306,723.15**	**421,744.33**
(Note: Rainfall amounting to roughly 3 inches per month to be removed from excavations and stored until discharged to the leachate collection system. Assume that discharge can be permitted through the leachate collection system. Assume active open excavations for 36 months (30 months of excavation plus six months additional during restoration). Labor to operate pumps is included in the dust control element under excavation. Laborers will maintain both dust controls and dewatering activities. Assume roughly 1 acre of excavation to be open and requiring dewatering at anyone time. Assume 20% infiltration. Volume = 43,560 sf x 0.25 ft x .8 = 8,712 CF. Volume = 8,712 cf x 7.48 gal/cf = 65,166 gal.)												
			0.0000		*695.4215*	*0.0000*	*4,349.4800*	*0.0000*	*5,044.9015*	*7,247.1459*	*7,247.1459*	*9,964.8257*
1.4.1.1.1.1 MIL 152305005090 Pump, general utility, centrifugal, in-line, vertical mount, iron body, 125 lb. flanged, 3550 RPM, single stage, 300 GPM, 50 H.P., 3" discharge, includes TEFC motor	EA	4.0000	0.00	1.2 CL Craft Labor	2,781.69	0.00	17,397.92	0.00	20,179.61	28,988.58	28,988.58	39,859.30
			0.0000		*195.9627*	*0.0000*	*1,141.0000*	*0.0000*	*1,336.9627*	*1,922.0993*	*1,922.0993*	*2,642.8866*
1.4.1.1.1.2 AF 151802004090 Pump, circulating, cast iron, close coupled, end suction, bronze impeller, flanged joints, 2 H.P., to 50 GPM, 2" size	EA	4.0000	0.00	1.2 CL Craft Labor	783.85	0.00	4,564.00	0.00	5,347.85	7,688.40	7,688.40	10,571.55
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,154.9300*	*1,154.9300*	*1,498.7735*	*1,498.7735*	*2,060.8136*
1.4.1.1.1.3 HTW 021055509117 Wastewater holding tanks, above ground, steel, open, stationary, monthly rental, 21,000 gal	MO	144.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	166,309.92	166,309.92	215,823.38	215,823.38	296,757.15
(Note: Assume 4 tanks per month average during excavation (36 months))												
			0.0000		*0.0000*	*0.0000*	*210.9500*	*0.0000*	*210.9500*	*297.7071*	*297.7071*	*409.3472*
1.4.1.1.1.4 HTW 021503004162 High sump level switch, (for avoiding overflow)	EA	4.0000	0.00	1.2 CL Craft Labor	0.00	0.00	843.80	0.00	843.80	1,190.83	1,190.83	1,637.39
			0.0000		*0.0000*	*0.0000*	*450.0000*	*74.5300*	*524.5300*	*699.4071*	*699.4071*	*961.6848*
1.4.1.1.1.5 HTW 021055506111 Sample collection, subcontracted sampling, hourly rate (air, water, soil, ground water)	EA	72.0000	0.00	1.2 CL Craft Labor	0.00	0.00	32,400.00	5,366.16	37,766.16	50,357.31	50,357.31	69,241.31
(Note: Assume 2 samples per month with 4 hrs labor and 36 months total. Analytical cost based on Engineering Estimate.)												
			0.0000		*0.2245*	*0.0000*	*1.6400*	*0.0000*	*1.8645*	*2.6746*	*2.6746*	*3.6776*
1.4.1.1.1.6 MIL 139104002360 Fire Hose, less couplings, synthetic jacket, lined, high strength, 500 lb test, 1-1/2" dia, excludes couplings	LF	1,000.0000	0.00	1.2 CL Craft Labor	224.48	0.00	1,640.00	0.00	1,864.48	2,674.64	2,674.64	3,677.63

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			35,966.0469		*2,876,082.6488*	*2,815,228.6199*	*398,922.7400*	*66,577.2800*	*6,156,811.2887*	*8,581,778.4410*	*8,581,778.4410*	*11,799,945.3564*
1.5 331XX08 Solids Collect And Containment	**EA**	**1.0000**	**35,966.05**		**2,876,082.65**	**2,815,228.62**	**398,922.74**	**66,577.28**	**6,156,811.29**	**8,581,778.44**	**8,581,778.44**	**11,799,945.36**
			0.0000		*2,754,575.6411*	*2,732,096.3487*	*23,297.5000*	*66,577.2800*	*5,576,546.7697*	*7,686,106.9591*	*7,686,106.9591*	*10,568,397.0687*
1.5.1 331XX0801 Contaminated Soil Collection	**EA**	**1.0000**	**0.00**		**2,754,575.64**	**2,732,096.35**	**23,297.50**	**66,577.28**	**5,576,546.77**	**7,686,106.96**	**7,686,106.96**	**10,568,397.07**
			0.0000		*2,754,575.6411*	*2,732,096.3487*	*23,297.5000*	*66,577.2800*	*5,576,546.7697*	*7,686,106.9591*	*7,686,106.9591*	*10,568,397.0687*
1.5.1.1 331XX080102 Excavation	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**2,754,575.64**	**2,732,096.35**	**23,297.50**	**66,577.28**	**5,576,546.77**	**7,686,106.96**	**7,686,106.96**	**10,568,397.07**

(Note: This element includes all equipment, labor, and material costs directly associated with the excavation of MED and overburden soil. The estimated volume of soil to be removed from each area is: (1) Area A - 75,700 cy (94,600 cy exsitu); (2) Area B-C - 304,000 cy (380,000 cy exsitu); (3) Northside 5,300 cy (6,600 cy exsitu); and (4) Southside 9,100 cy (11,400 cy exsitu). The expected maximum excavation depth in Areas A is 10 feet and up to 75 ft in Area B-C. The parameters and assumptions are as follows: (1) The excavation production will be greater than the transportation and loading, so the total excavation of MED soil will be limited to 55,000 cy per year. This is based on a 1 month mob and setup, 7 months transport and disposal, and 1 month demob and cleanup. Rail shipments based on USACE provided data and assume that 20 intermodals will be shipped per day for 7 months for a total volume of 55,000 cy. The annual material to be shipped will be excavated and stockpiled in a 3-4 month period. (2) Construction of temporary access roads may be required to remove material upon reaching maximum depths and to control site traffic flow. (3) Assumes area at site will be designated for stockpiling of both radiologically impacted soil and overburden to be reused as backfill. (4) Assumes transport of material from excavation area and stockpile areas (and vice versa) is accomplished using articulated dump trucks. (5) Covered stockpiles and intermodals will be used for storage of impacted material. (6) Assumes radiologically impacted soils will be stockpiled and covered with a tarp to provide a constant dry source of soils for loading. Soils will be loaded from the stockpile into intermodals, surveyed, and transported to the loading area at the rail spur for off-site disposal. (7) The clean overburden removed during the excavation activities can be placed in Area A or new Area B-C as backfill. (8) Safety and contaminated materials handling factor of 63% carried for HRTW components of project. Production rates have been adjusted additionally for weather (1 day/week) and delays associated with delineating the areas to be excavated (1 day/week). The total productivity factor of 0.40 was added to the excavation of MED and overburden soils.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*515,381.6000*	*5,364.2529*	*4,220.0000*	*46,577.2800*	*571,543.1329*	*846,343.7201*	*846,343.7201*	*1,163,722.6152*
1.5.1.1.1 331XX08010201 Dust Control	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**515,381.60**	**5,364.25**	**4,220.00**	**46,577.28**	**571,543.13**	**846,343.72**	**846,343.72**	**1,163,722.62**
1.5.1.1.1.1 331XX0801020101 Dust Control - Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**515,381.60**	**5,364.25**	**4,220.00**	**46,577.28**	**571,543.13**	**846,343.72**	**846,343.72**	**1,163,722.62**

(Note: Active excavation and loading is approximately 32 months (30 months excavation with 2 months overlap in loading). Assume dust control at loading area and excavation area full time (2 FTE).)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*727.7700*	*727.7700*	*944.1695*	*944.1695*	*1,298.2330*
1.5.1.1.1.1.1 HTW 019102003101 Spray washers, cold water, gas, 3200 psi, 4.2 GPM, 11 HP, rent/month	MO	64.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	46,577.28	46,577.28	60,426.85	60,426.85	83,086.91

(Note: 2 each)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*68.2071*	*68.2071*	*93.7848*
1.5.1.1.1.1.2 MIL B-LABORER Laborers, (Semi-Skilled)	HR	11,264.0000	0.00	1.2 CL Craft Labor	512,512.00	0.00	0.00	0.00	512,512.00	768,285.02	768,285.02	1,056,391.90
			0.0000		*0.1360*	*0.2542*	*0.2000*	*0.0000*	*0.5902*	*0.8356*	*0.8356*	*1.1490*
1.5.1.1.1.1.3 MIL 023153109030 Water for compaction, 5000 gallon wagon, 3 mile haul	ECY	21,100.0000	0.00	1.2 CL Craft Labor	2,869.60	5,364.25	4,220.00	0.00	12,453.85	17,631.86	17,631.86	24,243.81

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.5.1.1.2 331XX08010202 Excavation of MED Material Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**1,752,299.72**	**1,285,573.70**	**19,077.50**	**20,000.00**	**3,076,950.92**	**4,306,843.44**	**4,306,843.44**	**5,921,909.73**
(Note: This element is sum of all costs associated with the excavation of MED soil from Area A, B, C, Northside, and Southside and transportation to the material staging area at Seaway. Total MED Soils = 110,600 cy insitu (138,200 cy exsitu))												
1.5.1.1.2.1 331XX0801020201 MED Soils in Area A, B, C, Northside, and Southside	**LS**	**75,700.0000**	**0.00**	**1.2 CL Craft Labor**	**1,752,299.72**	**1,285,573.70**	**19,077.50**	**20,000.00**	**3,076,950.92**	**4,306,843.44**	**4,306,843.44**	**5,921,909.73**
(Note: Soil will be excavated using a hydraulic excavator, loaded in off road trucks, and transported to the staging area. The soil stockpile will be covered with a tarp to maintain a constant dry soil supply for offsite disposal.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*10,000.0000*	*10,000.0000*	*12,402.9250*	*12,402.9250*	*17,054.0219*
1.5.1.1.2.1.1 USR Dump Ramp	EA	2.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	20,000.00	20,000.00	24,805.85	24,805.85	34,108.04
(Note: Includes jersey barriers and gravel for 2 dump stations. Cost based on an Engineering Estimate.)												
			0.0000		*0.1657*	*0.0168*	*0.2700*	*0.0000*	*0.4525*	*0.6335*	*0.6335*	*0.8710*
1.5.1.1.2.1.2 HTW 021401002111 Secure burial cell construction, polymeric liner and cover system, very low density polyethylene (VLDPE), 20 mil	SF	62,000.0000	0.00	1.2 CL Craft Labor	10,272.27	1,044.13	16,740.00	0.00	28,056.40	39,275.02	39,275.02	54,003.15
			0.0000		*2.0298*	*0.2123*	*4.2500*	*0.0000*	*6.4921*	*9.0722*	*9.0722*	*12.4743*
1.5.1.1.2.1.3 HTW 021151057173 Petroleum contaminated soil, excavate and stockpile, sandbags for stockpile, excludes transportation and disposal fees	EA	550.0000	0.00	1.2 CL Craft Labor	1,116.41	116.77	2,337.50	0.00	3,570.68	4,989.72	4,989.72	6,860.87
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*68.2071*	*68.2071*	*93.7848*
1.5.1.1.2.1.4 MIL B-LABORER Laborers, (Semi-Skilled)	HR	19,184.0000	0.00	1.2 CL Craft Labor	872,872.00	0.00	0.00	0.00	872,872.00	1,308,485.42	1,308,485.42	1,799,167.45
(Note: Assume 1 laborer average at excavation for a 9 months excavation duration and 4 laborers average at loading site for 25 months duration. Includes spotting at excavation, lining containers, supporting loading operations, and closing containers.)												
			0.0000		*960.4800*	*2,977.6000*	*0.0000*	*0.0000*	*3,938.0800*	*5,165.0983*	*5,165.0983*	*7,102.0101*
1.5.1.1.2.1.5 USR Seaway Excavation Crew	DAY	198.0000	0.00	1.2 CL Craft Labor	190,175.04	589,564.80	0.00	0.00	779,739.84	1,022,689.45	1,022,689.45	1,406,198.00
(Note: This crew uses one 2 cy hydraulic excavator, two 50 ton off road trucks, and one 4-5 cy loader to build/maintain the stock pile. Assume 2000 ft round trip @ 20 MPH (4 cycles/hour). Rates are based on RSMeans Dec 2006 cost data and equipment rental costs include rental operating cost. Includes 9 months @ 22 dy/mo.)												
			0.0000		*1,232.4800*	*1,263.3600*	*0.0000*	*0.0000*	*2,495.8400*	*3,466.5418*	*3,466.5418*	*4,766.4949*
1.5.1.1.2.1.6 USR Seaway Loading and Transport Crew	DAY	550.0000	0.00	1.2 CL Craft Labor	677,864.00	694,848.00	0.00	0.00	1,372,712.00	1,906,597.98	1,906,597.98	2,621,572.22
(Note: Include one 4-5 cy loader to fill intermodal and three trucks to haul intermodals. Rates are based on RSMeans Dec 2006 cost data and equipment rental costs include rental operating cost. Includes 25 months @ 22 dy/mo.)												

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.5.1.1.3 331XX0801020301 Overburden Material in Areas B-C and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**486,894.32**	**1,441,158.40**	**0.00**	**0.00**	**1,928,052.72**	**2,532,919.80**	**2,532,919.80**	**3,482,764.73**
(Note: Removal of overburden required in new Area B-C and Southside. Overburden will be stockpiled for reuse as backfill. Estimated total overburden volume for removal/reuse is (1) Area B-C - 275,000 cy (344,000 cy exsitu), (2) Southside - 8,200 cy (10,300 cy exsitu). The total volume is 283,200 cy (354,300 cy exsitu) Due to the small quantity, side slopes, and reduced efficiencies associated with defining the interface between the overburden and MED soils, assume the same productivity rate as MED soil.)												
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*68.2071*	*68.2071*	*93.7848*
1.5.1.1.3.1 MIL B-LABORER Laborers, (Semi-Skilled)	HR	484.0000	0.00	1.2 CL Craft Labor	22,022.00	0.00	0.00	0.00	22,022.00	33,012.25	33,012.25	45,391.84
(Note: Assume 1 laborer average at excavation site for a 22 months excavation duration. Includes spotting at excavation and supporting loading.)												
			0.0000		*960.4800*	*2,977.6000*	*0.0000*	*0.0000*	*3,938.0800*	*5,165.0983*	*5,165.0983*	*7,102.0101*
1.5.1.1.3.2 USR Seaway Excavation Crew	DAY	484.0000	0.00	1.2 CL Craft Labor	464,872.32	1,441,158.40	0.00	0.00	1,906,030.72	2,499,907.56	2,499,907.56	3,437,372.89
(Note: This crew uses one 2 cy hydraulic excavator, two 50 ton off road trucks, and one 4-5 cy loader to build/maintain the stock pile. Assume 2000 ft round trip @ 20 MPH (4 cycles/hour). Rates are based on RSMeans Dec 2006 cost data and equipment rental costs include rental operating cost. Includes 22 months @ 22 dy/mo.)												
			2.9972		*10.1256*	*6.9277*	*31.3021*	*0.0000*	*48.3554*	*74.6393*	*74.6393*	*102.6290*
1.5.2 331XX0805 Capping Disturbed Cap Area	**SY**	**12,000.0000**	**35,966.05**	**1.2 CL Craft Labor**	**121,507.01**	**83,132.27**	**375,625.24**	**0.00**	**580,264.52**	**895,671.48**	**895,671.48**	**1,231,548.29**
			2.9972		*10.1256*	*6.9277*	*31.3021*	*0.0000*	*48.3554*	*74.6393*	*74.6393*	*102.6290*
1.5.2.1 331XX080591 Capping Disturbed Cap Area	**SY**	**12,000.0000**	**35,966.05**	**1.2 CL Craft Labor**	**121,507.01**	**83,132.27**	**375,625.24**	**0.00**	**580,264.52**	**895,671.48**	**895,671.48**	**1,231,548.29**
(Note: This element is the sum of costs associated with placement of a cap over excavated areas where the existing cap had been disturbed. All regrading and backfill not associated with the cap is included in the Site Restoration WBS element. The following are assumptions for capping: (1) The cross section of the caps major work items include: (a) 6" topsoil with vegetative layer; (b) 24" native soil barrier protection layer; (c) 60-mil HDPE geomembrane; (d) 18" clay low permeability layer; (e) Filter fabric; (f) 12" gas vent layer; and (g) Filter fabric. (2) Note that gas treatment or leachate collection systems are not included in the costs. It is assumed that the gas venting system will be connected to the existing gas treatment system, and that there are existing leachate controls. (3) An 85% production rate (where appropriate) has been incorporated for all cap work activities due to the decrease in productivity associated with working on sideslopes. (4) Assumes cap placement will occur after surficial excavations of MED soil have been completed.)												
			0.2896		*0.9975*	*0.6436*	*0.0000*	*0.0000*	*1.6410*	*2.6835*	*2.6835*	*3.6898*
1.5.2.1.1 331XX08059106 Grading Layer	**SY**	**12,000.0000**	**3,475.16**	**1.2 CL Craft Labor**	**11,969.60**	**7,722.96**	**0.00**	**0.00**	**19,692.56**	**32,201.49**	**32,201.49**	**44,277.05**
(Note: Includes grading excavated areas to final grade for cap placement.)												
			85.0000		*0.9975*	*0.6436*	*0.0000*	*0.0000*	*1.6410*	*2.6835*	*2.6835*	*3.6898*
1.5.2.1.1.1 MIL 023103300200 Shape enbankment, slope up to 1 in 4, by machine	SY	12,000.0000	3,475.16	1.2 CL Craft Labor	11,969.60	7,722.96	0.00	0.00	19,692.56	32,201.49	32,201.49	44,277.05
			1,173.1730		*4,401.1333*	*2,246.8469*	*0.0000*	*0.0000*	*6,647.9802*	*11,432.6384*	*11,432.6384*	*15,719.8778*
1.5.2.1.2 Rough Grade Area and Compact	**EA**	**1.0000**	**1,173.17**	**1.2 CL Craft Labor**	**4,401.13**	**2,246.85**	**0.00**	**0.00**	**6,647.98**	**11,432.64**	**11,432.64**	**15,719.88**
			85.0000		*32.5200*	*14.5569*	*0.0000*	*0.0000*	*47.0769*	*81.9236*	*81.9236*	*112.6450*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.5.2.1.2.1 MIL 023104104000 Grading for structures and slabs, grader, 2 passes, semi grade	CSY	120.0000	996.92	1.2 CL Craft Labor	3,902.40	1,746.82	0.00	0.00	5,649.22	9,830.84	9,830.84	13,517.40
			85.0000		*0.2494*	*0.2500*	*0.0000*	*0.0000*	*0.4994*	*0.8009*	*0.8009*	*1.1012*
1.5.2.1.2.2 RSM 023153105600 Compaction, 2 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	ECY	2,000.0000	176.25	1.2 CL Craft Labor	498.73	500.02	0.00	0.00	998.76	1,601.80	1,601.80	2,202.48
(Note: Compact subgrade prior to cap placement. Depth is 0.5 ft.)												
			0.0436		*0.1893*	*0.0576*	*0.2137*	*0.0000*	*0.4606*	*0.7430*	*0.7430*	*1.0217*
1.5.2.1.3 331XX08059107 Filter Fabric	**SY**	**41,000.0000**	**1,786.55**	**1.2 CL Craft Labor**	**7,762.56**	**2,361.24**	**8,760.00**	**0.00**	**18,883.80**	**30,465.03**	**30,465.03**	**41,889.42**
(Note: For use between existing grade and gas vent layer.)												
			85.0000		*0.6469*	*0.1968*	*0.7300*	*0.0000*	*1.5736*	*2.5388*	*2.5388*	*3.4908*
1.5.2.1.3.1 CIV 023403001600 Drainage geotextiles, non-woven polypropylene, 60 mils thick	SY	12,000.0000	1,786.55	1.2 CL Craft Labor	7,762.56	2,361.24	8,760.00	0.00	18,883.80	30,465.03	30,465.03	41,889.42
			0.5292		*2.0624*	*0.9366*	*11.3143*	*0.0000*	*14.3133*	*21.2138*	*21.2138*	*29.1690*
1.5.2.1.4 331XX08059116 Gas Collection System	**SY**	**12,000.0000**	**6,350.78**	**1.2 CL Craft Labor**	**24,748.62**	**11,239.13**	**135,771.35**	**0.00**	**171,759.10**	**254,565.71**	**254,565.71**	**350,027.86**
(Note: Assumes 3000 lf of 6" perforated pipe with miscellaneous fittings. Assumes connection to existing landfill gas collection system. Includes 1 ft of sand over 12,000 sy with a 10% swell added to volume.)												
			85.0000		*3.9467*	*0.0000*	*9.7200*	*0.0000*	*13.6667*	*21.0105*	*21.0105*	*28.8895*
1.5.2.1.4.1 HTW 021402001314 Landfill gas and leachate control systems, leachate and gas collection pipe, slotted PVC, 2 to 6 rows of slots, 6" dia, SDR 26	LF	3,000.0000	2,089.41	1.2 CL Craft Labor	11,840.00	0.00	29,160.00	0.00	41,000.00	63,031.62	63,031.62	86,668.48
			85.0000		*52.9629*	*0.0000*	*34.7900*	*0.0000*	*87.7529*	*148.3958*	*148.3958*	*204.0442*
1.5.2.1.4.2 MIL 151085602860 Elbow, 90 Deg., plastic, PVC, white, socket joint, 6", schedule 40	EA	25.0000	233.66	1.2 CL Craft Labor	1,324.07	0.00	869.75	0.00	2,193.82	3,709.89	3,709.89	5,101.10
			85.0000		*79.4443*	*0.0000*	*54.6600*	*0.0000*	*134.1043*	*226.0866*	*226.0866*	*310.8690*
1.5.2.1.4.3 MIL 151085603280 Tee, plastic, PVC, white, socket joint, 6", schedule 40	EA	15.0000	210.29	1.2 CL Craft Labor	1,191.66	0.00	819.90	0.00	2,011.56	3,391.30	3,391.30	4,663.04
			85.0000		*29.1034*	*0.0000*	*16.3800*	*0.0000*	*45.4834*	*77.6812*	*77.6812*	*106.8116*
1.5.2.1.4.4 MIL 151085603690 Cap, plastic, PVC, white, socket joint, 6", schedule 40	EA	15.0000	77.04	1.2 CL Craft Labor	436.55	0.00	245.70	0.00	682.25	1,165.22	1,165.22	1,602.17

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			85.0000		*2.2628*	*2.5543*	*23.7900*	*0.0000*	*28.6071*	*41.6517*	*41.6517*	*57.2711*
1.5.2.1.4.5 AF 027202001505 Aggregrate base course, for roadways and large paved areas, sand, washed and graded, compacted, 6" deep	CY	4,400.0000	3,740.37	1.2 CL Craft Labor	9,956.33	11,239.13	104,676.00	0.00	125,871.46	183,267.68	183,267.68	251,993.06
			0.1489		*0.6469*	*0.1968*	*0.7300*	*0.0000*	*1.5736*	*2.5388*	*2.5388*	*3.4908*
1.5.2.1.5 331XX08059109 Filter Fabric	**SY**	**12,000.0000**	**1,786.55**	**1.2 CL Craft Labor**	**7,762.56**	**2,361.24**	**8,760.00**	**0.00**	**18,883.80**	**30,465.03**	**30,465.03**	**41,889.42**
(Note: For use between grading layer and gas vent layer.)												
			85.0000		*0.6469*	*0.1968*	*0.7300*	*0.0000*	*1.5736*	*2.5388*	*2.5388*	*3.4908*
1.5.2.1.5.1 CIV 023403001600 Drainage geotextiles, non-woven polypropylene, 60 mils thick	SY	12,000.0000	1,786.55	1.2 CL Craft Labor	7,762.56	2,361.24	8,760.00	0.00	18,883.80	30,465.03	30,465.03	41,889.42
			0.1172		*0.2720*	*0.3919*	*9.6100*	*0.0000*	*10.2739*	*14.0589*	*14.0589*	*19.3309*
1.5.2.1.6 331XX08059110 Place Low Permeability Clay Cap	**CY**	**7,500.0000**	**878.73**	**1.2 CL Craft Labor**	**2,040.27**	**2,939.17**	**72,075.00**	**0.00**	**77,054.44**	**105,441.43**	**105,441.43**	**144,981.96**
(Note: Includes 12,000 SY of area to be covered at 1.5 foot depth with a swell of 25% added to volume.)												
			0.0000		*0.0000*	*0.0000*	*9.6100*	*0.0000*	*9.6100*	*12.9621*	*12.9621*	*17.8229*
1.5.2.1.6.1 RSM 31051 310 0200 CLAY BORROW DELIVERED	CY	7,500.0000	0.00	1.2 CL Craft Labor	0.00	0.00	72,075.00	0.00	72,075.00	97,216.06	97,216.06	133,672.09
(Note: Cost Based on MEANS 2006, 4th quarther, US Natl Average for native soil and 2 mile haul. Add for additional 5 mile haul (RSM 31051 310 0900). Assume cost of clay is similar.)												
			85.0000		*0.2720*	*0.3919*	*0.0000*	*0.0000*	*0.6639*	*1.0967*	*1.0967*	*1.5080*
1.5.2.1.6.2 MIL 023151205520 Backfill, structural, 6" lifts, backfill around foundation, with dozer	LCY	7,500.0000	878.73	1.2 CL Craft Labor	2,040.27	2,939.17	0.00	0.00	4,979.44	8,225.36	8,225.36	11,309.87
			0.0689		*0.1360*	*0.2542*	*0.2000*	*0.0000*	*0.5902*	*0.9340*	*0.9340*	*1.2843*
1.5.2.1.7 331XX08059111 Cmpt Low Permeability Clay Cap	**CY**	**6,000.0000**	**413.18**	**1.2 CL Craft Labor**	**816.00**	**1,525.38**	**1,200.00**	**0.00**	**3,541.38**	**5,604.02**	**5,604.02**	**7,705.53**
(Note: Includes 12,000 SY of area to be covered at 1.5 foot depth with no swell since units are ECY.)												
			85.0000		*0.1360*	*0.2542*	*0.2000*	*0.0000*	*0.5902*	*0.9340*	*0.9340*	*1.2843*
1.5.2.1.7.1 MIL 023153109030 Water for compaction, 5000 gallon wagon, 3 mile haul	ECY	6,000.0000	413.18	1.2 CL Craft Labor	816.00	1,525.38	1,200.00	0.00	3,541.38	5,604.02	5,604.02	7,705.53
			0.3189		*1.6403*	*0.1667*	*3.9600*	*0.0000*	*5.7670*	*8.8743*	*8.8743*	*12.2022*
1.5.2.1.8 331XX08059112 60-mil HDPE geomembrane	**SY**	**12,000.0000**	**3,826.53**	**1.2 CL Craft Labor**	**19,683.00**	**2,000.68**	**47,520.00**	**0.00**	**69,203.68**	**106,491.89**	**106,491.89**	**146,426.35**
(Note: Installation of 60-mil HDPE liner.)												

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			85.0000		*0.1823*	*0.0185*	*0.4400*	*0.0000*	*0.6408*	*0.9860*	*0.9860*	*1.3558*
1.5.2.1.8.1 HTW 021401002152 Secure burial cell construction, polymeric liner and cover system, rough textured H.D. polyethylene (HDPE), 60 mil	SF	108,000.0000	3,826.53	1.2 CL Craft Labor	19,683.00	2,000.68	47,520.00	0.00	69,203.68	106,491.89	106,491.89	146,426.35
			1.0828		*2.2899*	*3.8460*	*5.7100*	*0.0000*	*11.8459*	*17.0366*	*17.0366*	*23.4253*
1.5.2.1.9 331XX08059113 Barrier Protection Layer	**CY**	**9,600.0000**	**10,394.85**	**1.2 CL Craft Labor**	**21,982.77**	**36,921.39**	**54,816.00**	**0.00**	**113,720.16**	**163,551.04**	**163,551.04**	**224,882.68**
(Note: Includes 12,000 SY of area to be covered at 2 foot depth with 20% swell added to volume.)												
			85.0000		*0.9521*	*1.2576*	*5.7100*	*0.0000*	*7.9197*	*11.2475*	*11.2475*	*15.4653*
1.5.2.1.9.1 RSM 023155100020 Fill, borrow, for embankments, 1 mile haul, spread, by dozer	LCY	9,600.0000	3,743.49	1.2 CL Craft Labor	9,139.84	12,073.29	54,816.00	0.00	76,029.13	107,975.71	107,975.71	148,466.61
			85.0000		*0.2494*	*0.2500*	*0.0000*	*0.0000*	*0.4994*	*0.8009*	*0.8009*	*1.1012*
1.5.2.1.9.2 RSM 023153105600 Compaction, 2 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	ECY	8,000.0000	705.01	1.2 CL Craft Labor	1,994.93	2,000.10	0.00	0.00	3,995.03	6,407.21	6,407.21	8,809.92
			85.0000		*1.1300*	*2.3800*	*0.0000*	*0.0000*	*3.5100*	*5.1217*	*5.1217*	*7.0423*
1.5.2.1.9.3 RSM 31051 310 0900 Borrow, buy & load at pit, spread with 200 HP dozer, for 5 mile haul, add	CY	9,600.0000	5,946.35	1.2 CL Craft Labor	10,848.00	22,848.00	0.00	0.00	33,696.00	49,168.11	49,168.11	67,606.16
(Note: Assumed total haul of 7 mi.)												
			1.0920		*4.4006*	*1.7875*	*20.2000*	*0.0000*	*26.3881*	*39.2992*	*39.2992*	*54.0363*
1.5.2.1.10 331XX08059114 Place Topsoil	**CY**	**2,200.0000**	**2,402.45**	**1.2 CL Craft Labor**	**9,681.29**	**3,932.58**	**44,440.00**	**0.00**	**58,053.87**	**86,458.15**	**86,458.15**	**118,879.95**
(Note: Includes 12,000 SY of area to be covered at 0.5 foot depth with 10% swell added to volume.)												
			85.0000		*4.4006*	*1.7875*	*20.2000*	*0.0000*	*26.3881*	*39.2992*	*39.2992*	*54.0363*
1.5.2.1.10.1 MIL 029108100805 Loam or topsoil, imported topsoil, 6" deep, furnish and place	LCY	2,200.0000	2,402.45	1.2 CL Craft Labor	9,681.29	3,932.58	44,440.00	0.00	58,053.87	86,458.15	86,458.15	118,879.95
			67.4359		*276.1371*	*105.9997*	*685.4967*	*0.0000*	*1,067.6334*	*1,633.2886*	*1,633.2886*	*2,245.7718*
1.5.2.1.11 331XX08059115 Seeding	**ACR**	**3.0000**	**202.31**	**1.2 CL Craft Labor**	**828.41**	**318.00**	**2,056.49**	**0.00**	**3,202.90**	**4,899.87**	**4,899.87**	**6,737.32**
(Note: Seeding of landfill surface for vegetative growth. Includes 12,000 SY of area to be covered with 10% added for perimeter damage.)												
			85.0000		*221.5319*	*85.0386*	*602.1100*	*0.0000*	*908.6805*	*1,383.9344*	*1,383.9344*	*1,902.9098*
1.5.2.1.11.1 MIL 029203200320 Seeding, athletic field mix, 450 lb. per acre, mechanical seeding	ACR	3.0000	162.30	1.2 CL Craft Labor	664.60	255.12	1,806.33	0.00	2,726.04	4,151.80	4,151.80	5,708.73

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			85.0000		*1.3883*	*0.5329*	*2.1200*	*0.0000*	*4.0412*	*6.3395*	*6.3395*	*8.7168*
1.5.2.1.11.2 AF 029203207010 Seeding, apply fertilizer, 35 lb. per M.S.F.	MSF	118.0000	40.01	1.2 CL Craft Labor	163.82	62.88	250.16	0.00	476.86	748.06	748.06	1,028.59
			364.2294		*976.0081*	*1,191.9182*	*28.3000*	*0.0000*	*2,196.2264*	*7,620.4749*	*7,620.4749*	*10,478.1530*
1.5.2.1.12 331XX08059117 Gas Extraction Wells	**EA**	**8.0000**	**2,913.83**	**1.4 Prime Professional Labor**	**7,808.07**	**9,535.35**	**226.40**	**0.00**	**17,569.81**	**60,963.80**	**60,963.80**	**83,825.22**
(Note: Assume 8 each,15' deep landfill gas extraction wells.)												
			85.0000		*25.5603*	*0.5011*	*3.8800*	*0.0000*	*29.9414*	*113.8582*	*113.8582*	*156.5550*
1.5.2.1.12.1 MIL 151076605630 Nozzle, steel, T-O-L, weld-on, 1/4" pipe size, includes 1 weld per joint and weld machine	EA	8.0000	36.79	1.4 Prime Professional Labor	204.48	4.01	31.04	0.00	239.53	910.87	910.87	1,252.44
			85.0000		*8.5838*	*0.0000*	*0.5200*	*0.0000*	*9.1038*	*35.4951*	*35.4951*	*48.8057*
1.5.2.1.12.2 MIL 151202204664 Cocks, drains and specialties, nipple, black steel, 1/4" x 3"	EA	8.0000	12.12	1.4 Prime Professional Labor	68.67	0.00	4.16	0.00	72.83	283.96	283.96	390.45
			85.0000		*0.0000*	*141.8354*	*0.0000*	*0.0000*	*141.8354*	*468.9095*	*468.9095*	*644.7506*
1.5.2.1.12.3 GEN D35Z2900 DRILL, ROTARY BLASTHOLE, WATER WELL, 16" (406MM), TRUCK MOUNTED (ADD COST FOR DRILL STEEL AND BIT WEAR)	HR	64.0000	1,601.91	1.4 Prime Professional Labor	0.00	9,077.46	0.00	0.00	9,077.46	30,010.21	30,010.21	41,264.04
			85.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*190.7485*	*190.7485*	*262.2792*
1.5.2.1.12.4 MIL B-EQOPRMED Equip. Operators, Medium	HR	64.0000	587.97	1.4 Prime Professional Labor	3,331.84	0.00	0.00	0.00	3,331.84	12,207.90	12,207.90	16,785.87
			85.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*168.4360*	*168.4360*	*231.5995*
1.5.2.1.12.5 MIL B-LABORER Laborers, (Semi-Skilled)	HR	64.0000	513.88	1.4 Prime Professional Labor	2,912.00	0.00	0.00	0.00	2,912.00	10,779.91	10,779.91	14,822.37
			0.0000		*25.9900*	*0.0000*	*0.0000*	*0.0000*	*25.9900*	*90.9651*	*90.9651*	*125.0771*
1.5.2.1.12.6 FOP FC-ENCGF Hydrogeologist	HR	32.0000	0.00	1.4 Prime Professional Labor	831.68	0.00	0.00	0.00	831.68	2,910.88	2,910.88	4,002.47
			85.0000		*5.7424*	*5.6734*	*2.3900*	*0.0000*	*13.8058*	*48.2509*	*48.2509*	*66.3450*
1.5.2.1.12.7 HTW 022101105219 Casing, PVC, flush threaded, standard length 10', 4" diameter, schedule 40	LF	80.0000	161.16	1.4 Prime Professional Labor	459.39	453.87	191.20	0.00	1,104.47	3,860.07	3,860.07	5,307.60
			7.5406		*42.1400*	*0.5900*	*0.0000*	*0.0000*	*42.7300*	*65.2370*	*65.2370*	*89.7009*
1.5.2.1.13 331XX08059118 QA/QC Testing	**EA**	**48.0000**	**361.95**	**1.2 CL Craft Labor**	**2,022.72**	**28.32**	**0.00**	**0.00**	**2,051.04**	**3,131.38**	**3,131.38**	**4,305.65**

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
(Note: In situ density testing of placed cap material for quality assurance and control verification.)												
			85.0000		*42.1400*	*0.5900*	*0.0000*	*0.0000*	*42.7300*	*65.2370*	*65.2370*	*89.7009*
1.5.2.1.13.1 MIL Soil Density Test,Nuclear Method ASTM D2922-71	EA	48.0000	361.95	1.2 CL Craft Labor	2,022.72	28.32	0.00	0.00	2,051.04	3,131.38	3,131.38	4,305.65
(Note: Assume 1 test per 1,000 sy or 12 tests per layer. Includes 2 layers of native fill and 2 layers of clay.)												
			0.0000		*793,357.9200*	*1,905,146.3396*	*782,200.6800*	*45,267,219.6600*	*48,747,924.5996*	*50,864,157.3400*	*50,864,157.3400*	*63,580,196.6749*
1.6 331XX19 Disposal (Commercial)	**EA**	**1.0000**	**0.00**		**793,357.92**	**1,905,146.34**	**782,200.68**	**45,267,219.66**	**48,747,924.60**	**50,864,157.34**	**50,864,157.34**	**63,580,196.67**
			0.0000		*721,163.5200*	*1,626,443.1301*	*711,095.5800*	*23,815,881.6600*	*26,874,583.8901*	*28,271,776.3851*	*28,271,776.3851*	*35,339,720.4814*
1.6.1 331XX1921 Transport to Storage/Disp Facil	**EA**	**1.0000**	**0.00**		**721,163.52**	**1,626,443.13**	**711,095.58**	**23,815,881.66**	**26,874,583.89**	**28,271,776.39**	**28,271,776.39**	**35,339,720.48**
			0.0000		*6.1012*	*13.7601*	*6.0160*	*201.4880*	*227.3653*	*239.1859*	*239.1859*	*298.9824*
1.6.1.1 331XX192101 Load/Haul/Unload of Solids	**CY**	**118,200.0000**	**0.00**		**721,163.52**	**1,626,443.13**	**711,095.58**	**23,815,881.66**	**26,874,583.89**	**28,271,776.39**	**28,271,776.39**	**35,339,720.48**
(Note: This element includes all costs associated with loading and transportation of radiologically impacted MED soil removed from Areas A, B, C, Northside and Southside. For this alternative, the MED soil disposal volumes are as follows: (1) Area A - 94,600 cy exsitu; (2) Area B-C - 36,000 cy exsitu; (3) Northside - 1,100 cy exsitu; and (4) Southside - 6,600 cy exsitu. The total volume is 138,300 cy exsitu Loaded intermodals will be staged for loading rail cars for transport to an approved disposal facility. Rental and delivery costs have been included in this line item. Assumes sufficient area will be available for staging of intermodals at rail spur. Costs have been included to perform a minimal amount of rehab of loading area at rail spur to accommodate intermodal storage (fencing, paving, lighting, etc.). Assumes an average of 20 intermodals are loaded out per day (5 rail cars). Transportation and loading costs could vary significantly if rail cars are not available and should be considered as one of the items under the Remedial Contingency. Assume 13 cubic yards per container based on 1.6 tons per cubic yard of insitu soil and 41,700 lbs average intermodal capacity. Total duration = 118,200 cy / 260 cy/day = 455 days or 20.7 months. Say 21 months.)												
			0.0000		*6.1012*	*6.3838*	*0.0000*	*0.0000*	*12.4850*	*17.0050*	*17.0050*	*21.2562*
1.6.1.1.1 331XX19210101 Loading Area A, B, C, Northside, and Southside	**CY**	**118,200.0000**	**0.00**	**1.2 CL Craft Labor**	**721,163.52**	**754,561.47**	**0.00**	**0.00**	**1,475,724.99**	**2,009,985.54**	**2,009,985.54**	**2,512,481.93**
			0.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*77.0998*	*77.0998*	*96.3747*
1.6.1.1.1.1 MIL B-EQOPRCRN Equip. Operators, Heavy	HR	3,696.0000	0.00	1.2 CL Craft Labor	192,413.76	0.00	0.00	0.00	192,413.76	284,960.78	284,960.78	356,200.98
(Note: Operator to move rail cars for 21 months.)												
			0.0000		*0.0000*	*30.3881*	*0.0000*	*0.0000*	*30.3881*	*37.6901*	*37.6901*	*47.1127*
1.6.1.1.1.2 GEN L40Z4390 LOADER, FRONT END, WHEEL, ARTICULATED, 1.75 CY (1.3M3) BUCKET, 4X4	HR	3,696.0000	0.00	1.2 CL Craft Labor	0.00	112,314.40	0.00	0.00	112,314.40	139,302.71	139,302.71	174,128.39
(Note: Tractor loader to move rail cars.)												
			0.0000		*0.0000*	*173.7681*	*0.0000*	*0.0000*	*173.7681*	*215.5233*	*215.5233*	*269.4042*
1.6.1.1.1.3 GEN C90Z2600 CRANE, MECHANICAL, LATTICE BOOM, TRUCK MOUNTED, 125 TON (113MT), 240' (73.2M) BOOM	HR	3,696.0000	0.00	1.2 CL Craft Labor	0.00	642,247.07	0.00	0.00	642,247.07	796,574.22	796,574.22	995,717.78

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*77.0998*	*77.0998*	*96.3747*
1.6.1.1.1.4 MIL B-EQOPRCRN Equip. Operators, Heavy	HR	3,696.0000	0.00	1.2 CL Craft Labor	192,413.76	0.00	0.00	0.00	192,413.76	284,960.78	284,960.78	356,200.98
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*68.2071*	*68.2071*	*85.2589*
1.6.1.1.1.5 MIL B-LABORER Laborers, (Semi-Skilled)	HR	7,392.0000	0.00	1.2 CL Craft Labor	336,336.00	0.00	0.00	0.00	336,336.00	504,187.04	504,187.04	630,233.80
(Note: Assume 2 laborers to support loading operations.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*128.0000*	*128.0000*	*131.8400*	*131.8400*	*164.8000*
1.6.1.1.2 331XX19210102 Transportation - Area A, B, C, Northside, and Southside	**TON**	**177,000.0000**	**0.00**		**0.00**	**0.00**	**0.00**	**22,656,000.00**	**22,656,000.00**	**23,335,680.00**	**23,335,680.00**	**29,169,600.00**
(Note: Assumes unit price of $128.00/ton for transportation based on recent numbers provided to SAIC by J. Wyrk in an email dated January 9, 2007. Based on 1.6 tons per cubic yars of insitu soil. Estimated tonnage for disposal is 177,000 tons.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*128.0000*	*128.0000*	*131.8400*	*131.8400*	*164.8000*
1.6.1.1.2.1 USR Transportation of Material to disposal Facility	TON	177,000.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	22,656,000.00	22,656,000.00	23,335,680.00	23,335,680.00	29,169,600.00
			0.0000		*0.0000*	*27.3300*	*22.2900*	*36.3576*	*85.9776*	*91.7219*	*91.7219*	*114.6523*
1.6.1.1.3 331XX19210103 Intermodal Rental - Area A, B, C, Northside, and Southside	**WK**	**31,902.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**871,881.66**	**711,095.58**	**1,159,881.66**	**2,742,858.90**	**2,926,110.84**	**2,926,110.84**	**3,657,638.56**
(Note: Assumes that each intermodal carries 13 cubic yards and have a 3 week average turnaround rental time (time it arrives on site to time it is returned to site). Based on 138,200 cy total volume, approximately 10,634 intermodal containers will be required and equates to 31,902 rental weeks. Also assumes that intermodal containers will be available as needed. Assuming off site disposal activities will run 7 months throughout year. It is estimated that at least 360 dedicated intermodal containers will be required and includes a 3 day reserve supply. A premium of 100% of the rental rate has been included in this line item to ensure that the number of containers will be available.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*200.0000*	*200.0000*	*206.0000*	*206.0000*	*257.5000*
1.6.1.1.3.1 USR Intermodal Delivery and Return	EA	1,440.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	288,000.00	288,000.00	296,640.00	296,640.00	370,800.00
(Note: Assumes each delivery/return includes 2 containers and is based on a vendor quote. Includes mob/demob for 4 seasons.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*27.3300*	*27.3300*	*28.1499*	*28.1499*	*35.1874*
1.6.1.1.3.2 USR Intermodal Rental (avg 3 weeks per intermodal)	WK	31,902.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	871,881.66	871,881.66	898,038.11	898,038.11	1,122,547.64
			0.0000		*0.0000*	*0.0000*	*22.2900*	*0.0000*	*22.2900*	*26.1236*	*26.1236*	*32.6545*
1.6.1.1.3.3 HTW 021202507112 Bulk material hauling, hazardous waste packaging, poly liners, bulk solids & sludge, roll-off liner, disposable, 20 C.Y. and 30 C.Y., 6 mil	EA	31,902.0000	0.00	1.3 Transport and Disposal	0.00	0.00	711,095.58	0.00	711,095.58	833,394.62	833,394.62	1,041,743.28
			0.0000		*0.0000*	*27.3300*	*0.0000*	*0.0000*	*27.3300*	*28.1499*	*28.1499*	*35.1874*

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.6.1.1.3.4 USR Intermodal Rental Premium	WK	31,902.0000	0.00	1.3 Transport and Disposal	0.00	871,881.66	0.00	0.00	871,881.66	898,038.11	898,038.11	1,122,547.64
			0.0000		*72,194.4000*	*278,703.2095*	*71,105.1000*	*21,451,338.0000*	*21,873,340.7095*	*22,592,380.9549*	*22,592,380.9549*	*28,240,476.1936*
1.6.2 331XX1922 Disposal Fees and Taxes	**EA**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**72,194.40**	**278,703.21**	**71,105.10**	**21,451,338.00**	**21,873,340.71**	**22,592,380.95**	**22,592,380.95**	**28,240,476.19**
			0.0000		*0.0000*	*0.0000*	*0.0000*	*17,441,580.0000*	*17,441,580.0000*	*17,964,827.4000*	*17,964,827.4000*	*22,456,034.2500*
1.6.2.1 331XX192201 Landfill/Burial Grnd/Trench/Pit	**EA**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**17,441,580.00**	**17,441,580.00**	**17,964,827.40**	**17,964,827.40**	**22,456,034.25**
(Note: This element includes all costs associated with the disposal of radiologically impacted soil removed from Areas A, B, C, Northside, and Southside. The disposal volumes are as follows: (1) Area A - 94,600 cy; (2) Area B -C - 36,000 cy; (3) Northside and Southside - 7,700 cy. The total volume is 138,300 cy. It is assumed that 10% of the total volume is hazardous mixed waste. Estimated tonnage for disposal is 177,000 tons. The total MED volume is 124,400 cy and the total mixed hazardous waste is 13,800 cy. Based on 1.6 tons per cubic yards of insitu soil, the total mass of MED soil is 159,300 tons and the total mixed hazardous waste mass is 17,700 tons.)												
1.6.2.1.1 331XX19220102 Off-site Disposal of MED Soil in Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**14,337,000.00**	**14,337,000.00**	**14,767,110.00**	**14,767,110.00**	**18,458,887.50**
(Note: Includes disposal of MED waste in Area A, B, C, Northside, and Southside and is assumed to be homogenous and without large debris for disposal purposes. Assumes unit price of $90.00/ton for disposal based on recent numbers provided to SAIC by J. Wryk in an email dated January 9, 2007.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*90.0000*	*90.0000*	*92.7000*	*92.7000*	*115.8750*
1.6.2.1.1.1 USR Off-site Disposal of Rad Soil (Accessible and Inaccessible)	TON	159,300.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	14,337,000.00	14,337,000.00	14,767,110.00	14,767,110.00	18,458,887.50
1.6.2.1.2 331XX19220102 Off-site Disposal of Mixed Hazardous Waste in Area B- C	**LS**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**3,104,580.00**	**3,104,580.00**	**3,197,717.40**	**3,197,717.40**	**3,997,146.75**
(Note: Includes disposal of mixed hazardous waste in Areas B-C and is assumed to be homogenous and without large debris for disposal purposes. Assumes unit price of $175.40/ton for disposal based on cost provided to SAIC by D. Conboy.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*175.4000*	*175.4000*	*180.6620*	*180.6620*	*225.8275*
1.6.2.1.2.1 USR Off-site Disposal of Mixed Haxardous Waste	TON	17,700.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	3,104,580.00	3,104,580.00	3,197,717.40	3,197,717.40	3,997,146.75
1.6.2.2 331XX1922010202 Material Overrun Premium (10%)	**LS**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**72,194.40**	**278,703.21**	**71,105.10**	**4,009,758.00**	**4,431,760.71**	**4,627,553.55**	**4,627,553.55**	**5,784,441.94**
(Note: Based on prior FUSRAP projects, the largest component of risk is the estimated volume of soil to be disposed. Historically, actual volumes remediated at FUSRAP sites exceed the estimated volumes. Additionally rail car and intermodal demurage cost due to project delays will increase the estimated cost. This line item carries 10% overrun on excavated material as a modifier to these elements. The excavation of this material has not been included in this line item because it is considered negligible in comparison to the disposal costs and can be covered in the Contingency line item. This line item includes loading, transportation, disposal and intermodal rental costs only.)												
			0.0000		*6.1078*	*6.3907*	*0.0000*	*0.0000*	*12.4985*	*17.3357*	*17.3357*	*21.6697*
1.6.2.2.1 331XX19210101 Loading Area A, B, C, Northside, and Southside	**CY**	**11,820.0000**	**0.00**	**1.2 CL Craft Labor**	**72,194.40**	**75,537.81**	**0.00**	**0.00**	**147,732.21**	**204,908.22**	**204,908.22**	**256,135.27**

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*77.0998*	*77.0998*	*96.3747*
1.6.2.2.1.1 MIL B-EQOPRCRN Equip. Operators, Heavy	HR	370.0000	0.00	1.2 CL Craft Labor	19,262.20	0.00	0.00	0.00	19,262.20	28,526.92	28,526.92	35,658.65
(Note: Operator to move rail cars.)												
			0.0000		*0.0000*	*30.3881*	*0.0000*	*0.0000*	*30.3881*	*37.6901*	*37.6901*	*47.1127*
1.6.2.2.1.2 GEN L40Z4390 LOADER, FRONT END, WHEEL, ARTICULATED, 1.75 CY (1.3M3) BUCKET, 4X4	HR	370.0000	0.00	1.2 CL Craft Labor	0.00	11,243.60	0.00	0.00	11,243.60	13,945.35	13,945.35	17,431.68
(Note: Tractor loader to move rail cars.)												
			0.0000		*0.0000*	*173.7681*	*0.0000*	*0.0000*	*173.7681*	*225.5021*	*225.5021*	*281.8776*
1.6.2.2.1.3 GEN C90Z2600 CRANE, MECHANICAL, LATTICE BOOM, TRUCK MOUNTED, 125 TON (113MT), 240' (73.2M) BOOM	HR	370.0000	0.00	1.2 CL Craft Labor	0.00	64,294.21	0.00	0.00	64,294.21	83,435.76	83,435.76	104,294.70
			0.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*77.0998*	*77.0998*	*96.3747*
1.6.2.2.1.4 MIL B-EQOPRCRN Equip. Operators, Heavy	HR	370.0000	0.00	1.2 CL Craft Labor	19,262.20	0.00	0.00	0.00	19,262.20	28,526.92	28,526.92	35,658.65
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*68.2071*	*68.2071*	*85.2589*
1.6.2.2.1.5 MIL B-LABORER Laborers, (Semi-Skilled)	HR	740.0000	0.00	1.2 CL Craft Labor	33,670.00	0.00	0.00	0.00	33,670.00	50,473.27	50,473.27	63,091.59
(Note: Assume 2 laborers to support loading operations.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*128.0000*	*128.0000*	*131.8400*	*131.8400*	*164.8000*
1.6.2.2.2 331XX19210102 Transportation - Area A, B, C, Northside, and Southside	**TON**	**17,700.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**2,265,600.00**	**2,265,600.00**	**2,333,568.00**	**2,333,568.00**	**2,916,960.00**
(Note: Assumes unit price of $128.00/ton for transportation based on recent numbers provided to SAIC by J. Wyrk in an email dated January 9, 2007.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*128.0000*	*128.0000*	*131.8400*	*131.8400*	*164.8000*
1.6.2.2.2.1 USR Transportation of Material to disposal Facility	TON	17,700.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	2,265,600.00	2,265,600.00	2,333,568.00	2,333,568.00	2,916,960.00
			0.0000		*0.0000*	*63.6882*	*22.2900*	*0.0000*	*85.9782*	*91.7224*	*91.7224*	*114.6531*
1.6.2.2.3 331XX19210103 Intermodal Rental - Area A, B, C, Northside, and Southside	**WK**	**3,190.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**203,165.40**	**71,105.10**	**0.00**	**274,270.50**	**292,594.60**	**292,594.60**	**365,743.25**
(Note: Assumes that each intermodal carries 13 cubic yards and will have a 3 week average turnaround rental time (time it arrives on site to time it is returned to site). This premium is based on 10% of the actual quantities.)												
			0.0000		*0.0000*	*200.0000*	*0.0000*	*0.0000*	*200.0000*	*206.0000*	*206.0000*	*257.5000*
1.6.2.2.3.1 USR Intermodal Delivery and Return	EA	144.0000	0.00	1.3 Transport and Disposal	0.00	28,800.00	0.00	0.00	28,800.00	29,664.00	29,664.00	37,080.00
(Note: Assumes each delivery/return includes 2 containers and is based on a vendor quote. Includes mob/demob for 2 seasons.)												

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*27.3300*	*0.0000*	*0.0000*	*27.3300*	*28.1499*	*28.1499*	*35.1874*
1.6.2.2.3.2 USR Intermodal Rental (avg 3 weeks per intermodal)	WK	3,190.0000	0.00	1.3 Transport and Disposal	0.00	87,182.70	0.00	0.00	87,182.70	89,798.18	89,798.18	112,247.73
			0.0000		*0.0000*	*0.0000*	*22.2900*	*0.0000*	*22.2900*	*26.1236*	*26.1236*	*32.6545*
1.6.2.2.3.3 HTW 021202507112 Bulk material hauling, hazardous waste packaging, poly liners, bulk solids & sludge, roll-off liner, disposable, 20 C.Y. and 30 C.Y., 6 mil	EA	3,190.0000	0.00	1.3 Transport and Disposal	0.00	0.00	71,105.10	0.00	71,105.10	83,334.24	83,334.24	104,167.80
			0.0000		*0.0000*	*27.3300*	*0.0000*	*0.0000*	*27.3300*	*28.1499*	*28.1499*	*35.1874*
1.6.2.2.3.4 USR Intermodal Rental Premium	WK	3,190.0000	0.00	1.3 Transport and Disposal	0.00	87,182.70	0.00	0.00	87,182.70	89,798.18	89,798.18	112,247.73
1.6.2.2.4 331XX19220102 Off-site Disposal of MED Soil in Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**1,744,158.00**	**1,744,158.00**	**1,796,482.74**	**1,796,482.74**	**2,245,603.43**
			0.0000		*0.0000*	*0.0000*	*0.0000*	*90.0000*	*90.0000*	*92.7000*	*92.7000*	*115.8750*
1.6.2.2.4.1 331XX1922010201 Off-site Disposal of MED Soil in Area A, B, C, Northside, and Southside	**TON**	**15,930.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**1,433,700.00**	**1,433,700.00**	**1,476,711.00**	**1,476,711.00**	**1,845,888.75**
(Note: Includes disposal of MED waste in Area A, B, C, Northside, and Southside and is assumed to be homogenous and without large debris for disposal purposes. Assumes unit price of $90.00/ton for disposal based on recent numbers provided to SAIC by J. Wryk in an email dated January 9, 2007.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*90.0000*	*90.0000*	*92.7000*	*92.7000*	*115.8750*
1.6.2.2.4.1.1 USR Off-site Disposal of Rad Soil (Accessible and Inaccessible)	TON	15,930.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	1,433,700.00	1,433,700.00	1,476,711.00	1,476,711.00	1,845,888.75
1.6.2.2.4.2 331XX19220102 Off-site Disposal of Mixed Hazardous Waste in Area B- C	**LS**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**310,458.00**	**310,458.00**	**319,771.74**	**319,771.74**	**399,714.68**
(Note: Includes disposal of mixed hazardous waste in Areas B-C and is assumed to be homogenous and without large debris for disposal purposes. Assumes unit price of $175.40/ton for disposal based on cost provided to SAIC by D. Conboy.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*175.4000*	*175.4000*	*180.6620*	*180.6620*	*225.8275*
1.6.2.2.4.2.1 USR Off-site Disposal of Mixed Haxardous Waste	TON	1,770.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	310,458.00	310,458.00	319,771.74	319,771.74	399,714.68
			0.0000		*520,929.4153*	*874,551.5362*	*719,800.0000*	*0.0000*	*2,115,280.9515*	*2,782,931.1766*	*2,782,931.1766*	*3,826,530.3678*
1.7 331XX20 Site Restoration	**EA**	**1.0000**	**0.00**		**520,929.42**	**874,551.54**	**719,800.00**	**0.00**	**2,115,280.95**	**2,782,931.18**	**2,782,931.18**	**3,826,530.37**
			0.0000		*520,929.4153*	*874,551.5362*	*719,800.0000*	*0.0000*	*2,115,280.9515*	*2,782,931.1766*	*2,782,931.1766*	*3,826,530.3678*
1.7.1 331XX2001 Earthwork	**EA**	**1.0000**	**0.00**		**520,929.42**	**874,551.54**	**719,800.00**	**0.00**	**2,115,280.95**	**2,782,931.18**	**2,782,931.18**	**3,826,530.37**

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*520,929.4153*	*874,551.5362*	*719,800.0000*	*0.0000*	*2,115,280.9515*	*2,782,931.1766*	*2,782,931.1766*	*3,826,530.3678*
1.7.1.1 331XX200103 Backfill	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**520,929.42**	**874,551.54**	**719,800.00**	**0.00**	**2,115,280.95**	**2,782,931.18**	**2,782,931.18**	**3,826,530.37**
1.7.1.1.1 331XX20010301 Backfill of Excavated Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**520,929.42**	**874,551.54**	**719,800.00**	**0.00**	**2,115,280.95**	**2,782,931.18**	**2,782,931.18**	**3,826,530.37**
(Note: The backfill of Area A, B, C, Northside, and Southside is assumed to be provided primarily using onsite soils with clean native offsite soils for the final cover. The total area is 102,000 sy. There are 492,000 cy of exsitu MED and overburden soils that have been excavated and require replacement to return site to existing grade. The overburden will be used as backfill. It is assumed that a 1 ft thick clean native fill cover will be placed over all excavated areas. The total overburden volume is 354,000 cy and the clean native offsite fill is 118,000 cy with 20% swell for compaction.)												
1.7.1.1.1.1 331XX2001030101 Backfill Onsite Overburden Soils	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**92,595.07**	**135,330.14**	**0.00**	**0.00**	**227,925.21**	**322,087.47**	**322,087.47**	**442,870.27**
			0.0000		*0.2616*	*0.3823*	*0.0000*	*0.0000*	*0.6439*	*0.9099*	*0.9099*	*1.2510*
1.7.1.1.1.1.1 MIL 023153109310 Spread and compact, roadway enbankment, 6" lift, sheepsfoot roller	ECY	354,000.0000	0.00	1.2 CL Craft Labor	92,595.07	135,330.14	0.00	0.00	227,925.21	322,087.47	322,087.47	442,870.27
(Note: No swell is included in volume.)												
			0.0000		*2.7677*	*5.7083*	*6.1000*	*0.0000*	*14.5760*	*18.7917*	*18.7917*	*25.8385*
1.7.1.1.1.2 331XX2001030102 Backfill Clean Imported Native Soil Cover	**CY**	**118,000.0000**	**0.00**	**1.2 CL Craft Labor**	**326,592.74**	**673,576.22**	**719,800.00**	**0.00**	**1,719,968.96**	**2,217,415.98**	**2,217,415.98**	**3,048,946.97**
			0.0000		*1.4300*	*3.1200*	*6.1000*	*0.0000*	*10.6500*	*13.8711*	*13.8711*	*19.0728*
1.7.1.1.1.2.1 RSM 310513100200 Common borrow, spread with 200 H.P. dozer, includes load at pit and haul, 2 miles round trip, excludes compaction	CY	118,000.0000	0.00	1.2 CL Craft Labor	168,740.00	368,160.00	719,800.00	0.00	1,256,700.00	1,636,792.31	1,636,792.31	2,250,589.42
(Note: Cost Based on MEANS 2006, 4th quarther, US Natl Average.)												
			0.0000		*0.2494*	*0.2500*	*0.0000*	*0.0000*	*0.4994*	*0.6808*	*0.6808*	*0.9361*
1.7.1.1.1.2.2 RSM 023153105600 Compaction, 2 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	ECY	98,300.0000	0.00	1.2 CL Craft Labor	24,512.74	24,576.22	0.00	0.00	49,088.96	66,919.32	66,919.32	92,014.07
			0.0000		*1.1300*	*2.3800*	*0.0000*	*0.0000*	*3.5100*	*4.3534*	*4.3534*	*5.9860*
1.7.1.1.1.2.3 RSM 31051 310 0900 Borrow, buy & load at pit, spread with 200 HP dozer, for 5 mile haul, add	CY	118,000.0000	0.00	1.2 CL Craft Labor	133,340.00	280,840.00	0.00	0.00	414,180.00	513,704.35	513,704.35	706,343.48
(Note: Assumed total haul of 7 mi.)												
			0.0000		*0.9975*	*0.6436*	*0.0000*	*0.0000*	*1.6410*	*2.3865*	*2.3865*	*3.2815*

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.7.1.1.1.3 331XX08059101 Finish Grading	**SY**	**102,000.0000**	**0.00**	**1.2 CL Craft Labor**	**101,741.60**	**65,645.18**	**0.00**	**0.00**	**167,386.78**	**243,427.73**	**243,427.73**	**334,713.13**
			0.0000		*0.9975*	*0.6436*	*0.0000*	*0.0000*	*1.6410*	*2.3865*	*2.3865*	*3.2815*
1.7.1.1.1.3.1 MIL 023103300200 Shape enbankment, slope up to 1 in 4, by machine	SY	102,000.0000	0.00	1.2 CL Craft Labor	101,741.60	65,645.18	0.00	0.00	167,386.78	243,427.73	243,427.73	334,713.13
			0.0000		*3,678,768.0000*	*70,542.0000*	*89,069.8000*	*1,863,737.4500*	*5,702,117.2500*	*12,616,659.7316*	*12,616,659.7316*	*15,770,824.6645*
1.8 331XX22 Gen Requirements (Opt Breakout)	**EA**	**1.0000**	**0.00**		**3,678,768.00**	**70,542.00**	**89,069.80**	**1,863,737.45**	**5,702,117.25**	**12,616,659.73**	**12,616,659.73**	**15,770,824.66**

(Note: This section includes estimated labor requirements for office personnel during the remedial action phases of the project. Also included are the monthly costs associated with Health & Safety equipment, office trailers, utilities, and other general conditions. Assumes that monthly labor requirement is 176 hours (FTE) for a remedial action duration of 45 months. This is based on RA staff support starting after the design is complete and one month prior to the start of field work. All labor rates are based on Engineering Estimates. For fulltime field personnel, travel cost are based on a two week cycle from home office to site for 10 months of the year. Includes airfare ($600), car rental ($56/day), per diem @ 75% ($101/day), and misc ($12.50/day). Total hourly rate is $31.96. For part time field and office personnel, travel cost are based on two night, three day trip to site. Includes airfare ($600), car rental ($56/day), per diem ($135/day), and misc ($12.50/day). The total trip cost is $1,250.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*969,210.0000*	*0.0000*	*0.0000*	*328,714.0500*	*1,297,924.0500*	*3,004,359.5618*	*3,004,359.5618*	*3,755,449.4523*
1.8.1 331XX2201 Supervision and Management for Area A, B, C, Northside, and Southside	**EA**	**1.0000**	**0.00**		**969,210.00**	**0.00**	**0.00**	**328,714.05**	**1,297,924.05**	**3,004,359.56**	**3,004,359.56**	**3,755,449.45**
			0.0000		*396,000.0000*	*0.0000*	*0.0000*	*56,250.0000*	*452,250.0000*	*1,132,230.9600*	*1,132,230.9600*	*1,415,288.7000*
1.8.1.1 331XX220101 Project Manager	**EA**	**1.0000**	**0.00**		**396,000.00**	**0.00**	**0.00**	**56,250.00**	**452,250.00**	**1,132,230.96**	**1,132,230.96**	**1,415,288.70**
(Note: Includes 1 FTE and monthly trips to the site.)												
			0.0000		*50.0000*	*0.0000*	*0.0000*	*0.0000*	*50.0000*	*134.2880*	*134.2880*	*167.8600*
1.8.1.1.1 USR Project Manager (Hourly Labor Rate)	HR	7,920.0000	0.00	1.4 Prime Professional Labor	396,000.00	0.00	0.00	0.00	396,000.00	1,063,560.96	1,063,560.96	1,329,451.20
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.1.1.2 USR Project Manager Travel	EA	45.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	56,250.00	56,250.00	68,670.00	68,670.00	85,837.50
			0.0000		*177,210.0000*	*0.0000*	*0.0000*	*590.8500*	*177,800.8500*	*476,664.8393*	*476,664.8393*	*595,831.0491*
1.8.1.2 331XX220102 Project Engineer	**EA**	**1.0000**	**0.00**		**177,210.00**	**0.00**	**0.00**	**590.85**	**177,800.85**	**476,664.84**	**476,664.84**	**595,831.05**
(Note: Includes 0.5 FTE and quarterly trips to the site.)												
			0.0000		*45.0000*	*0.0000*	*0.0000*	*0.0000*	*45.0000*	*120.8592*	*120.8592*	*151.0740*
1.8.1.2.1 USR Project Engineer (Hourly Labor Rate)	HR	3,938.0000	0.00	1.4 Prime Professional Labor	177,210.00	0.00	0.00	0.00	177,210.00	475,943.53	475,943.53	594,929.41
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*39.3900*	*39.3900*	*48.0873*	*48.0873*	*60.1091*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.8.1.2.2 USR Project Engineer Travel	EA	15.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	590.85	590.85	721.31	721.31	901.64
			0.0000		*316,800.0000*	*0.0000*	*0.0000*	*253,123.2000*	*569,923.2000*	*1,159,861.5706*	*1,159,861.5706*	*1,449,826.9632*
1.8.1.3 331XX220103 General Superintendent	**EA**	**1.0000**	**0.00**		**316,800.00**	**0.00**	**0.00**	**253,123.20**	**569,923.20**	**1,159,861.57**	**1,159,861.57**	**1,449,826.96**
(Note: Includes 1 FTE and travel to the site for 10 months per year.)												
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
1.8.1.3.1 USR Site Superintendent (Hourly Labor Rate)	HR	7,920.0000	0.00	1.4 Prime Professional Labor	316,800.00	0.00	0.00	0.00	316,800.00	850,848.77	850,848.77	1,063,560.96
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.1.3.2 USR Site Superintendent (Hourly Travel Premium)	HR	7,920.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	253,123.20	253,123.20	309,012.80	309,012.80	386,266.00
			0.0000		*79,200.0000*	*0.0000*	*0.0000*	*18,750.0000*	*97,950.0000*	*235,602.1920*	*235,602.1920*	*294,502.7400*
1.8.1.4 331XX220191 Attorney/QA/H&S	**EA**	**1.0000**	**0.00**		**79,200.00**	**0.00**	**0.00**	**18,750.00**	**97,950.00**	**235,602.19**	**235,602.19**	**294,502.74**
(Note: Includes 0.5 FTE and quarterly trips to the site.)												
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
1.8.1.4.1 USR Attorney/QA/H&S (Hourly Labor Rate)	HR	1,980.0000	0.00	1.4 Prime Professional Labor	79,200.00	0.00	0.00	0.00	79,200.00	212,712.19	212,712.19	265,890.24
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.1.4.2 USR Attorney/QA/H&S Travel	HR	15.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	18,750.00	18,750.00	22,890.00	22,890.00	28,612.50
			0.0000		*386,100.0000*	*0.0000*	*0.0000*	*10,000.0000*	*396,100.0000*	*1,049,179.9360*	*1,049,179.9360*	*1,311,474.9200*
1.8.2 331XX2202 Administration Job Office	**EA**	**1.0000**	**0.00**		**386,100.00**	**0.00**	**0.00**	**10,000.00**	**396,100.00**	**1,049,179.94**	**1,049,179.94**	**1,311,474.92**
			0.0000		*316,800.0000*	*0.0000*	*0.0000*	*0.0000*	*316,800.0000*	*850,848.7680*	*850,848.7680*	*1,063,560.9600*
1.8.2.2 331XX220292 Admin and Data Management	**EA**	**1.0000**	**0.00**		**316,800.00**	**0.00**	**0.00**	**0.00**	**316,800.00**	**850,848.77**	**850,848.77**	**1,063,560.96**
(Note: Includes 2 FTE and no travel to the site.)												
			0.0000		*20.0000*	*0.0000*	*0.0000*	*0.0000*	*20.0000*	*53.7152*	*53.7152*	*67.1440*
1.8.2.2.1 USR Admin/Data Mgmnt. (Hourly Labor Rate)	HR	15,840.0000	0.00	1.4 Prime Professional Labor	316,800.00	0.00	0.00	0.00	316,800.00	850,848.77	850,848.77	1,063,560.96
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*69,300.0000*	*0.0000*	*0.0000*	*10,000.0000*	*79,300.0000*	*198,331.1680*	*198,331.1680*	*247,913.9600*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.8.2.3 331XX220293 Community Relations	**EA**	**1.0000**	**0.00**		**69,300.00**	**0.00**	**0.00**	**10,000.00**	**79,300.00**	**198,331.17**	**198,331.17**	**247,913.96**
(Note: Includes 0.25 FTE and semi-annual trips to the site.)												
			0.0000		*35.0000*	*0.0000*	*0.0000*	*0.0000*	*35.0000*	*94.0016*	*94.0016*	*117.5020*
1.8.2.3.1 USR Community Relations (Hourly Labor Rate)	HR	1,980.0000	0.00	1.4 Prime Professional Labor	69,300.00	0.00	0.00	0.00	69,300.00	186,123.17	186,123.17	232,653.96
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.2.3.2 USR Community Relations (Hourly Travel Premium)	HR	8.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	10,000.00	10,000.00	12,208.00	12,208.00	15,260.00
			0.0000		*2,064,480.0000*	*0.0000*	*0.0000*	*1,199,993.2000*	*3,264,473.2000*	*7,290,229.9908*	*7,290,229.9908*	*9,112,787.4885*
1.8.3 331XX2204 Engineering, Surveying, & QC	**EA**	**1.0000**	**0.00**		**2,064,480.00**	**0.00**	**0.00**	**1,199,993.20**	**3,264,473.20**	**7,290,229.99**	**7,290,229.99**	**9,112,787.49**
			0.0000		*427,680.0000*	*0.0000*	*0.0000*	*506,246.4000*	*933,926.4000*	*2,047,251.9293*	*2,047,251.9293*	*2,559,064.9117*
1.8.3.1 331XX220409 Field Engineer	**EA**	**1.0000**	**0.00**		**427,680.00**	**0.00**	**0.00**	**506,246.40**	**933,926.40**	**2,047,251.93**	**2,047,251.93**	**2,559,064.91**
(Note: Includes 2 FTE at the site and travel to the site for 10 months per year.)												
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*90.2289*	*90.2289*	*112.7862*
1.8.3.1.1 USR Field Engineers, 2 FTE	HR	15,840.0000	0.00	1.4 Prime Professional Labor	427,680.00	0.00	0.00	0.00	427,680.00	1,429,226.32	1,429,226.32	1,786,532.91
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.3.1.2 USR Field Engineer, 2 FTE. (Hourly Travel Premium)	HR	15,840.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	506,246.40	506,246.40	618,025.61	618,025.61	772,532.01
			0.0000		*1,061,280.0000*	*0.0000*	*0.0000*	*225,000.0000*	*1,286,280.0000*	*3,125,023.3728*	*3,125,023.3728*	*3,906,279.2160*
1.8.3.2 331XX220411 Office Engineer	**EA**	**1.0000**	**0.00**		**1,061,280.00**	**0.00**	**0.00**	**225,000.00**	**1,286,280.00**	**3,125,023.37**	**3,125,023.37**	**3,906,279.22**
(Note: Includes 2 FTE Senior Engineers and one monthly trip to the site. This position includes senior engineering support and includes engineering, waste management, health physics, data validation, analytical, and lab support. Includes 3 FTE Junior Engineers and one monthly trip to the site. This position includes senior engineering support and includes engineering, waste management, health physics, data validation, analytical, and lab support.)												
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
1.8.3.2.1 USR Senior Engineer (Hourly Labor Rate)	HR	15,840.0000	0.00	1.4 Prime Professional Labor	633,600.00	0.00	0.00	0.00	633,600.00	1,701,697.54	1,701,697.54	2,127,121.92
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.3.2.2 USR Senior Engineer Travel	HR	90.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	112,500.00	112,500.00	137,340.00	137,340.00	171,675.00
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*72.5155*	*72.5155*	*90.6444*
1.8.3.2.3 USR Junior Engineer (Hourly Labor Rate)	HR	15,840.0000	0.00	1.4 Prime Professional Labor	427,680.00	0.00	0.00	0.00	427,680.00	1,148,645.84	1,148,645.84	1,435,807.30

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.3.2.4 USR Junior Engineer Travel	HR	90.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	112,500.00	112,500.00	137,340.00	137,340.00	171,675.00
			0.0000		*99,000.0000*	*0.0000*	*0.0000*	*18,750.0000*	*117,750.0000*	*288,780.2400*	*288,780.2400*	*360,975.3000*
1.8.3.3 331XX220416 Schedulers	**EA**	**1.0000**	**0.00**		**99,000.00**	**0.00**	**0.00**	**18,750.00**	**117,750.00**	**288,780.24**	**288,780.24**	**360,975.30**
(Note: Includes 0.5 FTE and quarterly trips to the site.)												
			0.0000		*25.0000*	*0.0000*	*0.0000*	*0.0000*	*25.0000*	*67.1440*	*67.1440*	*83.9300*
1.8.3.3.1 USR Prjt. Control/Scheduler (Hourly Labor Rate)	HR	3,960.0000	0.00	1.4 Prime Professional Labor	99,000.00	0.00	0.00	0.00	99,000.00	265,890.24	265,890.24	332,362.80
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.3.3.2 USR Prjt. Control/Scheduler Travel	HR	15.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	18,750.00	18,750.00	22,890.00	22,890.00	28,612.50
			0.0000		*369,600.0000*	*0.0000*	*0.0000*	*337,497.6000*	*707,097.6000*	*1,404,673.9661*	*1,404,673.9661*	*1,755,842.4576*
1.8.3.4 331XX220419 Waste Management Technicians	**EA**	**1.0000**	**0.00**		**369,600.00**	**0.00**	**0.00**	**337,497.60**	**707,097.60**	**1,404,673.97**	**1,404,673.97**	**1,755,842.46**
(Note: Includes 2 FTE at the site and travel to the site for 10 months per year. Only required during the transportation operations. Assume 30 months.)												
			0.0000		*35.0000*	*0.0000*	*0.0000*	*0.0000*	*35.0000*	*94.0016*	*94.0016*	*117.5020*
1.8.3.4.1 USR Waste Management, 2 FTE. (Hourly Labor Rate)	HR	10,560.0000	0.00	1.4 Prime Professional Labor	369,600.00	0.00	0.00	0.00	369,600.00	992,656.90	992,656.90	1,240,821.12
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.3.4.2 USR Waste Management, 2 FTE. (Hourly Travel Premium)	HR	10,560.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	337,497.60	337,497.60	412,017.07	412,017.07	515,021.34
			0.0000		*106,920.0000*	*0.0000*	*0.0000*	*112,499.2000*	*219,419.2000*	*424,500.4826*	*424,500.4826*	*530,625.6032*
1.8.3.5 331XX220424 Quality Control Engineer	**EA**	**1.0000**	**0.00**		**106,920.00**	**0.00**	**0.00**	**112,499.20**	**219,419.20**	**424,500.48**	**424,500.48**	**530,625.60**
(Note: Includes 0.50 FTE at the site and travel to the site for 5 months per year.)												
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*72.5155*	*72.5155*	*90.6444*
1.8.3.5.1 USR QA/QC Technician (Hourly Labor Rate)	HR	3,960.0000	0.00	1.4 Prime Professional Labor	106,920.00	0.00	0.00	0.00	106,920.00	287,161.46	287,161.46	358,951.82
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.3.5.2 USR QA/QC Technician (Hourly Travel Premium)	HR	3,520.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	112,499.20	112,499.20	137,339.02	137,339.02	171,673.78
			0.0000		*244,585.0000*	*69,850.0000*	*30,853.0000*	*253,123.2000*	*598,411.2000*	*1,084,062.3374*	*1,084,062.3374*	*1,355,077.9217*
1.8.4 331XX2207 Health & Safety	**EA**	**1.0000**	**0.00**		**244,585.00**	**69,850.00**	**30,853.00**	**253,123.20**	**598,411.20**	**1,084,062.34**	**1,084,062.34**	**1,355,077.92**
			0.0000		*237,600.0000*	*0.0000*	*0.0000*	*253,123.2000*	*490,723.2000*	*947,149.3786*	*947,149.3786*	*1,183,936.7232*
1.8.4.1 331XX220707 Site Safety & Health Officer	**EA**	**1.0000**	**0.00**		**237,600.00**	**0.00**	**0.00**	**253,123.20**	**490,723.20**	**947,149.38**	**947,149.38**	**1,183,936.72**

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
(Note: Includes 1 FTE at the site and travel to the site for 10 months per year.)												
			0.0000		*30.0000*	*0.0000*	*0.0000*	*0.0000*	*30.0000*	*80.5728*	*80.5728*	*100.7160*
1.8.4.1.1 USR SSHO, 1 pers. (Hourly Labor Rate)	HR	7,920.0000	0.00	1.4 Prime Professional Labor	237,600.00	0.00	0.00	0.00	237,600.00	638,136.58	638,136.58	797,670.72
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.4.1.2 USR SSHO, 1 pers. (Hourly Travel Premium)	HR	7,920.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	253,123.20	253,123.20	309,012.80	309,012.80	386,266.00
1.8.4.2 331XX220791 Health and Safety Equipment	**LS**	**1.0000**	**0.00**		**6,985.00**	**69,850.00**	**30,853.00**	**0.00**	**107,688.00**	**136,912.96**	**136,912.96**	**171,141.20**
(Note: Line item includes a lump sum item for provision of disposal health and safety equipment, rental, operation and maintenance of H&S monitoring equipment, and emergency PPE and breathing air equipment.)												
			0.0000		*5,285.0000*	*52,850.0000*	*23,103.0000*	*0.0000*	*81,238.0000*	*103,266.1489*	*103,266.1489*	*129,082.6861*
1.8.4.2.1 USR H&S Equipment	EA	1.0000	0.00	1.2 CL Craft Labor	5,285.00	52,850.00	23,103.00	0.00	81,238.00	103,266.15	103,266.15	129,082.69
			0.0000		*1,700.0000*	*17,000.0000*	*7,750.0000*	*0.0000*	*26,450.0000*	*33,646.8100*	*33,646.8100*	*42,058.5124*
1.8.4.2.2 USR H&S Equipment	EA	1.0000	0.00	1.2 CL Craft Labor	1,700.00	17,000.00	7,750.00	0.00	26,450.00	33,646.81	33,646.81	42,058.51
			0.0000		*0.0000*	*0.0000*	*0.0000*	*24,750.0000*	*24,750.0000*	*30,697.2394*	*30,697.2394*	*38,371.5492*
1.8.5 331XX2210 Project Utilities	**EA**	**1.0000**	**0.00**		**0.00**	**0.00**	**0.00**	**24,750.00**	**24,750.00**	**30,697.24**	**30,697.24**	**38,371.55**
1.8.5.1 331XX221091 Monthly Utilities	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**24,750.00**	**24,750.00**	**30,697.24**	**30,697.24**	**38,371.55**
(Note: Assume power/utilities to 2 trailers.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*250.0000*	*250.0000*	*310.0731*	*310.0731*	*387.5914*
1.8.5.1.1 USR Temp Power/Lighting/Month (1000 sf)	MO	45.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	11,250.00	11,250.00	13,953.29	13,953.29	17,441.61
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*100.0000*	*100.0000*	*124.0292*	*124.0292*	*155.0366*
1.8.5.1.2 USR Temp Water Service	MO	45.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	4,500.00	4,500.00	5,581.32	5,581.32	6,976.65
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*100.0000*	*100.0000*	*124.0292*	*124.0292*	*155.0366*
1.8.5.1.3 USR Temp Telephone Service	MO	45.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	4,500.00	4,500.00	5,581.32	5,581.32	6,976.65
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*100.0000*	*100.0000*	*124.0292*	*124.0292*	*155.0366*
1.8.5.1.4 USR Internet Service	MO	45.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	4,500.00	4,500.00	5,581.32	5,581.32	6,976.65
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*14,393.0000*	*692.0000*	*58,216.8000*	*47,157.0000*	*120,458.8000*	*158,130.6663*	*158,130.6663*	*197,663.3328*
1.8.6 331XX2208 Temp Const Facilities-Ownership	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**14,393.00**	**692.00**	**58,216.80**	**47,157.00**	**120,458.80**	**158,130.67**	**158,130.67**	**197,663.33**

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*23,416.2000*	*25,300.0000*	*48,716.2000*	*64,425.9427*	*64,425.9427*	*80,532.4283*
1.8.6.1 331XX220801 Office Trailers and Facilities	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**23,416.20**	**25,300.00**	**48,716.20**	**64,425.94**	**64,425.94**	**80,532.43**
1.8.6.1.1 331XX22080101 Office Trailers	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**23,416.20**	**25,300.00**	**48,716.20**	**64,425.94**	**64,425.94**	**80,532.43**
(Note: Assume 2 trailers.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*3.5000*	*3.5000*	*4.3410*	*4.3410*	*5.4263*
1.8.6.1.1.1 RSM 015213200800 Transportation Of Rental Units	MI	800.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	2,800.00	2,800.00	3,472.82	3,472.82	4,341.02
(Note: Assume 200 mi. ea way. Cost Based on MEANS 2006, 4th quarther, US Natl Average.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*500.0000*	*500.0000*	*620.1462*	*620.1462*	*775.1828*
1.8.6.1.1.2 USR Field Office Expense, office equipment rental, supplies, postage, etc.	MO	45.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	22,500.00	22,500.00	27,906.58	27,906.58	34,883.23
(Note: Cost based on Engineering Estimate)												
			0.0000		*0.0000*	*0.0000*	*260.1800*	*0.0000*	*260.1800*	*367.1838*	*367.1838*	*458.9798*
1.8.6.1.1.3 AF 015205000450 Office Trailer, furnished, rent per month, 50' x 10', excl. hookups	MO	90.0000	0.00	1.2 CL Craft Labor	0.00	0.00	23,416.20	0.00	23,416.20	33,046.54	33,046.54	41,308.18
			0.0000		*0.0000*	*0.0000*	*15,150.6000*	*0.0000*	*15,150.6000*	*21,381.5626*	*21,381.5626*	*26,726.9532*
1.8.6.2 331XX220808 Construction Portable Toilets	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**15,150.60**	**0.00**	**15,150.60**	**21,381.56**	**21,381.56**	**26,726.95**
			0.0000		*0.0000*	*0.0000*	*84.1700*	*0.0000*	*84.1700*	*118.7865*	*118.7865*	*148.4831*
1.8.6.2.1 AF 015205001400 Toilet, portable, chemical, rent per month	EA	180.0000	0.00	1.2 CL Craft Labor	0.00	0.00	15,150.60	0.00	15,150.60	21,381.56	21,381.56	26,726.95
(Note: Assume 4 ea.)												
			0.0000		*14,393.0000*	*692.0000*	*19,650.0000*	*21,857.0000*	*56,592.0000*	*72,323.1610*	*72,323.1610*	*90,403.9513*
1.8.6.3 331XX220811 Decon Facilities	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**14,393.00**	**692.00**	**19,650.00**	**21,857.00**	**56,592.00**	**72,323.16**	**72,323.16**	**90,403.95**
1.8.6.3.1 331XX22081101 Decon Trailers	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**14,393.00**	**692.00**	**19,650.00**	**21,857.00**	**56,592.00**	**72,323.16**	**72,323.16**	**90,403.95**
			0.0000		*14,393.0000*	*692.0000*	*19,650.0000*	*0.0000*	*34,735.0000*	*45,214.0879*	*45,214.0879*	*56,517.6099*
1.8.6.3.1.1 USR Decon Facility and Labor	EA	1.0000	0.00	1.2 CL Craft Labor	14,393.00	692.00	19,650.00	0.00	34,735.00	45,214.09	45,214.09	56,517.61
(Note: Cost based on RACER 2006 cost model for Decon Facility and includes geomembrane constructed pad for heavey equipment, pumps, and tanks. Includes 2 months labor for decon activities.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*21,857.0000*	*21,857.0000*	*27,109.0732*	*27,109.0732*	*33,886.3414*
1.8.6.3.1.2 RAC Off-site Disposal of Decon Water	EA	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	21,857.00	21,857.00	27,109.07	27,109.07	33,886.34

Currency in US dollars

(Note: Cost based on RACER 2006 cost model for Transportation and disposal based on 10,000 gal of decon water to be transported 500 mi and disposed using the high disposal fee. No stabilization was included.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
2 333XX01 FUSRAP Mgmnt. & Integration	**LS**	**1.0000**	**0.00**		**5,814,200.00**	**0.00**	**0.00**	**250,000.00**	**6,064,200.00**	**0.00**	**6,088,200.00**	**7,610,250.00**

(Note: This item has been included in estimate as of Revision 2 per request of USACE. USACE has provided estimated M&I costs for completion of remedial work under this alternative. Item include all project management, engineering analysis, supervision and administration, and design services to be undertaken by USACE in implementing this remedial alternative. Costs are based on estimates provided to SAIC by USACE on 3/24/00. Price adjustment from 3/2000 to 12/2006 is included. Represents costs to USACE from conceptual stage through completion of field activities. Costs have been broken down into 3 phases: 1. Design 2. PreConstruction 3. Construction)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
2.1 333XX0101 Project Management	**LS**	**1.0000**	**0.00**		**570,000.00**	**0.00**	**0.00**	**0.00**	**570,000.00**	**0.00**	**570,000.00**	**712,500.00**
2.1.1 USR Design Phase	LS	1.0000	0.00		110,000.00	0.00	0.00	0.00	110,000.00	0.00	110,000.00	137,500.00
			0.0000		*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
2.1.2 USR Preconstruction Phase	EA	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			0.0000		*230,000.0000*	*0.0000*	*0.0000*	*0.0000*	*230,000.0000*	*0.0000*	*230,000.0000*	*287,500.0000*
2.1.3 USR Construction Phase	EA	2.0000	0.00		460,000.00	0.00	0.00	0.00	460,000.00	0.00	460,000.00	575,000.00
2.2 333XX0102 Project Design	**LS**	**1.0000**	**0.00**		**605,150.00**	**0.00**	**0.00**	**0.00**	**605,150.00**	**0.00**	**605,150.00**	**756,437.50**
2.2.1 3 2 1 Design Phase	**LS**	**1.0000**	**0.00**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
2.2.1.1 USR Design Costs	LS	1.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.2.2 3 2 6 Preconstruction Phase	**LS**	**1.0000**	**0.00**		**137,500.00**	**0.00**	**0.00**	**0.00**	**137,500.00**	**0.00**	**137,500.00**	**171,875.00**
2.2.2.1 USR QA/QC Plan	LS	1.0000	0.00		11,000.00	0.00	0.00	0.00	11,000.00	0.00	11,000.00	13,750.00
2.2.2.2 USR SOW/Drawings	LS	1.0000	0.00		55,000.00	0.00	0.00	0.00	55,000.00	0.00	55,000.00	68,750.00
2.2.2.3 USR BCOE/ITR	LS	1.0000	0.00		27,500.00	0.00	0.00	0.00	27,500.00	0.00	27,500.00	34,375.00
2.2.2.4 USR Value Engineering	LS	1.0000	0.00		27,500.00	0.00	0.00	0.00	27,500.00	0.00	27,500.00	34,375.00
2.2.2.5 USR Prep Gov't Cost Estimate	LS	1.0000	0.00		16,500.00	0.00	0.00	0.00	16,500.00	0.00	16,500.00	20,625.00
2.2.3 3 211 Construction Phase	**LS**	**1.0000**	**0.00**		**467,650.00**	**0.00**	**0.00**	**0.00**	**467,650.00**	**0.00**	**467,650.00**	**584,562.50**
2.2.3.1 USR Submittal Review and Coordination	LS	1.0000	0.00		55,000.00	0.00	0.00	0.00	55,000.00	0.00	55,000.00	68,750.00
			0.0000		*219,000.0000*	*0.0000*	*0.0000*	*0.0000*	*219,000.0000*	*0.0000*	*219,000.0000*	*273,750.0000*
2.2.3.2 USR On-Site Technical Assistance	EA	1.5000	0.00		328,500.00	0.00	0.00	0.00	328,500.00	0.00	328,500.00	410,625.00
			0.0000		*56,100.0000*	*0.0000*	*0.0000*	*0.0000*	*56,100.0000*	*0.0000*	*56,100.0000*	*70,125.0000*
2.2.3.3 USR Construction Estimate Support	EA	1.5000	0.00		84,150.00	0.00	0.00	0.00	84,150.00	0.00	84,150.00	105,187.50
2.3 333XX00103 Engineering Analysis Branch	**LS**	**1.0000**	**0.00**		**2,058,800.00**	**0.00**	**0.00**	**0.00**	**2,058,800.00**	**0.00**	**2,058,800.00**	**2,573,500.00**
2.3.1 3 3 5 Design Phase	**LS**	**1.0000**	**0.00**		**105,600.00**	**0.00**	**0.00**	**0.00**	**105,600.00**	**0.00**	**105,600.00**	**132,000.00**
2.3.1.1 USR Project Preparation	LS	1.0000	0.00		96,000.00	0.00	0.00	0.00	96,000.00	0.00	96,000.00	120,000.00

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
2.3.1.2 USR Contingency (10%)	LS	1.0000	0.00		9,600.00	0.00	0.00	0.00	9,600.00	0.00	9,600.00	12,000.00
2.3.2 3 310 Construction Phase	**LS**	**1.0000**	**0.00**		**1,953,200.00**	**0.00**	**0.00**	**0.00**	**1,953,200.00**	**0.00**	**1,953,200.00**	**2,441,500.00**
			0.0000		*1,155,000.0000*	*0.0000*	*0.0000*	*0.0000*	*1,155,000.0000*	*0.0000*	*1,155,000.0000*	*1,443,750.0000*
2.3.2.1 USR Construction Support	EA	1.5000	0.00		1,732,500.00	0.00	0.00	0.00	1,732,500.00	0.00	1,732,500.00	2,165,625.00
2.3.2.2 USR Project Close Out	LS	1.0000	0.00		95,700.00	0.00	0.00	0.00	95,700.00	0.00	95,700.00	119,625.00
2.3.2.3 USR Contingency (10%)	LS	1.0000	0.00		125,000.00	0.00	0.00	0.00	125,000.00	0.00	125,000.00	156,250.00
2.4 333XX0104 Supervision and Administration	**LS**	**1.0000**	**0.00**		**1,345,500.00**	**0.00**	**0.00**	**0.00**	**1,345,500.00**	**0.00**	**1,345,500.00**	**1,681,875.00**
2.4.1 USR S&A Costs	LS	1.0000	0.00		1,345,500.00	0.00	0.00	0.00	1,345,500.00	0.00	1,345,500.00	1,681,875.00
2.5 333XX0105 O&M Involvement	**LS**	**1.0000**	**0.00**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
(Note: O&M costs for alternative have been assumed to be 10% of FUSRAP management costs provided by USACE (3/00).)												
			0.0000		*148,000.0000*	*0.0000*	*0.0000*	*0.0000*	*148,000.0000*	*0.0000*	*0.0000*	*0.0000*
2.5.1 USR O&M	EA	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.6 333XX0106 Project Management B-C	**LS**	**1.0000**	**0.00**		**225,000.00**	**0.00**	**0.00**	**0.00**	**225,000.00**	**0.00**	**225,000.00**	**281,250.00**
2.6.1 USR Design Phase	LS	1.0000	0.00		60,000.00	0.00	0.00	0.00	60,000.00	0.00	60,000.00	75,000.00
			0.0000		*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
2.6.2 USR Preconstruction Phase	EA	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			0.0000		*110,000.0000*	*0.0000*	*0.0000*	*0.0000*	*110,000.0000*	*0.0000*	*110,000.0000*	*137,500.0000*
2.6.3 USR Construction Phase	EA	1.5000	0.00		165,000.00	0.00	0.00	0.00	165,000.00	0.00	165,000.00	206,250.00
2.7 333XX0107 Project Design B-C	**LS**	**1.0000**	**0.00**		**290,000.00**	**0.00**	**0.00**	**250,000.00**	**540,000.00**	**0.00**	**564,000.00**	**705,000.00**
2.7.1 312 1 Design Phase	**LS**	**1.0000**	**0.00**		**50,000.00**	**0.00**	**0.00**	**250,000.00**	**300,000.00**	**0.00**	**324,000.00**	**405,000.00**
2.7.1.1 USR Design Costs	LS	1.0000	0.00		50,000.00	0.00	0.00	250,000.00	300,000.00	0.00	324,000.00	405,000.00
2.7.2 312 6 Preconstruction Phase	**LS**	**1.0000**	**0.00**		**135,000.00**	**0.00**	**0.00**	**0.00**	**135,000.00**	**0.00**	**135,000.00**	**168,750.00**
2.7.2.1 USR QA/QC Plan	LS	1.0000	0.00		10,000.00	0.00	0.00	0.00	10,000.00	0.00	10,000.00	12,500.00
2.7.2.2 USR SOW/Drawings	LS	1.0000	0.00		50,000.00	0.00	0.00	0.00	50,000.00	0.00	50,000.00	62,500.00
2.7.2.3 USR BCOE/ITR	LS	1.0000	0.00		25,000.00	0.00	0.00	0.00	25,000.00	0.00	25,000.00	31,250.00
2.7.2.4 USR Value Engineering	LS	1.0000	0.00		25,000.00	0.00	0.00	0.00	25,000.00	0.00	25,000.00	31,250.00
2.7.2.5 USR Prep Gov't Cost Estimate	LS	1.0000	0.00		25,000.00	0.00	0.00	0.00	25,000.00	0.00	25,000.00	31,250.00
2.7.3 31211 Construction Phase	**LS**	**1.0000**	**0.00**		**105,000.00**	**0.00**	**0.00**	**0.00**	**105,000.00**	**0.00**	**105,000.00**	**131,250.00**
2.7.3.1 USR Submittal Review and Coordination	LS	1.0000	0.00		30,000.00	0.00	0.00	0.00	30,000.00	0.00	30,000.00	37,500.00

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*41,667.0000*	*0.0000*	*0.0000*	*0.0000*	*41,667.0000*	*0.0000*	*41,667.0000*	*52,083.7500*
2.7.3.2 USR On-Site Technical Assistance	EA	1.5000	0.00		62,500.50	0.00	0.00	0.00	62,500.50	0.00	62,500.50	78,125.63
			0.0000		*8,333.0000*	*0.0000*	*0.0000*	*0.0000*	*8,333.0000*	*0.0000*	*8,333.0000*	*10,416.2500*
2.7.3.3 USR Construction Estimate Support	EA	1.5000	0.00		12,499.50	0.00	0.00	0.00	12,499.50	0.00	12,499.50	15,624.38
2.8 333XX0108 Engineering Analysis Branch B-C	**LS**	**1.0000**	**0.00**		**398,750.00**	**0.00**	**0.00**	**0.00**	**398,750.00**	**0.00**	**398,750.00**	**498,437.50**
2.8.1 313 5 Design Phase	**LS**	**1.0000**	**0.00**		**55,000.00**	**0.00**	**0.00**	**0.00**	**55,000.00**	**0.00**	**55,000.00**	**68,750.00**
2.8.1.1 USR Project Preparation	LS	1.0000	0.00		50,000.00	0.00	0.00	0.00	50,000.00	0.00	50,000.00	62,500.00
2.8.1.2 USR Contingency (10%)	LS	1.0000	0.00		5,000.00	0.00	0.00	0.00	5,000.00	0.00	5,000.00	6,250.00
2.8.2 31310 Construction Phase	**LS**	**1.0000**	**0.00**		**343,750.00**	**0.00**	**0.00**	**0.00**	**343,750.00**	**0.00**	**343,750.00**	**429,687.50**
			0.0000		*175,000.0000*	*0.0000*	*0.0000*	*0.0000*	*175,000.0000*	*0.0000*	*175,000.0000*	*218,750.0000*
2.8.2.1 USR Construction Support	EA	1.5000	0.00		262,500.00	0.00	0.00	0.00	262,500.00	0.00	262,500.00	328,125.00
2.8.2.2 USR Project Close Out	LS	1.0000	0.00		50,000.00	0.00	0.00	0.00	50,000.00	0.00	50,000.00	62,500.00
2.8.2.3 USR Contingency (10%)	LS	1.0000	0.00		31,250.00	0.00	0.00	0.00	31,250.00	0.00	31,250.00	39,062.50
2.9 333XX0109 Supervision and Administration B	**LS**	**1.0000**	**0.00**		**321,000.00**	**0.00**	**0.00**	**0.00**	**321,000.00**	**0.00**	**321,000.00**	**401,250.00**
2.9.1 USR S&A Costs	LS	1.0000	0.00		321,000.00	0.00	0.00	0.00	321,000.00	0.00	321,000.00	401,250.00

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

APPENDIX G

ATTACHMENT (Cont'd)

DETAILED COST ESTIMATE FOR

Alternative 4 (Partial Excavation with Off-Site Disposal) and

ALTERNATIVE 4B - SEAWAY PARTIAL EXCAVATION WITH OFFSITE DISPOSAL
SEAWAY AREA A, NEW AREA B-C, NORTHSIDE, AND SOUTHSIDE

Estimated by	D. Cobb, R. Tucker, Mike Poligone
Designed by	SAIC
Prepared by	Mike Poligone
Preparation Date	6/21/2007
Effective Date of Pricing	12/11/2006
Estimated Construction Time	726 Days

Description	Page

Description **Page**

Designed by	
SAIC	
Estimated by	
D. Cobb, R. Tucker, Mike Poligone	
Prepared by	
Mike Poligone	

Design Document	ADDENDUM TO THE FEASIBILITY STUDY - SEPTEMBER 2006
Document Date	
District	USACE BUFFALO DISTRICT
Contact	JANNA HUMMEL (PM)
Budget Year	2007
UOM System	English

Direct Costs

LaborCost
EQCost
MatlCost
SubBidCost

Timeline/Currency

Preparation Date	6/21/2007
Escalation Date	12/11/2006
Eff. Pricing Date	12/11/2006
Estimated Duration	726 Day(s)
Currency	US dollars
Exchange Rate	1.000000

Costbook CB04aEB: MII English Cost Book 2004b Final

Labor : MII English Cost Book 2004b Final
Note: System.Data.DataRow

Labor Rates

LaborCost1
LaborCost2
LaborCost3
LaborCost4

Equipment : Eq Rates EP 1110-1-8, Aug. 1995

Sales Tax	8.25
Working Hours per Year	1,600
Labor Adjustment Factor	1.00
Cost of Money	8.13
Cost of Money Discount	6.50
Tire Recap Cost Factor	1.50
Tire Recap Wear Factor	1.80
Tire Repair Factor	0.15
Equipment Cost Factor	1.00
Standby Depreciation Factor	0.50

Fuel

Electricity	0.060
Gas	3.100
Diesel Off-Road	2.500
Diesel On-Road	2.800

Shipping Rates

Over 0 CWT	12.05
Over 240 CWT	9.64
Over 300 CWT	7.23
Over 400 CWT	5.79
Over 500 CWT	4.45
Over 700 CWT	3.62
Over 800 CWT	4.29

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Date	Author	Note
12/11/2006	Mike Poligone	The purpose of this estimate is to provide the an order-of-magnitude cost for Alternative No. 4B for the Seaway Landfill in Tonawanda, New York, as part of Addendum To The Feasibility Study - September 2006. Under this alternative, MED soil will be excavated in Area A, part of new Area B-C, Northside (NS), and Southside (SS) of the Seaway Landfill. An engineered cap will be installed in new Area B-C and Southside where remediation will not be performed. The elements of this alternative includes the excavation, transportation, and disposal of approximately 84,311 cubic yards (cy) of in place impacted radioactive materials and 15,570 cy of overburden as identified during site gamma walkover surveys and later investigations. Material depths range from the surface to 12 feet depending on the specific area of site. The material in question is accessible without disturbing the existing final cap. The excavated material will be stockpiled onsite, containerized in intermodals, and transported offsite by rail for disposal at an approved facility. Upon removal of all contaminated material, the excavated areas will be backfilled with clean fill and overburden. The estimated schedule for this alternative assumes a start date for field activities of March after the design is complete. A 9-month construction schedule was assumed from March to November due to expected winter conditions that prohibit completion of site work. Based on this assumption and the anticipated site production rates, the entire project will take approximately 2.5 to 3 construction seasons. The estimated duration of excavation and backfill would be 2.5 years and the cap would be 0.75 years. It is assumed that the excavation/loading and capping activities run concurrently in the last year. The professional staff and capital overhead is assumed to be required for 33 months unless otherwise noted.

A phased approach is assumed to excavate Area A at 75,700 cy and new Area B-C at 17,310 cy. The remediation is assumed to start in Area A with an approximate ex-situ volume of 55,000 cy in the first year. The remaining Area A, Northside, and Southside with an approximate ex-situ volume of 50,000 cy would be excavated in the second year. The exact order of excavations will be determined in the design phase. The excavation of the new Area B-C would generate approximately 2,900 cy of MED soil and 14,400 cy of clean overburden material. It was assumed the clean overburden would used as backfill in Area A or new Area B-C to minimize on site material handling activities. Additionally, the area to be capped in new Area B-C is assumed to have approximately 5 ft of clean overburden (68,300 cy) removed and used as backfill in other areas that are remediated to minimize the offsite fill required and allow the cap to be installed without impacting the existing grade. Contaminated material amounting to 5,260 cy will be removed from the Northside of the landfill and 466 cy of material from a lens on the Southside. Both of these areas are outside the leachate collection system of the landfill. No overburden would be moved to access the Northside material and 1,145 cy in place of overburden would be removed to access the Southside material.

This alternative includes excavation of MED and Overburden soils and consolidating in a stockpile on the Seaway site. The soils will be directly loaded from the stockpile into intermodals for transportation to the railcar staging and loading area. The intermodal containers will be loaded onto railcars for transport to a licensed and permitted disposal facility. Actual off-site disposal production rates may be affected by available intermodal containers and railcars, which can result in substantial daily delays. Upon completion of excavations in Area A and new Area B-C and receipt of clean confirmation results, the resulting excavations will be backfilled to the appropriate elevation using the overburden and additional clean fill from offsite sources. In new Area B-C and Southside where no remediation is being performed, an engineered cap will be constructed. At Northside and Southside excavations, these areas will be backfilled to grade.

Due to the depth of the remaining material, minimal O&M activities are needed after the Remedial Action period. The project schedule is based on 8 hours per day and 5 days per week. Overtime costs have not been included.

All work is assumed to be managed by the prime contractor. Transportation and disposal will be subcontracted by the prime contractor and a 3% handling charge has been included. The prime contractor will perform all professional services and subcontract all field activities.

The professional labor assigned to the prime contractor includes the following markups: (1) Overhead 120%; (2) G&A 12%; (3) Profit 9%; and (4) S/C Markup 3%.

The subcontractor includes the following markups: (1) Field Overhead (General Conditions) 10%; (2) Small Tools 2% (only on labor); (3) Profit 9%; and (4) Bonds 2.75%.

An 8.75% sales tax is included on material purchases. Prices from the USACE Unit Price Book, MEANS, RACER, and historical rates were adjusted to December 2006 pricing. A location factor of 0.94 was designated by RSMeans however the Davis Bacon Rates were higher than average rated listed in RSMeans, so no adjustment was made. Vendor quotes, USACE quotes, and engineering estimates were not adjusted for location or adjusted for price escalation. Labor rates were based on the 2/16/07 Department of Labor, Davis Bacon Rates and a 10% premium was added to account for employers paying more for employee retention.

A 10% Design markup has been included on all field work except transportation and disposal. A 25% contingency was applied to the entire estimate for design and construction contingency.

HTRW productivity factors, as established in the USACE Engineering Instructions, were also included for the remediation effort where applicable as noted in the estimate. This includes a 0.63 safety and contaminated materials productivity factor on all contaminated material handling activities. Additionally a weather delay factor of 0.8 and a radiological survey factor of 0.8 was included to account for delays in delineating areas of contamination.

FUSRAP Management and Integration costs have been included as of Revision 2 of this alternative (March, 2000). No USACE cost for O&M activities are included. Costs incorporated into estimate are based on costs provided by USACE. This estimate is based on items presented in the Feasibility Study addendum entitled "Addendum to the Feasibility Study for the Seaway Site, Areas A, B, and C - Tonawanda, New York". The actual project budget may vary depending upon such factors as design parameters, scheduling, differing assumptions, revisions to the existing feasibility study, and other project specific requirements.

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Direct Cost Markups	Category	Method
Sales Tax	TaxAdj	Running % on Selected Costs
MatlCost		
Productivity (63%)	Productivity	Productivity
Productivity (85%)	Productivity	Productivity
Price Adjust Cost Book (4.6%)	TaxAdj	Running % on Selected Costs
LaborCost		
EQCost		
MatlCost		
SubBidCost		
USACE Labor Adj. (9.6%)	TaxAdj	Running % on Selected Costs
SubBidCost		
Buffalo Location Factor (-6%)	TaxAdj	Running % on Selected Costs
LaborCost		
EQCost		
MatlCost		
SubBidCost		

Contractor Markups	Category	Method
Prime OH	HOOH	Running %
Prime G&A	Allowance	Running %
Prime Profit	Allowance	Running %
Craft HOOH	Allowance	Running %
Craft FOOH	Allowance	Running %
Craft Profit	Profit	Running %
Craft Small Tools (Small Tools)	JOOH	% of Labor
Craft Small Tools	JOOH	JOOH (Calculated)
Craft Bond	Bond	Bond Table

HTRW (Other), Banded, 24 months, 1.00% Surcharge

Contract Price	*Bond Rate*
0	*4.40*
3,000,000	*3.85*
5,000,000	*3.30*
7,500,000	*2.75*

Craft Insurance	MiscContract	Running %
Small TOols (Small Tools)	JOOH	% of Labor
Transport & Disposal Handlinf	Allowance	Running %

Owner Markups	Category	Method
Design	MiscOwner	Running %
Conting (Running%)	Contingency	Running %
Cost Book Calc	Escalation	Escalation

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

StartDate	StartIndex	EndDate	EndIndex	Escalation
1/28/2004	3,703.10	12/31/2006	3,874.40	4.63

USACE Labor Calc Escalation Escalation

StartDate	StartIndex	EndDate	EndIndex	Escalation
3/11/2000	3,536.00	12/11/2006	3,874.00	9.56

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
Seaway Alt 4			**135,495.90**		**20,251,880.32**	**3,930,385.20**	**11,578,622.80**	**43,485,637.42**	**79,246,525.74**	**100,436,020.84**	**106,839,227.01**	**134,934,279.17**
			1.2855		*65.8656*	*33.1373*	*21.9045*	*337.6246*	*458.5321*	*554.0539*	*555.2521*	*707.2078*
1 331XX HTRW REMEDIAL ACTION (CONSTRUCT)	**CY**	**105,400.0000**	**135,495.90**		**6,942,239.40**	**3,492,670.54**	**2,308,737.79**	**35,585,637.42**	**48,329,285.16**	**58,397,276.86**	**58,523,569.31**	**74,539,707.05**
			0.0000		*41,438.1269*	*24,494.8791*	*58,707.0000*	*0.0000*	*124,640.0060*	*169,574.2190*	*169,574.2190*	*233,164.5511*
1.1 331XX01 Mobilize and Preparatory Work	**EA**	**1.0000**	**0.00**		**41,438.13**	**24,494.88**	**58,707.00**	**0.00**	**124,640.01**	**169,574.22**	**169,574.22**	**233,164.55**
			0.0000		*6,795.0000*	*15,750.0000*	*0.0000*	*0.0000*	*22,545.0000*	*27,900.2857*	*27,900.2857*	*38,362.8928*
1.1.1 331XX0101 Mob Construction Equip & Fac	**EA**	**1.0000**	**0.00**		**6,795.00**	**15,750.00**	**0.00**	**0.00**	**22,545.00**	**27,900.29**	**27,900.29**	**38,362.89**
			0.0000		*6,795.0000*	*15,750.0000*	*0.0000*	*0.0000*	*22,545.0000*	*27,900.2857*	*27,900.2857*	*38,362.8928*
1.1.1.1 331XX010107 Const Equip Ownership/Oper	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**6,795.00**	**15,750.00**	**0.00**	**0.00**	**22,545.00**	**27,900.29**	**27,900.29**	**38,362.89**
(Note: Mob/Demob of heavy equipment is based on the estimated equipment reuirements for excavation, loading, backfill, and capping requirements. This element includes mob/demob of 15 pieces of equipment per season. Actual number of mob/demob required will depend on scheduling of project.)												
1.1.1.1.1 331XX01010701 Mobilization/Demobilization - Area A, new Area B-C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**6,795.00**	**15,750.00**	**0.00**	**0.00**	**22,545.00**	**27,900.29**	**27,900.29**	**38,362.89**
			0.0000		*75.5000*	*175.0000*	*0.0000*	*0.0000*	*250.5000*	*310.0032*	*310.0032*	*426.2544*
1.1.1.1.1.1 RSM 015436500100 Mobilization or demobilization, dozer, loader, backhoe or excavator, above 250 H.P., up to 50 miles	EA	90.0000	0.00	1.2 CL Craft Labor	6,795.00	15,750.00	0.00	0.00	22,545.00	27,900.29	27,900.29	38,362.89
(Note: Cost Based on MEANS 2006, 4th quarther, US Natl Average.)												
			0.0000		*16,962.1269*	*7,385.8791*	*48,160.0000*	*0.0000*	*72,508.0060*	*103,916.8306*	*103,916.8306*	*142,885.6421*
1.1.2 331XX0104 Setup/Construct Temp Facilities	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**16,962.13**	**7,385.88**	**48,160.00**	**0.00**	**72,508.01**	**103,916.83**	**103,916.83**	**142,885.64**
			0.0000		*2.2628*	*2.5469*	*15.4000*	*0.0000*	*20.2097*	*28.5216*	*28.5216*	*39.2172*
1.1.2.1 331XX010423 Aggregate Surfacing	**EA**	**400.0000**	**0.00**	**1.2 CL Craft Labor**	**905.12**	**1,018.74**	**6,160.00**	**0.00**	**8,083.86**	**11,408.63**	**11,408.63**	**15,686.87**
1.1.2.1.1 331XX01042301 MED Soil Staging Area - Area A, new Area B-C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**905.12**	**1,018.74**	**6,160.00**	**0.00**	**8,083.86**	**11,408.63**	**11,408.63**	**15,686.87**
(Note: Assume the rail staging area is in place from the Ashland Project. Assume 20,000 sf of gravel is required to upgrade existing area for future loading operations. Assume 6" depth.)												

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*2.2628*	*2.5469*	*15.4000*	*0.0000*	*20.2097*	*28.5216*	*28.5216*	*39.2172*
1.1.2.1.1.1 AF 027202001530 Aggregrate base course, for roadways and large paved areas, gravel, bank run, compacted, 6" deep	CY	400.0000	0.00	1.2 CL Craft Labor	905.12	1,018.74	6,160.00	0.00	8,083.86	11,408.63	11,408.63	15,686.87
			0.0000		*5,657.0060*	*6,367.1371*	*38,500.0000*	*0.0000*	*50,524.1431*	*71,303.9385*	*71,303.9385*	*98,042.9154*
1.1.2.2 331XX010425 Roads and Parking	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**5,657.01**	**6,367.14**	**38,500.00**	**0.00**	**50,524.14**	**71,303.94**	**71,303.94**	**98,042.92**
1.1.2.2.1 331XX01042501 Preparation Access Roads	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**5,657.01**	**6,367.14**	**38,500.00**	**0.00**	**50,524.14**	**71,303.94**	**71,303.94**	**98,042.92**
(Note: Assume roadways are 20 feet wide and thickness is 1.5 feet. Estimate is for 2,000 LF of temporary roads. Assume 10% compaction.)												
			0.0000		*2.2628*	*2.5469*	*15.4000*	*0.0000*	*20.2097*	*28.5216*	*28.5216*	*39.2172*
1.1.2.2.1.1 AF 027202001530 Aggregrate base course, for roadways and large paved areas, gravel, bank run, compacted, 6" deep	CY	2,500.0000	0.00	1.2 CL Craft Labor	5,657.01	6,367.14	38,500.00	0.00	50,524.14	71,303.94	71,303.94	98,042.92
			0.0000		*10,400.0000*	*0.0000*	*3,500.0000*	*0.0000*	*13,900.0000*	*21,204.2620*	*21,204.2620*	*29,155.8602*
1.1.2.3 331XX010430 Erosion Control	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**10,400.00**	**0.00**	**3,500.00**	**0.00**	**13,900.00**	**21,204.26**	**21,204.26**	**29,155.86**
1.1.2.3.1 331XX01043002 Erosion/Sediment Control - Area A, new Area B-C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**10,400.00**	**0.00**	**3,500.00**	**0.00**	**13,900.00**	**21,204.26**	**21,204.26**	**29,155.86**
			0.0000		*2.0800*	*0.0000*	*0.7000*	*0.0000*	*2.7800*	*4.2409*	*4.2409*	*5.8312*
1.1.2.3.1.1 MIL 023707001120 Erosion control, silt fence, polypropylene, 3' high, includes 7.5' posts	LF	5,000.0000	0.00	1.2 CL Craft Labor	10,400.00	0.00	3,500.00	0.00	13,900.00	21,204.26	21,204.26	29,155.86
			0.0000		*17,681.0000*	*1,359.0000*	*10,547.0000*	*0.0000*	*29,587.0000*	*37,757.1027*	*37,757.1027*	*51,916.0162*
1.1.3 331XX0105 Construct Temporary Utilities	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**17,681.00**	**1,359.00**	**10,547.00**	**0.00**	**29,587.00**	**37,757.10**	**37,757.10**	**51,916.02**
1.1.3.1 331XX010501 Utility Installation - Area A, new Area B-C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**17,681.00**	**1,359.00**	**10,547.00**	**0.00**	**29,587.00**	**37,757.10**	**37,757.10**	**51,916.02**

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.1.3.1.1 RAC RACER Temporary Trailer Utility Hookups	LS	1.0000	0.00	1.2 CL Craft Labor	10,590.00	834.00	8,317.00	0.00	19,741.00	25,330.83	25,330.83	34,829.90
(Note: Cost based on RACER 2006 cost model for Overhead Electrical Distribution based on 1000 lf run of 5kV, 3 phase, 160 amp service. Assume pole spacing at 250 ft.)												
1.1.3.1.2 USR Temp Telephone Install (5 lines)	LS	1.0000	0.00	1.2 CL Craft Labor	400.00	0.00	100.00	0.00	500.00	629.60	629.60	865.70
(Note: Cost based on an Engineering Estimate.)												
1.1.3.1.3 RAC RACER Utility Trench Excavation	LS	1.0000	0.00	1.2 CL Craft Labor	6,691.00	525.00	2,130.00	0.00	9,346.00	11,796.67	11,796.67	16,220.42
(Note: Cost based on RACER 2006 cost model for trenching and includes 1000 lf trench with 2" PVC water line. Trench is 4 ft deep and 3 ft wide.)												
			0.0000		*937,728.0000*	*148,500.0000*	*0.0000*	*892,681.4000*	*1,978,909.4000*	*2,638,190.0668*	*2,638,190.0668*	*3,627,511.3418*
1.2 331XX02 Monitoring, Samplng, Testing, Analysis	**EA**	**1.0000**	**0.00**		**937,728.00**	**148,500.00**	**0.00**	**892,681.40**	**1,978,909.40**	**2,638,190.07**	**2,638,190.07**	**3,627,511.34**
			0.0000		*937,728.0000*	*148,500.0000*	*0.0000*	*892,681.4000*	*1,978,909.4000*	*2,638,190.0668*	*2,638,190.0668*	*3,627,511.3418*
1.2.1 331XX0208 Sampling Radioactve Contam Media	**EA**	**1.0000**	**0.00**		**937,728.00**	**148,500.00**	**0.00**	**892,681.40**	**1,978,909.40**	**2,638,190.07**	**2,638,190.07**	**3,627,511.34**
			0.0000		*937,728.0000*	*148,500.0000*	*0.0000*	*892,681.4000*	*1,978,909.4000*	*2,638,190.0668*	*2,638,190.0668*	*3,627,511.3418*
1.2.1.1 331XX020805 Sub-Surface Soil	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**937,728.00**	**148,500.00**	**0.00**	**892,681.40**	**1,978,909.40**	**2,638,190.07**	**2,638,190.07**	**3,627,511.34**
1.2.1.1.1 1 3 1 1 1 Seaway MSA - Area A, new Area B-C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**937,728.00**	**148,500.00**	**0.00**	**892,681.40**	**1,978,909.40**	**2,638,190.07**	**2,638,190.07**	**3,627,511.34**
(Note: Includes all monitoring, sampling, and analysis and verification testing.)												
			0.0000		*937,728.0000*	*148,500.0000*	*0.0000*	*0.0000*	*1,086,228.0000*	*1,533,463.2497*	*1,533,463.2497*	*2,108,511.9683*
1.2.1.1.1.1 331XX02080501 Rad Monitoring	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**937,728.00**	**148,500.00**	**0.00**	**0.00**	**1,086,228.00**	**1,533,463.25**	**1,533,463.25**	**2,108,511.97**
(Note: This element covers IH/HP technicians for the following areas: 3 at the excavation site to survey personnel, survey additional areas requiring excavation, and obtaining post RA samples for 7 months; 4 at the loading site to survey personnel and transport vehicles for 15 months; and 2 at the onsite lab to analyze samples/swipes and calibrate equipment for 15 months. The IH/HP technicians and equipment would be required for a total of 111 months duration at 176 hrs/month spanning approximately 3 years. Total hours is 19,536. Equipment pricing base on Vendor Quote and escalated to 12/2006 pricing.;Rates escalated from 2/2002)- The Beryllium and Radiological monitoring equipment includes the following: 1. Model 2929 dual channel scaler (2 @ $440/mo =$880/mo) 2. Alpha Survey Instrument, 43-5 or equal (3 @ 260/mo = $880/mo) 3. Ratemeter w/GM pancake, 44-9 or equal (2 @ $235/mo = $470/mo) 4. Alarming Frisker w/ GM pancake, 44-9 or equal (5 @ $160/mo = $800/mo) 5. Micro R Meter, Model 19 or equal (2 @ $160/mo = $320/mo) 6. Personal Air Sampling pumps (3 @ $100/mo = $300/mo) 7. Personal air sampling pump charger (2 @ $60/mo = $120/mo) 8. High Volume air samplers (8 @ $155/mo = $1,240/mo) Total = $5,010/month. Use $5,500/mo direct cost to account for other miscellaneous equipment or supplies. Assume technicians are permanate in area and no per diem or travel is required.)												
			0.0000		*0.0000*	*5,500.0000*	*0.0000*	*0.0000*	*5,500.0000*	*6,806.4569*	*6,806.4569*	*9,358.8783*
1.2.1.1.1.1.1 USR Rad Monitoring Equipment	MO	27.0000	0.00	1.2 CL Craft Labor	0.00	148,500.00	0.00	0.00	148,500.00	183,774.34	183,774.34	252,689.71
(Note: (3 seasons x 9 months/season))												

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*48.0000*	*0.0000*	*0.0000*	*0.0000*	*48.0000*	*69.0873*	*69.0873*	*94.9950*
1.2.1.1.1.1.2 RAD H-RADPRTEC Radiation Protection Technicians	HR	19,536.0000	0.00	1.2 CL Craft Labor	937,728.00	0.00	0.00	0.00	937,728.00	1,349,688.91	1,349,688.91	1,855,822.26
			0.0000		*0.0000*	*0.0000*	*0.0000*	*20,124.0000*	*20,124.0000*	*24,904.2071*	*24,904.2071*	*34,243.2848*
1.2.1.1.1.2 331XX02080502 Bioassays	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**20,124.00**	**20,124.00**	**24,904.21**	**24,904.21**	**34,243.28**
(Note: Bioassays (2/yr x 3 yrs x 30 people))												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*111.8000*	*111.8000*	*138.3567*	*138.3567*	*190.2405*
1.2.1.1.1.2.1 RAD 021055508154 Testing, rad analytical urine & feces, radium-226, 228, radon de-emanation, gas flow	EA	180.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	20,124.00	20,124.00	24,904.21	24,904.21	34,243.28
			0.0000		*0.0000*	*0.0000*	*0.0000*	*872,557.4000*	*872,557.4000*	*1,079,822.6100*	*1,079,822.6100*	*1,484,756.0887*
1.2.1.1.1.3 331XX02080503 Rad Lab Soils Analysis	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**872,557.40**	**872,557.40**	**1,079,822.61**	**1,079,822.61**	**1,484,756.09**
(Note: Since a MARSSIM analysis has not been performed, assume confirmation samples are obtained every 1,000 sf. The total area is 71,000 sy or 639,000 sf. Total samples collected are 639. Add 30% additional samples for sidewall samples and overburden delineation. Add 20% additional samples for hotspots. Total samples = 1,000 ea Samples will be analyzed for radionuclides. Assume 1% of rad samples will also have TCLP Test = 10 ea.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*65.9200*	*65.9200*	*81.5785*	*81.5785*	*112.1704*
1.2.1.1.1.3.1 HTW 021055506428 Documentation package, for Q.A. verification	EA	1,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	65,920.00	65,920.00	81,578.48	81,578.48	112,170.41
(Note: (Assume 100%))												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*121.0000*	*121.0000*	*149.7421*	*149.7421*	*205.8953*
1.2.1.1.1.3.2 RAD 021055508236 Testing, rad analytical vegetation/sediment/soil, gamma spectroscopy, radium-226, 228	EA	1,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	121,000.00	121,000.00	149,742.05	149,742.05	205,895.32
			0.0000		*0.0000*	*0.0000*	*0.0000*	*98.6200*	*98.6200*	*122.0460*	*122.0460*	*167.8132*

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.2.1.1.1.3.3 RAD 021055508238 Testing, rad analytical vegetation/sediment/soil, gamma spectroscopy, uranium-total	EA	1,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	98,620.00	98,620.00	122,045.96	122,045.96	167,813.20
			0.0000		*0.0000*	*0.0000*	*0.0000*	*126.5700*	*126.5700*	*156.6351*	*156.6351*	*215.3733*
1.2.1.1.1.3.4 RAD 021055508216 Testing, rad analytical vegetation/sediment/soil, alpha spectroscopy, uranium isotopic	EA	1,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	126,570.00	126,570.00	156,635.14	156,635.14	215,373.31
			0.0000		*0.0000*	*0.0000*	*0.0000*	*123.4300*	*123.4300*	*152.7493*	*152.7493*	*210.0302*
1.2.1.1.1.3.5 RAD 021055508215 Testing, rad analytical vegetation/sediment/soil, alpha spectroscopy, thorium isotopic	EA	1,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	123,430.00	123,430.00	152,749.27	152,749.27	210,030.24
			0.0000		*0.0000*	*0.0000*	*0.0000*	*46.2700*	*46.2700*	*57.2609*	*57.2609*	*78.7337*
1.2.1.1.1.3.6 RAD 021055508252 Testing, rad analytical vegetation/sediment/soil, gross alpha & gross beta, total	EA	1,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	46,270.00	46,270.00	57,260.87	57,260.87	78,733.69
			0.0000		*0.0000*	*0.0000*	*0.0000*	*289.6700*	*289.6700*	*358.4775*	*358.4775*	*492.9066*
1.2.1.1.1.3.7 AFH 021055507120 Testing, TAL metals (6010/7000s)	EA	1,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	289,670.00	289,670.00	358,477.52	358,477.52	492,906.59
			0.0000		*0.0000*	*0.0000*	*0.0000*	*107.7400*	*107.7400*	*133.3323*	*133.3323*	*183.3319*
1.2.1.1.1.3.8 AFH 021055507427 Testing, RCRA evaluations, toxic characteristic leaching procedure, TCLP (RCRA) (EPA 1311)	EA	10.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	1,077.40	1,077.40	1,333.32	1,333.32	1,833.32
			0.0000		*23,107.3966*	*0.0000*	*5,500.0000*	*0.0000*	*28,607.3966*	*45,697.1073*	*45,697.1073*	*62,833.5225*
1.3 331XX03 Site Work	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**23,107.40**	**0.00**	**5,500.00**	**0.00**	**28,607.40**	**45,697.11**	**45,697.11**	**62,833.52**
			0.0000		*23,107.3966*	*0.0000*	*5,500.0000*	*0.0000*	*28,607.3966*	*45,697.1073*	*45,697.1073*	*62,833.5225*
1.3.1 331XX0303 Earthwork	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**23,107.40**	**0.00**	**5,500.00**	**0.00**	**28,607.40**	**45,697.11**	**45,697.11**	**62,833.52**

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*23,107.3966*	*0.0000*	*5,500.0000*	*0.0000*	*28,607.3966*	*45,697.1073*	*45,697.1073*	*62,833.5225*
1.3.1.1 331XX030302 Excavation/Fill	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**23,107.40**	**0.00**	**5,500.00**	**0.00**	**28,607.40**	**45,697.11**	**45,697.11**	**62,833.52**
1.3.1.1.1 331XX03030201 Surveying Area A, Area B-C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**23,107.40**	**0.00**	**5,500.00**	**0.00**	**28,607.40**	**45,697.11**	**45,697.11**	**62,833.52**
(Note: This is a summary line item for required surveying services throughout the project. Includes staking of areas to be excavated or capped, volume calculations for pay items, establish and reestablish control points for both excavation and landfill cap, and layout of landfill cap.)												
1.3.1.1.1.1 331XX0303020101 Establish Site Control/Layout	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**10,000.14**	**0.00**	**2,500.00**	**0.00**	**12,500.14**	**19,942.55**	**19,942.55**	**27,421.01**
(Note: Assume 3 man crew for 4 weeks (60 days) and 22 days drafting to develop drawings. Assume 22 days/month.)												
			0.0000		*2,825.8621*	*0.0000*	*0.0000*	*0.0000*	*2,825.8621*	*4,692.8124*	*4,692.8124*	*6,452.6171*
1.3.1.1.1.1.1 MIL 013107000640 Field Personnel, surveyor	MO	2.7200	0.00	1.2 CL Craft Labor	7,686.34	0.00	0.00	0.00	7,686.34	12,764.45	12,764.45	17,551.12
			0.0000		*2,313.7931*	*0.0000*	*0.0000*	*0.0000*	*2,313.7931*	*3,813.5483*	*3,813.5483*	*5,243.6289*
1.3.1.1.1.1.2 MIL 013107000650 Field Personnel, draftsman	MO	1.0000	0.00	1.2 CL Craft Labor	2,313.79	0.00	0.00	0.00	2,313.79	3,813.55	3,813.55	5,243.63
1.3.1.1.1.1.3 USR Miscellaneous Materials and Supplies	LS	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	2,500.00	0.00	2,500.00	3,364.56	3,364.56	4,626.26
(Note: Cost based on an Engineering Estimate.)												
1.3.1.1.1.2 331XX0303020102 Reestablish Site Control/Layout	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**3,612.74**	**0.00**	**1,000.00**	**0.00**	**4,612.74**	**7,332.38**	**7,332.38**	**10,082.02**
(Note: Assume 10 visits of a 2 man crew (20 days) and 10 days drafting to develop drawings. Assume 22 days/month.)												
			0.0000		*2,825.8621*	*0.0000*	*0.0000*	*0.0000*	*2,825.8621*	*4,692.8124*	*4,692.8124*	*6,452.6171*
1.3.1.1.1.2.1 MIL 013107000640 Field Personnel, surveyor	MO	0.9100	0.00	1.2 CL Craft Labor	2,571.53	0.00	0.00	0.00	2,571.53	4,270.46	4,270.46	5,871.88
			0.0000		*2,313.7931*	*0.0000*	*0.0000*	*0.0000*	*2,313.7931*	*3,813.5483*	*3,813.5483*	*5,243.6289*
1.3.1.1.1.2.2 MIL 013107000650 Field Personnel, draftsman	MO	0.4500	0.00	1.2 CL Craft Labor	1,041.21	0.00	0.00	0.00	1,041.21	1,716.10	1,716.10	2,359.63

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.3.1.1.1.2.3 FOP Materials and Supplies	LS	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	1,000.00	0.00	1,000.00	1,345.82	1,345.82	1,850.51
1.3.1.1.1.3 331XX0303020103 Volume Surveys	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**6,531.72**	**0.00**	**1,000.00**	**0.00**	**7,531.72**	**12,169.14**	**12,169.14**	**16,732.57**
(Note: Assume 1 visit per month for 18 months of 2 man crew (36 days) and 18 days drafting to develop drawings. Assume 22 days/month.)												
			0.0000		*2,825.8621*	*0.0000*	*0.0000*	*0.0000*	*2,825.8621*	*4,692.8124*	*4,692.8124*	*6,452.6171*
1.3.1.1.1.3.1 MIL 013107000640 Field Personnel, surveyor	MO	1.6400	0.00	1.2 CL Craft Labor	4,634.41	0.00	0.00	0.00	4,634.41	7,696.21	7,696.21	10,582.29
			0.0000		*2,313.7931*	*0.0000*	*0.0000*	*0.0000*	*2,313.7931*	*3,813.5483*	*3,813.5483*	*5,243.6289*
1.3.1.1.1.3.2 MIL 013107000650 Field Personnel, draftsman	MO	0.8200	0.00	1.2 CL Craft Labor	1,897.31	0.00	0.00	0.00	1,897.31	3,127.11	3,127.11	4,299.78
1.3.1.1.1.3.3 USR Miscellaneous Materials and Supplies	LS	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	1,000.00	0.00	1,000.00	1,345.82	1,345.82	1,850.51
(Note: Cost based on an Engineering Estimate.)												
1.3.1.1.1.4 331XX0303020104 Post Restoration Survey	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**2,962.79**	**0.00**	**1,000.00**	**0.00**	**3,962.79**	**6,253.03**	**6,253.03**	**8,597.92**
(Note: Assume 3 man crew for 5 days (15 days) and 10 days drafting to develop drawings. Assume 22 days/month.)												
			0.0000		*2,825.8621*	*0.0000*	*0.0000*	*0.0000*	*2,825.8621*	*4,692.8124*	*4,692.8124*	*6,452.6171*
1.3.1.1.1.4.1 MIL 013107000640 Field Personnel, surveyor	MO	0.6800	0.00	1.2 CL Craft Labor	1,921.59	0.00	0.00	0.00	1,921.59	3,191.11	3,191.11	4,387.78
			0.0000		*2,313.7931*	*0.0000*	*0.0000*	*0.0000*	*2,313.7931*	*3,813.5483*	*3,813.5483*	*5,243.6289*
1.3.1.1.1.4.2 MIL 013107000650 Field Personnel, draftsman	MO	0.4500	0.00	1.2 CL Craft Labor	1,041.21	0.00	0.00	0.00	1,041.21	1,716.10	1,716.10	2,359.63
1.3.1.1.1.4.3 USR Miscellaneous Materials and Supplies	LS	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	1,000.00	0.00	1,000.00	1,345.82	1,345.82	1,850.51
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*3,790.0168*	*0.0000*	*46,045.7200*	*59,014.0800*	*108,849.8168*	*145,730.7122*	*145,730.7122*	*200,379.7292*
1.4 331XX05 Surface Water Collect & Control	**EA**	**1.0000**	**0.00**		**3,790.02**	**0.00**	**46,045.72**	**59,014.08**	**108,849.82**	**145,730.71**	**145,730.71**	**200,379.73**
			0.0000		*3,790.0168*	*0.0000*	*46,045.7200*	*59,014.0800*	*108,849.8168*	*145,730.7122*	*145,730.7122*	*200,379.7292*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.4.1 331XX0509 Lagoons/Basins/Tanks/Dikes	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**3,790.02**	**0.00**	**46,045.72**	**59,014.08**	**108,849.82**	**145,730.71**	**145,730.71**	**200,379.73**
			0.0000		*3,790.0168*	*0.0000*	*46,045.7200*	*59,014.0800*	*108,849.8168*	*145,730.7122*	*145,730.7122*	*200,379.7292*
1.4.1.1 331XX050901 Excavation Dewatering	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**3,790.02**	**0.00**	**46,045.72**	**59,014.08**	**108,849.82**	**145,730.71**	**145,730.71**	**200,379.73**
(Note:)												
			0.0000		*0.0581*	*0.0000*	*0.7062*	*0.9051*	*1.6695*	*2.2351*	*2.2351*	*3.0733*
1.4.1.1.1 331XX05090101 Surface Water Collection and Containment - Area A, B-C, Northside, and Southside	**GAL**	**65,200.0000**	**0.00**	**1.2 CL Craft Labor**	**3,790.02**	**0.00**	**46,045.72**	**59,014.08**	**108,849.82**	**145,730.71**	**145,730.71**	**200,379.73**
(Note: Rainfall amounting to roughly 3 inches per month to be removed from excavations and stored until discharged to the leachate collection system. Assume that discharge can be permitted through the leachate collection system. Assume active open excavations for 12 months. Labor to operate pumps is included in the dust control element under excavation. Laborers will maintain both dust controls and dewatering activities. Assume roughly 1 acre of excavation to be open and requiring dewatering at anyone time. Assume 20% infiltration. Volume = 43,560 sf x 0.25 ft x .8 = 8,712 CF. Volume = 8712 cf x 7.48 gal/cf = 65,166 gal.)												
			0.0000		*695.4215*	*0.0000*	*4,349.4800*	*0.0000*	*5,044.9015*	*7,231.0489*	*7,231.0489*	*9,942.6923*
1.4.1.1.1.1 MIL 152305005090 Pump, general utility, centrifugal, in-line, vertical mount, iron body, 125 lb. flanged, 3550 RPM, single stage, 300 GPM, 50 H.P., 3" discharge, includes TEFC motor	EA	4.0000	0.00	1.2 CL Craft Labor	2,781.69	0.00	17,397.92	0.00	20,179.61	28,924.20	28,924.20	39,770.77
			0.0000		*195.9627*	*0.0000*	*1,141.0000*	*0.0000*	*1,336.9627*	*1,917.8300*	*1,917.8300*	*2,637.0163*
1.4.1.1.1.2 AF 151802004090 Pump, circulating, cast iron, close coupled, end suction, bronze impeller, flanged joints, 2 H.P., to 50 GPM, 2" size	EA	4.0000	0.00	1.2 CL Craft Labor	783.85	0.00	4,564.00	0.00	5,347.85	7,671.32	7,671.32	10,548.07
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,154.9300*	*1,154.9300*	*1,495.4445*	*1,495.4445*	*2,056.2362*
1.4.1.1.1.3 HTW 021055509117 Wastewater holding tanks, above ground, steel, open, stationary, monthly rental, 21,000 gal	MO	48.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	55,436.64	55,436.64	71,781.34	71,781.34	98,699.34
(Note: Assume 4 tanks per month average during excavation (12 months))												

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*210.9500*	*0.0000*	*210.9500*	*297.0458*	*297.0458*	*408.4380*
1.4.1.1.1.4 HTW 021503004162 High sump level switch, (for avoiding overflow)	EA	4.0000	0.00	1.2 CL Craft Labor	0.00	0.00	843.80	0.00	843.80	1,188.18	1,188.18	1,633.75
			0.0000		*0.0000*	*0.0000*	*450.0000*	*74.5300*	*524.5300*	*697.8537*	*697.8537*	*959.5488*
1.4.1.1.1.5 HTW 021055506111 Sample collection, subcontracted sampling, hourly rate (air, water, soil, ground water)	EA	48.0000	0.00	1.2 CL Craft Labor	0.00	0.00	21,600.00	3,577.44	25,177.44	33,496.98	33,496.98	46,058.34
(Note: Assume 2 samples per month with 4 hrs labor and 12 months total. Analytical cost based on Engineering Estimate.)												
			0.0000		*0.2245*	*0.0000*	*1.6400*	*0.0000*	*1.8645*	*2.6687*	*2.6687*	*3.6695*
1.4.1.1.1.6 MIL 139104002360 Fire Hose, less couplings, synthetic jacket, lined, high strength, 500 lb test, 1-1/2" dia, excludes couplings	LF	1,000.0000	0.00	1.2 CL Craft Labor	224.48	0.00	1,640.00	0.00	1,864.48	2,668.70	2,668.70	3,669.47
			135,495.8980		*2,067,284.9035*	*1,350,725.5479*	*1,380,546.2200*	*42,372.0900*	*4,840,928.7614*	*6,999,579.5126*	*6,999,579.5126*	*9,624,421.8298*
1.5 331XX08 Solids Collect And Containment	**EA**	**1.0000**	**135,495.90**		**2,067,284.90**	**1,350,725.55**	**1,380,546.22**	**42,372.09**	**4,840,928.76**	**6,999,579.51**	**6,999,579.51**	**9,624,421.83**
			0.0000		*1,630,843.2020*	*1,018,525.4804*	*25,172.5000*	*42,372.0900*	*2,716,913.2724*	*3,814,213.3075*	*3,814,213.3075*	*5,244,543.2978*
1.5.1 331XX0801 Contaminated Soil Collection	**EA**	**1.0000**	**0.00**		**1,630,843.20**	**1,018,525.48**	**25,172.50**	**42,372.09**	**2,716,913.27**	**3,814,213.31**	**3,814,213.31**	**5,244,543.30**
			0.0000		*1,630,843.2020*	*1,018,525.4804*	*25,172.5000*	*42,372.0900*	*2,716,913.2724*	*3,814,213.3075*	*3,814,213.3075*	*5,244,543.2978*
1.5.1.1 331XX080102 Excavation	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**1,630,843.20**	**1,018,525.48**	**25,172.50**	**42,372.09**	**2,716,913.27**	**3,814,213.31**	**3,814,213.31**	**5,244,543.30**
(Note: This element includes all equipment, labor, and material costs directly associated with the excavation of MED and overburden soil. The estimated volume of soil to be removed from each area is: (1) Area A - 75,700 cy (94,600 cy exsitu); (2) Area B-C - 17,300 cy (21,600 cy exsitu); (3) Northside 5,300 cy (6,600 cy exsitu); and (4) Southside 1,600 cy (2,000 cy exsitu). The expected maximum excavation depth in Areas A is 10 feet and 12 ft in Area C. The parameters and assumptions are as follows: (1) The excavation production will be greater than the transportation and loading, so the total excavation will be limited to 55,000 cy per year. This is based on a 1 month mob and setup, 7 months transport and disposal, and 1 month demob and cleanup. Rail shipments based on USACE provided data and assume that 20 intermodals will be shipped per day for 7 months for a total volume of 55,000 cy. The annual material to be shipped will be excavated and stockpiled in a 3-4 month period. (2) Construction of temporary access roads may be required to remove material upon reaching maximum depths and to control site traffic flow. (3) Assumes area at site will be designated for stockpiling of both radiologically impacted soil and overburden to be reused as backfill. (4) Assumes transport of material from excavation area and stockpile areas (and vice versa) is accomplished using articulated dump trucks. (5) Covered stockpiles and intermodals will be used for storage of impacted material. (6) Assumes radiologically impacted soils will be stockpiled and covered with a tarp to provide a constant dry source of soils for loading. Soils will be loaded from the stockpile into intermodals, surveyed, and transported to the loading area at the rail spur for off-site disposal. (7) The clean overburden removed during the excavation activities can be placed in Area A or new Area B-C as backfill. (8) Safety and contaminated materials handling factor of 63% carried for HRTW components of project. Production rates have been adjusted additionally for weather (1 day/week) and delays associated with delineating the areas to be excavated (1 day/week). The total productivity factor of 0.40 was added to the excavation of MED and overburden soils.)												
			0.0000		*275,141.6000*	*5,354.3263*	*4,220.0000*	*12,372.0900*	*297,088.0163*	*440,839.9242*	*440,839.9242*	*606,154.8958*

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.5.1.1.1 331XX08010201 Dust Control	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**275,141.60**	**5,354.33**	**4,220.00**	**12,372.09**	**297,088.02**	**440,839.92**	**440,839.92**	**606,154.90**
1.5.1.1.1.1 331XX0801020101 Dust Control - Area A, new Area B-C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**275,141.60**	**5,354.33**	**4,220.00**	**12,372.09**	**297,088.02**	**440,839.92**	**440,839.92**	**606,154.90**
(Note: Active excavation and loading is approximately 17 months. Assume dust control at loading area and excavation area full time.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*727.7700*	*727.7700*	*942.0723*	*942.0723*	*1,295.3494*
1.5.1.1.1.1.1 HTW 019102003101 Spray washers, cold water, gas, 3200 psi, 4.2 GPM, 11 HP, rent/month	MO	17.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	12,372.09	12,372.09	16,015.23	16,015.23	22,020.94
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*68.0556*	*68.0556*	*93.5765*
1.5.1.1.1.1.2 MIL B-LABORER Laborers, (Semi-Skilled)	HR	5,984.0000	0.00	1.2 CL Craft Labor	272,272.00	0.00	0.00	0.00	272,272.00	407,244.85	407,244.85	559,961.67
			0.0000		*0.1360*	*0.2538*	*0.2000*	*0.0000*	*0.5898*	*0.8332*	*0.8332*	*1.1456*
1.5.1.1.1.1.3 MIL 023153109030 Water for compaction, 5000 gallon wagon, 3 mile haul	ECY	21,100.0000	0.00	1.2 CL Craft Labor	2,869.60	5,354.33	4,220.00	0.00	12,443.93	17,579.85	17,579.85	24,172.29
1.5.1.1.2 331XX08010202 Excavation of Material Area A	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**1,172,663.40**	**833,222.91**	**19,077.50**	**20,000.00**	**2,044,963.81**	**2,858,494.08**	**2,858,494.08**	**3,930,429.35**
(Note: This element is sum of all costs associated with the excavation of MED and Overburden soil from Area A and transportation to the material staging area at Seaway. MED Soils Area A - 75,700 cy (94,600 cy exsitu))												
1.5.1.1.2.1 331XX0801020201 MED Soils in Area A	**LS**	**75,700.0000**	**0.00**	**1.2 CL Craft Labor**	**1,172,663.40**	**833,222.91**	**19,077.50**	**20,000.00**	**2,044,963.81**	**2,858,494.08**	**2,858,494.08**	**3,930,429.35**
(Note: Overburden in Area A is to be excavated and disposed as MED material. Soil will be excavated using a hydraulic excavator, loaded in off road trucks, and transported to the staging area. The soil stockpile will be covered with a tarp to maintain a constant dry soil supply for offsite disposal.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*10,000.0000*	*10,000.0000*	*12,375.3762*	*12,375.3762*	*17,016.1423*
1.5.1.1.2.1.1 USR Dump Ramp	EA	2.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	20,000.00	20,000.00	24,750.75	24,750.75	34,032.28
(Note: Includes jersey barriers and gravel for 2 dump stations. Cost based on an Engineering Estimate.)												
			0.0000		*0.1657*	*0.0168*	*0.2700*	*0.0000*	*0.4525*	*0.6320*	*0.6320*	*0.8691*

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.5.1.1.2.1.2 HTW 021401002111 Secure burial cell construction, polymeric liner and cover system, very low density polyethylene (VLDPE), 20 mil	SF	62,000.0000	0.00	1.2 CL Craft Labor	10,272.27	1,043.29	16,740.00	0.00	28,055.56	39,186.74	39,186.74	53,881.77
			0.0000		*2.0298*	*0.2120*	*4.2500*	*0.0000*	*6.4918*	*9.0517*	*9.0517*	*12.4460*
1.5.1.1.2.1.3 HTW 021151057173 Petroleum contaminated soil, excavate and stockpile, sandbags for stockpile, excludes transportation and disposal fees	EA	550.0000	0.00	1.2 CL Craft Labor	1,116.41	116.59	2,337.50	0.00	3,570.49	4,978.41	4,978.41	6,845.31
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*68.0556*	*68.0556*	*93.5765*
1.5.1.1.2.1.4 MIL B-LABORER Laborers, (Semi-Skilled)	HR	13,024.0000	0.00	1.2 CL Craft Labor	592,592.00	0.00	0.00	0.00	592,592.00	886,356.43	886,356.43	1,218,740.10
(Note: Assume 1 laborer average at excavation for a 6 month excavation duration and 4 laborers average at site for 17 month loading duration. Includes spotting at excavation, lining containers, supporting loading operations, and closing containers.)												
			0.0000		*960.4800*	*2,977.6000*	*0.0000*	*0.0000*	*3,938.0800*	*5,153.6258*	*5,153.6258*	*7,086.2355*
1.5.1.1.2.1.5 USR Seaway Excavation Crew	DAY	125.0000	0.00	1.2 CL Craft Labor	120,060.00	372,200.00	0.00	0.00	492,260.00	644,203.22	644,203.22	885,779.43
(Note: This crew uses one 2 cy hydraulic excavator, two 50 ton off road trucks, and one 4-5 cy loader to build/maintain the stock pile. Assume 2000 ft round trip @ 20 MPH (4 cycles/hour). Rates are based on RSMeans Dec 2006 cost data and equipment rental costs include rental operating cost.)												
			0.0000		*1,232.4800*	*1,263.3600*	*0.0000*	*0.0000*	*2,495.8400*	*3,458.8421*	*3,458.8421*	*4,755.9078*
1.5.1.1.2.1.6 USR Seaway Loading and Transport Crew	DAY	364.0000	0.00	1.2 CL Craft Labor	448,622.72	459,863.04	0.00	0.00	908,485.76	1,259,018.51	1,259,018.51	1,731,150.45
(Note: Include one 4-5 cy loader to fill intermodal and three trucks to haul intermodals. Rates are based on RSMeans Dec 2006 cost data and equipment rental costs include rental operating cost.)												
1.5.1.1.3 331XX0801020301 Overburden Material in Areas B-C and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**44,992.48**	**77,417.60**	**0.00**	**0.00**	**122,410.08**	**163,938.74**	**163,938.74**	**225,415.77**
(Note: Removal of overburden required in new Area B-C and Southside. Overburden will be stockpiled for reuse as backfill. Estimated total overburden volume for removal/reuse is (1) Area B-C - 14,400 cy (18,000 cy exsitu), (2) Southside - 1,100 cy (1,400 cy exsitu). The total volume is 15,500 cy (19,400 cy exsitu) Due to the small quantity, side slopes, and reduced efficiencies associated with defining the interface between the overburden and MED soils, assume the same productivity rate as MED soil.)												
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*68.0556*	*68.0556*	*93.5765*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.5.1.1.3.1 MIL B-LABORER Laborers, (Semi -Skilled)	HR	440.0000	0.00	1.2 CL Craft Labor	20,020.00	0.00	0.00	0.00	20,020.00	29,944.47	29,944.47	41,173.65
(Note: Assume 2 laborers average at excavation site for a 1.25 months excavation duration. Includes spotting at excavation and supporting loading.)												
			0.0000		*960.4800*	*2,977.6000*	*0.0000*	*0.0000*	*3,938.0800*	*5,153.6258*	*5,153.6258*	*7,086.2355*
1.5.1.1.3.2 USR Seaway Excavation Crew	DAY	26.0000	0.00	1.2 CL Craft Labor	24,972.48	77,417.60	0.00	0.00	102,390.08	133,994.27	133,994.27	184,242.12
(Note: This crew uses one 2 cy hydraulic excavator, two 50 ton off road trucks, and one 4-5 cy loader to build/maintain the stock pile. Assume 2000 ft round trip @ 20 MPH (4 cycles/hour). Rates are based on RSMeans Dec 2006 cost data and equipment rental costs include rental operating cost.)												
1.5.1.1.4 331XX08010202 Excavation of Material Area B-C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**138,045.72**	**102,530.64**	**1,875.00**	**10,000.00**	**252,451.36**	**350,940.56**	**350,940.56**	**482,543.27**
(Note: This element is the sum of all costs associated with the excavation of MED and Overburden soils from new Area B-C, Northside, and Southside and transportation to the material staging area at Seaway. The MED soil volume is (1) Area B-C - 2,900 cy (3,600 cy exsitu), (2) Northside - 5,300 cy (6,600 cy exsitu), and (3) Southside - 500 cy (600 cy exsitu) The total volume is 8,700 cy (10,800 cy exsitu))												
1.5.1.1.4.1 331XX0801020201 MED Soil in New Areas B-C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**138,045.72**	**102,530.64**	**1,875.00**	**10,000.00**	**252,451.36**	**350,940.56**	**350,940.56**	**482,543.27**
(Note: Soil will be excavated using a hydraulic excavator, loaded in off road trucks, and transported to the staging area. The soil stockpile will be covered with a tarp to maintain a constant dry soil supply for offsite disposal.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*10,000.0000*	*10,000.0000*	*12,375.3762*	*12,375.3762*	*17,016.1423*
1.5.1.1.4.1.1 USR Dump Ramp	EA	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	10,000.00	10,000.00	12,375.38	12,375.38	17,016.14
(Note: Includes jersey barriers and gravel for 2 dump stations. Cost based on an Engineeing Estimate.)												
			0.0000		*0.1657*	*0.0168*	*0.2700*	*0.0000*	*0.4525*	*0.6320*	*0.6320*	*0.8691*
1.5.1.1.4.1.2 HTW 021401002111 Secure burial cell construction, polymeric liner and cover system, very low density polyethylene (VLDPE), 20 mil	SF	6,000.0000	0.00	1.2 CL Craft Labor	994.09	100.96	1,620.00	0.00	2,715.05	3,792.27	3,792.27	5,214.37
			0.0000		*2.0298*	*0.2120*	*4.2500*	*0.0000*	*6.4918*	*9.0517*	*9.0517*	*12.4460*
1.5.1.1.4.1.3 HTW 021151057173 Petroleum contaminated soil, excavate and stockpile, sandbags for stockpile, excludes transportation and disposal fees	EA	60.0000	0.00	1.2 CL Craft Labor	121.79	12.72	255.00	0.00	389.51	543.10	543.10	746.76

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*68.0556*	*68.0556*	*93.5765*
1.5.1.1.4.1.4 MIL B-LABORER Laborers, (Semi-Skilled)	HR	1,540.0000	0.00	1.2 CL Craft Labor	70,070.00	0.00	0.00	0.00	70,070.00	104,805.66	104,805.66	144,107.78
(Note: Assume 1 laborer average at excavation for a 0.75 months duration and 4 laborers average at site for 2 months loading duration. Includes spotting at excavation, lining containers, supporting loading operations, and closing containers.)												
			0.0000		*960.4800*	*2,977.6000*	*0.0000*	*0.0000*	*3,938.0800*	*5,153.6258*	*5,153.6258*	*7,086.2355*
1.5.1.1.4.1.5 USR Seaway Excavation Crew	DAY	17.0000	0.00	1.2 CL Craft Labor	16,328.16	50,619.20	0.00	0.00	66,947.36	87,611.64	87,611.64	120,466.00
(Note: This crew uses one 2 cy hydraulic excavator, two 50 ton off road trucks, and one 4-5 cy loader to build/maintain the stock pile. Assume 2000 ft round trip @ 20 MPH (4 cycles/hour). Rates are based on RSMeans Dec 2006 cost data and equipment rental costs include rental operating cost.)												
			0.0000		*1,232.4800*	*1,263.3600*	*0.0000*	*0.0000*	*2,495.8400*	*3,458.8421*	*3,458.8421*	*4,755.9078*
1.5.1.1.4.1.6 USR Seaway Loading and Transport Crew	DAY	41.0000	0.00	1.2 CL Craft Labor	50,531.68	51,797.76	0.00	0.00	102,329.44	141,812.52	141,812.52	194,992.22
(Note: Includes one 4-5 cy loader to fill intermodal and three trucks to haul intermodals. Rates are based on RSMeans Dec 2006 cost data and equipment rental costs include rental operating cost.)												
			3.3048		*10.6449*	*8.1024*	*33.0579*	*0.0000*	*51.8053*	*77.6919*	*77.6919*	*106.8263*
1.5.2 331XX0805 Capping Contam Areas/Waste Pile	**SY**	**41,000.0000**	**135,495.90**	**1.2 CL Craft Labor**	**436,441.70**	**332,200.07**	**1,355,373.72**	**0.00**	**2,124,015.49**	**3,185,366.21**	**3,185,366.21**	**4,379,878.53**
			3.3048		*10.6449*	*8.1024*	*33.0579*	*0.0000*	*51.8053*	*77.6919*	*77.6919*	*106.8263*
1.5.2.1 331XX080591 Capping Remaining MED Areas	**SY**	**41,000.0000**	**135,495.90**	**1.2 CL Craft Labor**	**436,441.70**	**332,200.07**	**1,355,373.72**	**0.00**	**2,124,015.49**	**3,185,366.21**	**3,185,366.21**	**4,379,878.53**
(Note: This element is the sum of costs associated with placement of a cap over excavated areas within the footprint of the leachate collection system in new Area B-C and Southside that were not remediated. All regrading and backfill not associated with the cap is included in the Site Restoration WBS element. The following are assumptions for capping Area B-C and Southside. (1) The cross section of the caps major work items include: (a) 6" topsoil with vegetative layer; (b) 24" native soil barrier protection layer; (c) 60-mil HDPE geomembrane; (d) 18" clay low permeability layer; (e) Filter fabric; (f) 12" gas vent layer; (g) Filter fabric; (h) 12" Grading (leveling) layer. (2) Note that gas treatment or leachate collection systems are not included in the costs. It is assumed that the gas venting system will be connected to the existing gas treatment system, and that there are existing leachate controls. (3) An 85% production rate (where appropriate) has been incorporated for all cap work activities due to the decrease in productivity associated with working on sideslopes. (4) Assumes cap placement will occur after surficial excavations of MED soil have been completed. Assumes that 5-7 ft of clean overburden in Area B-C is removed and used as backfill in Area A so that after the cap is constructed the new grade will be similar to the existing grade. (5) Assumes cap sections will be tied into existing landfill cover system at site.)												
			4,010.0883		*15,053.8300*	*7,670.0035*	*0.0000*	*0.0000*	*22,723.8335*	*39,251.7542*	*39,251.7542*	*53,971.1620*
1.5.2.1.1 Rough Grade Area and Compact	**EA**	**1.0000**	**4,010.09**	**1.2 CL Craft Labor**	**15,053.83**	**7,670.00**	**0.00**	**0.00**	**22,723.83**	**39,251.75**	**39,251.75**	**53,971.16**
			85.0000		*32.5200*	*14.5132*	*0.0000*	*0.0000*	*47.0332*	*81.6751*	*81.6751*	*112.3033*
1.5.2.1.1.1 MIL 023104104000 Grading for structures and slabs, grader, 2 passes, semi grade	CSY	410.0000	3,402.99	1.2 CL Craft Labor	13,333.20	5,950.40	0.00	0.00	19,283.60	33,486.79	33,486.79	46,044.34
			85.0000		*0.2494*	*0.2492*	*0.0000*	*0.0000*	*0.4986*	*0.8355*	*0.8355*	*1.1488*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.5.2.1.1.2 RSM 023153105600 Compaction, 2 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	ECY	6,900.0000	607.10	1.2 CL Craft Labor	1,720.63	1,719.61	0.00	0.00	3,440.24	5,764.96	5,764.96	7,926.82
(Note: Compact subgrade prior to cap placement. Depth is 0.5 ft.)												
			0.3755		*0.7982*	*1.3296*	*1.9550*	*0.0000*	*4.0828*	*6.1361*	*6.1361*	*8.4371*
1.5.2.1.2 331XX08059113 Grading Fill Layer	**CY**	**47,900.0000**	**17,986.35**	**1.2 CL Craft Labor**	**38,235.51**	**63,687.13**	**93,644.00**	**0.00**	**195,566.64**	**293,917.55**	**293,917.55**	**404,136.63**
(Note: Includes 120,000 SY of area to be covered at 1 foot depth with 20% swell added to volume.)												
			85.0000		*0.9521*	*1.2541*	*5.7100*	*0.0000*	*7.9162*	*11.7394*	*11.7394*	*16.1417*
1.5.2.1.2.1 RSM 023155100020 Fill, borrow, for embankments, 1 mile haul, spread, by dozer	LCY	16,400.0000	6,385.03	1.2 CL Craft Labor	15,613.89	20,567.95	93,644.00	0.00	129,825.84	192,526.01	192,526.01	264,723.26
			85.0000		*0.2494*	*0.2492*	*0.0000*	*0.0000*	*0.4986*	*0.8355*	*0.8355*	*1.1488*
1.5.2.1.2.2 RSM 023153105600 Compaction, 2 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	ECY	16,400.0000	1,442.96	1.2 CL Craft Labor	4,089.61	4,087.18	0.00	0.00	8,176.80	13,702.22	13,702.22	18,840.56
			85.0000		*1.1300*	*2.3800*	*0.0000*	*0.0000*	*3.5100*	*5.3469*	*5.3469*	*7.3520*
1.5.2.1.2.3 RSM 31051 310 0900 Borrow, buy & load at pit, spread with 200 HP dozer, for 5 mile haul, add	CY	16,400.0000	10,158.35	1.2 CL Craft Labor	18,532.00	39,032.00	0.00	0.00	57,564.00	87,689.31	87,689.31	120,572.81
(Note: Assumed total haul of 7 mi.)												
			0.2893		*0.9975*	*0.6416*	*0.0000*	*0.0000*	*1.6391*	*2.6747*	*2.6747*	*3.6777*
1.5.2.1.3 331XX08059106 Grading Layer	**SY**	**41,000.0000**	**11,859.34**	**1.2 CL Craft Labor**	**40,896.13**	**26,306.81**	**0.00**	**0.00**	**67,202.94**	**109,660.93**	**109,660.93**	**150,783.79**
(Note: Includes grading excavated areas to final grade for cap placement.)												
			85.0000		*0.9975*	*0.6416*	*0.0000*	*0.0000*	*1.6391*	*2.6747*	*2.6747*	*3.6777*
1.5.2.1.3.1 MIL 023103300200 Shape enbankment, slope up to 1 in 4, by machine	SY	41,000.0000	11,859.34	1.2 CL Craft Labor	40,896.13	26,306.81	0.00	0.00	67,202.94	109,660.93	109,660.93	150,783.79
			0.1489		*0.6469*	*0.1966*	*0.7300*	*0.0000*	*1.5735*	*2.5329*	*2.5329*	*3.4827*
1.5.2.1.4 331XX08059107 Filter Fabric	**SY**	**41,000.0000**	**6,102.93**	**1.2 CL Craft Labor**	**26,522.08**	**8,061.21**	**29,930.00**	**0.00**	**64,513.29**	**103,848.00**	**103,848.00**	**142,791.00**

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
(Note: For use between existing grade and gas vent layer.)												
			85.0000		*0.6469*	*0.1966*	*0.7300*	*0.0000*	*1.5735*	*2.5329*	*2.5329*	*3.4827*
1.5.2.1.4.1 CIV 023403001600 Drainage geotextiles, non-woven polypropylene, 60 mils thick	SY	41,000.0000	6,102.93	1.2 CL Craft Labor	26,522.08	8,061.21	29,930.00	0.00	64,513.29	103,848.00	103,848.00	142,791.00
			4,001.2897		*15,028.8933*	*7,645.0816*	*0.0000*	*0.0000*	*22,673.9750*	*38,912.9684*	*38,912.9684*	*53,505.3315*
1.5.2.1.5 Rough Grade Area and Compact	**EA**	**1.0000**	**4,001.29**	**1.2 CL Craft Labor**	**15,028.89**	**7,645.08**	**0.00**	**0.00**	**22,673.97**	**38,912.97**	**38,912.97**	**53,505.33**
			85.0000		*32.5200*	*14.5132*	*0.0000*	*0.0000*	*47.0332*	*81.6751*	*81.6751*	*112.3033*
1.5.2.1.5.1 MIL 023104104000 Grading for structures and slabs, grader, 2 passes, semi grade	CSY	410.0000	3,402.99	1.2 CL Craft Labor	13,333.20	5,950.40	0.00	0.00	19,283.60	33,486.79	33,486.79	46,044.34
			85.0000		*0.2494*	*0.2492*	*0.0000*	*0.0000*	*0.4986*	*0.7980*	*0.7980*	*1.0972*
1.5.2.1.5.2 RSM 023153105600 Compaction, 2 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	ECY	6,800.0000	598.30	1.2 CL Craft Labor	1,695.69	1,694.69	0.00	0.00	3,390.38	5,426.17	5,426.17	7,460.99
(Note: Compact subgrade prior to cap placement. Depth is 0.5 ft.)												
			0.4716		*1.7342*	*0.9380*	*10.7440*	*0.0000*	*13.4162*	*19.7577*	*19.7577*	*27.1668*
1.5.2.1.6 331XX08059116 Gas Collection System	**SY**	**41,000.0000**	**19,334.29**	**1.2 CL Craft Labor**	**71,103.49**	**38,457.51**	**440,504.50**	**0.00**	**550,065.49**	**810,063.67**	**810,063.67**	**1,113,837.54**
(Note: Assumes 8,000 lf of 6" perforated pipe with miscellaneous fittings. Assumes connection to existing landfill gas collection system. Includes 1 ft of sand over 41,000 sy with a 10% swell added to volume.)												
			85.0000		*3.9467*	*0.0000*	*9.7200*	*0.0000*	*13.6667*	*20.9639*	*20.9639*	*28.8253*
1.5.2.1.6.1 HTW 021402001314 Landfill gas and leachate control systems, leachate and gas collection pipe, slotted PVC, 2 to 6 rows of slots, 6" dia, SDR 26	LF	8,000.0000	5,571.76	1.2 CL Craft Labor	31,573.33	0.00	77,760.00	0.00	109,333.33	167,710.99	167,710.99	230,602.61
			85.0000		*52.9629*	*0.0000*	*34.7900*	*0.0000*	*87.7529*	*148.0662*	*148.0662*	*203.5910*
1.5.2.1.6.2 MIL 151085602860 Elbow, 90 Deg., plastic, PVC, white, socket joint, 6", schedule 40	EA	50.0000	467.32	1.2 CL Craft Labor	2,648.14	0.00	1,739.50	0.00	4,387.64	7,403.31	7,403.31	10,179.55

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			85.0000		*79.4443*	*0.0000*	*54.6600*	*0.0000*	*134.1043*	*225.5844*	*225.5844*	*310.1785*
1.5.2.1.6.3 MIL 151085603280 Tee, plastic, PVC, white, socket joint, 6", schedule 40	EA	25.0000	350.49	1.2 CL Craft Labor	1,986.11	0.00	1,366.50	0.00	3,352.61	5,639.61	5,639.61	7,754.46
			85.0000		*29.1034*	*0.0000*	*16.3800*	*0.0000*	*45.4834*	*77.5086*	*77.5086*	*106.5744*
1.5.2.1.6.4 MIL 151085603690 Cap, plastic, PVC, white, socket joint, 6", schedule 40	EA	25.0000	128.40	1.2 CL Craft Labor	727.58	0.00	409.50	0.00	1,137.08	1,937.72	1,937.72	2,664.36
			85.0000		*2.2628*	*2.5469*	*23.7900*	*0.0000*	*28.5997*	*41.5478*	*41.5478*	*57.1282*
1.5.2.1.6.5 AF 027202001505 Aggregrate base course, for roadways and large paved areas, sand, washed and graded, compacted, 6" deep	CY	15,100.0000	12,816.32	1.2 CL Craft Labor	34,168.32	38,457.51	359,229.00	0.00	431,854.82	627,372.04	627,372.04	862,636.56
			0.1489		*0.6469*	*0.1966*	*0.7300*	*0.0000*	*1.5735*	*2.5329*	*2.5329*	*3.4827*
1.5.2.1.7 331XX08059109 Filter Fabric	**SY**	**41,000.0000**	**6,102.93**	**1.2 CL Craft Labor**	**26,522.08**	**8,061.21**	**29,930.00**	**0.00**	**64,513.29**	**103,848.00**	**103,848.00**	**142,791.00**
(Note: For use between grading layer and gas vent layer.)												
			85.0000		*0.6469*	*0.1966*	*0.7300*	*0.0000*	*1.5735*	*2.5329*	*2.5329*	*3.4827*
1.5.2.1.7.1 CIV 023403001600 Drainage geotextiles, non-woven polypropylene, 60 mils thick	SY	41,000.0000	6,102.93	1.2 CL Craft Labor	26,522.08	8,061.21	29,930.00	0.00	64,513.29	103,848.00	103,848.00	142,791.00
			0.1169		*0.2720*	*0.3906*	*9.6100*	*0.0000*	*10.2726*	*14.0256*	*14.0256*	*19.2852*
1.5.2.1.8 331XX08059110 Place Low Permeability Clay Cap	**CY**	**25,700.0000**	**3,005.09**	**1.2 CL Craft Labor**	**6,991.33**	**10,037.52**	**246,977.00**	**0.00**	**264,005.85**	**360,458.23**	**360,458.23**	**495,630.07**
(Note: Includes 41,000 SY of area to be covered at 1.5 foot depth with a swell of 25% added to volume.)												
			0.0000		*0.0000*	*0.0000*	*9.6100*	*0.0000*	*9.6100*	*12.9334*	*12.9334*	*17.7834*
1.5.2.1.8.1 RSM 31051 310 0200 CLAY BORROW DELIVERED	CY	25,700.0000	0.00	1.2 CL Craft Labor	0.00	0.00	246,977.00	0.00	246,977.00	332,387.12	332,387.12	457,032.29
(Note: Cost Based on MEANS 2006, 4th quarther, US Natl Average for native soil and 2 mile haul. Add for additional 5 mile haul (RSM 31051 310 0900). Assume cost of clay is similar.)												
			85.0000		*0.2720*	*0.3906*	*0.0000*	*0.0000*	*0.6626*	*1.0923*	*1.0923*	*1.5019*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.5.2.1.8.2 MIL 023151205520 Backfill, structural, 6" lifts, backfill around foundation, with dozer	LCY	25,700.0000	3,005.09	1.2 CL Craft Labor	6,991.33	10,037.52	0.00	0.00	17,028.85	28,071.11	28,071.11	38,597.78
			0.0688		*0.1360*	*0.2538*	*0.2000*	*0.0000*	*0.5898*	*0.9312*	*0.9312*	*1.2804*
1.5.2.1.9 331XX08059111 Cmpt Low Permeability Clay Cap	**CY**	**20,560.0000**	**1,414.14**	**1.2 CL Craft Labor**	**2,796.16**	**5,217.30**	**4,112.00**	**0.00**	**12,125.46**	**19,145.73**	**19,145.73**	**26,325.39**
(Note: Includes 41,000 SY of area to be covered at 1.5 foot depth with no swell since units are ECY.)												
			85.0000		*0.1360*	*0.2538*	*0.2000*	*0.0000*	*0.5898*	*0.9312*	*0.9312*	*1.2804*
1.5.2.1.9.1 MIL 023153109030 Water for compaction, 5000 gallon wagon, 3 mile haul	ECY	20,560.0000	1,414.14	1.2 CL Craft Labor	2,796.16	5,217.30	4,112.00	0.00	12,125.46	19,145.73	19,145.73	26,325.39
			0.3189		*1.6403*	*0.1666*	*3.9600*	*0.0000*	*5.7668*	*8.8544*	*8.8544*	*12.1748*
1.5.2.1.10 331XX08059112 60-mil HDPE geomembrane	**SY**	**41,000.0000**	**13,073.01**	**1.2 CL Craft Labor**	**67,250.25**	**6,830.17**	**162,360.00**	**0.00**	**236,440.42**	**363,030.78**	**363,030.78**	**499,167.33**
(Note: Installation of 60-mil HDPE liner.)												
			85.0000		*0.1823*	*0.0185*	*0.4400*	*0.0000*	*0.6408*	*0.9838*	*0.9838*	*1.3528*
1.5.2.1.10.1 HTW 021401002152 Secure burial cell construction, polymeric liner and cover system, rough textured H.D. polyethylene (HDPE), 60 mil	SF	369,000.0000	13,073.01	1.2 CL Craft Labor	67,250.25	6,830.17	162,360.00	0.00	236,440.42	363,030.78	363,030.78	499,167.33
			1.0820		*2.2896*	*3.8416*	*5.7100*	*0.0000*	*11.8412*	*16.9919*	*16.9919*	*23.3638*
1.5.2.1.11 331XX08059113 Barrier Protection Layer	**CY**	**32,800.0000**	**35,488.77**	**1.2 CL Craft Labor**	**75,099.50**	**126,003.56**	**187,288.00**	**0.00**	**388,391.06**	**557,333.29**	**557,333.29**	**766,333.27**
(Note: Includes 41,000 SY of area to be covered at 2 foot depth with 20% swell added to volume.)												
			85.0000		*0.9521*	*1.2541*	*5.7100*	*0.0000*	*7.9162*	*11.2174*	*11.2174*	*15.4239*
1.5.2.1.11.1 RSM 023155100020 Fill, borrow, for embankments, 1 mile haul, spread, by dozer	LCY	32,800.0000	12,770.06	1.2 CL Craft Labor	31,227.79	41,135.90	187,288.00	0.00	259,651.68	367,930.88	367,930.88	505,904.96
			85.0000		*0.2494*	*0.2492*	*0.0000*	*0.0000*	*0.4986*	*0.7980*	*0.7980*	*1.0972*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.5.2.1.11.2 RSM 023153105600 Compaction, 2 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	ECY	27,300.0000	2,402.01	1.2 CL Craft Labor	6,807.71	6,803.66	0.00	0.00	13,611.37	21,784.49	21,784.49	29,953.68
			85.0000		*1.1300*	*2.3800*	*0.0000*	*0.0000*	*3.5100*	*5.1103*	*5.1103*	*7.0267*
1.5.2.1.11.3 RSM 31051 310 0900 Borrow, buy & load at pit, spread with 200 HP dozer, for 5 mile haul, add	CY	32,800.0000	20,316.71	1.2 CL Craft Labor	37,064.00	78,064.00	0.00	0.00	115,128.00	167,617.92	167,617.92	230,474.64
(Note: Assumed total haul of 7 mi.)												
			1.0912		*4.4006*	*1.7826*	*20.2000*	*0.0000*	*26.3832*	*39.2044*	*39.2044*	*53.9060*
1.5.2.1.12 331XX08059114 Place Topsoil	**CY**	**7,600.0000**	**8,292.75**	**1.2 CL Craft Labor**	**33,444.47**	**13,547.77**	**153,520.00**	**0.00**	**200,512.24**	**297,953.08**	**297,953.08**	**409,685.49**
(Note: Includes 41,000 SY of area to be covered at 0.5 foot depth with 10% swell added to volume.)												
			85.0000		*4.4006*	*1.7826*	*20.2000*	*0.0000*	*26.3832*	*39.2044*	*39.2044*	*53.9060*
1.5.2.1.12.1 MIL 029108100805 Loam or topsoil, imported topsoil, 6" deep, furnish and place	LCY	7,600.0000	8,292.75	1.2 CL Craft Labor	33,444.47	13,547.77	153,520.00	0.00	200,512.24	297,953.08	297,953.08	409,685.49
			67.8051		*277.8955*	*106.3334*	*688.1820*	*0.0000*	*1,072.4110*	*1,637.1532*	*1,637.1532*	*2,251.0857*
1.5.2.1.13 331XX08059115 Seeding	**ACR**	**10.0000**	**678.05**	**1.2 CL Craft Labor**	**2,778.96**	**1,063.33**	**6,881.82**	**0.00**	**10,724.11**	**16,371.53**	**16,371.53**	**22,510.86**
(Note: Seeding of landfill surface for vegetative growth. Includes 41,000 SY of area to be covered with 10% added for perimeter damage.)												
			85.0000		*221.5319*	*84.7666*	*602.1100*	*0.0000*	*908.4085*	*1,380.4460*	*1,380.4460*	*1,898.1133*
1.5.2.1.13.1 MIL 029203200320 Seeding, athletic field mix, 450 lb. per acre, mechanical seeding	ACR	10.0000	540.53	1.2 CL Craft Labor	2,215.32	847.67	6,021.10	0.00	9,084.08	13,804.46	13,804.46	18,981.13
			85.0000		*1.3883*	*0.5312*	*2.1200*	*0.0000*	*4.0395*	*6.3228*	*6.3228*	*8.6939*
1.5.2.1.13.2 AF 029203207010 Seeding, apply fertilizer, 35 lb. per M.S.F.	MSF	406.0000	137.52	1.2 CL Craft Labor	563.64	215.67	860.72	0.00	1,640.03	2,567.07	2,567.07	3,529.72
			363.7741		*976.0081*	*1,189.3386*	*28.3000*	*0.0000*	*2,193.6467*	*7,611.9465*	*7,611.9465*	*10,466.4264*
1.5.2.1.14 331XX08059117 Gas Extraction Wells	**EA**	**8.0000**	**2,910.19**	**1.4 Prime Professional Labor**	**7,808.07**	**9,514.71**	**226.40**	**0.00**	**17,549.17**	**60,895.57**	**60,895.57**	**83,731.41**
(Note: Assume 8 each,15' deep landfill gas extraction wells.)												

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			85.0000		*25.5603*	*0.4999*	*3.8800*	*0.0000*	*29.9403*	*113.8543*	*113.8543*	*156.5497*
1.5.2.1.14.1 MIL 151076605630 Nozzle, steel, T-O-L, weld-on, 1/4" pipe size, includes 1 weld per joint and weld machine	EA	8.0000	36.79	1.4 Prime Professional Labor	204.48	4.00	31.04	0.00	239.52	910.83	910.83	1,252.40
			85.0000		*8.5838*	*0.0000*	*0.5200*	*0.0000*	*9.1038*	*35.4951*	*35.4951*	*48.8057*
1.5.2.1.14.2 MIL 151202204664 Cocks, drains and specialties, nipple, black steel, 1/4" x 3"	EA	8.0000	12.12	1.4 Prime Professional Labor	68.67	0.00	4.16	0.00	72.83	283.96	283.96	390.45
			85.0000		*0.0000*	*141.5284*	*0.0000*	*0.0000*	*141.5284*	*467.8947*	*467.8947*	*643.3552*
1.5.2.1.14.3 GEN D35Z2900 DRILL, ROTARY BLASTHOLE, WATER WELL, 16" (406MM), TRUCK MOUNTED (ADD COST FOR DRILL STEEL AND BIT WEAR)	HR	64.0000	1,598.44	1.4 Prime Professional Labor	0.00	9,057.82	0.00	0.00	9,057.82	29,945.26	29,945.26	41,174.73
			85.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*190.7485*	*190.7485*	*262.2792*
1.5.2.1.14.4 MIL B-EQOPRMED Equip. Operators, Medium	HR	64.0000	587.97	1.4 Prime Professional Labor	3,331.84	0.00	0.00	0.00	3,331.84	12,207.90	12,207.90	16,785.87
			85.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*168.4360*	*168.4360*	*231.5995*
1.5.2.1.14.5 MIL B-LABORER Laborers, (Semi -Skilled)	HR	64.0000	513.88	1.4 Prime Professional Labor	2,912.00	0.00	0.00	0.00	2,912.00	10,779.91	10,779.91	14,822.37
			0.0000		*25.9900*	*0.0000*	*0.0000*	*0.0000*	*25.9900*	*90.9651*	*90.9651*	*125.0771*
1.5.2.1.14.6 FOP FC-ENCGF Hydrogeologist	HR	32.0000	0.00	1.4 Prime Professional Labor	831.68	0.00	0.00	0.00	831.68	2,910.88	2,910.88	4,002.47
			85.0000		*5.7424*	*5.6611*	*2.3900*	*0.0000*	*13.7935*	*48.2103*	*48.2103*	*66.2891*
1.5.2.1.14.7 HTW 022101105219 Casing, PVC, flush threaded, standard length 10', 4" diameter, schedule 40	LF	80.0000	160.99	1.4 Prime Professional Labor	459.39	452.89	191.20	0.00	1,103.48	3,856.82	3,856.82	5,303.13
			7.5406		*42.1400*	*0.5900*	*0.0000*	*0.0000*	*42.7300*	*65.0921*	*65.0921*	*89.5017*
1.5.2.1.15 331XX08059118 QA/QC Testing	**EA**	**164.0000**	**1,236.66**	**1.2 CL Craft Labor**	**6,910.96**	**96.76**	**0.00**	**0.00**	**7,007.72**	**10,675.11**	**10,675.11**	**14,678.28**

(Note: In situ density testing of placed cap material for quality assurance and control verification.)

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			85.0000		*42.1400*	*0.5900*	*0.0000*	*0.0000*	*42.7300*	*65.0921*	*65.0921*	*89.5017*
1.5.2.1.15.1 MIL Soil Density Test,Nuclear Method ASTM D2922-71	EA	164.0000	1,236.66	1.2 CL Craft Labor	6,910.96	96.76	0.00	0.00	7,007.72	10,675.11	10,675.11	14,678.28
(Note: Assume 1 test per 1,000 sy or 41 tests per layer. Includes 2 layers of native fill and 2 layers of clay.)												
			0.0000		*717,651.3600*	*1,500,452.2285*	*596,413.5300*	*33,253,774.9200*	*36,068,292.0385*	*37,717,113.1188*	*37,717,113.1188*	*47,146,391.3985*
1.6 331XX19 Disposal (Commercial)	**EA**	**1.0000**	**0.00**		**717,651.36**	**1,500,452.23**	**596,413.53**	**33,253,774.92**	**36,068,292.04**	**37,717,113.12**	**37,717,113.12**	**47,146,391.40**
			0.0000		*652,481.2800*	*1,344,978.1860*	*542,181.9600*	*18,160,774.9200*	*20,700,416.3460*	*21,837,177.5698*	*21,837,177.5698*	*27,296,471.9623*
1.6.1 331XX1921 Transport to Storage/Disp Facil	**EA**	**1.0000**	**0.00**		**652,481.28**	**1,344,978.19**	**542,181.96**	**18,160,774.92**	**20,700,416.35**	**21,837,177.57**	**21,837,177.57**	**27,296,471.96**
			0.0000		*6.1905*	*12.7607*	*5.1440*	*172.3034*	*196.3986*	*207.1838*	*207.1838*	*258.9798*
1.6.1.1 331XX192101 Load/Haul/Unload of Solids	**CY**	**105,400.0000**	**0.00**		**652,481.28**	**1,344,978.19**	**542,181.96**	**18,160,774.92**	**20,700,416.35**	**21,837,177.57**	**21,837,177.57**	**27,296,471.96**
(Note: This element includes all costs associated with loading and transportation of radiologically impacted soil removed from Areas A, new Area B-C, Northside and Southside. For this alternative, the MED soil disposal volumes are as follows: (1) Area A - 94,600 cy exsitu; (2) Area B-C - 3,600 cy exsitu; (3) Northside - 6,600 cy exsitu; and (4) Southside - 600 cy exsitu. The total volume is 105,400 cy exsitu Loaded intermodals will be staged for loading rail cars for transport to an approved disposal facility. Rental and delivery costs have been included in this line item. Assumes sufficient area will be available for staging of intermodals at rail spur. Costs have been included to perform a minimal amount of rehab of loading area at rail spur to accommodate intermodal storage (fencing, paving, lighting, etc.). Assumes an average of 20 intermodals are loaded out per day (5 rail cars). Transportation and loading costs could vary significantly if rail cars are not available and should be considered as one of the items under the Remedial Contingency. Assume 13 cubic yards per container based on 1.6 tons per cubic yard of insitu soil and 41,700 lbs average intermodal capacity. Total duration = 105,400 cy / 260 cy/day = 406 days or 18.5 months. Say 19 months.)												
			0.0000		*6.1905*	*6.4535*	*0.0000*	*0.0000*	*12.6441*	*17.1863*	*17.1863*	*21.4828*
1.6.1.1.1 331XX19210101 Loading Area A , new Area B-C, Northside, and Southside	**CY**	**105,400.0000**	**0.00**	**1.2 CL Craft Labor**	**652,481.28**	**680,203.27**	**0.00**	**0.00**	**1,332,684.55**	**1,811,431.14**	**1,811,431.14**	**2,264,288.93**
			0.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*76.9285*	*76.9285*	*96.1607*
1.6.1.1.1.1 MIL B-EQOPRCRN Equip. Operators, Heavy	HR	3,344.0000	0.00	1.2 CL Craft Labor	174,088.64	0.00	0.00	0.00	174,088.64	257,249.00	257,249.00	321,561.25
(Note: Operator to move rail cars for 19 months.)												
			0.0000		*0.0000*	*30.3042*	*0.0000*	*0.0000*	*30.3042*	*37.5026*	*37.5026*	*46.8783*
1.6.1.1.1.2 GEN L40Z4390 LOADER, FRONT END, WHEEL, ARTICULATED, 1.75 CY (1.3M3) BUCKET, 4X4	HR	3,344.0000	0.00	1.2 CL Craft Labor	0.00	101,337.30	0.00	0.00	101,337.30	125,408.72	125,408.72	156,760.90
(Note: Tractor loader to move rail cars.)												
			0.0000		*0.0000*	*173.1059*	*0.0000*	*0.0000*	*173.1059*	*214.2250*	*214.2250*	*267.7813*

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.6.1.1.1.3 GEN C90Z2600 CRANE, MECHANICAL, LATTICE BOOM, TRUCK MOUNTED, 125 TON (113MT), 240' (73.2M) BOOM	HR	3,344.0000	0.00	1.2 CL Craft Labor	0.00	578,865.97	0.00	0.00	578,865.97	716,368.41	716,368.41	895,460.52
			0.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*76.9285*	*76.9285*	*96.1607*
1.6.1.1.1.4 MIL B-EQOPRCRN Equip. Operators, Heavy	HR	3,344.0000	0.00	1.2 CL Craft Labor	174,088.64	0.00	0.00	0.00	174,088.64	257,249.00	257,249.00	321,561.25
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*68.0556*	*68.0556*	*85.0695*
1.6.1.1.1.5 MIL B-LABORER Laborers, (Semi -Skilled)	HR	6,688.0000	0.00	1.2 CL Craft Labor	304,304.00	0.00	0.00	0.00	304,304.00	455,156.01	455,156.01	568,945.01
(Note: Assume 2 laborers to support loading operations.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*128.0000*	*128.0000*	*131.8400*	*131.8400*	*164.8000*
1.6.1.1.2 331XX19210102 Transportation - Area A, new Area B-C, Northside, and Southside	**TON**	**135,000.0000**	**0.00**		**0.00**	**0.00**	**0.00**	**17,280,000.00**	**17,280,000.00**	**17,798,400.00**	**17,798,400.00**	**22,248,000.00**
(Note: Assumes unit price of $128.00/ton for transportation based on recent numbers provided to SAIC by J. Wyrk in an email dated January 9, 2007. Based on 1.6 tons per cubic yars of insitu soil. Estimated tonnage for disposal is 135,000 tons.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*128.0000*	*128.0000*	*131.8400*	*131.8400*	*164.8000*
1.6.1.1.2.1 USR Transportation of Material to disposal Facility	TON	135,000.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	17,280,000.00	17,280,000.00	17,798,400.00	17,798,400.00	22,248,000.00
			0.0000		*0.0000*	*27.3300*	*22.2900*	*36.2101*	*85.8301*	*91.5699*	*91.5699*	*114.4624*
1.6.1.1.3 331XX19210103 Intermodal Rental - Area A, new Area B-C, Northside, and Southside	**WK**	**24,324.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**664,774.92**	**542,181.96**	**880,774.92**	**2,087,731.80**	**2,227,346.43**	**2,227,346.43**	**2,784,183.04**
(Note: Assumes that each intermodal carries 13 cubic yards and have a 3 week average turnaround rental time (time it arrives on site to time it is returned to site). Based on 105,400 cy total volume, approximately 8,108 intermodal containers will be required and equates to 24,324 rental weeks. Also assumes that intermodal containers will be available as needed. Assuming off site disposal activities will run 7 months throughout year. It is estimated that at least 360 dedicated intermodal containers will be required and includes a 3 day reserve supply. A premium of 100% of the rental rate has been included in this line item to ensure that the number of containers will be available.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*200.0000*	*200.0000*	*206.0000*	*206.0000*	*257.5000*
1.6.1.1.3.1 USR Intermodal Delivery and Return	EA	1,080.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	216,000.00	216,000.00	222,480.00	222,480.00	278,100.00
(Note: Assumes each delivery/return includes 2 containers and is based on a vendor quote. Includes mob/demob for 3 seasons.)												

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*27.3300*	*27.3300*	*28.1499*	*28.1499*	*35.1874*
1.6.1.1.3.2 USR Intermodal Rental (avg 3 weeks per intermodal)	WK	24,324.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	664,774.92	664,774.92	684,718.17	684,718.17	855,897.71
			0.0000		*0.0000*	*0.0000*	*22.2900*	*0.0000*	*22.2900*	*26.1236*	*26.1236*	*32.6545*
1.6.1.1.3.3 HTW 021202507112 Bulk material hauling, hazardous waste packaging, poly liners, bulk solids & sludge, roll-off liner, disposable, 20 C.Y. and 30 C.Y., 6 mil	EA	24,324.0000	0.00	1.3 Transport and Disposal	0.00	0.00	542,181.96	0.00	542,181.96	635,430.09	635,430.09	794,287.62
			0.0000		*0.0000*	*27.3300*	*0.0000*	*0.0000*	*27.3300*	*28.1499*	*28.1499*	*35.1874*
1.6.1.1.3.4 USR Intermodal Rental Premium	WK	24,324.0000	0.00	1.3 Transport and Disposal	0.00	664,774.92	0.00	0.00	664,774.92	684,718.17	684,718.17	855,897.71
			0.0000		*65,170.0800*	*155,474.0426*	*54,231.5700*	*15,093,000.0000*	*15,367,875.6926*	*15,879,935.5489*	*15,879,935.5489*	*19,849,919.4362*
1.6.2 331XX1922 Disposal Fees and Taxes	**EA**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**65,170.08**	**155,474.04**	**54,231.57**	**15,093,000.00**	**15,367,875.69**	**15,879,935.55**	**15,879,935.55**	**19,849,919.44**
			0.0000		*0.0000*	*0.0000*	*0.0000*	*12,150,000.0000*	*12,150,000.0000*	*12,514,500.0000*	*12,514,500.0000*	*15,643,125.0000*
1.6.2.1 331XX192201 Landfill/Burial Grnd/Trench/Pit	**EA**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**12,150,000.00**	**12,150,000.00**	**12,514,500.00**	**12,514,500.00**	**15,643,125.00**

(Note: This element includes all costs associated with the disposal of radiologically impacted soil removed from Areas A, new Area B-C, Northside, and Southside. The disposal volumes are as follows: (1) Area A - 94,600 cy; (2) Area B-C - 3,600 cy; (3) Northside and Southside - 7,200 cy. The total volume is 105,400 cy. Based on 1.6 tons per cubic yars of insitu soil. Estimated tonnage for disposal is 135,000 tons.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.6.2.1.1 331XX19220102 Off-site Disposal Area A, new Area B-C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**12,150,000.00**	**12,150,000.00**	**12,514,500.00**	**12,514,500.00**	**15,643,125.00**
			0.0000		*0.0000*	*0.0000*	*0.0000*	*90.0000*	*90.0000*	*92.7000*	*92.7000*	*115.8750*
1.6.2.1.1.1 331XX1922010201 Area A, new Area B-C, Northside, and Southside	**TON**	**135,000.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**12,150,000.00**	**12,150,000.00**	**12,514,500.00**	**12,514,500.00**	**15,643,125.00**

(Note: Includes disposal of MED waste in Area A, new Area B-C, Northside, and Southside and is assumed to be homogenous and without large debris for disposal purposes. Assumes unit price of $90.00/ton for disposal based on recent numbers provided to SAIC by J. Wryk in an email dated January 9, 2007.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*90.0000*	*90.0000*	*92.7000*	*92.7000*	*115.8750*
1.6.2.1.1.1.1 USR Off-site Disposal of Rad Soil (Accessible)	TON	135,000.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	12,150,000.00	12,150,000.00	12,514,500.00	12,514,500.00	15,643,125.00

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.6.2.2 331XX1922010202 Material Overrun	**LS**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**65,170.08**	**155,474.04**	**54,231.57**	**2,943,000.00**	**3,217,875.69**	**3,365,435.55**	**3,365,435.55**	**4,206,794.44**
(Note: Based on prior FUSRAP projects, the largest component of risk is the estimated volume of soil to be disposed. Historically, actual volumes remediated at FUSRAP sites exceed the estimated volumes. Additionally rail car and intermodal demurage cost due to project delays will increase the estimated cost. This line item carries 10% overrun on excavated material as a modifier to these elements. The excavation of this material has not been included in this line item because it is considered negligible in comparison to the disposal costs and can be covered in the Contingency line item. This line item includes loading, transportation, disposal and intermodal rental costs only.)												
			0.0000		*6.1831*	*6.4458*	*0.0000*	*0.0000*	*12.6289*	*17.4800*	*17.4800*	*21.8500*
1.6.2.2.1 331XX19210101 Loading Area A , new Area B-C, Northside, and Southside	**CY**	**10,540.0000**	**0.00**	**1.2 CL Craft Labor**	**65,170.08**	**67,938.96**	**0.00**	**0.00**	**133,109.04**	**184,239.25**	**184,239.25**	**230,299.07**
			0.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*76.9285*	*76.9285*	*96.1607*
1.6.2.2.1.1 MIL B-EQOPRCRN Equip. Operators, Heavy	HR	334.0000	0.00	1.2 CL Craft Labor	17,388.04	0.00	0.00	0.00	17,388.04	25,694.13	25,694.13	32,117.66
(Note: Operator to move rail cars.)												
			0.0000		*0.0000*	*30.3042*	*0.0000*	*0.0000*	*30.3042*	*37.5026*	*37.5026*	*46.8783*
1.6.2.2.1.2 GEN L40Z4390 LOADER, FRONT END, WHEEL, ARTICULATED, 1.75 CY (1.3M3) BUCKET, 4X4	HR	334.0000	0.00	1.2 CL Craft Labor	0.00	10,121.61	0.00	0.00	10,121.61	12,525.87	12,525.87	15,657.34
(Note: Tractor loader to move rail cars.)												
			0.0000		*0.0000*	*173.1059*	*0.0000*	*0.0000*	*173.1059*	*224.1436*	*224.1436*	*280.1795*
1.6.2.2.1.3 GEN C90Z2600 CRANE, MECHANICAL, LATTICE BOOM, TRUCK MOUNTED, 125 TON (113MT), 240' (73.2M) BOOM	HR	334.0000	0.00	1.2 CL Craft Labor	0.00	57,817.35	0.00	0.00	57,817.35	74,863.97	74,863.97	93,579.96
			0.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*76.9285*	*76.9285*	*96.1607*
1.6.2.2.1.4 MIL B-EQOPRCRN Equip. Operators, Heavy	HR	334.0000	0.00	1.2 CL Craft Labor	17,388.04	0.00	0.00	0.00	17,388.04	25,694.13	25,694.13	32,117.66
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*68.0556*	*68.0556*	*85.0695*
1.6.2.2.1.5 MIL B-LABORER Laborers, (Semi -Skilled)	HR	668.0000	0.00	1.2 CL Craft Labor	30,394.00	0.00	0.00	0.00	30,394.00	45,461.16	45,461.16	56,826.45
(Note: Assume 2 laborers to support loading operations.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*128.0000*	*128.0000*	*131.8400*	*131.8400*	*164.8000*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.6.2.2.2 331XX19210102 Transportation - Area A, new Area B-C, Northside, and Southside	**TON**	**13,500.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**1,728,000.00**	**1,728,000.00**	**1,779,840.00**	**1,779,840.00**	**2,224,800.00**
(Note: Assumes unit price of $128.00/ton for transportation based on recent numbers provided to SAIC by J. Wyrk in an email dated January 9, 2007.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*128.0000*	*128.0000*	*131.8400*	*131.8400*	*164.8000*
1.6.2.2.2.1 USR Transportation of Material to disposal Facility	TON	13,500.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	1,728,000.00	1,728,000.00	1,779,840.00	1,779,840.00	2,224,800.00
			0.0000		*0.0000*	*35.9930*	*22.2992*	*0.0000*	*58.2922*	*61.6391*	*61.6391*	*77.0489*
1.6.2.2.3 331XX19210103 Intermodal Rental - Area A, new Area B-C, Northside, and Southside	**WK**	**2,432.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**87,535.08**	**54,231.57**	**0.00**	**141,766.65**	**149,906.29**	**149,906.29**	**187,382.87**
(Note: Assumes that each intermodal carries 13 cubic yards and will have a 3 week average turnaround rental time (time it arrives on site to time it is returned to site). The premium is based on 10% of the actual quantities.)												
			0.0000		*0.0000*	*200.0000*	*0.0000*	*0.0000*	*200.0000*	*206.0000*	*206.0000*	*257.5000*
1.6.2.2.3.1 USR Intermodal Delivery and Return	EA	72.0000	0.00	1.3 Transport and Disposal	0.00	14,400.00	0.00	0.00	14,400.00	14,832.00	14,832.00	18,540.00
(Note: Assumes each delivery/return includes 2 containers and is based on a vendor quote. Includes mob/demob for 2 seasons.)												
			0.0000		*0.0000*	*27.3300*	*0.0000*	*0.0000*	*27.3300*	*28.1499*	*28.1499*	*35.1874*
1.6.2.2.3.2 USR Intermodal Rental (avg 3 weeks per intermodal)	WK	243.0000	0.00	1.3 Transport and Disposal	0.00	6,641.19	0.00	0.00	6,641.19	6,840.43	6,840.43	8,550.53
			0.0000		*0.0000*	*0.0000*	*22.2900*	*0.0000*	*22.2900*	*24.5562*	*24.5562*	*30.6952*
1.6.2.2.3.3 HTW 021202507112 Bulk material hauling, hazardous waste packaging, poly liners, bulk solids & sludge, roll-off liner, disposable, 20 C.Y. and 30 C.Y., 6 mil	EA	2,433.0000	0.00	1.3 Transport and Disposal	0.00	0.00	54,231.57	0.00	54,231.57	59,745.16	59,745.16	74,681.45
			0.0000		*0.0000*	*27.3300*	*0.0000*	*0.0000*	*27.3300*	*28.1499*	*28.1499*	*35.1874*
1.6.2.2.3.4 USR Intermodal Rental Premium	WK	2,433.0000	0.00	1.3 Transport and Disposal	0.00	66,493.89	0.00	0.00	66,493.89	68,488.71	68,488.71	85,610.88
1.6.2.2.4 331XX19220102 Off-site Disposal Area A, new Area B-C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**1,215,000.00**	**1,215,000.00**	**1,251,450.00**	**1,251,450.00**	**1,564,312.50**

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*90.0000*	*90.0000*	*92.7000*	*92.7000*	*115.8750*
1.6.2.2.4.1 331XX1922010201 Area A, new Area B-C, Northside, and Southside	**TON**	**13,500.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**1,215,000.00**	**1,215,000.00**	**1,251,450.00**	**1,251,450.00**	**1,564,312.50**

(Note: Includes disposal of MED waste in Area A, new Area B-C, Northside, and Southside and is assumed to be homogenous and without large debris for disposal purposes. Assumes unit price of $90.00/ton for disposal based on recent numbers provided to SAIC by J. Wryk in an email dated January 9, 2007.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*90.0000*	*90.0000*	*92.7000*	*92.7000*	*115.8750*
1.6.2.2.4.1.1 USR Off-site Disposal of Rad Soil (Accessible)	TON	13,500.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	1,215,000.00	1,215,000.00	1,251,450.00	1,251,450.00	1,564,312.50
			0.0000		*265,593.5993*	*397,955.8890*	*142,740.0000*	*0.0000*	*806,289.4883*	*1,083,191.6505*	*1,083,191.6505*	*1,489,388.5195*
1.7 331XX20 Site Restoration	**EA**	**1.0000**	**0.00**		**265,593.60**	**397,955.89**	**142,740.00**	**0.00**	**806,289.49**	**1,083,191.65**	**1,083,191.65**	**1,489,388.52**
			0.0000		*265,593.5993*	*397,955.8890*	*142,740.0000*	*0.0000*	*806,289.4883*	*1,083,191.6505*	*1,083,191.6505*	*1,489,388.5195*
1.7.1 331XX2001 Earthwork	**EA**	**1.0000**	**0.00**		**265,593.60**	**397,955.89**	**142,740.00**	**0.00**	**806,289.49**	**1,083,191.65**	**1,083,191.65**	**1,489,388.52**
			0.0000		*265,593.5993*	*397,955.8890*	*142,740.0000*	*0.0000*	*806,289.4883*	*1,083,191.6505*	*1,083,191.6505*	*1,489,388.5195*
1.7.1.1 331XX200103 Backfill	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**265,593.60**	**397,955.89**	**142,740.00**	**0.00**	**806,289.49**	**1,083,191.65**	**1,083,191.65**	**1,489,388.52**
1.7.1.1.1 331XX20010301 Backfill of Excavated Area A, new B-C, Southside, and Northside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**265,593.60**	**397,955.89**	**142,740.00**	**0.00**	**806,289.49**	**1,083,191.65**	**1,083,191.65**	**1,489,388.52**

(Note: The backfill of Area A, new Area B-C, Northside, and Southside is assumed to be provided primarily using onsite soils with clean native offsite soils for the final cover. The total area is 71,000 sy. There are 124,500 cy of exsitu MED and overburden soils that have been excavated and require replacement to return site to existing grade. The overburden will be used as backfill. Backfill will be obtained from new Area B-C that is to be capped to allow the capped area to be returned to its existing grade. The cap volume is approximately the area of the cap (41,000 sy) multiplied by 5 ft thick cap with 20% swell for compaction. It is assumed that a 1 ft thick clean native fill cover will be placed over Area A or part of new Area B-C that is not capped, part of Southside, and Northside. The clean native fill cover volume is approximately 71,000 sy multiplied by 1 ft thick cover with 20% swell for compaction. It is assumed that the backfill will be from the following sources: (1) Overburden Area B-C - 18,000 cy; (2) Overburden Southside - 1,400 cy; (3) Cap Area B-C - 82,000 cy; (4) Clean Cover - 23,400 cy. The total volume is 124,900 cy. This includes a 20% increase in volumes for backfill due to compaction. This scenario will allow the remediation cuts to equal fill volumes. Assumed costs to replace removed material will be covered in excavation/backfill item.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*1.3239*	*2.2877*	*0.0000*	*0.0000*	*3.6115*	*4.8359*	*4.8359*	*6.6494*
1.7.1.1.1.1 331XX0801020201 Excavate Soils in new Area B-C and Relocate to Area A	**BCY**	**82,000.0000**	**0.00**	**1.2 CL Craft Labor**	**108,558.24**	**187,588.80**	**0.00**	**0.00**	**296,147.04**	**396,545.16**	**396,545.16**	**545,249.60**

(Note: Overburden in new Area B-C is to be excavated and relocated to B-C. Soil will be excavated using a hydraulic excavator, loaded in off road trucks, and transported to Area A. Include only a weather productivity factor of 0.8 to this element.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*68.0556*	*68.0556*	*93.5765*
1.7.1.1.1.1.1 MIL B-LABORER Laborers, (Semi-Skilled)	HR	1,056.0000	0.00	1.2 CL Craft Labor	48,048.00	0.00	0.00	0.00	48,048.00	71,866.74	71,866.74	98,816.76

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
(Note: Assume 1 laborer at excavation and 1 at fill site as spotters. Assumes 3 months.)												
			0.0000		*960.4800*	*2,977.6000*	*0.0000*	*0.0000*	*3,938.0800*	*5,153.6258*	*5,153.6258*	*7,086.2355*
1.7.1.1.1.1.2 USR SEAEXCAV Seaway Excavation Crew	DAY	63.0000	0.00	1.2 CL Craft Labor	60,510.24	187,588.80	0.00	0.00	248,099.04	324,678.42	324,678.42	446,432.83
(Note: This crew uses one 2 cy hydraulic excavator, two 50 ton off road trucks, and one 4-5 cy loader to build/maintain the stock pile. Assume 2000 ft round trip @ 20 MPH (4 cycles/hour). Rates are based on RSMeans Dec 2006 cost data and equipment rental costs include rental operating cost.)												
1.7.1.1.1.2 331XX2001030101 Backfill Onsite Soils	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**21,448.58**	**31,251.64**	**0.00**	**0.00**	**52,700.22**	**74,317.79**	**74,317.79**	**102,186.96**
			0.0000		*0.2616*	*0.3811*	*0.0000*	*0.0000*	*0.6427*	*0.9063*	*0.9063*	*1.2462*
1.7.1.1.1.2.1 MIL 023153109310 Spread and compact, roadway enbankment, 6" lift, sheepsfoot roller	ECY	82,000.0000	0.00	1.2 CL Craft Labor	21,448.58	31,251.64	0.00	0.00	52,700.22	74,317.79	74,317.79	102,186.96
(Note: No swell is included in volume.)												
			0.0000		*0.0003*	*0.0006*	*0.0006*	*0.0000*	*0.0015*	*0.0019*	*0.0019*	*0.0026*
1.7.1.1.1.3 331XX2001030102 Backfill Clean Imported Native Soil Cover	**CY**	**234,000,000.0000**	**0.00**	**1.2 CL Craft Labor**	**64,766.65**	**133,559.76**	**142,740.00**	**0.00**	**341,066.41**	**443,439.61**	**443,439.61**	**609,729.47**
			0.0000		*1.4300*	*3.1200*	*6.1000*	*0.0000*	*10.6500*	*13.8403*	*13.8403*	*19.0304*
1.7.1.1.1.3.1 RSM 310513100200 Common borrow, spread with 200 H.P. dozer, includes load at pit and haul, 2 miles round trip, excludes compaction	CY	23,400.0000	0.00	1.2 CL Craft Labor	33,462.00	73,008.00	142,740.00	0.00	249,210.00	323,863.29	323,863.29	445,312.02
(Note: Cost Based on MEANS 2006, 4th quarther, US Natl Average.)												
			0.0000		*0.2494*	*0.2492*	*0.0000*	*0.0000*	*0.4986*	*0.6783*	*0.6783*	*0.9326*
1.7.1.1.1.3.2 RSM 023153105600 Compaction, 2 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	ECY	19,500.0000	0.00	1.2 CL Craft Labor	4,862.65	4,859.76	0.00	0.00	9,722.41	13,226.30	13,226.30	18,186.16
			0.0000		*1.1300*	*2.3800*	*0.0000*	*0.0000*	*3.5100*	*4.5449*	*4.5449*	*6.2492*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.7.1.1.1.3.3 RSM 31051 310 0900 Borrow, buy & load at pit, spread with 200 HP dozer, for 5 mile haul, add	CY	23,400.0000	0.00	1.2 CL Craft Labor	26,442.00	55,692.00	0.00	0.00	82,134.00	106,350.03	106,350.03	146,231.29
(Note: Assumed total haul of 7 mi.)												
			0.0000		*0.9975*	*0.6416*	*0.0000*	*0.0000*	*1.6391*	*2.3787*	*2.3787*	*3.2707*
1.7.1.1.1.4 331XX08059101 Finish Grading	**SY**	**71,000.0000**	**0.00**	**1.2 CL Craft Labor**	**70,820.13**	**45,555.69**	**0.00**	**0.00**	**116,375.82**	**168,889.09**	**168,889.09**	**232,222.49**
			0.0000		*0.9975*	*0.6416*	*0.0000*	*0.0000*	*1.6391*	*2.3787*	*2.3787*	*3.2707*
1.7.1.1.1.4.1 MIL 023103300200 Shape enbankment, slope up to 1 in 4, by machine	SY	71,000.0000	0.00	1.2 CL Craft Labor	70,820.13	45,555.69	0.00	0.00	116,375.82	168,889.09	168,889.09	232,222.49
			0.0000		*2,885,646.0000*	*70,542.0000*	*78,785.3200*	*1,337,794.9300*	*4,372,768.2500*	*9,598,200.4750*	*9,724,492.9232*	*12,155,616.1540*
1.8 331XX22 Gen Requirements (Opt Breakout)	**EA**	**1.0000**	**0.00**		**2,885,646.00**	**70,542.00**	**78,785.32**	**1,337,794.93**	**4,372,768.25**	**9,598,200.48**	**9,724,492.92**	**12,155,616.15**
(Note: This section includes estimated labor requirements for office personnel during the remedial action phases of the project. Also included are the monthly costs associated with Health & Safety equipment, office trailers, utilities, and other general conditions. Assumes that monthly labor requirement is 176 hours (FTE) for a remedial action duration of 33 months. This is based on RA staff support starting after the design is complete and one month prior to the start of field work. All labor rates are based on Engineering Estimates. For fulltime field personnel, travel cost are based on a two week cycle from home office to site for 10 months of the year. Includes airfare ($600), car rental ($56/day), per diem @ 75% ($101/day), and misc ($12.50/day). Total hourly rate is $31.96. For part time field and office personnel, travel cost are based on two night, three day trip to site. Includes airfare ($600), car rental ($56/day), per diem ($135/day), and misc ($12.50/day). The total trip cost is $1,250.)												
			0.0000		*711,480.0000*	*0.0000*	*0.0000*	*238,556.9700*	*950,036.9700*	*2,202,094.8738*	*2,202,094.8738*	*2,752,618.5922*
1.8.1 331XX2201 Supervision and Management for Area A, new Area B-C, Southside, and Northside	**EA**	**1.0000**	**0.00**		**711,480.00**	**0.00**	**0.00**	**238,556.97**	**950,036.97**	**2,202,094.87**	**2,202,094.87**	**2,752,618.59**
			0.0000		*290,400.0000*	*0.0000*	*0.0000*	*41,250.0000*	*331,650.0000*	*830,302.7040*	*830,302.7040*	*1,037,878.3800*
1.8.1.1 331XX220101 Project Manager	**EA**	**1.0000**	**0.00**		**290,400.00**	**0.00**	**0.00**	**41,250.00**	**331,650.00**	**830,302.70**	**830,302.70**	**1,037,878.38**
(Note: Includes 1 FTE and monthly trips to the site.)												
			0.0000		*50.0000*	*0.0000*	*0.0000*	*0.0000*	*50.0000*	*134.2880*	*134.2880*	*167.8600*
1.8.1.1.1 USR Project Manager (Hourly Labor Rate)	HR	5,808.0000	0.00	1.4 Prime Professional Labor	290,400.00	0.00	0.00	0.00	290,400.00	779,944.70	779,944.70	974,930.88
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.1.1.2 USR Project Manager Travel	EA	33.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	41,250.00	41,250.00	50,358.00	50,358.00	62,947.50

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*130,680.0000*	*0.0000*	*0.0000*	*433.2900*	*131,113.2900*	*351,504.0772*	*351,504.0772*	*439,380.0965*
1.8.1.2 331XX220102 Project Engineer for Area A, new B-C, Southside, and Northside	**EA**	**1.0000**	**0.00**		**130,680.00**	**0.00**	**0.00**	**433.29**	**131,113.29**	**351,504.08**	**351,504.08**	**439,380.10**
(Note: Includes 0.5 FTE and quarterly trips to the site.)												
			0.0000		*45.0000*	*0.0000*	*0.0000*	*0.0000*	*45.0000*	*120.8592*	*120.8592*	*151.0740*
1.8.1.2.1 USR Project Engineer (Hourly Labor Rate)	HR	2,904.0000	0.00	1.4 Prime Professional Labor	130,680.00	0.00	0.00	0.00	130,680.00	350,975.12	350,975.12	438,718.90
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*39.3900*	*39.3900*	*48.0873*	*48.0873*	*60.1091*
1.8.1.2.2 USR Project Engineer Travel	EA	11.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	433.29	433.29	528.96	528.96	661.20
			0.0000		*232,320.0000*	*0.0000*	*0.0000*	*185,623.6800*	*417,943.6800*	*850,565.1517*	*850,565.1517*	*1,063,206.4397*
1.8.1.3 331XX220103 General Superintendent for Area A, new B-C, Southside, and Northside	**EA**	**1.0000**	**0.00**		**232,320.00**	**0.00**	**0.00**	**185,623.68**	**417,943.68**	**850,565.15**	**850,565.15**	**1,063,206.44**
(Note: Includes 1 FTE at the site and travel to the site for 10 months per year.)												
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
1.8.1.3.1 USR Site Superintendent (Hourly Labor Rate)	HR	5,808.0000	0.00	1.4 Prime Professional Labor	232,320.00	0.00	0.00	0.00	232,320.00	623,955.76	623,955.76	779,944.70
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.1.3.2 USR Site Superintendent (Hourly Travel Premium)	HR	5,808.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	185,623.68	185,623.68	226,609.39	226,609.39	283,261.74
			0.0000		*58,080.0000*	*0.0000*	*0.0000*	*11,250.0000*	*69,330.0000*	*169,722.9408*	*169,722.9408*	*212,153.6760*
1.8.1.4 331XX220191 Attorney/QA/H&S	**EA**	**1.0000**	**0.00**		**58,080.00**	**0.00**	**0.00**	**11,250.00**	**69,330.00**	**169,722.94**	**169,722.94**	**212,153.68**
(Note: Includes 0.5 FTE and quarterly trips to the site.)												
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
1.8.1.4.1 USR Attorney/QA/H&S (Hourly Labor Rate)	HR	1,452.0000	0.00	1.4 Prime Professional Labor	58,080.00	0.00	0.00	0.00	58,080.00	155,988.94	155,988.94	194,986.18
(Note: Unit rate based on an Engineering Estimate.)												

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.1.4.2 USR Attorney/QA/H&S Travel	HR	9.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	11,250.00	11,250.00	13,734.00	13,734.00	17,167.50
			0.0000		*283,140.0000*	*0.0000*	*0.0000*	*7,500.0000*	*290,640.0000*	*769,602.0864*	*769,602.0864*	*962,002.6080*
1.8.2 331XX2202 Administration Job Office for Area A, new B-C, Southside, and Northside	**EA**	**1.0000**	**0.00**		**283,140.00**	**0.00**	**0.00**	**7,500.00**	**290,640.00**	**769,602.09**	**769,602.09**	**962,002.61**
			0.0000		*232,320.0000*	*0.0000*	*0.0000*	*0.0000*	*232,320.0000*	*623,955.7632*	*623,955.7632*	*779,944.7040*
1.8.2.2 331XX220292 Admin and Data Management	**EA**	**1.0000**	**0.00**		**232,320.00**	**0.00**	**0.00**	**0.00**	**232,320.00**	**623,955.76**	**623,955.76**	**779,944.70**
(Note: Includes 2 FTE and no travel to the site.)												
			0.0000		*20.0000*	*0.0000*	*0.0000*	*0.0000*	*20.0000*	*53.7152*	*53.7152*	*67.1440*
1.8.2.2.1 USR Admin/Data Mgmnt. (Hourly Labor Rate)	HR	11,616.0000	0.00	1.4 Prime Professional Labor	232,320.00	0.00	0.00	0.00	232,320.00	623,955.76	623,955.76	779,944.70
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*50,820.0000*	*0.0000*	*0.0000*	*7,500.0000*	*58,320.0000*	*145,646.3232*	*145,646.3232*	*182,057.9040*
1.8.2.3 331XX220293 Community Relations	**EA**	**1.0000**	**0.00**		**50,820.00**	**0.00**	**0.00**	**7,500.00**	**58,320.00**	**145,646.32**	**145,646.32**	**182,057.90**
(Note: Includes 0.25 FTE and semi-annual trips to the site.)												
			0.0000		*35.0000*	*0.0000*	*0.0000*	*0.0000*	*35.0000*	*94.0016*	*94.0016*	*117.5020*
1.8.2.3.1 USR Community Relations (Hourly Labor Rate)	HR	1,452.0000	0.00	1.4 Prime Professional Labor	50,820.00	0.00	0.00	0.00	50,820.00	136,490.32	136,490.32	170,612.90
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.2.3.2 USR Community Relations (Hourly Travel Premium)	HR	6.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	7,500.00	7,500.00	9,156.00	9,156.00	11,445.00
			0.0000		*1,695,408.0000*	*0.0000*	*0.0000*	*830,307.2800*	*2,525,715.2800*	*5,772,857.1416*	*5,772,857.1416*	*7,216,071.4270*
1.8.3 331XX2204 Engineering, Surveying, & QC for Area A, new B-C, Southside, and Northside	**EA**	**1.0000**	**0.00**		**1,695,408.00**	**0.00**	**0.00**	**830,307.28**	**2,525,715.28**	**5,772,857.14**	**5,772,857.14**	**7,216,071.43**
			0.0000		*313,632.0000*	*0.0000*	*0.0000*	*371,247.3600*	*684,879.3600*	*1,501,318.0815*	*1,501,318.0815*	*1,876,647.6019*
1.8.3.1 331XX220409 Field Engineer	**EA**	**1.0000**	**0.00**		**313,632.00**	**0.00**	**0.00**	**371,247.36**	**684,879.36**	**1,501,318.08**	**1,501,318.08**	**1,876,647.60**
(Note: Includes 2 FTE at the site and travel to the site for 10 months per year.)												

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*90.2289*	*90.2289*	*112.7862*
1.8.3.1.1 USR Field Engineers, 2 FTE	HR	11,616.0000	0.00	1.4 Prime Professional Labor	313,632.00	0.00	0.00	0.00	313,632.00	1,048,099.30	1,048,099.30	1,310,124.13
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.3.1.2 USR Field Engineer, 2 FTE. (Hourly Travel Premium)	HR	11,616.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	371,247.36	371,247.36	453,218.78	453,218.78	566,523.47
			0.0000		*935,088.0000*	*0.0000*	*0.0000*	*82,500.0000*	*1,017,588.0000*	*2,612,137.9469*	*2,612,137.9469*	*3,265,172.4336*
1.8.3.2 331XX220411 Office Engineer for Area A, new B -C, Southside, and Northside	**EA**	**1.0000**	**0.00**		**935,088.00**	**0.00**	**0.00**	**82,500.00**	**1,017,588.00**	**2,612,137.95**	**2,612,137.95**	**3,265,172.43**
(Note: Includes 2 FTE Senior Engineers and one monthly trip to the site. This position includes senior engineering support and includes engineering, waste management, health physics, data validation, analytical, and lab support. Includes 3 FTE Junior Engineers and one monthly trip to the site. This position includes senior engineering support and includes engineering, waste management, health physics, data validation, analytical, and lab support.)												
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
1.8.3.2.1 USR Senior Engineer (Hourly Labor Rate)	HR	11,616.0000	0.00	1.4 Prime Professional Labor	464,640.00	0.00	0.00	0.00	464,640.00	1,247,911.53	1,247,911.53	1,559,889.41
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.3.2.2 USR Senior Engineer Travel	HR	33.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	41,250.00	41,250.00	50,358.00	50,358.00	62,947.50
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*72.5155*	*72.5155*	*90.6444*
1.8.3.2.3 USR Junior Engineer (Hourly Labor Rate)	HR	17,424.0000	0.00	1.4 Prime Professional Labor	470,448.00	0.00	0.00	0.00	470,448.00	1,263,510.42	1,263,510.42	1,579,388.03
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.3.2.4 USR Junior Engineer Travel	HR	33.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	41,250.00	41,250.00	50,358.00	50,358.00	62,947.50
			0.0000		*72,600.0000*	*0.0000*	*0.0000*	*13,750.0000*	*86,350.0000*	*211,772.1760*	*211,772.1760*	*264,715.2200*
1.8.3.3 331XX220416 Schedulers	**EA**	**1.0000**	**0.00**		**72,600.00**	**0.00**	**0.00**	**13,750.00**	**86,350.00**	**211,772.18**	**211,772.18**	**264,715.22**
(Note: Includes 0.5 FTE and quarterly trips to the site.)												
			0.0000		*25.0000*	*0.0000*	*0.0000*	*0.0000*	*25.0000*	*67.1440*	*67.1440*	*83.9300*
1.8.3.3.1 USR Prjt. Control/Scheduler (Hourly Labor Rate)	HR	2,904.0000	0.00	1.4 Prime Professional Labor	72,600.00	0.00	0.00	0.00	72,600.00	194,986.18	194,986.18	243,732.72
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.8.3.3.2 USR Prjt. Control/Scheduler Travel	HR	11.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	13,750.00	13,750.00	16,786.00	16,786.00	20,982.50
			0.0000		*295,680.0000*	*0.0000*	*0.0000*	*269,998.0800*	*565,678.0800*	*1,123,739.1729*	*1,123,739.1729*	*1,404,673.9661*
1.8.3.4 331XX220419 Waste Management Technicians	**EA**	**1.0000**	**0.00**		**295,680.00**	**0.00**	**0.00**	**269,998.08**	**565,678.08**	**1,123,739.17**	**1,123,739.17**	**1,404,673.97**
(Note: Includes 2 FTE at the site and travel to the site for 10 months per year. Only required during the transportation operations. Assume 24 months.)												
			0.0000		*35.0000*	*0.0000*	*0.0000*	*0.0000*	*35.0000*	*94.0016*	*94.0016*	*117.5020*
1.8.3.4.1 USR Waste Management, 2 FTE. (Hourly Labor Rate)	HR	8,448.0000	0.00	1.4 Prime Professional Labor	295,680.00	0.00	0.00	0.00	295,680.00	794,125.52	794,125.52	992,656.90
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.3.4.2 USR Waste Management, 2 FTE. (Hourly Travel Premium)	HR	8,448.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	269,998.08	269,998.08	329,613.66	329,613.66	412,017.07
			0.0000		*78,408.0000*	*0.0000*	*0.0000*	*92,811.8400*	*171,219.8400*	*323,889.7644*	*323,889.7644*	*404,862.2054*
1.8.3.5 331XX220424 Quality Control Engineer	**EA**	**1.0000**	**0.00**		**78,408.00**	**0.00**	**0.00**	**92,811.84**	**171,219.84**	**323,889.76**	**323,889.76**	**404,862.21**
(Note: Includes 0.50 FTE at the site and travel to the site for 5 months per year.)												
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*72.5155*	*72.5155*	*90.6444*
1.8.3.5.1 USR QA/QC Technician (Hourly Labor Rate)	HR	2,904.0000	0.00	1.4 Prime Professional Labor	78,408.00	0.00	0.00	0.00	78,408.00	210,585.07	210,585.07	263,231.34
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.3.5.2 USR QA/QC Technician (Hourly Travel Premium)	HR	2,904.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	92,811.84	92,811.84	113,304.69	113,304.69	141,630.87
			0.0000		*181,225.0000*	*69,850.0000*	*30,853.0000*	*185,623.6800*	*467,551.6800*	*831,185.0654*	*831,185.0654*	*1,038,981.3317*
1.8.4 331XX2207 Health & Safety	**EA**	**1.0000**	**0.00**		**181,225.00**	**69,850.00**	**30,853.00**	**185,623.68**	**467,551.68**	**831,185.07**	**831,185.07**	**1,038,981.33**
			0.0000		*174,240.0000*	*0.0000*	*0.0000*	*185,623.6800*	*359,863.6800*	*694,576.2109*	*694,576.2109*	*868,220.2637*
1.8.4.1 331XX220707 Site Safety & Health Officer	**EA**	**1.0000**	**0.00**		**174,240.00**	**0.00**	**0.00**	**185,623.68**	**359,863.68**	**694,576.21**	**694,576.21**	**868,220.26**
(Note: Includes 1 FTE at the site and travel to the site for 10 months per year.)												
			0.0000		*30.0000*	*0.0000*	*0.0000*	*0.0000*	*30.0000*	*80.5728*	*80.5728*	*100.7160*
1.8.4.1.1 USR SSHO, 1 pers. (Hourly Labor Rate)	HR	5,808.0000	0.00	1.4 Prime Professional Labor	174,240.00	0.00	0.00	0.00	174,240.00	467,966.82	467,966.82	584,958.53
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.8.4.1.2 USR SSHO, 1 pers. (Hourly Travel Premium)	HR	5,808.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	185,623.68	185,623.68	226,609.39	226,609.39	283,261.74
1.8.4.2 331XX220791 Health and Safety Equipment for Area A, new B-C, Southside, and Northside	**LS**	**1.0000**	**0.00**		**6,985.00**	**69,850.00**	**30,853.00**	**0.00**	**107,688.00**	**136,608.85**	**136,608.85**	**170,761.07**
(Note: Line item includes a lump sum item for provision of disposal health and safety equipment, rental, operation and maintenance of H&S monitoring equipment, and emergency PPE and breathing air equipment.)												
			0.0000		*5,285.0000*	*52,850.0000*	*23,103.0000*	*0.0000*	*81,238.0000*	*103,036.7791*	*103,036.7791*	*128,795.9739*
1.8.4.2.1 USR H&S Equipment	EA	1.0000	0.00	1.2 CL Craft Labor	5,285.00	52,850.00	23,103.00	0.00	81,238.00	103,036.78	103,036.78	128,795.97
			0.0000		*1,700.0000*	*17,000.0000*	*7,750.0000*	*0.0000*	*26,450.0000*	*33,572.0753*	*33,572.0753*	*41,965.0941*
1.8.4.2.2 USR H&S Equipment	EA	1.0000	0.00	1.2 CL Craft Labor	1,700.00	17,000.00	7,750.00	0.00	26,450.00	33,572.08	33,572.08	41,965.09
			0.0000		*0.0000*	*0.0000*	*0.0000*	*18,150.0000*	*18,150.0000*	*22,461.3078*	*22,461.3078*	*28,076.6348*
1.8.5 331XX2210 Project Utilities	**EA**	**1.0000**	**0.00**		**0.00**	**0.00**	**0.00**	**18,150.00**	**18,150.00**	**22,461.31**	**22,461.31**	**28,076.63**
1.8.5.1 331XX221091 Monthly Utilities - Area A, new Area B-C, Southside, and Northside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**18,150.00**	**18,150.00**	**22,461.31**	**22,461.31**	**28,076.63**
(Note: Assume power/utilities to 2 trailers.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*250.0000*	*250.0000*	*309.3844*	*309.3844*	*386.7305*
1.8.5.1.1 USR Temp Power/Lighting/Month (1000 sf)	MO	33.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	8,250.00	8,250.00	10,209.69	10,209.69	12,762.11
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*100.0000*	*100.0000*	*123.7538*	*123.7538*	*154.6922*
1.8.5.1.2 USR Temp Water Service	MO	33.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	3,300.00	3,300.00	4,083.87	4,083.87	5,104.84
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*100.0000*	*100.0000*	*123.7538*	*123.7538*	*154.6922*
1.8.5.1.3 USR Temp Telephone Service	MO	33.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	3,300.00	3,300.00	4,083.87	4,083.87	5,104.84
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*100.0000*	*100.0000*	*123.7538*	*123.7538*	*154.6922*
1.8.5.1.4 USR Internet Service	MO	33.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	3,300.00	3,300.00	4,083.87	4,083.87	5,104.84

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*14,393.0000*	*692.0000*	*47,932.3200*	*57,657.0000*	*120,674.3200*	*0.0000*	*126,292.4482*	*157,865.5602*
1.8.6 331XX2208 Temp Const Facilities-Ownership	**EA**	**1.0000**	**0.00**		**14,393.00**	**692.00**	**47,932.32**	**57,657.00**	**120,674.32**	**0.00**	**126,292.45**	**157,865.56**
			0.0000		*0.0000*	*0.0000*	*17,171.8800*	*35,800.0000*	*52,971.8800*	*0.0000*	*55,339.0451*	*69,173.8064*
1.8.6.1 331XX220801 Office Trailers and Facilities	**EA**	**1.0000**	**0.00**		**0.00**	**0.00**	**17,171.88**	**35,800.00**	**52,971.88**	**0.00**	**55,339.05**	**69,173.81**
1.8.6.1.1 331XX22080101 Office Trailers for Area A, new B-C, Southside, and Northside	**LS**	**1.0000**	**0.00**		**0.00**	**0.00**	**17,171.88**	**35,800.00**	**52,971.88**	**0.00**	**55,339.05**	**69,173.81**
(Note: Assume 2 trailers.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*3.5000*	*3.5000*	*0.0000*	*3.5000*	*4.3750*
1.8.6.1.1.1 RSM 015213200800 Transportation Of Rental Units	MI	800.0000	0.00		0.00	0.00	0.00	2,800.00	2,800.00	0.00	2,800.00	3,500.00
(Note: Assume 200 mi. ea way. Cost Based on MEANS 2006, 4th quarther, US Natl Average.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*500.0000*	*500.0000*	*0.0000*	*500.0000*	*625.0000*
1.8.6.1.1.2 USR Field Office Expense, office equipment rental, supplies, postage, etc.	MO	66.0000	0.00		0.00	0.00	0.00	33,000.00	33,000.00	0.00	33,000.00	41,250.00
(Note: Cost based on Engineering Estimate)												
			0.0000		*0.0000*	*0.0000*	*260.1800*	*0.0000*	*260.1800*	*0.0000*	*296.0461*	*370.0577*
1.8.6.1.1.3 AF 015205000450 Office Trailer, furnished, rent per month, 50' x 10', excl. hookups	MO	66.0000	0.00		0.00	0.00	17,171.88	0.00	17,171.88	0.00	19,539.05	24,423.81
			0.0000		*0.0000*	*0.0000*	*11,110.4400*	*0.0000*	*11,110.4400*	*0.0000*	*12,642.0280*	*15,802.5351*
1.8.6.2 331XX220808 Construction Portable Toilets	**EA**	**1.0000**	**0.00**		**0.00**	**0.00**	**11,110.44**	**0.00**	**11,110.44**	**0.00**	**12,642.03**	**15,802.54**
			0.0000		*0.0000*	*0.0000*	*84.1700*	*0.0000*	*84.1700*	*0.0000*	*95.7729*	*119.7162*
1.8.6.2.1 AF 015205001400 Toilet, portable, chemical, rent per month	EA	132.0000	0.00		0.00	0.00	11,110.44	0.00	11,110.44	0.00	12,642.03	15,802.54
(Note: Assume 4 ea.)												

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*14,393.0000*	*692.0000*	*19,650.0000*	*21,857.0000*	*56,592.0000*	*0.0000*	*58,311.3750*	*72,889.2188*
1.8.6.3 331XX220811 Decon Facilities	**EA**	**1.0000**	**0.00**		**14,393.00**	**692.00**	**19,650.00**	**21,857.00**	**56,592.00**	**0.00**	**58,311.38**	**72,889.22**
1.8.6.3.1 331XX22081101 Decon Trailers	**LS**	**1.0000**	**0.00**		**14,393.00**	**692.00**	**19,650.00**	**21,857.00**	**56,592.00**	**0.00**	**58,311.38**	**72,889.22**
			0.0000		*14,393.0000*	*692.0000*	*19,650.0000*	*0.0000*	*34,735.0000*	*0.0000*	*36,454.3750*	*45,567.9688*
1.8.6.3.1.1 USR Decon Facility and Labor	EA	1.0000	0.00		14,393.00	692.00	19,650.00	0.00	34,735.00	0.00	36,454.38	45,567.97
(Note: Cost based on RACER 2006 cost model for Decon Facility and includes geomembrane constructed pad for heavey equipment, pumps, and tanks. Includes 2 months labor for decon activities.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*21,857.0000*	*21,857.0000*	*0.0000*	*21,857.0000*	*27,321.2500*
1.8.6.3.1.2 RAC Off-site Disposal of Decon Water	EA	1.0000	0.00		0.00	0.00	0.00	21,857.00	21,857.00	0.00	21,857.00	27,321.25
(Note: Cost based on RACER 2006 cost model for Transportation and disposal based on 10,000 gal of decon water to be transported 500 mi and disposed using the high disposal fee. No stabilization was included.)												
2 333XX01 FUSRAP Mgmnt. & Integration	**LS**	**1.0000**	**0.00**		**2,332,000.00**	**0.00**	**0.00**	**400,000.00**	**2,732,000.00**	**0.00**	**2,770,400.00**	**3,463,000.00**
(Note: This item has been included in estimate as of Revision 2 per request of USACE. USACE has provided estimated M&I costs for completion of remedial work under this alternative. Item include all project management, engineering analysis, supervision and administration, and design services to be undertaken by USACE in implementing this remedial alternative. Costs are based on estimates provided to SAIC by USACE on 3/24/00. Price adjustment from 3/2000 to 12/2006 is included. Represents costs to USACE from conceptual stage through completion of field activities. Costs have been broken down into 3 phases: 1. Design 2. PreConstruction 3. Construction)												
2.1 333XX0101 Project Management	**LS**	**1.0000**	**0.00**		**240,000.00**	**0.00**	**0.00**	**0.00**	**240,000.00**	**0.00**	**240,000.00**	**300,000.00**
2.1.1 USR Design Phase	LS	1.0000	0.00		40,000.00	0.00	0.00	0.00	40,000.00	0.00	40,000.00	50,000.00
			0.0000		*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
2.1.2 USR Preconstruction Phase	EA	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			0.0000		*100,000.0000*	*0.0000*	*0.0000*	*0.0000*	*100,000.0000*	*0.0000*	*100,000.0000*	*125,000.0000*
2.1.3 USR Construction Phase	EA	2.0000	0.00		200,000.00	0.00	0.00	0.00	200,000.00	0.00	200,000.00	250,000.00
2.2 333XX0102 Project Design	**LS**	**1.0000**	**0.00**		**285,000.00**	**0.00**	**0.00**	**150,000.00**	**435,000.00**	**0.00**	**449,400.00**	**561,750.00**
2.2.1 3 2 1 Design Phase	**LS**	**1.0000**	**0.00**		**50,000.00**	**0.00**	**0.00**	**150,000.00**	**200,000.00**	**0.00**	**214,400.00**	**268,000.00**
2.2.1.1 USR Design Costs	LS	1.0000	0.00		50,000.00	0.00	0.00	150,000.00	200,000.00	0.00	214,400.00	268,000.00
2.2.2 3 2 6 Preconstruction Phase	**LS**	**1.0000**	**0.00**		**135,000.00**	**0.00**	**0.00**	**0.00**	**135,000.00**	**0.00**	**135,000.00**	**168,750.00**
2.2.2.1 USR QA/QC Plan	LS	1.0000	0.00		10,000.00	0.00	0.00	0.00	10,000.00	0.00	10,000.00	12,500.00
2.2.2.2 USR SOW/Drawings	LS	1.0000	0.00		50,000.00	0.00	0.00	0.00	50,000.00	0.00	50,000.00	62,500.00
2.2.2.3 USR BCOE/ITR	LS	1.0000	0.00		25,000.00	0.00	0.00	0.00	25,000.00	0.00	25,000.00	31,250.00

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
2.2.2.4 USR Value Engineering	LS	1.0000	0.00		25,000.00	0.00	0.00	0.00	25,000.00	0.00	25,000.00	31,250.00
2.2.2.5 USR Prep Gov't Cost Estimate	LS	1.0000	0.00		25,000.00	0.00	0.00	0.00	25,000.00	0.00	25,000.00	31,250.00
2.2.3 3 211 Construction Phase	**LS**	**1.0000**	**0.00**		**100,000.00**	**0.00**	**0.00**	**0.00**	**100,000.00**	**0.00**	**100,000.00**	**125,000.00**
2.2.3.1 USR Submittal Review and Coordination	LS	1.0000	0.00		25,000.00	0.00	0.00	0.00	25,000.00	0.00	25,000.00	31,250.00
			0.0000		*41,667.0000*	*0.0000*	*0.0000*	*0.0000*	*41,667.0000*	*0.0000*	*41,667.0000*	*52,083.7500*
2.2.3.2 USR On-Site Technical Assistance	EA	1.5000	0.00		62,500.50	0.00	0.00	0.00	62,500.50	0.00	62,500.50	78,125.63
			0.0000		*8,333.0000*	*0.0000*	*0.0000*	*0.0000*	*8,333.0000*	*0.0000*	*8,333.0000*	*10,416.2500*
2.2.3.3 USR Construction Estimate Support	EA	1.5000	0.00		12,499.50	0.00	0.00	0.00	12,499.50	0.00	12,499.50	15,624.38
2.3 333XX00103 Engineering Analysis Branch	**LS**	**1.0000**	**0.00**		**272,250.00**	**0.00**	**0.00**	**0.00**	**272,250.00**	**0.00**	**272,250.00**	**340,312.50**
2.3.1 3 3 5 Design Phase	**LS**	**1.0000**	**0.00**		**33,000.00**	**0.00**	**0.00**	**0.00**	**33,000.00**	**0.00**	**33,000.00**	**41,250.00**
2.3.1.1 USR Project Preparation	LS	1.0000	0.00		30,000.00	0.00	0.00	0.00	30,000.00	0.00	30,000.00	37,500.00
2.3.1.2 USR Contingency (10%)	LS	1.0000	0.00		3,000.00	0.00	0.00	0.00	3,000.00	0.00	3,000.00	3,750.00
2.3.2 3 310 Construction Phase	**LS**	**1.0000**	**0.00**		**239,250.00**	**0.00**	**0.00**	**0.00**	**239,250.00**	**0.00**	**239,250.00**	**299,062.50**
			0.0000		*125,000.0000*	*0.0000*	*0.0000*	*0.0000*	*125,000.0000*	*0.0000*	*125,000.0000*	*156,250.0000*
2.3.2.1 USR Construction Support	EA	1.5000	0.00		187,500.00	0.00	0.00	0.00	187,500.00	0.00	187,500.00	234,375.00
2.3.2.2 USR Project Close Out	LS	1.0000	0.00		30,000.00	0.00	0.00	0.00	30,000.00	0.00	30,000.00	37,500.00
2.3.2.3 USR Contingency (10%)	LS	1.0000	0.00		21,750.00	0.00	0.00	0.00	21,750.00	0.00	21,750.00	27,187.50
2.4 333XX0104 Supervision and Administration	**LS**	**1.0000**	**0.00**		**300,000.00**	**0.00**	**0.00**	**0.00**	**300,000.00**	**0.00**	**300,000.00**	**375,000.00**
2.4.1 USR S&A Costs	LS	1.0000	0.00		300,000.00	0.00	0.00	0.00	300,000.00	0.00	300,000.00	375,000.00
2.5 333XX0105 O&M Involvement	**LS**	**1.0000**	**0.00**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

(Note: O&M costs for alternative have been assumed to be 10% of FUSRAP management costs provided by USACE (3/00).)

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*212,600.0000*	*0.0000*	*0.0000*	*0.0000*	*212,600.0000*	*0.0000*	*0.0000*	*0.0000*
2.5.1 USR O&M	EA	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.6 333XX0106 Project Management B-C	**LS**	**1.0000**	**0.00**		**225,000.00**	**0.00**	**0.00**	**0.00**	**225,000.00**	**0.00**	**225,000.00**	**281,250.00**
2.6.1 USR Design Phase	LS	1.0000	0.00		60,000.00	0.00	0.00	0.00	60,000.00	0.00	60,000.00	75,000.00
			0.0000		*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
2.6.2 USR Preconstruction Phase	EA	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			0.0000		*110,000.0000*	*0.0000*	*0.0000*	*0.0000*	*110,000.0000*	*0.0000*	*110,000.0000*	*137,500.0000*
2.6.3 USR Construction Phase	EA	1.5000	0.00		165,000.00	0.00	0.00	0.00	165,000.00	0.00	165,000.00	206,250.00
2.7 333XX0107 Project Design B-C	**LS**	**1.0000**	**0.00**		**290,000.00**	**0.00**	**0.00**	**250,000.00**	**540,000.00**	**0.00**	**564,000.00**	**705,000.00**
2.7.1 312 1 Design Phase	**LS**	**1.0000**	**0.00**		**50,000.00**	**0.00**	**0.00**	**250,000.00**	**300,000.00**	**0.00**	**324,000.00**	**405,000.00**
2.7.1.1 USR Design Costs	LS	1.0000	0.00		50,000.00	0.00	0.00	250,000.00	300,000.00	0.00	324,000.00	405,000.00
2.7.2 312 6 Preconstruction Phase	**LS**	**1.0000**	**0.00**		**135,000.00**	**0.00**	**0.00**	**0.00**	**135,000.00**	**0.00**	**135,000.00**	**168,750.00**
2.7.2.1 USR QA/QC Plan	LS	1.0000	0.00		10,000.00	0.00	0.00	0.00	10,000.00	0.00	10,000.00	12,500.00
2.7.2.2 USR SOW/Drawings	LS	1.0000	0.00		50,000.00	0.00	0.00	0.00	50,000.00	0.00	50,000.00	62,500.00
2.7.2.3 USR BCOE/ITR	LS	1.0000	0.00		25,000.00	0.00	0.00	0.00	25,000.00	0.00	25,000.00	31,250.00
2.7.2.4 USR Value Engineering	LS	1.0000	0.00		25,000.00	0.00	0.00	0.00	25,000.00	0.00	25,000.00	31,250.00
2.7.2.5 USR Prep Gov't Cost Estimate	LS	1.0000	0.00		25,000.00	0.00	0.00	0.00	25,000.00	0.00	25,000.00	31,250.00
2.7.3 31211 Construction Phase	**LS**	**1.0000**	**0.00**		**105,000.00**	**0.00**	**0.00**	**0.00**	**105,000.00**	**0.00**	**105,000.00**	**131,250.00**
2.7.3.1 USR Submittal Review and Coordination	LS	1.0000	0.00		30,000.00	0.00	0.00	0.00	30,000.00	0.00	30,000.00	37,500.00
			0.0000		*41,667.0000*	*0.0000*	*0.0000*	*0.0000*	*41,667.0000*	*0.0000*	*41,667.0000*	*52,083.7500*
2.7.3.2 USR On-Site Technical Assistance	EA	1.5000	0.00		62,500.50	0.00	0.00	0.00	62,500.50	0.00	62,500.50	78,125.63
			0.0000		*8,333.0000*	*0.0000*	*0.0000*	*0.0000*	*8,333.0000*	*0.0000*	*8,333.0000*	*10,416.2500*
2.7.3.3 USR Construction Estimate Support	EA	1.5000	0.00		12,499.50	0.00	0.00	0.00	12,499.50	0.00	12,499.50	15,624.38
2.8 333XX0108 Engineering Analysis Branch B-C	**LS**	**1.0000**	**0.00**		**398,750.00**	**0.00**	**0.00**	**0.00**	**398,750.00**	**0.00**	**398,750.00**	**498,437.50**

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
2.8.1 313 5 Design Phase	**LS**	**1.0000**	**0.00**		**55,000.00**	**0.00**	**0.00**	**0.00**	**55,000.00**	**0.00**	**55,000.00**	**68,750.00**
2.8.1.1 USR Project Preparation	LS	1.0000	0.00		50,000.00	0.00	0.00	0.00	50,000.00	0.00	50,000.00	62,500.00
2.8.1.2 USR Contingency (10%)	LS	1.0000	0.00		5,000.00	0.00	0.00	0.00	5,000.00	0.00	5,000.00	6,250.00
2.8.2 31310 Construction Phase	**LS**	**1.0000**	**0.00**		**343,750.00**	**0.00**	**0.00**	**0.00**	**343,750.00**	**0.00**	**343,750.00**	**429,687.50**
			0.0000		*175,000.0000*	*0.0000*	*0.0000*	*0.0000*	*175,000.0000*	*0.0000*	*175,000.0000*	*218,750.0000*
2.8.2.1 USR Construction Support	EA	1.5000	0.00		262,500.00	0.00	0.00	0.00	262,500.00	0.00	262,500.00	328,125.00
2.8.2.2 USR Project Close Out	LS	1.0000	0.00		50,000.00	0.00	0.00	0.00	50,000.00	0.00	50,000.00	62,500.00
2.8.2.3 USR Contingency (10%)	LS	1.0000	0.00		31,250.00	0.00	0.00	0.00	31,250.00	0.00	31,250.00	39,062.50
2.9 333XX0109 Supervision and Administration B	**LS**	**1.0000**	**0.00**		**321,000.00**	**0.00**	**0.00**	**0.00**	**321,000.00**	**0.00**	**321,000.00**	**401,250.00**
2.9.1 USR S&A Costs	LS	1.0000	0.00		321,000.00	0.00	0.00	0.00	321,000.00	0.00	321,000.00	401,250.00
			0.0000		*10,977,640.9135*	*437,714.6578*	*9,269,885.0100*	*7,500,000.0000*	*28,185,240.5813*	*42,038,743.9806*	*45,545,257.6999*	*56,931,572.1248*
3 334XX HTRW REMEDIAL ACTION (O&M)	**EA**	**1.0000**	**0.00**		**10,977,640.91**	**437,714.66**	**9,269,885.01**	**7,500,000.00**	**28,185,240.58**	**42,038,743.98**	**45,545,257.70**	**56,931,572.12**
			0.0000		*10,977,640.9135*	*437,714.6578*	*9,269,885.0100*	*7,500,000.0000*	*28,185,240.5813*	*42,038,743.9806*	*45,545,257.6999*	*56,931,572.1248*
3.1 334XX91 Landfill Cover Maintenance and Reporting	**EA**	**1.0000**	**0.00**		**10,977,640.91**	**437,714.66**	**9,269,885.01**	**7,500,000.00**	**28,185,240.58**	**42,038,743.98**	**45,545,257.70**	**56,931,572.12**
(Note: This element defines Operations and Maintenance requirements for the landfill cover system. Components include the following: 1) Signs and sign maintenance 2) Annual site inspection 3) 5-Year Status Reports O&M costs will be performed for a 1000-year period. Area A is not subject to O&M since it is completely excavated.)												
			0.0000		*6,400.0000*	*0.0000*	*0.0000*	*0.0000*	*6,400.0000*	*17,188.8640*	*17,188.8640*	*21,486.0800*
3.1.1 115 2 O&M Home Office Support	**YR**	**1,000.0000**	**0.00**	**1.4 Prime Professional Labor**	**6,400,000.00**	**0.00**	**0.00**	**0.00**	**6,400,000.00**	**17,188,864.00**	**17,188,864.00**	**21,486,080.00**
(Note: Assumes a 1,000 year O&M period following completion of project.)												
			0.0000		*50.0000*	*0.0000*	*0.0000*	*0.0000*	*50.0000*	*134.2880*	*134.2880*	*167.8600*
3.1.1.1 USR Project Manager (Hourly Labor Rate)	HR	80,000.0000	0.00	1.4 Prime Professional Labor	4,000,000.00	0.00	0.00	0.00	4,000,000.00	10,743,040.00	10,743,040.00	13,428,800.00
(Note: Assume 80 hrs per year for project manager and no travel to the site.)												
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
3.1.1.2 USR Senior Engineer (Hourly Labor Rate)	HR	40,000.0000	0.00	1.4 Prime Professional Labor	1,600,000.00	0.00	0.00	0.00	1,600,000.00	4,297,216.00	4,297,216.00	5,371,520.00

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
(Note: Assume 40 hrs per year for senior engineer and no travel to the site.)												
			0.0000		*20.0000*	*0.0000*	*0.0000*	*0.0000*	*20.0000*	*53.7152*	*53.7152*	*67.1440*
3.1.1.3 USR Admin/Data Mgmnt. (Hourly Labor Rate)	HR	40,000.0000	0.00	1.4 Prime Professional Labor	800,000.00	0.00	0.00	0.00	800,000.00	2,148,608.00	2,148,608.00	2,685,760.00
(Note: Assume 40 hrs per year and no travel to the site.)												
			0.0000		*151.6515*	*0.0000*	*149.8850*	*0.0000*	*301.5365*	*448.3897*	*448.3897*	*560.4872*
3.1.2 Warning Signs	**YR**	**1,000.0000**	**0.00**	**1.2 CL Craft Labor**	**151,651.50**	**0.00**	**149,885.01**	**0.00**	**301,536.51**	**448,389.73**	**448,389.73**	**560,487.16**
(Note: This element details costs associated with the posting of signs and maintenance of signs for a 1,000 year period.)												
			0.0000		*45.5000*	*0.0000*	*44.9700*	*0.0000*	*90.4700*	*134.5304*	*134.5304*	*168.1630*
3.1.2.1 MIL 028901000560 Signs, stock, reflectorized, UTMCD standard, warning sign, 24" x 24", with posts	EA	3,333.0000	0.00	1.2 CL Craft Labor	151,651.50	0.00	149,885.01	0.00	301,536.51	448,389.73	448,389.73	560,487.16
			0.0000		*1,435.6854*	*437.7147*	*1,680.0000*	*0.0000*	*3,553.4001*	*281.9600*	*3,788.4737*	*4,735.5921*
3.1.3 11508 Fence Repair	**YR**	**1,000.0000**	**0.00**		**1,435,685.41**	**437,714.66**	**1,680,000.00**	**0.00**	**3,553,400.07**	**281,959.97**	**3,788,473.69**	**4,735,592.11**
(Note: Assume 200 lf of fence is replaced annually for this element.)												
			0.0000		*6.3837*	*2.0139*	*8.4000*	*0.0000*	*16.7976*	*0.0000*	*17.5326*	*21.9157*
3.1.3.1 MIL 028201306560 Chain link fence, industrial, galvanized, 9 ga. mesh, 1-5/8" top rail, 6' high, posts in concrete, excludes excavation	LF	200,000.0000	0.00		1,276,736.84	402,776.88	1,680,000.00	0.00	3,359,513.72	0.00	3,506,513.72	4,383,142.15
			0.0000		*7.9474*	*1.7469*	*0.0000*	*0.0000*	*9.6943*	*14.0980*	*14.0980*	*17.6225*
3.1.3.2 MIL 028201507925 Auger fence post hole, medium soil, 3' deep, by machine, includes excavation	EA	20,000.0000	0.00	1.2 CL Craft Labor	158,948.57	34,937.78	0.00	0.00	193,886.35	281,959.97	281,959.97	352,449.96
			0.0000		*0.0000*	*0.0000*	*7,440.0000*	*0.0000*	*7,440.0000*	*10,012.9169*	*10,012.9169*	*12,516.1461*
3.1.4 1151313 Seaway - Surveillance	**YR**	**1,000.0000**	**0.00**		**0.00**	**0.00**	**7,440,000.00**	**0.00**	**7,440,000.00**	**10,012,916.90**	**10,012,916.90**	**12,516,146.13**
(Note: Institutional controls in this cost item include monitoring and maintaining the leachate collection system and occasional replacement of pumps. Also includes deed restrictions or covenants to restrict the future use.)												
			0.0000		*0.0000*	*0.0000*	*620.0000*	*0.0000*	*620.0000*	*834.4097*	*834.4097*	*1,043.0122*
3.1.4.1 USR Inst. Controls, O&M, and Surveillance (O&M Phase)	MO	12,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	7,440,000.00	0.00	7,440,000.00	10,012,916.90	10,012,916.90	12,516,146.13
3.1.5 11510 Annual Inspection	**LS**	**1,000.0000**	**0.00**		**2,160,000.00**	**0.00**	**0.00**	**3,000,000.00**	**5,160,000.00**	**6,307,696.81**	**6,307,696.81**	**7,884,621.01**
(Note: This element describes costs associated with an annual inspection of the capped area.)												

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
3.1.5.1 1151010 Field Engineer (2)	**LS**	**1.0000**	**0.00**	**1.5 Prime Professional Travel**	**2,160,000.00**	**0.00**	**0.00**	**2,500,000.00**	**4,660,000.00**	**5,688,928.00**	**5,688,928.00**	**7,111,160.00**
(Note: Assume two field engineers @ 40 hours each per year for site inspeciton and follow up report.)												
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*32.9616*	*32.9616*	*41.2020*
3.1.5.1.1 USR Field Engineer, 2 pers. (Hourly Labor Rate)	HR	80,000.0000	0.00	1.5 Prime Professional Travel	2,160,000.00	0.00	0.00	0.00	2,160,000.00	2,636,928.00	2,636,928.00	3,296,160.00
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
3.1.5.1.2 USR Field Engineer Travel	EA	2,000.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	2,500,000.00	2,500,000.00	3,052,000.00	3,052,000.00	3,815,000.00
			0.0000		*0.0000*	*0.0000*	*0.0000*	*500.0000*	*500.0000*	*618.7688*	*618.7688*	*773.4610*
3.1.5.2 1151015 Materials and expenses	**EA**	**1,000.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**500,000.00**	**500,000.00**	**618,768.81**	**618,768.81**	**773,461.01**
(Note: Assumes $500 per inspection.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*500.0000*	*500.0000*	*618.7688*	*618.7688*	*773.4610*
3.1.5.2.1 USR Materials and expenses.	EA	1,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	500,000.00	500,000.00	618,768.81	618,768.81	773,461.01
			0.0000		*4,151.5200*	*0.0000*	*0.0000*	*0.0000*	*4,151.5200*	*11,149.9864*	*11,149.9864*	*13,937.4829*
3.1.6 11515 5-Year Status Report	**EA**	**200.0000**	**0.00**	**1 MA Prime**	**830,304.00**	**0.00**	**0.00**	**0.00**	**830,304.00**	**2,229,997.27**	**2,229,997.27**	**2,787,496.59**
(Note: 5-year status summary report of the annual inspection results and review of state/federal files. There will be a total of 200 reports generated over the 1,000-year period.)												
			0.0000		*36,000.0000*	*0.0000*	*0.0000*	*0.0000*	*36,000.0000*	*96,687.3600*	*96,687.3600*	*120,859.2000*
3.1.6.1 11515 5 File Review	**EA**	**6.0000**	**0.00**	**1.4 Prime Professional Labor**	**216,000.00**	**0.00**	**0.00**	**0.00**	**216,000.00**	**580,124.16**	**580,124.16**	**725,155.20**
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*72.5155*	*72.5155*	*90.6444*
3.1.6.1.1 USR Junior Engineer for file review.	HR	8,000.0000	0.00	1.4 Prime Professional Labor	216,000.00	0.00	0.00	0.00	216,000.00	580,124.16	580,124.16	725,155.20
(Note: Assumes 5 days for each file)												
3.1.6.2 1151510 Report Preparation	**LS**	**1.0000**	**0.00**		**614,304.00**	**0.00**	**0.00**	**0.00**	**614,304.00**	**1,649,873.11**	**1,649,873.11**	**2,062,341.39**
(Note: Assume the following hours to prepare the 5-Year Status Reports. Project Manager 16 hrs Senior Engineer 24 hrs Jr. Engineer 60 hrs Admin/Editing 16 hrs)												
			0.0000		*50.0000*	*0.0000*	*0.0000*	*0.0000*	*50.0000*	*134.2880*	*134.2880*	*167.8600*
3.1.6.2.1 USR Project Manager (Hourly Labor Rate)	HR	3,200.0000	0.00	1.4 Prime Professional Labor	160,000.00	0.00	0.00	0.00	160,000.00	429,721.60	429,721.60	537,152.00

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
3.1.6.2.2 USR Senior Engineer (Hourly Labor Rate)	HR	4,800.0000	0.00	1.4 Prime Professional Labor	192,000.00	0.00	0.00	0.00	192,000.00	515,665.92	515,665.92	644,582.40
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*72.5155*	*72.5155*	*90.6444*
3.1.6.2.3 USR Junior Engineer (Hourly Labor Rate)	HR	8,000.0000	0.00	1.4 Prime Professional Labor	216,000.00	0.00	0.00	0.00	216,000.00	580,124.16	580,124.16	725,155.20
			0.0000		*14.4700*	*0.0000*	*0.0000*	*0.0000*	*14.4700*	*38.8629*	*38.8629*	*48.5787*
3.1.6.2.4 USR Admin/Data Mgmnt. (Hourly Labor Rate)	HR	3,200.0000	0.00	1.4 Prime Professional Labor	46,304.00	0.00	0.00	0.00	46,304.00	124,361.43	124,361.43	155,451.79
			0.0000		*0.0000*	*0.0000*	*0.0000*	*4,500.0000*	*4,500.0000*	*5,568.9193*	*5,568.9193*	*6,961.1491*
3.1.7 11520 Cap Maintenance and Repair	**YR**	**1,000.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**4,500,000.00**	**4,500,000.00**	**5,568,919.30**	**5,568,919.30**	**6,961,149.12**

(Note: This element includes maintenance of the cap over the 1,000 year O&M period. The cap may require erosion controls, repair from erosion issues, repair from settlement issues. The total area includes approximatey 9 acres. Mowing, watering, and fertilizing is assumed to be performed by the land owner. Below are the assumptions for repair. Erosion controls, repair from erosion issues, and settlement issues = $500/acre/year Annual Cost = 9 acres x $500/acre= $4,500)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*4,500.0000*	*4,500.0000*	*5,568.9193*	*5,568.9193*	*6,961.1491*
3.1.7.1 USR Cover System Repair	YR	1,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	4,500,000.00	4,500,000.00	5,568,919.30	5,568,919.30	6,961,149.12

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

APPENDIX G

ATTACHMENT (Cont'd)

DETAILED COST ESTIMATE FOR

Alternative 6 (Containment)

ALTERNATIVE 6 - CONTAINMENT
SEAWAY AREA A, B-C, NORTHSIDE, AND SOUTHSIDE

Estimated by	D. Cobb, R. Tucker, Mike Poligone
Designed by	SAIC
Prepared by	Mike Poligone
Preparation Date	6/21/2007
Effective Date of Pricing	12/11/2006
Estimated Construction Time	374 Days

Description	Page

Description	Page

Description	Page

Designed by
SAIC
Estimated by
D. Cobb, R. Tucker, Mike Poligone
Prepared by
Mike Poligone

Design Document	ADDENDUM TO THE FEASIBILITY STUDY - SEPTEMBER 2006
Document Date	
District	USACE BUFFALO DISTRICT
Contact	JANNA HUMMEL (PM)
Budget Year	2007
UOM System	English

Direct Costs
LaborCost
EQCost
MatlCost
SubBidCost

Timeline/Currency

Preparation Date	6/21/2007
Escalation Date	12/11/2006
Eff. Pricing Date	12/11/2006
Estimated Duration	374 Day(s)
Currency	US dollars
Exchange Rate	1.000000

Costbook CB04aEB: MII English Cost Book 2004b Final

Labor : MII English Cost Book 2004b Final
Note: System.Data.DataRow

Labor Rates
LaborCost1
LaborCost2
LaborCost3
LaborCost4

Equipment : Eq Rates EP 1110-1-8, Aug. 1995

Sales Tax	8.75
Working Hours per Year	1,600
Labor Adjustment Factor	1.00
Cost of Money	8.13
Cost of Money Discount	6.50
Tire Recap Cost Factor	1.50
Tire Recap Wear Factor	1.80
Tire Repair Factor	0.15
Equipment Cost Factor	1.00
Standby Depreciation Factor	0.50

Fuel

Electricity	0.060
Gas	3.100
Diesel Off-Road	2.500
Diesel On-Road	2.800

Shipping Rates

Over 0 CWT	12.05
Over 240 CWT	9.64
Over 300 CWT	7.23
Over 400 CWT	5.79
Over 500 CWT	4.45
Over 700 CWT	3.62
Over 800 CWT	4.29

Currency in US dollars

Date	Author	Note
12/11/2006	Mike Poligone	The purpose of this estimate is to provide the an order-of-magnitude cost for Alternative No. 6 for the Seaway Landfill in Tonawanda, New York, as part of Addendum To The Feasibility Study - September 2006. Under this alternative, MED soil in Areas A, B, C, and Southside (SS) within the clay cutoff wall site boundary will be capped. MED soil in the Northside (NS), and SS areas outside the clay cutoff wall boundary will be excavated and disposed offsite.

MED materials are known to be present in the surface and subsurface soils in Areas A, B, and C. In addition, a limited volume of MED material will be excavated from two areas adjacent to the Seaway site and outside of the clay cutoff wall and disposed of off-site at an approved facility. The excavation of this material has been included in this
option as a result of previous investigative activities at the adjacent Ashland site. The areas of excavation are located between the clay cutoff wall and the Ashland/Seaway property lines; at the northeast corner of the Seaway site and includes an 8 foot wide
by 72 foot long section on the Ashland II property; and on the south side of
the Seaway landfill along the Ashland I boundary under the Stone Road and
under a portion of the cover outside the cutoff wall.

The NS area is a portion of the site representing the termination point of soil removal activities performed by others on the Ashland II site. The total estimated volume of MED soil added an additional 3,650 cubic yards to excavated and disposal volumes in the NS Area. A computer generated cut and fill analysis of proposed final grading plans was prepared by SAIC (SAIC, 9/19/00) prior to capping activities. It was assumed that all slopes within the area to be capped shall have a maximum slope of 3:1. Cross sections taken through the work area indicated several regions where the slope exceeded the 3:1 slope and will require regrading. Material generated during the regrading activities will have to be disposed of off-site at an approved facility. The total MED and soils generating during regarding will result in a total volume of 5,260 cubic yards.

The material in the Southside Area to be excavated is predominantly in the road base near the boundary of the Ashland 1 site south and east of Areas A, and B-C. It consists of 388 cy of MED material with about 800 cy of overburden. All this is outside the limits of the landfill cover and the clay cutoff wall.

This alternative includes excavation of MED and Overburden soils. The soils will be directly loaded from the stockpile into intermodals for transportation to the railcar staging and loading area. The intermodal containers will be loaded onto railcars for transport to a licensed and permitted disposal facility. Actual off-site disposal production rates may be affected by available intermodal containers and railcars, which can result in substantial daily delays. Upon completion of excavations and receipt of clean confirmation results, the resulting areas will be backfilled to the appropriate elevation using clean fill from offsite sources.

The estimated schedule for this alternative assumes a start date for field activities of August for Grading activities after the design is complete. A 9-month construction schedule was assumed from March to November due to expected winter conditions that prohibit completion of site work. Based on this assumption and the anticipated site production rates, the entire project will take approximately 1.25 construction seasons. The estimated duration to place the grading layer and grade site is 2.5 months and installation of the cap is approximately 8 months. It is assumed that the excavation/loading and capping activities run concurrently in the last year. The professional staff and capital overhead is assumed to be required for 17 months unless otherwise noted. The project schedule is based on 8 hours per day and 5 days per week. Overtime costs have not been included.

A long-term O&M period for this alternative is 1,000 years and includes annual inspections of the capping system, maintaining institutional controls, and conducting 5-year records review and reporting.

All work is assumed to be managed by the prime contractor. Transportation and disposal will be subcontracted by the prime contractor and a 3% handling charge has been included. The prime contractor will perform all professional services and subcontract all field activities.

The professional labor assigned to the prime contractor includes the following markups: (1) Overhead 120%; (2) G&A 12%; (3) Profit 9%; and S/C Markup 3%.

The subcontractor includes the following markups: (1) Field Overhead (General Conditions) 10%; (2) Small Tools 2% (only on labor); (3) Profit 9%; and (3) Bonds 2.75%.

An 8.75% sales tax is included on material purchases. Prices from the USACE Unit Price Book, MEANS, RACER, and historical rates were adjusted to December 2006 pricing. A location factor of 0.94 was designated by RSMeans however the Davis Bacon Rates were higher than average rated listed in RSMeans, so no adjustment was made. Vendor quotes, USACE quotes, and engineering estimates were not adjusted for location or adjusted for price escalation. Labor rates were based on the 2/16/07 Department of Labor, Davis Bacon Rates and a 10% premium was added to account for employers paying more for employee retention.

A 10% Design markup has been included on all field work except transportation and disposal. A 25% contingency was applied to the entire estimate for design and construction contingency.

HTRW productivity factors, as established in the USACE Engineering Instructions, were also included for the remediation effort where applicable as noted in the estimate. This includes a 0.63 safety and contaminated materials productivity factor on all contaminated material handling activities. Additionally a weather delay factor of 0.8 and a radiological survey factor of 0.8 was included to account for delays in delineating areas of contamination.

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Date	Author	Note
12/11/2006	Mike Poligone	FUSRAP Management and Integration costs have been included as of Revision 2 of this alternative (March, 2000). No USACE cost for O&M activities are included. Costs incorporated into estimate are based on costs provided by USACE. This estimate is based on items presented in the Feasibility Study addendum entitled "Addendum to the Feasibility Study for the Seaway Site, Areas A, B, and C - Tonawanda, New York". The actual project budget may vary depending upon such factors as design parameters, scheduling, differing assumptions, revisions to the existing feasibility study, and other project specific requirements.

Direct Cost Markups	**Category**	**Method**
Sales Tax	TaxAdj	Running % on Selected Costs
MatlCost		
Productivity (63%)	Productivity	Productivity
Productivity (85%)	Productivity	Productivity
Price Adjust Cost Book (4.6%)	TaxAdj	Running % on Selected Costs
LaborCost		
EQCost		
MatlCost		
SubBidCost		
USACE Labor Adj. (9.6%)	TaxAdj	Running % on Selected Costs
SubBidCost		
Buffalo Location Factor (-6%)	TaxAdj	Running % on Selected Costs
LaborCost		
EQCost		
MatlCost		
SubBidCost		

Contractor Markups	**Category**	**Method**
Prime OH	HOOH	Running %
Prime G&A	Allowance	Running %
Prime Profit	Allowance	Running %
Craft HOOH	Allowance	Running %
Craft FOOH	Allowance	Running %
Craft Profit	Profit	Running %
Craft Small Tools (Small Tools)	JOOH	% of Labor
Craft Small Tools	JOOH	JOOH (Calculated)
Craft Bond	Bond	Bond Table

HTRW (Other), Banded, 24 months, 1.00% Surcharge

Contract Price	*Bond Rate*
0	*4.40*
3,000,000	*3.85*
5,000,000	*3.30*
7,500,000	*2.75*

Craft Insurance	MiscContract	Running %
Small TOols (Small Tools)	JOOH	% of Labor
Transport & Disposal Handlinf	Allowance	Running %

Owner Markups	**Category**	**Method**
Design	MiscOwner	Running %
Conting (Running%)	Contingency	Running %
Cost Book Calc	Escalation	Escalation

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

	StartDate	*StartIndex*	*EndDate*	*EndIndex*	*Escalation*
	1/28/2004	*3,703.10*	*12/31/2006*	*3,874.40*	*4.63*

USACE Labor Calc Escalation Escalation

	StartDate	*StartIndex*	*EndDate*	*EndIndex*	*Escalation*
	3/11/2000	*3,536.00*	*12/11/2006*	*3,874.00*	*9.56*

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
Seaway Alt 4			**370,190.72**		**18,914,880.81**	**1,786,829.30**	**13,697,410.64**	**18,928,191.19**	**53,327,311.93**	**73,688,379.59**	**79,572,685.60**	**100,715,363.51**
			3.5122		*30.2762*	*12.7966*	*39.1623*	*32.5255*	*114.7607*	*173.1889*	*174.0873*	*229.4640*
1 331XX HTRW REMEDIAL ACTION (CONSTRUCT)	**CY**	**105,400.0000**	**370,190.72**		**3,191,116.39**	**1,348,758.88**	**4,127,710.64**	**3,428,191.19**	**12,095,777.10**	**18,254,111.93**	**18,348,801.43**	**24,185,508.30**
			0.0000		*37,663.1269*	*15,766.6066*	*58,707.0000*	*0.0000*	*112,136.7336*	*153,887.3710*	*153,887.3710*	*211,595.1352*
1.1 331XX01 Mobilize and Preparatory Work	**EA**	**1.0000**	**0.00**		**37,663.13**	**15,766.61**	**58,707.00**	**0.00**	**112,136.73**	**153,887.37**	**153,887.37**	**211,595.14**
			0.0000		*3,020.0000*	*7,000.0000*	*0.0000*	*0.0000*	*10,020.0000*	*12,382.8408*	*12,382.8408*	*17,026.4062*
1.1.1 331XX0101 Mob Construction Equip & Fac	**EA**	**1.0000**	**0.00**		**3,020.00**	**7,000.00**	**0.00**	**0.00**	**10,020.00**	**12,382.84**	**12,382.84**	**17,026.41**
			0.0000		*3,020.0000*	*7,000.0000*	*0.0000*	*0.0000*	*10,020.0000*	*12,382.8408*	*12,382.8408*	*17,026.4062*
1.1.1.1 331XX010107 Const Equip Ownership/Oper	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**3,020.00**	**7,000.00**	**0.00**	**0.00**	**10,020.00**	**12,382.84**	**12,382.84**	**17,026.41**

(Note: Mob/Demob of heavy equipment is based on the estimated equipment reuirements for excavation, loading, backfill, and capping requirements. This element includes mob/demob of 20 pieces of equipment. Actual number of mob/demob required will depend on scheduling of project.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.1.1.1.1 331XX01010701 Mobilization/Demobilization - Area A, new Area B-C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**3,020.00**	**7,000.00**	**0.00**	**0.00**	**10,020.00**	**12,382.84**	**12,382.84**	**17,026.41**
			0.0000		*75.5000*	*175.0000*	*0.0000*	*0.0000*	*250.5000*	*309.5710*	*309.5710*	*425.6602*
1.1.1.1.1.1 RSM 015436500100 Mobilization or demobilization, dozer, loader, backhoe or excavator, above 250 H.P., up to 50 miles	EA	40.0000	0.00	1.2 CL Craft Labor	3,020.00	7,000.00	0.00	0.00	10,020.00	12,382.84	12,382.84	17,026.41

(Note: Cost Based on MEANS 2006, 4th quarther, US Natl Average.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*16,962.1269*	*7,407.6066*	*48,160.0000*	*0.0000*	*72,529.7336*	*103,800.0620*	*103,800.0620*	*142,725.0852*
1.1.2 331XX0104 Setup/Construct Temp Facilities	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**16,962.13**	**7,407.61**	**48,160.00**	**0.00**	**72,529.73**	**103,800.06**	**103,800.06**	**142,725.09**
			0.0000		*2.2628*	*2.5543*	*15.4000*	*0.0000*	*20.2171*	*28.4915*	*28.4915*	*39.1758*
1.1.2.1 331XX010423 Aggregate Surfacing	**EA**	**400.0000**	**0.00**	**1.2 CL Craft Labor**	**905.12**	**1,021.74**	**6,160.00**	**0.00**	**8,086.86**	**11,396.60**	**11,396.60**	**15,670.33**
1.1.2.1.1 331XX01042301 MED Soil Staging Area - Northside and Southside Areas	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**905.12**	**1,021.74**	**6,160.00**	**0.00**	**8,086.86**	**11,396.60**	**11,396.60**	**15,670.33**

(Note: Assume the rail staging area is in place from the Ashland Project. Assume 20,000 sf of gravel is required to upgrade existing area for future loading operations. Assume 6" depth.)

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*2.2628*	*2.5543*	*15.4000*	*0.0000*	*20.2171*	*28.4915*	*28.4915*	*39.1758*
1.1.2.1.1.1 AF 027202001530 Aggregrate base course, for roadways and large paved areas, gravel, bank run, compacted, 6" deep	CY	400.0000	0.00	1.2 CL Craft Labor	905.12	1,021.74	6,160.00	0.00	8,086.86	11,396.60	11,396.60	15,670.33
			0.0000		*5,657.0060*	*6,385.8678*	*38,500.0000*	*0.0000*	*50,542.8738*	*71,228.7580*	*71,228.7580*	*97,939.5423*
1.1.2.2 331XX010425 Roads and Parking	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**5,657.01**	**6,385.87**	**38,500.00**	**0.00**	**50,542.87**	**71,228.76**	**71,228.76**	**97,939.54**
1.1.2.2.1 331XX01042501 Preparation Access Roads	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**5,657.01**	**6,385.87**	**38,500.00**	**0.00**	**50,542.87**	**71,228.76**	**71,228.76**	**97,939.54**
(Note: Assume roadways are 20 feet wide and thickness is 1.5 feet. Estimate is for 2,000 LF of temporary roads to access Areas A, B, C, NS, and SS. Assume 10% compaction.)												
			0.0000		*2.2628*	*2.5543*	*15.4000*	*0.0000*	*20.2171*	*28.4915*	*28.4915*	*39.1758*
1.1.2.2.1.1 AF 027202001530 Aggregrate base course, for roadways and large paved areas, gravel, bank run, compacted, 6" deep	CY	2,500.0000	0.00	1.2 CL Craft Labor	5,657.01	6,385.87	38,500.00	0.00	50,542.87	71,228.76	71,228.76	97,939.54
			0.0000		*10,400.0000*	*0.0000*	*3,500.0000*	*0.0000*	*13,900.0000*	*21,174.7026*	*21,174.7026*	*29,115.2161*
1.1.2.3 331XX010430 Erosion Control	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**10,400.00**	**0.00**	**3,500.00**	**0.00**	**13,900.00**	**21,174.70**	**21,174.70**	**29,115.22**
1.1.2.3.1 331XX01043002 Erosion/Sediment Control - Northside and Southside Areas	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**10,400.00**	**0.00**	**3,500.00**	**0.00**	**13,900.00**	**21,174.70**	**21,174.70**	**29,115.22**
			0.0000		*2.0800*	*0.0000*	*0.7000*	*0.0000*	*2.7800*	*4.2349*	*4.2349*	*5.8230*
1.1.2.3.1.1 MIL 023707001120 Erosion control, silt fence, polypropylene, 3' high, includes 7.5' posts	LF	5,000.0000	0.00	1.2 CL Craft Labor	10,400.00	0.00	3,500.00	0.00	13,900.00	21,174.70	21,174.70	29,115.22
			0.0000		*17,681.0000*	*1,359.0000*	*10,547.0000*	*0.0000*	*29,587.0000*	*37,704.4682*	*37,704.4682*	*51,843.6438*
1.1.3 331XX0105 Construct Temporary Utilities	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**17,681.00**	**1,359.00**	**10,547.00**	**0.00**	**29,587.00**	**37,704.47**	**37,704.47**	**51,843.64**
1.1.3.1 331XX010501 Utility Installation - Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**17,681.00**	**1,359.00**	**10,547.00**	**0.00**	**29,587.00**	**37,704.47**	**37,704.47**	**51,843.64**
1.1.3.1.1 RAC RACER Temporary Trailer Utility Hookups	LS	1.0000	0.00	1.2 CL Craft Labor	10,590.00	834.00	8,317.00	0.00	19,741.00	25,295.52	25,295.52	34,781.34
(Note: Cost based on RACER 2006 cost model for Overhead Electrical Distribution based on 1000 lf run of 5kV, 3 phase, 160 amp service. Assume pole spacing at 250 ft.)												

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.1.3.1.2 USR Temp Telephone Install (5 lines)	LS	1.0000	0.00	1.2 CL Craft Labor	400.00	0.00	100.00	0.00	500.00	628.72	628.72	864.49
(Note: Cost based on an Engineering Estimate.)												
1.1.3.1.3 RAC RACER Utility Trench Excavation	LS	1.0000	0.00	1.2 CL Craft Labor	6,691.00	525.00	2,130.00	0.00	9,346.00	11,780.23	11,780.23	16,197.81
(Note: Cost based on RACER 2006 cost model for trenching and includes 1000 lf trench with 2" PVC water line. Trench is 4 ft deep and 3 ft wide.)												
			0.0000		*126,720.0000*	*16,500.0000*	*0.0000*	*49,801.7400*	*193,021.7400*	*264,072.6526*	*264,072.6526*	*363,099.8973*
1.2 331XX02 Monitoring, Samplng, Testing, Analysis	**EA**	**1.0000**	**0.00**		**126,720.00**	**16,500.00**	**0.00**	**49,801.74**	**193,021.74**	**264,072.65**	**264,072.65**	**363,099.90**
			0.0000		*126,720.0000*	*16,500.0000*	*0.0000*	*49,801.7400*	*193,021.7400*	*264,072.6526*	*264,072.6526*	*363,099.8973*
1.2.1 331XX0208 Sampling Radioactve Contam Media	**EA**	**1.0000**	**0.00**		**126,720.00**	**16,500.00**	**0.00**	**49,801.74**	**193,021.74**	**264,072.65**	**264,072.65**	**363,099.90**
			0.0000		*126,720.0000*	*16,500.0000*	*0.0000*	*49,801.7400*	*193,021.7400*	*264,072.6526*	*264,072.6526*	*363,099.8973*
1.2.1.1 331XX020805 Sub-Surface Soil	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**126,720.00**	**16,500.00**	**0.00**	**49,801.74**	**193,021.74**	**264,072.65**	**264,072.65**	**363,099.90**
1.2.1.1.1 1 3 1 1 1 Seaway MSA - Northside and Southside Areas	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**126,720.00**	**16,500.00**	**0.00**	**49,801.74**	**193,021.74**	**264,072.65**	**264,072.65**	**363,099.90**
(Note: Includes all monitoring, sampling, and analysis and verification testing.)												
			0.0000		*126,720.0000*	*16,500.0000*	*0.0000*	*0.0000*	*143,220.0000*	*202,527.0418*	*202,527.0418*	*278,474.6825*
1.2.1.1.1.1 331XX02080501 Rad Monitoring	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**126,720.00**	**16,500.00**	**0.00**	**0.00**	**143,220.00**	**202,527.04**	**202,527.04**	**278,474.68**
(Note: This element covers IH/HP technicians for the following areas: 3 at the excavation site to survey personnel, survey additional areas requiring excavation, and obtaining post RA samples for 1 month; 4 at the loading site to survey personnel and transport vehicles for 2 months; and 2 at the onsite lab to analyze samples/swipes and calibrate equipment for 2 months. The IH/HP technicians and equipment would be required for a total of 2 months duration at 176 hrs/month. Total hours is 2,640. Equipment pricing base on Vendor Quote and escalated to 12/2006 pricing.;Rates escalated from 2/2002)- The Beryllium and Radiological monitoring equipment includes the following: 1. Model 2929 dual channel scaler (2 @ $440/mo =$880/mo) 2. Alpha Survey Instrument, 43-5 or equal (3 @ 260/mo = $880/mo) 3. Ratemeter w/GM pancake, 44-9 or equal (2 @ $235/mo = $470/mo) 4. Alarming Frisker w/ GM pancake, 44-9 or equal (5 @ $160/mo = $800/mo) 5. Micro R Meter, Model 19 or equal (2 @ $160/mo = $320/mo) 6. Personal Air Sampling pumps (3 @ $100/mo = $300/mo) 7. Personal air sampling pump charger (2 @ $60/mo = $120/mo) 8. High Volume air samplers (8 @ $155/mo = $1,240/mo) Total = $5,010/month. Use $5,500/mo direct cost to account for other miscellaneous equipment or supplies. Assume technicians are permanate in area and no per diem or travel is required.)												
			0.0000		*0.0000*	*5,500.0000*	*0.0000*	*0.0000*	*5,500.0000*	*6,796.9685*	*6,796.9685*	*9,345.8317*
1.2.1.1.1.1.1 USR Rad Monitoring Equipment	MO	3.0000	0.00	1.2 CL Craft Labor	0.00	16,500.00	0.00	0.00	16,500.00	20,390.91	20,390.91	28,037.50
			0.0000		*48.0000*	*0.0000*	*0.0000*	*0.0000*	*48.0000*	*68.9910*	*68.9910*	*94.8626*
1.2.1.1.1.1.2 RAD H-RADPRTEC Radiation Protection Technicians	HR	2,640.0000	0.00	1.2 CL Craft Labor	126,720.00	0.00	0.00	0.00	126,720.00	182,136.14	182,136.14	250,437.19
			0.0000		*0.0000*	*0.0000*	*0.0000*	*4,472.0000*	*4,472.0000*	*5,526.5533*	*5,526.5533*	*7,599.0108*
1.2.1.1.1.2 331XX02080502 Bioassays	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**4,472.00**	**4,472.00**	**5,526.55**	**5,526.55**	**7,599.01**

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
(Note: Bioassays (2/yr x 1 yr x 20 people))												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*111.8000*	*111.8000*	*138.1638*	*138.1638*	*189.9753*
1.2.1.1.1.2.1 RAD 021055508154 Testing, rad analytical urine & feces, radium-226, 228, radon de-emanation, gas flow	EA	40.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	4,472.00	4,472.00	5,526.55	5,526.55	7,599.01
			0.0000		*0.0000*	*0.0000*	*0.0000*	*45,329.7400*	*45,329.7400*	*56,019.0575*	*56,019.0575*	*77,026.2040*
1.2.1.1.1.3 331XX02080503 Rad Lab Soils Analysis	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**45,329.74**	**45,329.74**	**56,019.06**	**56,019.06**	**77,026.20**
(Note: Since a MARSSIM analysis has not been performed, assume confirmation samples are obtained every 1,000 sf. The total area is 18,000 sf. Total samples collected are 18. Add 30% additional samples for sidewall samples and overburden delineation. Add 100% additional samples for hotspots. Total samples = 47 (say 50) ea Samples will be analyzed for radionuclides. Assume 1% of rad samples will also have TCLP Test = 1 ea.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*65.9200*	*65.9200*	*81.4648*	*81.4648*	*112.0140*
1.2.1.1.1.3.1 HTW 021055506428 Documentation package, for Q.A. verification	EA	75.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	4,944.00	4,944.00	6,109.86	6,109.86	8,401.05
			0.0000		*0.0000*	*0.0000*	*0.0000*	*121.0000*	*121.0000*	*149.5333*	*149.5333*	*205.6083*
1.2.1.1.1.3.2 RAD 021055508236 Testing, rad analytical vegetation/sediment/soil, gamma spectroscopy, radium-226, 228	EA	50.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	6,050.00	6,050.00	7,476.67	7,476.67	10,280.41
			0.0000		*0.0000*	*0.0000*	*0.0000*	*98.6200*	*98.6200*	*121.8758*	*121.8758*	*167.5793*
1.2.1.1.1.3.3 RAD 021055508238 Testing, rad analytical vegetation/sediment/soil, gamma spectroscopy, uranium-total	EA	50.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	4,931.00	4,931.00	6,093.79	6,093.79	8,378.96
			0.0000		*0.0000*	*0.0000*	*0.0000*	*126.5700*	*126.5700*	*156.4168*	*156.4168*	*215.0731*
1.2.1.1.1.3.4 RAD 021055508216 Testing, rad analytical vegetation/sediment/soil, alpha spectroscopy, uranium isotopic	EA	50.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	6,328.50	6,328.50	7,820.84	7,820.84	10,753.65
			0.0000		*0.0000*	*0.0000*	*0.0000*	*123.4300*	*123.4300*	*152.5363*	*152.5363*	*209.7375*

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.2.1.1.1.3.5 RAD 021055508215 Testing, rad analytical vegetation/sediment/soil, alpha spectroscopy, thorium isotopic	EA	50.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	6,171.50	6,171.50	7,626.82	7,626.82	10,486.87
			0.0000		*0.0000*	*0.0000*	*0.0000*	*46.2700*	*46.2700*	*57.1810*	*57.1810*	*78.6239*
1.2.1.1.1.3.6 RAD 021055508252 Testing, rad analytical vegetation/sediment/soil, gross alpha & gross beta, total	EA	50.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	2,313.50	2,313.50	2,859.05	2,859.05	3,931.20
			0.0000		*0.0000*	*0.0000*	*0.0000*	*289.6700*	*289.6700*	*357.9778*	*357.9778*	*492.2195*
1.2.1.1.1.3.7 AFH 021055507120 Testing, TAL metals (6010/7000s)	EA	50.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	14,483.50	14,483.50	17,898.89	17,898.89	24,610.97
			0.0000		*0.0000*	*0.0000*	*0.0000*	*107.7400*	*107.7400*	*133.1464*	*133.1464*	*183.0763*
1.2.1.1.1.3.8 AFH 021055507427 Testing, RCRA evaluations, toxic characteristic leaching procedure, TCLP (RCRA) (EPA 1311)	EA	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	107.74	107.74	133.15	133.15	183.08
			0.0000		*19,661.1724*	*0.0000*	*5,500.0000*	*0.0000*	*25,161.1724*	*39,939.1267*	*39,939.1267*	*54,916.2991*
1.3 331XX03 Site Work	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**19,661.17**	**0.00**	**5,500.00**	**0.00**	**25,161.17**	**39,939.13**	**39,939.13**	**54,916.30**
			0.0000		*19,661.1724*	*0.0000*	*5,500.0000*	*0.0000*	*25,161.1724*	*39,939.1267*	*39,939.1267*	*54,916.2991*
1.3.1 331XX0303 Earthwork	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**19,661.17**	**0.00**	**5,500.00**	**0.00**	**25,161.17**	**39,939.13**	**39,939.13**	**54,916.30**
			0.0000		*19,661.1724*	*0.0000*	*5,500.0000*	*0.0000*	*25,161.1724*	*39,939.1267*	*39,939.1267*	*54,916.2991*
1.3.1.1 331XX030302 Excavation/Fill	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**19,661.17**	**0.00**	**5,500.00**	**0.00**	**25,161.17**	**39,939.13**	**39,939.13**	**54,916.30**
1.3.1.1.1 331XX03030201 Surveying Area A, B, C, Northside, and Southside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**19,661.17**	**0.00**	**5,500.00**	**0.00**	**25,161.17**	**39,939.13**	**39,939.13**	**54,916.30**

(Note: This is a summary line item for required surveying services throughout the project. Includes staking of areas to be excavated or capped, volume calculations for pay items, establish and reestablish control points for both excavation and landfill cap, and layout of landfill cap.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.3.1.1.1.1 331XX0303020101 Establish Site Control/Layout	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**10,000.14**	**0.00**	**2,500.00**	**0.00**	**12,500.14**	**19,914.75**	**19,914.75**	**27,382.79**

(Note: Assume 3 man crew for 4 weeks (30 days) and 22 days drafting to develop drawings. Assume 22 days/month.)

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*2,825.8621*	*0.0000*	*0.0000*	*0.0000*	*2,825.8621*	*4,686.2705*	*4,686.2705*	*6,443.6220*
1.3.1.1.1.1.1 MIL 013107000640 Field Personnel, surveyor	MO	2.7200	0.00	1.2 CL Craft Labor	7,686.34	0.00	0.00	0.00	7,686.34	12,746.66	12,746.66	17,526.65
			0.0000		*2,313.7931*	*0.0000*	*0.0000*	*0.0000*	*2,313.7931*	*3,808.2321*	*3,808.2321*	*5,236.3191*
1.3.1.1.1.1.2 MIL 013107000650 Field Personnel, draftsman	MO	1.0000	0.00	1.2 CL Craft Labor	2,313.79	0.00	0.00	0.00	2,313.79	3,808.23	3,808.23	5,236.32
1.3.1.1.1.1.3 USR Miscellaneous Materials and Supplies	LS	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	2,500.00	0.00	2,500.00	3,359.87	3,359.87	4,619.81
(Note: Cost based on an Engineering Estimate.)												
1.3.1.1.1.2 331XX0303020102 Reestablish Site Control/Layout	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**6,184.28**	**0.00**	**1,000.00**	**0.00**	**7,184.28**	**11,586.66**	**11,586.66**	**15,931.66**
(Note: Assume 20 visits of a 2 man crew (20 days) and 10 days drafting to develop drawings. Assume 22 days/month.)												
			0.0000		*2,825.8621*	*0.0000*	*0.0000*	*0.0000*	*2,825.8621*	*4,686.2705*	*4,686.2705*	*6,443.6220*
1.3.1.1.1.2.1 MIL 013107000640 Field Personnel, surveyor	MO	1.8200	0.00	1.2 CL Craft Labor	5,143.07	0.00	0.00	0.00	5,143.07	8,529.01	8,529.01	11,727.39
			0.0000		*2,313.7931*	*0.0000*	*0.0000*	*0.0000*	*2,313.7931*	*3,808.2321*	*3,808.2321*	*5,236.3191*
1.3.1.1.1.2.2 MIL 013107000650 Field Personnel, draftsman	MO	0.4500	0.00	1.2 CL Craft Labor	1,041.21	0.00	0.00	0.00	1,041.21	1,713.70	1,713.70	2,356.34
1.3.1.1.1.2.3 FOP Materials and Supplies	LS	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	1,000.00	0.00	1,000.00	1,343.95	1,343.95	1,847.93
1.3.1.1.1.3 331XX0303020103 Volume Surveys	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**513.97**	**0.00**	**1,000.00**	**0.00**	**1,513.97**	**2,193.40**	**2,193.40**	**3,015.92**
(Note: Assume 1 visit per month for 2 months of 2 man crew (2 days) and 2 days drafting to develop drawings. Assume 22 days/month.)												
			0.0000		*2,825.8621*	*0.0000*	*0.0000*	*0.0000*	*2,825.8621*	*4,686.2705*	*4,686.2705*	*6,443.6220*
1.3.1.1.1.3.1 MIL 013107000640 Field Personnel, surveyor	MO	0.1000	0.00	1.2 CL Craft Labor	282.59	0.00	0.00	0.00	282.59	468.63	468.63	644.36
			0.0000		*2,313.7931*	*0.0000*	*0.0000*	*0.0000*	*2,313.7931*	*3,808.2321*	*3,808.2321*	*5,236.3191*
1.3.1.1.1.3.2 MIL 013107000650 Field Personnel, draftsman	MO	0.1000	0.00	1.2 CL Craft Labor	231.38	0.00	0.00	0.00	231.38	380.82	380.82	523.63

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.3.1.1.1.3.3 USR Miscellaneous Materials and Supplies	LS	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	1,000.00	0.00	1,000.00	1,343.95	1,343.95	1,847.93
(Note: Cost based on an Engineering Estimate.)												
1.3.1.1.1.4 331XX0303020104 Post Restoration Survey	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**2,962.79**	**0.00**	**1,000.00**	**0.00**	**3,962.79**	**6,244.31**	**6,244.31**	**8,585.93**
(Note: Assume 3 man crew for 5 days (15 days) and 10 days drafting to develop drawings. Assume 22 days/month.)												
			0.0000		*2,825.8621*	*0.0000*	*0.0000*	*0.0000*	*2,825.8621*	*4,686.2705*	*4,686.2705*	*6,443.6220*
1.3.1.1.1.4.1 MIL 013107000640 Field Personnel, surveyor	MO	0.6800	0.00	1.2 CL Craft Labor	1,921.59	0.00	0.00	0.00	1,921.59	3,186.66	3,186.66	4,381.66
			0.0000		*2,313.7931*	*0.0000*	*0.0000*	*0.0000*	*2,313.7931*	*3,808.2321*	*3,808.2321*	*5,236.3191*
1.3.1.1.1.4.2 MIL 013107000650 Field Personnel, draftsman	MO	0.4500	0.00	1.2 CL Craft Labor	1,041.21	0.00	0.00	0.00	1,041.21	1,713.70	1,713.70	2,356.34
1.3.1.1.1.4.3 USR Miscellaneous Materials and Supplies	LS	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	1,000.00	0.00	1,000.00	1,343.95	1,343.95	1,847.93
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*1,003.6242*	*0.0000*	*7,421.4300*	*1,303.9900*	*9,729.0442*	*13,652.3692*	*13,652.3692*	*18,772.0076*
1.4 331XX05 Surface Water Collect & Control	**EA**	**1.0000**	**0.00**		**1,003.62**	**0.00**	**7,421.43**	**1,303.99**	**9,729.04**	**13,652.37**	**13,652.37**	**18,772.01**
			0.0000		*1,003.6242*	*0.0000*	*7,421.4300*	*1,303.9900*	*9,729.0442*	*13,652.3692*	*13,652.3692*	*18,772.0076*
1.4.1 331XX0509 Lagoons/Basins/Tanks/Dikes	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**1,003.62**	**0.00**	**7,421.43**	**1,303.99**	**9,729.04**	**13,652.37**	**13,652.37**	**18,772.01**
			0.0000		*1,003.6242*	*0.0000*	*7,421.4300*	*1,303.9900*	*9,729.0442*	*13,652.3692*	*13,652.3692*	*18,772.0076*
1.4.1.1 331XX050901 Excavation Dewatering	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**1,003.62**	**0.00**	**7,421.43**	**1,303.99**	**9,729.04**	**13,652.37**	**13,652.37**	**18,772.01**
(Note:)												
			0.0000		*0.0154*	*0.0000*	*0.1138*	*0.0200*	*0.1492*	*0.2094*	*0.2094*	*0.2879*
1.4.1.1.1 331XX05090101 Surface Water Collection and Containment - Area A, B -C, Northside, and Southside	**GAL**	**65,200.0000**	**0.00**	**1.2 CL Craft Labor**	**1,003.62**	**0.00**	**7,421.43**	**1,303.99**	**9,729.04**	**13,652.37**	**13,652.37**	**18,772.01**

(Note: Rainfall amounting to roughly 3 inches per month to be removed from excavations and stored until discharged to the leachate collection system. Assume that discharge can be permitted through the leachate collection system. Assume active open excavations for 1 months. Labor to operate pumps is included in the dust control element under excavation. Laborers will maintain both dust controls and dewatering activities. Assume roughly 0.25 acre of excavation to be open and requiring dewatering at anyone time. Assume 20% infiltration. Volume = 10,890 sf x 0.25 ft x .8 = 2,178 CF. Volume = 2,178 cf x 7.48 gal/cf = 16,291 gal.)

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*695.4215*	*0.0000*	*4,349.4800*	*0.0000*	*5,044.9015*	*7,220.9686*	*7,220.9686*	*9,928.8319*
1.4.1.1.1.1 MIL 152305005090 Pump, general utility, centrifugal, in-line, vertical mount, iron body, 125 lb. flanged, 3550 RPM, single stage, 300 GPM, 50 H.P., 3" discharge, includes TEFC motor	EA	1.0000	0.00	1.2 CL Craft Labor	695.42	0.00	4,349.48	0.00	5,044.90	7,220.97	7,220.97	9,928.83
			0.0000		*195.9627*	*0.0000*	*1,141.0000*	*0.0000*	*1,336.9627*	*1,915.1565*	*1,915.1565*	*2,633.3402*
1.4.1.1.1.2 AF 151802004090 Pump, circulating, cast iron, close coupled, end suction, bronze impeller, flanged joints, 2 H.P., to 50 GPM, 2" size	EA	1.0000	0.00	1.2 CL Craft Labor	195.96	0.00	1,141.00	0.00	1,336.96	1,915.16	1,915.16	2,633.34
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,154.9300*	*1,154.9300*	*1,493.3598*	*1,493.3598*	*2,053.3697*
1.4.1.1.1.3 HTW 021055509117 Wastewater holding tanks, above ground, steel, open, stationary, monthly rental, 21,000 gal	MO	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	1,154.93	1,154.93	1,493.36	1,493.36	2,053.37
(Note: Assume 1 tanks per month average during excavation (1 month))												
			0.0000		*0.0000*	*0.0000*	*210.9500*	*0.0000*	*210.9500*	*296.6317*	*296.6317*	*407.8686*
1.4.1.1.1.4 HTW 021503004162 High sump level switch, (for avoiding overflow)	EA	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	210.95	0.00	210.95	296.63	296.63	407.87
			0.0000		*0.0000*	*0.0000*	*450.0000*	*74.5300*	*524.5300*	*696.8808*	*696.8808*	*958.2111*
1.4.1.1.1.5 HTW 021055506111 Sample collection, subcontracted sampling, hourly rate (air, water, soil, ground water)	EA	2.0000	0.00	1.2 CL Craft Labor	0.00	0.00	900.00	149.06	1,049.06	1,393.76	1,393.76	1,916.42
(Note: Assume 2 samples per month with 4 hrs labor and 1 months total. Analytical cost based on Engineering Estimate.)												
			0.0000		*0.2245*	*0.0000*	*1.6400*	*0.0000*	*1.8645*	*2.6650*	*2.6650*	*3.6643*
1.4.1.1.1.6 MIL 139104002360 Fire Hose, less couplings, synthetic jacket, lined, high strength, 500 lb test, 1-1/2" dia, excludes couplings	LF	500.0000	0.00	1.2 CL Craft Labor	112.24	0.00	820.00	0.00	932.24	1,332.49	1,332.49	1,832.17

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			370,190.7150		*1,338,190.0356*	*1,050,286.3623*	*3,889,801.3000*	*11,455.5400*	*6,289,733.2379*	*9,356,968.7346*	*9,356,968.7346*	*12,865,832.0100*
1.5 331XX08 Solids Collect And Containment	**EA**	**1.0000**	**370,190.72**		**1,338,190.04**	**1,050,286.36**	**3,889,801.30**	**11,455.54**	**6,289,733.24**	**9,356,968.73**	**9,356,968.73**	**12,865,832.01**
			0.0000		*166,421.2364*	*121,812.7364*	*4,926.2500*	*11,455.5400*	*304,615.7629*	*423,044.1553*	*423,044.1553*	*581,685.7135*
1.5.1 331XX0801 Contaminated Soil Collection	**EA**	**1.0000**	**0.00**		**166,421.24**	**121,812.74**	**4,926.25**	**11,455.54**	**304,615.76**	**423,044.16**	**423,044.16**	**581,685.71**
			0.0000		*166,421.2364*	*121,812.7364*	*4,926.2500*	*11,455.5400*	*304,615.7629*	*423,044.1553*	*423,044.1553*	*581,685.7135*
1.5.1.1 331XX080102 Excavation	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**166,421.24**	**121,812.74**	**4,926.25**	**11,455.54**	**304,615.76**	**423,044.16**	**423,044.16**	**581,685.71**

(Note: This element includes all equipment, labor, and material costs directly associated with the excavation of MED and overburden soil. The estimated volume of soil to be removed from each area is: (1) Northside 5,300 cy (6,600 cy exsitu); and (2) Southside 1,600 cy (2,000 cy exsitu). The parameters and assumptions are as follows: (1) The excavation production will be greater than the transportation and loading, so the soils are assumed to be stockpiled prior to loading. (2) Construction of temporary access roads may be required to remove material upon reaching maximum depths and to control site traffic flow. (3) Assumes transport of material from excavation area and stockpile areas (and vice versa) is accomplished using articulated dump trucks. (4) Covered stockpiles and intermodals will be used for storage of impacted material. (5) Assumes radiologically impacted soils will be stockpiled and covered with a tarp to provide a constant dry source of soils for loading. Soils will be loaded from the stockpile into intermodals, surveyed, and transported to the loading area at the rail spur for off-site disposal. (6) The clean overburden removed during the excavation will be disposed as MED soil. (7) Safety and contaminated materials handling factor of 63% carried for HRTW components of project. Production rates have been adjusted additionally for weather (1 day/week) and delays associated with delineating the areas to be excavated (1 day/week). The total productivity factor of 0.40 was added to the excavation of MED and overburden soils.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*16,250.6000*	*438.5467*	*345.0000*	*1,455.5400*	*18,489.6867*	*27,239.9631*	*27,239.9631*	*37,454.9493*
1.5.1.1.1 331XX08010201 Dust Control	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**16,250.60**	**438.55**	**345.00**	**1,455.54**	**18,489.69**	**27,239.96**	**27,239.96**	**37,454.95**
1.5.1.1.1.1 331XX0801020101 Dust Control - Northside, and Southside Areas	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**16,250.60**	**438.55**	**345.00**	**1,455.54**	**18,489.69**	**27,239.96**	**27,239.96**	**37,454.95**

(Note: Active excavation and loading is approximately 1.5 (say 2) months. Assume dust control at loading area full time and excavation area 100% of the time.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*727.7700*	*727.7700*	*940.7590*	*940.7590*	*1,293.5437*
1.5.1.1.1.1.1 HTW 019102003101 Spray washers, cold water, gas, 3200 psi, 4.2 GPM, 11 HP, rent/month	MO	2.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	1,455.54	1,455.54	1,881.52	1,881.52	2,587.09
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*67.9608*	*67.9608*	*93.4460*
1.5.1.1.1.1.2 MIL B-LABORER Laborers, (Semi-Skilled)	HR	352.0000	0.00	1.2 CL Craft Labor	16,016.00	0.00	0.00	0.00	16,016.00	23,922.18	23,922.18	32,893.00
			0.0000		*0.1360*	*0.2542*	*0.2000*	*0.0000*	*0.5902*	*0.8326*	*0.8326*	*1.1448*
1.5.1.1.1.1.3 MIL 023153109030 Water for compaction, 5000 gallon wagon, 3 mile haul	ECY	1,725.0000	0.00	1.2 CL Craft Labor	234.60	438.55	345.00	0.00	1,018.15	1,436.26	1,436.26	1,974.86

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.5.1.1.2 331XX08010202 Excavation of Material in Northside and Southside Areas	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**150,170.64**	**121,374.19**	**4,581.25**	**10,000.00**	**286,126.08**	**395,804.19**	**395,804.19**	**544,230.76**
(Note: This element is sum of all costs associated with the excavation of MED and Overburden soil from Area A and transportation to the material staging area at Seaway. MED Soils Area A - 75,700 cy (94,600 cy exsitu))												
1.5.1.1.2.1 331XX0801020201 MED Soils - Northside and Southside Areas	**LS**	**75,700.0000**	**0.00**	**1.2 CL Craft Labor**	**150,170.64**	**121,374.19**	**4,581.25**	**10,000.00**	**286,126.08**	**395,804.19**	**395,804.19**	**544,230.76**
(Note: Overburden in the Northside and Southside Areas is to be excavated and disposed as MED material. Soil will be excavated using a hydraulic excavator, loaded in off road trucks, and transported to the staging area. The soil stockpile will be covered with a tarp to maintain a constant dry soil supply for offsite disposal.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*10,000.0000*	*10,000.0000*	*12,358.1246*	*12,358.1246*	*16,992.4213*
1.5.1.1.2.1.1 USR Dump Ramp	EA	1.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	10,000.00	10,000.00	12,358.12	12,358.12	16,992.42
(Note: Includes jersey barriers and gravel for 1 dump station. Cost based on an Engineering Estimate.)												
			0.0000		*0.1657*	*0.0168*	*0.2700*	*0.0000*	*0.4525*	*0.6312*	*0.6312*	*0.8679*
1.5.1.1.2.1.2 HTW 021401002111 Secure burial cell construction, polymeric liner and cover system, very low density polyethylene (VLDPE), 20 mil	SF	15,000.0000	0.00	1.2 CL Craft Labor	2,485.23	252.61	4,050.00	0.00	6,787.84	9,467.70	9,467.70	13,018.09
			0.0000		*2.0298*	*0.2123*	*4.2500*	*0.0000*	*6.4921*	*9.0394*	*9.0394*	*12.4292*
1.5.1.1.2.1.3 HTW 021151057173 Petroleum contaminated soil, excavate and stockpile, sandbags for stockpile, excludes transportation and disposal fees	EA	125.0000	0.00	1.2 CL Craft Labor	253.73	26.54	531.25	0.00	811.52	1,129.93	1,129.93	1,553.66
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*67.9608*	*67.9608*	*93.4460*
1.5.1.1.2.1.4 MIL B-LABORER Laborers, (Semi-Skilled)	HR	1,584.0000	0.00	1.2 CL Craft Labor	72,072.00	0.00	0.00	0.00	72,072.00	107,649.83	107,649.83	148,018.52
(Note: Assume 1 laborer average at excavation for a 1 month excavation duration and 2 laborers average at site for 2 month loading duration. Includes spotting at excavation, lining containers, supporting loading operations, and closing containers.)												
			0.0000		*960.4800*	*2,977.6000*	*0.0000*	*0.0000*	*3,938.0800*	*5,146.4415*	*5,146.4415*	*7,076.3570*
1.5.1.1.2.1.5 USR Seaway Excavation Crew	DAY	22.0000	0.00	1.2 CL Craft Labor	21,130.56	65,507.20	0.00	0.00	86,637.76	113,221.71	113,221.71	155,679.86

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
(Note: This crew uses one 2 cy hydraulic excavator, two 50 ton off road trucks, and one 4-5 cy loader to build/maintain the stock pile. Assume 2000 ft round trip @ 20 MPH (4 cycles/hour). Rates are based on RSMeans Dec 2006 cost data and equipment rental costs include rental operating cost.)												
			0.0000		*1,232.4800*	*1,263.3600*	*0.0000*	*0.0000*	*2,495.8400*	*3,454.0203*	*3,454.0203*	*4,749.2780*
1.5.1.1.2.1.6 USR Seaway Loading and Transport Crew	DAY	44.0000	0.00	1.2 CL Craft Labor	54,229.12	55,587.84	0.00	0.00	109,816.96	151,976.89	151,976.89	208,968.23
(Note: Include one 4-5 cy loader to fill intermodal and three trucks to haul intermodals. Rates are based on RSMeans Dec 2006 cost data and equipment rental costs include rental operating cost.)												
			9.0290		*28.5797*	*22.6457*	*94.7531*	*0.0000*	*145.9785*	*217.9006*	*217.9006*	*299.6133*
1.5.2 331XX0805 Capping Contam Areas/Waste Pile	**SY**	**41,000.0000**	**370,190.72**	**1.2 CL Craft Labor**	**1,171,768.80**	**928,473.63**	**3,884,875.05**	**0.00**	**5,985,117.48**	**8,933,924.58**	**8,933,924.58**	**12,284,146.30**
(Note: This element represents the remedial action costs related to landfill capping activities. Area A = 55,000 sy Area B-C = 36,000 sy SS = 1,000 sy Total = 92,000 sy Add 30% contingency for overlay and topography = 120,000 sy or 25 acres. The configuration of the landfill cap, for preliminary design purposes, is based on New York State regulation 6NYCRR Part 360.)												
			9.0290		*28.5797*	*22.6457*	*94.7531*	*0.0000*	*145.9785*	*217.9006*	*217.9006*	*299.6133*
1.5.2.1 331XX080591 Capping Remaining MED Areas	**SY**	**41,000.0000**	**370,190.72**	**1.2 CL Craft Labor**	**1,171,768.80**	**928,473.63**	**3,884,875.05**	**0.00**	**5,985,117.48**	**8,933,924.58**	**8,933,924.58**	**12,284,146.30**
(Note: This element is the sum of costs associated with placement of a cap over Areas A, B, C, Northside, and Southside within the clay cutoff wall that were not remediated. The following are assumptions for capping. (1) The cross section of the caps major work items include: (a) 6" topsoil with vegetative layer; (b) 24" native soil barrier protection layer; (c) 60-mil HDPE geomembrane; (d) 18" clay low permeability layer; (e) Filter fabric; (f) 12" gas vent layer; (g) Filter fabric; (h) 12" grading layer (2) Note that gas treatment or leachate collection systems are not included in the costs. It is assumed that the gas venting system will be connected to the existing gas treatment system, and that there are existing leachate controls. (3) An 85% production rate (where appropriate) has been incorporated for all cap work activities due to the decrease in productivity associated with working on sideslopes. (4) Assumes cap sections will be tied into existing landfill cover system at site.)												
			11,731.7298		*44,011.3333*	*22,468.4687*	*0.0000*	*0.0000*	*66,479.8021*	*113,913.4276*	*113,913.4276*	*156,630.9629*
1.5.2.1.1 Rough Grade Area and Compact	**EA**	**1.0000**	**11,731.73**	**1.2 CL Craft Labor**	**44,011.33**	**22,468.47**	**0.00**	**0.00**	**66,479.80**	**113,913.43**	**113,913.43**	**156,630.96**
			85.0000		*32.5200*	*14.5569*	*0.0000*	*0.0000*	*47.0769*	*81.6277*	*81.6277*	*112.2381*
1.5.2.1.1.1 MIL 023104104000 Grading for structures and slabs, grader, 2 passes, semi grade	CSY	1,200.0000	9,969.22	1.2 CL Craft Labor	39,024.00	17,468.22	0.00	0.00	56,492.22	97,953.26	97,953.26	134,685.73
			85.0000		*0.2494*	*0.2500*	*0.0000*	*0.0000*	*0.4994*	*0.7980*	*0.7980*	*1.0973*
1.5.2.1.1.2 RSM 023153105600 Compaction, 2 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	ECY	20,000.0000	1,762.51	1.2 CL Craft Labor	4,987.33	5,000.25	0.00	0.00	9,987.58	15,960.17	15,960.17	21,945.24
(Note: Compact subgrade prior to cap placement. Depth is 0.5 ft.)												
			1.0830		*2.2903*	*3.8464*	*5.7100*	*0.0000*	*11.8467*	*17.7655*	*17.7655*	*24.4276*
1.5.2.1.2 331XX08059113 Grading Fill Layer	**CY**	**47,900.0000**	**51,873.33**	**1.2 CL Craft Labor**	**109,705.66**	**184,243.18**	**273,509.00**	**0.00**	**567,457.84**	**850,969.03**	**850,969.03**	**1,170,082.42**
(Note: Includes 120,000 SY of area to be covered at 1 foot depth with 20% swell added to volume.)												

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			85.0000		*0.9521*	*1.2576*	*5.7100*	*0.0000*	*7.9197*	*11.7283*	*11.7283*	*16.1265*
1.5.2.1.2.1 RSM 023155100020 Fill, borrow, for embankments, 1 mile haul, spread, by dozer	LCY	47,900.0000	18,678.47	1.2 CL Craft Labor	45,603.99	60,240.69	273,509.00	0.00	379,353.68	561,787.33	561,787.33	772,457.58
			85.0000		*0.2494*	*0.2500*	*0.0000*	*0.0000*	*0.4994*	*0.8355*	*0.8355*	*1.1489*
1.5.2.1.2.2 RSM 023153105600 Compaction, 2 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	ECY	40,000.0000	3,525.03	1.2 CL Craft Labor	9,974.67	10,000.50	0.00	0.00	19,975.16	33,421.77	33,421.77	45,954.94
			85.0000		*1.1300*	*2.3800*	*0.0000*	*0.0000*	*3.5100*	*5.3395*	*5.3395*	*7.3418*
1.5.2.1.2.3 RSM 31051 310 0900 Borrow, buy & load at pit, spread with 200 HP dozer, for 5 mile haul, add	CY	47,900.0000	29,669.82	1.2 CL Craft Labor	54,127.00	114,002.00	0.00	0.00	168,129.00	255,759.93	255,759.93	351,669.90
(Note: Assumed total haul of 7 mi.)												
			0.2896		*0.9975*	*0.6436*	*0.0000*	*0.0000*	*1.6410*	*2.6738*	*2.6738*	*3.6764*
1.5.2.1.3 331XX08059106 Final Grading Layer	**SY**	**120,000.0000**	**34,751.58**	**1.2 CL Craft Labor**	**119,696.00**	**77,229.62**	**0.00**	**0.00**	**196,925.62**	**320,851.76**	**320,851.76**	**441,171.17**
(Note: Includes grading excavated areas to final grade for cap placement.)												
			85.0000		*0.9975*	*0.6436*	*0.0000*	*0.0000*	*1.6410*	*2.6738*	*2.6738*	*3.6764*
1.5.2.1.3.1 MIL 023103300200 Shape enbankment, slope up to 1 in 4, by machine	SY	120,000.0000	34,751.58	1.2 CL Craft Labor	119,696.00	77,229.62	0.00	0.00	196,925.62	320,851.76	320,851.76	441,171.17
			0.1489		*0.6469*	*0.1968*	*0.7300*	*0.0000*	*1.5736*	*2.5296*	*2.5296*	*3.4782*
1.5.2.1.4 331XX08059107 Filter Fabric	**SY**	**120,000.0000**	**17,865.52**	**1.2 CL Craft Labor**	**77,625.60**	**23,612.36**	**87,600.00**	**0.00**	**188,837.96**	**303,549.91**	**303,549.91**	**417,381.12**
(Note: For use between existing grade and gas vent layer.)												
			85.0000		*0.6469*	*0.1968*	*0.7300*	*0.0000*	*1.5736*	*2.5296*	*2.5296*	*3.4782*
1.5.2.1.4.1 CIV 023403001600 Drainage geotextiles, non-woven polypropylene, 60 mils thick	SY	120,000.0000	17,865.52	1.2 CL Craft Labor	77,625.60	23,612.36	87,600.00	0.00	188,837.96	303,549.91	303,549.91	417,381.12
			0.4739		*1.7512*	*0.9345*	*10.7351*	*0.0000*	*13.4207*	*19.7435*	*19.7435*	*27.1473*
1.5.2.1.5 331XX08059116 Gas Collection System	**SY**	**120,000.0000**	**56,872.65**	**1.2 CL Craft Labor**	**210,142.53**	**112,135.84**	**1,288,207.50**	**0.00**	**1,610,485.87**	**2,369,217.73**	**2,369,217.73**	**3,257,674.38**

(Note: Assumes 24,000 lf of 6" perforated pipe with miscellaneous fittings. Assumes connection to existing landfill gas collection system. Includes 1 ft of sand over 120,000 sy with a 10% swell added to volume.)

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			85.0000		*3.9467*	*0.0000*	*9.7200*	*0.0000*	*13.6667*	*20.9346*	*20.9346*	*28.7851*
1.5.2.1.5.1 HTW 021402001314 Landfill gas and leachate control systems, leachate and gas collection pipe, slotted PVC, 2 to 6 rows of slots, 6" dia, SDR 26	LF	24,000.0000	16,715.29	1.2 CL Craft Labor	94,720.00	0.00	233,280.00	0.00	328,000.00	502,431.59	502,431.59	690,843.44
			85.0000		*52.9629*	*0.0000*	*34.7900*	*0.0000*	*87.7529*	*147.8598*	*147.8598*	*203.3072*
1.5.2.1.5.2 MIL 151085602860 Elbow, 90 Deg., plastic, PVC, white, socket joint, 6", schedule 40	EA	150.0000	1,401.96	1.2 CL Craft Labor	7,944.43	0.00	5,218.50	0.00	13,162.93	22,178.96	22,178.96	30,496.08
			85.0000		*79.4443*	*0.0000*	*54.6600*	*0.0000*	*134.1043*	*225.2699*	*225.2699*	*309.7461*
1.5.2.1.5.3 MIL 151085603280 Tee, plastic, PVC, white, socket joint, 6", schedule 40	EA	75.0000	1,051.47	1.2 CL Craft Labor	5,958.32	0.00	4,099.50	0.00	10,057.82	16,895.24	16,895.24	23,230.96
			85.0000		*29.1034*	*0.0000*	*16.3800*	*0.0000*	*45.4834*	*77.4006*	*77.4006*	*106.4258*
1.5.2.1.5.4 MIL 151085603690 Cap, plastic, PVC, white, socket joint, 6", schedule 40	EA	75.0000	385.19	1.2 CL Craft Labor	2,182.75	0.00	1,228.50	0.00	3,411.25	5,805.04	5,805.04	7,981.94
			85.0000		*2.2628*	*2.5543*	*23.7900*	*0.0000*	*28.6071*	*41.5013*	*41.5013*	*57.0643*
1.5.2.1.5.5 AF 027202001505 Aggregrate base course, for roadways and large paved areas, sand, washed and graded, compacted, 6" deep	CY	43,900.0000	37,318.74	1.2 CL Craft Labor	99,337.03	112,135.84	1,044,381.00	0.00	1,255,853.86	1,821,906.89	1,821,906.89	2,505,121.97
			0.0001		*0.0006*	*0.0002*	*0.0007*	*0.0000*	*0.0016*	*0.0025*	*0.0025*	*0.0035*
1.5.2.1.6 331XX08059109 Filter Fabric	**SY**	**120,000.0000**	**17.87**	**1.2 CL Craft Labor**	**77.63**	**23.61**	**87.60**	**0.00**	**188.84**	**303.55**	**303.55**	**417.38**
(Note: For use between grading layer and gas vent layer.)												
			85.0000		*0.6469*	*0.1968*	*0.7300*	*0.0000*	*1.5736*	*2.5296*	*2.5296*	*3.4782*
1.5.2.1.6.1 CIV 023403001600 Drainage geotextiles, non-woven polypropylene, 60 mils thick	SY	120.0000	17.87	1.2 CL Craft Labor	77.63	23.61	87.60	0.00	188.84	303.55	303.55	417.38
			0.1172		*0.2720*	*0.3919*	*9.6100*	*0.0000*	*10.2739*	*14.0081*	*14.0081*	*19.2611*
1.5.2.1.7 331XX08059110 Place Low Permeability Clay Cap	**CY**	**74,800.0000**	**8,763.82**	**1.2 CL Craft Labor**	**20,348.32**	**29,313.34**	**718,828.00**	**0.00**	**768,489.66**	**1,047,804.02**	**1,047,804.02**	**1,440,730.52**
(Note: Includes 120,000 SY of area to be covered at 1.5 foot depth with a swell of 25% added to volume.)												

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Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*9.6100*	*0.0000*	*9.6100*	*12.9153*	*12.9153*	*17.7586*
1.5.2.1.7.1 RSM 31051 310 0200 CLAY BORROW DELIVERED	CY	74,800.0000	0.00	1.2 CL Craft Labor	0.00	0.00	718,828.00	0.00	718,828.00	966,066.05	966,066.05	1,328,340.82
(Note: Cost Based on MEANS 2006, 4th quarther, US Natl Average for native soil and 2 mile haul. Add for additional 5 mile haul (RSM 31051 310 0900). Assume cost of clay is similar.)												
			85.0000		*0.2720*	*0.3919*	*0.0000*	*0.0000*	*0.6639*	*1.0928*	*1.0928*	*1.5025*
1.5.2.1.7.2 MIL 023151205520 Backfill, structural, 6" lifts, backfill around foundation, with dozer	LCY	74,800.0000	8,763.82	1.2 CL Craft Labor	20,348.32	29,313.34	0.00	0.00	49,661.66	81,737.97	81,737.97	112,389.70
			0.0689		*0.1360*	*0.2542*	*0.2000*	*0.0000*	*0.5902*	*0.9306*	*0.9306*	*1.2796*
1.5.2.1.8 331XX08059111 Cmpt Low Permeability Clay Cap	**CY**	**59,840.0000**	**4,120.83**	**1.2 CL Craft Labor**	**8,138.24**	**15,213.12**	**11,968.00**	**0.00**	**35,319.36**	**55,688.92**	**55,688.92**	**76,572.26**
(Note: Includes 120,000 SY of area to be covered at 1.5 foot depth with no swell since units are ECY.)												
			85.0000		*0.1360*	*0.2542*	*0.2000*	*0.0000*	*0.5902*	*0.9306*	*0.9306*	*1.2796*
1.5.2.1.8.1 MIL 023153109030 Water for compaction, 5000 gallon wagon, 3 mile haul	ECY	59,840.0000	4,120.83	1.2 CL Craft Labor	8,138.24	15,213.12	11,968.00	0.00	35,319.36	55,688.92	55,688.92	76,572.26
			0.3189		*1.6403*	*0.1667*	*3.9600*	*0.0000*	*5.7670*	*8.8423*	*8.8423*	*12.1581*
1.5.2.1.9 331XX08059112 60-mil HDPE geomembrane	**SY**	**120,000.0000**	**38,265.32**	**1.2 CL Craft Labor**	**196,830.00**	**20,006.79**	**475,200.00**	**0.00**	**692,036.79**	**1,061,072.35**	**1,061,072.35**	**1,458,974.48**
(Note: Installation of 60-mil HDPE liner.)												
			85.0000		*0.1823*	*0.0185*	*0.4400*	*0.0000*	*0.6408*	*0.9825*	*0.9825*	*1.3509*
1.5.2.1.9.1 HTW 021401002152 Secure burial cell construction, polymeric liner and cover system, rough textured H.D. polyethylene (HDPE), 60 mil	SF	1,080,000.0000	38,265.32	1.2 CL Craft Labor	196,830.00	20,006.79	475,200.00	0.00	692,036.79	1,061,072.35	1,061,072.35	1,458,974.48
			1.0828		*2.2899*	*3.8460*	*5.7100*	*0.0000*	*11.8459*	*16.9750*	*16.9750*	*23.3407*
1.5.2.1.10 331XX08059113 Barrier Protection Layer	**CY**	**95,700.0000**	**103,623.68**	**1.2 CL Craft Labor**	**219,140.77**	**368,060.10**	**546,447.00**	**0.00**	**1,133,647.87**	**1,624,510.28**	**1,624,510.28**	**2,233,701.63**
(Note: Includes 120,000 SY of area to be covered at 2 foot depth with 20% swell added to volume.)												
			85.0000		*0.9521*	*1.2576*	*5.7100*	*0.0000*	*7.9197*	*11.2068*	*11.2068*	*15.4094*
1.5.2.1.10.1 RSM 023155100020 Fill, borrow, for embankments, 1 mile haul, spread, by dozer	LCY	95,700.0000	37,317.95	1.2 CL Craft Labor	91,112.78	120,355.61	546,447.00	0.00	757,915.39	1,072,494.91	1,072,494.91	1,474,680.50

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			85.0000		*0.2494*	*0.2500*	*0.0000*	*0.0000*	*0.4994*	*0.7980*	*0.7980*	*1.0973*
1.5.2.1.10.2 RSM 023153105600 Compaction, 2 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	ECY	79,750.0000	7,028.03	1.2 CL Craft Labor	19,886.99	19,938.49	0.00	0.00	39,825.48	63,641.18	63,641.18	87,506.63
			85.0000		*1.1300*	*2.3800*	*0.0000*	*0.0000*	*3.5100*	*5.1032*	*5.1032*	*7.0169*
1.5.2.1.10.3 RSM 31051 310 0900 Borrow, buy & load at pit, spread with 200 HP dozer, for 5 mile haul, add	CY	95,700.0000	59,277.71	1.2 CL Craft Labor	108,141.00	227,766.00	0.00	0.00	335,907.00	488,374.18	488,374.18	671,514.50
(Note: Assumed total haul of 7 mi.)												
			1.0920		*4.4006*	*1.7875*	*20.2000*	*0.0000*	*26.3881*	*39.1572*	*39.1572*	*53.8412*
1.5.2.1.11 331XX08059114 Place Topsoil	**CY**	**22,000.0000**	**24,024.48**	**1.2 CL Craft Labor**	**96,812.94**	**39,325.77**	**444,400.00**	**0.00**	**580,538.71**	**861,458.54**	**861,458.54**	**1,184,505.50**
(Note: Includes 120,000 SY of area to be covered at 0.5 foot depth with 10% swell added to volume.)												
			85.0000		*4.4006*	*1.7875*	*20.2000*	*0.0000*	*26.3881*	*39.1572*	*39.1572*	*53.8412*
1.5.2.1.11.1 MIL 029108100805 Loam or topsoil, imported topsoil, 6" deep, furnish and place	LCY	22,000.0000	24,024.48	1.2 CL Craft Labor	96,812.94	39,325.77	444,400.00	0.00	580,538.71	861,458.54	861,458.54	1,184,505.50
			200.5620		*821.2631*	*315.2551*	*1,517.9500*	*0.0000*	*2,654.4682*	*4,107.7135*	*4,107.7135*	*5,648.1060*
1.5.2.1.12 331XX08059115 Seeding	**ACR**	**25.0000**	**5,014.05**	**1.2 CL Craft Labor**	**20,531.58**	**7,881.38**	**37,948.75**	**0.00**	**66,361.70**	**102,692.84**	**102,692.84**	**141,202.65**
(Note: Seeding of landfill surface for vegetative growth. Includes 120,000 SY of area to be covered.)												
			85.0000		*221.5319*	*85.0386*	*602.1100*	*0.0000*	*908.6805*	*1,378.9355*	*1,378.9355*	*1,896.0363*
1.5.2.1.12.1 MIL 029203200320 Seeding, athletic field mix, 450 lb. per acre, mechanical seeding	ACR	25.0000	1,352.52	1.2 CL Craft Labor	5,538.30	2,125.96	15,052.75	0.00	22,717.01	34,473.39	34,473.39	47,400.91
			85.0000		*1.3883*	*0.5329*	*2.1200*	*0.0000*	*4.0412*	*6.3166*	*6.3166*	*8.6853*
1.5.2.1.12.2 AF 029203207010 Seeding, apply fertilizer, 35 lb. per M.S.F.	MSF	10,800.0000	3,661.53	1.2 CL Craft Labor	14,993.28	5,755.41	22,896.00	0.00	43,644.69	68,219.45	68,219.45	93,801.74
			364.2294		*976.0081*	*1,191.9182*	*28.3000*	*0.0000*	*2,196.2264*	*7,620.4749*	*7,620.4749*	*10,478.1530*
1.5.2.1.13 331XX08059117 Gas Extraction Wells	**EA**	**24.0000**	**8,741.50**	**1.4 Prime Professional Labor**	**23,424.20**	**28,606.04**	**679.20**	**0.00**	**52,709.43**	**182,891.40**	**182,891.40**	**251,475.67**
(Note: Assume 8 each,15' deep landfill gas extraction wells.)												

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			85.0000		*25.5603*	*0.5011*	*3.8800*	*0.0000*	*29.9414*	*113.8582*	*113.8582*	*156.5550*
1.5.2.1.13.1 MIL 151076605630 Nozzle, steel, T-O-L, weld-on, 1/4" pipe size, includes 1 weld per joint and weld machine	EA	24.0000	110.38	1.4 Prime Professional Labor	613.45	12.03	93.12	0.00	718.59	2,732.60	2,732.60	3,757.32
			85.0000		*8.5838*	*0.0000*	*0.5200*	*0.0000*	*9.1038*	*35.4951*	*35.4951*	*48.8057*
1.5.2.1.13.2 MIL 151202204664 Cocks, drains and specialties, nipple, black steel, 1/4" x 3"	EA	24.0000	36.35	1.4 Prime Professional Labor	206.01	0.00	12.48	0.00	218.49	851.88	851.88	1,171.34
			85.0000		*0.0000*	*141.8354*	*0.0000*	*0.0000*	*141.8354*	*468.9095*	*468.9095*	*644.7506*
1.5.2.1.13.3 GEN D35Z2900 DRILL, ROTARY BLASTHOLE, WATER WELL, 16" (406MM), TRUCK MOUNTED (ADD COST FOR DRILL STEEL AND BIT WEAR)	HR	192.0000	4,805.72	1.4 Prime Professional Labor	0.00	27,232.39	0.00	0.00	27,232.39	90,030.63	90,030.63	123,792.12
			85.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*190.7485*	*190.7485*	*262.2792*
1.5.2.1.13.4 MIL B-EQOPRMED Equip. Operators, Medium	HR	192.0000	1,763.92	1.4 Prime Professional Labor	9,995.52	0.00	0.00	0.00	9,995.52	36,623.71	36,623.71	50,357.60
			85.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*168.4360*	*168.4360*	*231.5995*
1.5.2.1.13.5 MIL B-LABORER Laborers, (Semi-Skilled)	HR	192.0000	1,541.65	1.4 Prime Professional Labor	8,736.00	0.00	0.00	0.00	8,736.00	32,339.72	32,339.72	44,467.11
			0.0000		*25.9900*	*0.0000*	*0.0000*	*0.0000*	*25.9900*	*90.9651*	*90.9651*	*125.0771*
1.5.2.1.13.6 FOP FC-ENCGF Hydrogeologist	HR	96.0000	0.00	1.4 Prime Professional Labor	2,495.04	0.00	0.00	0.00	2,495.04	8,732.65	8,732.65	12,007.40
			85.0000		*5.7424*	*5.6734*	*2.3900*	*0.0000*	*13.8058*	*48.2509*	*48.2509*	*66.3450*
1.5.2.1.13.7 HTW 022101105219 Casing, PVC, flush threaded, standard length 10', 4" diameter, schedule 40	LF	240.0000	483.49	1.4 Prime Professional Labor	1,378.18	1,361.62	573.60	0.00	3,313.40	11,580.21	11,580.21	15,922.79
			7.5406		*42.1400*	*0.5900*	*0.0000*	*0.0000*	*42.7300*	*65.0014*	*65.0014*	*89.3769*
1.5.2.1.14 331XX08059118 QA/QC Testing	**EA**	**600.0000**	**4,524.35**	**1.2 CL Craft Labor**	**25,284.00**	**354.00**	**0.00**	**0.00**	**25,638.00**	**39,000.84**	**39,000.84**	**53,626.16**
(Note: In situ density testing of placed cap material for quality assurance and control verification.)												
			85.0000		*42.1400*	*0.5900*	*0.0000*	*0.0000*	*42.7300*	*65.0014*	*65.0014*	*89.3769*

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.5.2.1.14.1 MIL Soil Density Test,Nuclear Method ASTM D2922-71	EA	600.0000	4,524.35	1.2 CL Craft Labor	25,284.00	354.00	0.00	0.00	25,638.00	39,000.84	39,000.84	53,626.16
(Note: Assume 1 test per 1,000 sy or 120 tests per layer. Includes 3 layers of native fill and 2 layers of clay.)												
			0.0000		*75,661.0600*	*145,276.6619*	*48,748.2300*	*2,764,077.3800*	*3,033,763.3319*	*3,182,395.6777*	*3,182,395.6777*	*3,977,994.5971*
1.6 331XX19 Disposal (Commercial)	**EA**	**1.0000**	**0.00**		**75,661.06**	**145,276.66**	**48,748.23**	**2,764,077.38**	**3,033,763.33**	**3,182,395.68**	**3,182,395.68**	**3,977,994.60**
			0.0000		*68,682.2400*	*126,140.3772*	*44,267.9400*	*1,534,277.3800*	*1,773,367.9372*	*1,878,828.5870*	*1,878,828.5870*	*2,348,535.7337*
1.6.1 331XX1921 Transport to Storage/Disp Facil	**EA**	**1.0000**	**0.00**		**68,682.24**	**126,140.38**	**44,267.94**	**1,534,277.38**	**1,773,367.94**	**1,878,828.59**	**1,878,828.59**	**2,348,535.73**
			0.0000		*7.9863*	*14.6675*	*5.1474*	*178.4043*	*206.2056*	*218.4684*	*218.4684*	*273.0856*
1.6.1.1 331XX192101 Load/Haul/Unload of Solids	**CY**	**8,600.0000**	**0.00**		**68,682.24**	**126,140.38**	**44,267.94**	**1,534,277.38**	**1,773,367.94**	**1,878,828.59**	**1,878,828.59**	**2,348,535.73**
(Note: This element includes all costs associated with loading and transportation of radiologically impacted soil removed from the Northside and Southside Areas. For this alternative, the MED and overburden soil disposal volumes are as follows: (1) Northside - 6,600 cy exsitu; and (2) Southside - 2,000 cy exsitu. The total volume is 8,600 cy exsitu Loaded intermodals will be staged for loading rail cars for transport to an approved disposal facility. Rental and delivery costs have been included in this line item. Assumes sufficient area will be available for staging of intermodals at rail spur. Costs have been included to perform a minimal amount of rehab of loading area at rail spur to accommodate intermodal storage (fencing, paving, lighting, etc.). Assumes an average of 20 intermodals are loaded out per day (5 rail cars). Transportation and loading costs could vary significantly if rail cars are not available and should be considered as one of the items under the Remedial Contingency. Assume 13 cubic yards per container based on 1.6 tons per cubic yard of insitu soil and 41,700 lbs average intermodal capacity. Total duration = 8,600 cy / 260 cy/day = 34 days or 1.5 months. Say 2 months.)												
			0.0000		*0.6516*	*0.6818*	*0.0000*	*0.0000*	*1.3334*	*1.8096*	*1.8096*	*2.2620*
1.6.1.1.1 331XX19210101 Loading of Northside, and Southside Areas	**CY**	**105,400.0000**	**0.00**	**1.2 CL Craft Labor**	**68,682.24**	**71,863.00**	**0.00**	**0.00**	**140,545.24**	**190,735.74**	**190,735.74**	**238,419.68**
			0.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*76.8213*	*76.8213*	*96.0266*
1.6.1.1.1.1 MIL B-EQOPRCRN Equip. Operators, Heavy	HR	352.0000	0.00	1.2 CL Craft Labor	18,325.12	0.00	0.00	0.00	18,325.12	27,041.09	27,041.09	33,801.37
(Note: Operator to move rail cars for 19 months.)												
			0.0000		*0.0000*	*30.3881*	*0.0000*	*0.0000*	*30.3881*	*37.5540*	*37.5540*	*46.9425*
1.6.1.1.1.2 GEN L40Z4390 LOADER, FRONT END, WHEEL, ARTICULATED, 1.75 CY (1.3M3) BUCKET, 4X4	HR	352.0000	0.00	1.2 CL Craft Labor	0.00	10,696.61	0.00	0.00	10,696.61	13,219.00	13,219.00	16,523.75
(Note: Tractor loader to move rail cars.)												
			0.0000		*0.0000*	*173.7681*	*0.0000*	*0.0000*	*173.7681*	*214.7448*	*214.7448*	*268.4311*
1.6.1.1.1.3 GEN C90Z2600 CRANE, MECHANICAL, LATTICE BOOM, TRUCK MOUNTED, 125 TON (113MT), 240' (73.2M) BOOM	HR	352.0000	0.00	1.2 CL Craft Labor	0.00	61,166.39	0.00	0.00	61,166.39	75,590.18	75,590.18	94,487.73

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*76.8213*	*76.8213*	*96.0266*
1.6.1.1.1.4 MIL B-EQOPRCRN Equip. Operators, Heavy	HR	352.0000	0.00	1.2 CL Craft Labor	18,325.12	0.00	0.00	0.00	18,325.12	27,041.09	27,041.09	33,801.37
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*67.9608*	*67.9608*	*84.9509*
1.6.1.1.1.5 MIL B-LABORER Laborers, (Semi-Skilled)	HR	704.0000	0.00	1.2 CL Craft Labor	32,032.00	0.00	0.00	0.00	32,032.00	47,844.37	47,844.37	59,805.46
(Note: Assume 2 laborers to support loading operations.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*128.0000*	*128.0000*	*131.8400*	*131.8400*	*164.8000*
1.6.1.1.2 331XX19210102 Transportation - Northside, and Southside Areas	**TON**	**11,000.0000**	**0.00**		**0.00**	**0.00**	**0.00**	**1,408,000.00**	**1,408,000.00**	**1,450,240.00**	**1,450,240.00**	**1,812,800.00**
(Note: Assumes unit price of $128.00/ton for transportation based on recent numbers provided to SAIC by J. Wyrk in an email dated January 9, 2007. Based on 1.6 tons per cubic yars of insitu soil.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*128.0000*	*128.0000*	*131.8400*	*131.8400*	*164.8000*
1.6.1.1.2.1 USR Transportation of Material to disposal Facility	TON	11,000.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	1,408,000.00	1,408,000.00	1,450,240.00	1,450,240.00	1,812,800.00
			0.0000		*0.0000*	*27.3300*	*22.2900*	*63.5838*	*113.2038*	*119.7648*	*119.7648*	*149.7060*
1.6.1.1.3 331XX19210103 Intermodal Rental - Northside, and Southside Areas	**WK**	**1,986.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**54,277.38**	**44,267.94**	**126,277.38**	**224,822.70**	**237,852.84**	**237,852.84**	**297,316.05**
(Note: Assumes that each intermodal carries 13 cubic yards and have a 3 week average turnaround rental time (time it arrives on site to time it is returned to site). Based on 8,600 cy total volume, approximately 662 intermodal containers will be required and equates to 1,986 rental weeks. Also assumes that intermodal containers will be available as needed. It is estimated that at least 360 dedicated intermodal containers will be required and includes a 3 day reserve supply. A premium of 100% of the rental rate has been included in this line item to ensure that the number of containers will be available.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*200.0000*	*200.0000*	*206.0000*	*206.0000*	*257.5000*
1.6.1.1.3.1 USR Intermodal Delivery and Return	EA	360.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	72,000.00	72,000.00	74,160.00	74,160.00	92,700.00
(Note: Assumes each delivery/return includes 2 containers and is based on a vendor quote. Includes mob/demob for 2 seasons.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*27.3300*	*27.3300*	*28.1499*	*28.1499*	*35.1874*
1.6.1.1.3.2 USR Intermodal Rental (avg 3 weeks per intermodal)	WK	1,986.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	54,277.38	54,277.38	55,905.70	55,905.70	69,882.13
			0.0000		*0.0000*	*0.0000*	*22.2900*	*0.0000*	*22.2900*	*26.1236*	*26.1236*	*32.6545*

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.6.1.1.3.3 HTW 021202507112 Bulk material hauling, hazardous waste packaging, poly liners, bulk solids & sludge, roll-off liner, disposable, 20 C.Y. and 30 C.Y., 6 mil	EA	1,986.0000	0.00	1.3 Transport and Disposal	0.00	0.00	44,267.94	0.00	44,267.94	51,881.44	51,881.44	64,851.80
			0.0000		*0.0000*	*27.3300*	*0.0000*	*0.0000*	*27.3300*	*28.1499*	*28.1499*	*35.1874*
1.6.1.1.3.4 USR Intermodal Rental Premium	WK	1,986.0000	0.00	1.3 Transport and Disposal	0.00	54,277.38	0.00	0.00	54,277.38	55,905.70	55,905.70	69,882.13
			0.0000		*6,978.8200*	*19,136.2847*	*4,480.2900*	*1,229,800.0000*	*1,260,395.3947*	*1,303,567.0907*	*1,303,567.0907*	*1,629,458.8633*
1.6.2 331XX1922 Disposal Fees and Taxes	**EA**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**6,978.82**	**19,136.28**	**4,480.29**	**1,229,800.00**	**1,260,395.39**	**1,303,567.09**	**1,303,567.09**	**1,629,458.86**
			0.0000		*0.0000*	*0.0000*	*0.0000*	*990,000.0000*	*990,000.0000*	*1,019,700.0000*	*1,019,700.0000*	*1,274,625.0000*
1.6.2.1 331XX192201 Landfill/Burial Grnd/Trench/Pit	**EA**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**990,000.00**	**990,000.00**	**1,019,700.00**	**1,019,700.00**	**1,274,625.00**
(Note: This element includes all costs associated with the disposal of radiologically impacted soil removed from the Northside and Southside Areas. The disposal volumes are as follows: (1) Northside and Southside - 8,600 cy. Based on 1.6 tons per cubic yars of insitu soil. Estimated tonnage for disposal is 11,000 tons.)												
1.6.2.1.1 331XX19220102 Off-site Disposal of Northside, and Southside Areas	**LS**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**990,000.00**	**990,000.00**	**1,019,700.00**	**1,019,700.00**	**1,274,625.00**
			0.0000		*0.0000*	*0.0000*	*0.0000*	*90.0000*	*90.0000*	*92.7000*	*92.7000*	*115.8750*
1.6.2.1.1.1 331XX1922010201 Northside, and Southside Areas	**TON**	**11,000.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**990,000.00**	**990,000.00**	**1,019,700.00**	**1,019,700.00**	**1,274,625.00**
(Note: Includes disposal of MED waste in Area A, new Area B-C, Northside, and Southside and is assumed to be homogenous and without large debris for disposal purposes. Assumes unit price of $90.00/ton for disposal based on recent numbers provided to SAIC by J. Wryk in an email dated January 9, 2007.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*90.0000*	*90.0000*	*92.7000*	*92.7000*	*115.8750*
1.6.2.1.1.1.1 USR Off-site Disposal of MED and Overburden Soil	TON	11,000.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	990,000.00	990,000.00	1,019,700.00	1,019,700.00	1,274,625.00
1.6.2.2 331XX1922010202 Material Overrun	**LS**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**6,978.82**	**19,136.28**	**4,480.29**	**239,800.00**	**270,395.39**	**283,867.09**	**283,867.09**	**354,833.86**
(Note: Based on prior FUSRAP projects, the largest component of risk is the estimated volume of soil to be disposed. Historically, actual volumes remediated at FUSRAP sites exceed the estimated volumes. Additionally rail car and intermodal demurage cost due to project delays will increase the estimated cost. This line item carries 10% overrun on excavated material as a modifier to these elements. The excavation of this material has not been included in this line item because it is considered negligible in comparison to the disposal costs and can be covered in the Contingency line item. This line item includes loading, transportation, disposal and intermodal rental costs only.)												
			0.0000		*8.1149*	*8.5461*	*0.0000*	*0.0000*	*16.6610*	*23.0198*	*23.0198*	*28.7748*

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.6.2.2.1 331XX19210101 Loading of Northside, and Southside Areas	**CY**	**860.0000**	**0.00**	**1.2 CL Craft Labor**	**6,978.82**	**7,349.62**	**0.00**	**0.00**	**14,328.44**	**19,797.04**	**19,797.04**	**24,746.30**
			0.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*76.8213*	*76.8213*	*96.0266*
1.6.2.2.1.1 MIL B-EQOPRCRN Equip. Operators, Heavy	HR	36.0000	0.00	1.2 CL Craft Labor	1,874.16	0.00	0.00	0.00	1,874.16	2,765.57	2,765.57	3,456.96
(Note: Operator to move rail cars.)												
			0.0000		*0.0000*	*30.3881*	*0.0000*	*0.0000*	*30.3881*	*37.5540*	*37.5540*	*46.9425*
1.6.2.2.1.2 GEN L40Z4390 LOADER, FRONT END, WHEEL, ARTICULATED, 1.75 CY (1.3M3) BUCKET, 4X4	HR	36.0000	0.00	1.2 CL Craft Labor	0.00	1,093.97	0.00	0.00	1,093.97	1,351.94	1,351.94	1,689.93
(Note: Tractor loader to move rail cars.)												
			0.0000		*0.0000*	*173.7681*	*0.0000*	*0.0000*	*173.7681*	*224.6875*	*224.6875*	*280.8594*
1.6.2.2.1.3 GEN C90Z2600 CRANE, MECHANICAL, LATTICE BOOM, TRUCK MOUNTED, 125 TON (113MT), 240' (73.2M) BOOM	HR	36.0000	0.00	1.2 CL Craft Labor	0.00	6,255.65	0.00	0.00	6,255.65	8,088.75	8,088.75	10,110.94
			0.0000		*52.0600*	*0.0000*	*0.0000*	*0.0000*	*52.0600*	*76.8213*	*76.8213*	*96.0266*
1.6.2.2.1.4 MIL B-EQOPRCRN Equip. Operators, Heavy	HR	36.0000	0.00	1.2 CL Craft Labor	1,874.16	0.00	0.00	0.00	1,874.16	2,765.57	2,765.57	3,456.96
			0.0000		*45.5000*	*0.0000*	*0.0000*	*0.0000*	*45.5000*	*67.9608*	*67.9608*	*84.9509*
1.6.2.2.1.5 MIL B-LABORER Laborers, (Semi-Skilled)	HR	71.0000	0.00	1.2 CL Craft Labor	3,230.50	0.00	0.00	0.00	3,230.50	4,825.21	4,825.21	6,031.52
(Note: Assume 2 laborers to support loading operations.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*128.0000*	*128.0000*	*131.8400*	*131.8400*	*164.8000*
1.6.2.2.2 331XX19210102 Transportation - Northside, and Southside Areas	**TON**	**1,100.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**140,800.00**	**140,800.00**	**145,024.00**	**145,024.00**	**181,280.00**
(Note: Assumes unit price of $128.00/ton for transportation based on recent numbers provided to SAIC by J. Wyrk in an email dated January 9, 2007.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*128.0000*	*128.0000*	*131.8400*	*131.8400*	*164.8000*
1.6.2.2.2.1 USR Transportation of Material to disposal Facility	TON	1,100.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	140,800.00	140,800.00	145,024.00	145,024.00	181,280.00
			0.0000		*0.0000*	*58.6401*	*22.2900*	*0.0000*	*80.9301*	*84.9555*	*84.9555*	*106.1943*

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.6.2.2.3 331XX19210103 Intermodal Rental - Northside, and Southside Areas	**WK**	**201.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**11,786.66**	**4,480.29**	**0.00**	**16,266.95**	**17,076.05**	**17,076.05**	**21,345.06**
(Note: Assumes that each intermodal carries 13 cubic yards and will have a 3 week average turnaround rental time (time it arrives on site to time it is returned to site). Based on 860 cy total volume, approximately 67 intermodal containers will be required and equates to 201 rental weeks. Also assumes that intermodal containers will be available as needed. It is estimated that at least 360 dedicated intermodal containers will be required and includes a 3 day reserve supply. A premium of 100% of the rental rate has been included in this line item to ensure that the number of containers will be available.)												
			0.0000		*0.0000*	*200.0000*	*0.0000*	*0.0000*	*200.0000*	*206.0000*	*206.0000*	*257.5000*
1.6.2.2.3.1 USR Intermodal Delivery and Return	EA	4.0000	0.00	1.3 Transport and Disposal	0.00	800.00	0.00	0.00	800.00	824.00	824.00	1,030.00
(Note: Assumes each delivery/return includes 2 containers and is based on a vendor quote. Includes mob/demob for 2 seasons.)												
			0.0000		*0.0000*	*27.3300*	*0.0000*	*0.0000*	*27.3300*	*28.1499*	*28.1499*	*35.1874*
1.6.2.2.3.2 USR Intermodal Rental (avg 3 weeks per intermodal)	WK	201.0000	0.00	1.3 Transport and Disposal	0.00	5,493.33	0.00	0.00	5,493.33	5,658.13	5,658.13	7,072.66
			0.0000		*0.0000*	*0.0000*	*22.2900*	*0.0000*	*22.2900*	*24.5562*	*24.5562*	*30.6952*
1.6.2.2.3.3 HTW 021202507112 Bulk material hauling, hazardous waste packaging, poly liners, bulk solids & sludge, roll-off liner, disposable, 20 C.Y. and 30 C.Y., 6 mil	EA	201.0000	0.00	1.3 Transport and Disposal	0.00	0.00	4,480.29	0.00	4,480.29	4,935.79	4,935.79	6,169.74
			0.0000		*0.0000*	*27.3300*	*0.0000*	*0.0000*	*27.3300*	*28.1499*	*28.1499*	*35.1874*
1.6.2.2.3.4 USR Intermodal Rental Premium	WK	201.0000	0.00	1.3 Transport and Disposal	0.00	5,493.33	0.00	0.00	5,493.33	5,658.13	5,658.13	7,072.66
1.6.2.2.4 331XX19220102 Off-site Disposal of Northside, and Southside Areas	**LS**	**1.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**99,000.00**	**99,000.00**	**101,970.00**	**101,970.00**	**127,462.50**
			0.0000		*0.0000*	*0.0000*	*0.0000*	*90.0000*	*90.0000*	*92.7000*	*92.7000*	*115.8750*
1.6.2.2.4.1 331XX1922010201 Northside, and Southside Areas	**TON**	**1,100.0000**	**0.00**	**1.3 Transport and Disposal**	**0.00**	**0.00**	**0.00**	**99,000.00**	**99,000.00**	**101,970.00**	**101,970.00**	**127,462.50**
(Note: Includes disposal of MED waste in Area A, new Area B-C, Northside, and Southside and is assumed to be homogenous and without large debris for disposal purposes. Assumes unit price of $90.00/ton for disposal based on recent numbers provided to SAIC by J. Wryk in an email dated January 9, 2007.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*90.0000*	*90.0000*	*92.7000*	*92.7000*	*115.8750*
1.6.2.2.4.1.1 USR Off-site Disposal of MED and Overburden Soil	TON	1,100.0000	0.00	1.3 Transport and Disposal	0.00	0.00	0.00	99,000.00	99,000.00	101,970.00	101,970.00	127,462.50

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*25,806.3733*	*50,387.2495*	*52,460.0000*	*0.0000*	*128,653.6228*	*167,531.8367*	*167,531.8367*	*230,356.2754*
1.7 331XX20 Site Restoration	**EA**	**1.0000**	**0.00**		**25,806.37**	**50,387.25**	**52,460.00**	**0.00**	**128,653.62**	**167,531.84**	**167,531.84**	**230,356.28**
			0.0000		*25,806.3733*	*50,387.2495*	*52,460.0000*	*0.0000*	*128,653.6228*	*167,531.8367*	*167,531.8367*	*230,356.2754*
1.7.1 331XX2001 Earthwork	**EA**	**1.0000**	**0.00**		**25,806.37**	**50,387.25**	**52,460.00**	**0.00**	**128,653.62**	**167,531.84**	**167,531.84**	**230,356.28**
			0.0000		*25,806.3733*	*50,387.2495*	*52,460.0000*	*0.0000*	*128,653.6228*	*167,531.8367*	*167,531.8367*	*230,356.2754*
1.7.1.1 331XX200103 Backfill	**EA**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**25,806.37**	**50,387.25**	**52,460.00**	**0.00**	**128,653.62**	**167,531.84**	**167,531.84**	**230,356.28**
1.7.1.1.1 331XX20010301 Backfill of Excavated Northside, and Southside Areas	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**25,806.37**	**50,387.25**	**52,460.00**	**0.00**	**128,653.62**	**167,531.84**	**167,531.84**	**230,356.28**
(Note: Backfill of the Northside and Southside Areas is assumed to be provided using offsite soils. The total area is 2,000 sy. There are 8,600 cy of exsitu MED and overburden soils that have been excavated and require replacement to return site to existing grade.)												
			0.0000		*2.7688*	*5.7093*	*6.1000*	*0.0000*	*14.5781*	*18.9274*	*18.9274*	*26.0252*
1.7.1.1.1.1 331XX2001030102 Backfill Clean Imported Native Soil Cover	**CY**	**8,600.0000**	**0.00**	**1.2 CL Craft Labor**	**23,811.44**	**49,100.09**	**52,460.00**	**0.00**	**125,371.53**	**162,775.98**	**162,775.98**	**223,816.98**
			0.0000		*1.4300*	*3.1200*	*6.1000*	*0.0000*	*10.6500*	*13.8210*	*13.8210*	*19.0039*
1.7.1.1.1.1.1 RSM 310513100200 Common borrow, spread with 200 H.P. dozer, includes load at pit and haul, 2 miles round trip, excludes compaction	CY	8,600.0000	0.00	1.2 CL Craft Labor	12,298.00	26,832.00	52,460.00	0.00	91,590.00	118,860.75	118,860.75	163,433.53
(Note: Cost Based on MEANS 2006, 4th quarther, US Natl Average.)												
			0.0000		*0.2494*	*0.2500*	*0.0000*	*0.0000*	*0.4994*	*0.6783*	*0.6783*	*0.9327*
1.7.1.1.1.1.2 RSM 023153105600 Compaction, 2 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	ECY	7,200.0000	0.00	1.2 CL Craft Labor	1,795.44	1,800.09	0.00	0.00	3,595.53	4,883.81	4,883.81	6,715.24
			0.0000		*1.1300*	*2.3800*	*0.0000*	*0.0000*	*3.5100*	*4.5385*	*4.5385*	*6.2405*
1.7.1.1.1.1.3 RSM 31051 310 0900 Borrow, buy & load at pit, spread with 200 HP dozer, for 5 mile haul, add	CY	8,600.0000	0.00	1.2 CL Craft Labor	9,718.00	20,468.00	0.00	0.00	30,186.00	39,031.42	39,031.42	53,668.20
(Note: Assumed total haul of 7 mi.)												
			0.0000		*0.9975*	*0.6436*	*0.0000*	*0.0000*	*1.6410*	*2.3779*	*2.3779*	*3.2696*
1.7.1.1.1.2 331XX08059101 Finish Grading	**SY**	**2,000.0000**	**0.00**	**1.2 CL Craft Labor**	**1,994.93**	**1,287.16**	**0.00**	**0.00**	**3,282.09**	**4,755.85**	**4,755.85**	**6,539.30**

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.9975*	*0.6436*	*0.0000*	*0.0000*	*1.6410*	*2.3779*	*2.3779*	*3.2696*
1.7.1.1.1.2.1 MIL 023103300200 Shape enbankment, slope up to 1 in 4, by machine	SY	2,000.0000	0.00	1.2 CL Craft Labor	1,994.93	1,287.16	0.00	0.00	3,282.09	4,755.85	4,755.85	6,539.30
			0.0000		*1,566,411.0000*	*70,542.0000*	*65,072.6800*	*601,552.5400*	*2,303,578.2200*	*5,075,664.1626*	*5,170,353.6662*	*6,462,942.0828*
1.8 331XX22 Gen Requirements (Opt Breakout)	**EA**	**1.0000**	**0.00**		**1,566,411.00**	**70,542.00**	**65,072.68**	**601,552.54**	**2,303,578.22**	**5,075,664.16**	**5,170,353.67**	**6,462,942.08**

(Note: This section includes estimated labor requirements for office personnel during the remedial action phases of the project. Also included are the monthly costs associated with Health & Safety equipment, office trailers, utilities, and other general conditions. Assumes that monthly labor requirement is 176 hours (FTE) for a remedial action duration of 17 months. This is based on RA staff support starting after the design is complete and one month prior to the start of field work. All labor rates are based on Engineering Estimates. For fulltime field personnel, travel cost are based on a two week cycle from home office to site for 10 months of the year. Includes airfare ($600), car rental ($56/day), per diem @ 75% ($101/day), and misc ($12.50/day). Total hourly rate is $31.96. For part time field and office personnel, travel cost are based on two night, three day trip to site. Includes airfare ($600), car rental ($56/day), per diem ($135/day), and misc ($12.50/day). The total trip cost is $1,250.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*396,440.0000*	*0.0000*	*0.0000*	*124,610.6600*	*521,050.6600*	*1,216,867.3881*	*1,216,867.3881*	*1,521,084.2352*
1.8.1 331XX2201 Supervision and Management for Area A, new Area B-C, Southside, and Northside	**EA**	**1.0000**	**0.00**		**396,440.00**	**0.00**	**0.00**	**124,610.66**	**521,050.66**	**1,216,867.39**	**1,216,867.39**	**1,521,084.24**
			0.0000		*149,600.0000*	*0.0000*	*0.0000*	*21,250.0000*	*170,850.0000*	*427,731.6960*	*427,731.6960*	*534,664.6200*
1.8.1.1 331XX220101 Project Manager	**EA**	**1.0000**	**0.00**		**149,600.00**	**0.00**	**0.00**	**21,250.00**	**170,850.00**	**427,731.70**	**427,731.70**	**534,664.62**

(Note: Includes 1 FTE and monthly trips to the site.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*50.0000*	*0.0000*	*0.0000*	*0.0000*	*50.0000*	*134.2880*	*134.2880*	*167.8600*
1.8.1.1.1 USR Project Manager (Hourly Labor Rate)	HR	2,992.0000	0.00	1.4 Prime Professional Labor	149,600.00	0.00	0.00	0.00	149,600.00	401,789.70	401,789.70	502,237.12

(Note: Unit rate based on an Engineering Estimate.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.1.1.2 USR Project Manager Travel	EA	17.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	21,250.00	21,250.00	25,942.00	25,942.00	32,427.50
			0.0000		*67,320.0000*	*0.0000*	*0.0000*	*236.3400*	*67,556.3400*	*181,093.8871*	*181,093.8871*	*226,367.3588*
1.8.1.2 331XX220102 Project Engineer for Area A, new B-C, Southside, and Northside	**EA**	**1.0000**	**0.00**		**67,320.00**	**0.00**	**0.00**	**236.34**	**67,556.34**	**181,093.89**	**181,093.89**	**226,367.36**

(Note: Includes 0.5 FTE and quarterly trips to the site.)

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*45.0000*	*0.0000*	*0.0000*	*0.0000*	*45.0000*	*120.8592*	*120.8592*	*151.0740*
1.8.1.2.1 USR Project Engineer (Hourly Labor Rate)	HR	1,496.0000	0.00	1.4 Prime Professional Labor	67,320.00	0.00	0.00	0.00	67,320.00	180,805.36	180,805.36	226,006.70

(Note: Unit rate based on an Engineering Estimate.)

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*39.3900*	*39.3900*	*48.0873*	*48.0873*	*60.1091*
1.8.1.2.2 USR Project Engineer Travel	EA	6.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	236.34	236.34	288.52	288.52	360.65
			0.0000		*119,680.0000*	*0.0000*	*0.0000*	*95,624.3200*	*215,304.3200*	*438,169.9267*	*438,169.9267*	*547,712.4083*
1.8.1.3 331XX220103 General Superintendent for Area A, new B-C, Southside, and Northside	**EA**	**1.0000**	**0.00**		**119,680.00**	**0.00**	**0.00**	**95,624.32**	**215,304.32**	**438,169.93**	**438,169.93**	**547,712.41**
(Note: Includes 1 FTE at the site and travel to the site for 10 months per year.)												
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
1.8.1.3.1 USR Site Superintendent (Hourly Labor Rate)	HR	2,992.0000	0.00	1.4 Prime Professional Labor	119,680.00	0.00	0.00	0.00	119,680.00	321,431.76	321,431.76	401,789.70
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.1.3.2 USR Site Superintendent (Hourly Travel Premium)	HR	2,992.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	95,624.32	95,624.32	116,738.17	116,738.17	145,922.71
			0.0000		*59,840.0000*	*0.0000*	*0.0000*	*7,500.0000*	*67,340.0000*	*169,871.8784*	*169,871.8784*	*212,339.8480*
1.8.1.4 331XX220191 Attorney/QA/H&S	**EA**	**1.0000**	**0.00**		**59,840.00**	**0.00**	**0.00**	**7,500.00**	**67,340.00**	**169,871.88**	**169,871.88**	**212,339.85**
(Note: Includes 0.50 FTE and quarterly trips to the site.)												
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
1.8.1.4.1 USR Attorney/QA/H&S (Hourly Labor Rate)	HR	1,496.0000	0.00	1.4 Prime Professional Labor	59,840.00	0.00	0.00	0.00	59,840.00	160,715.88	160,715.88	200,894.85
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.1.4.2 USR Attorney/QA/H&S Travel	HR	6.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	7,500.00	7,500.00	9,156.00	9,156.00	11,445.00
			0.0000		*381,585.0000*	*0.0000*	*0.0000*	*7,500.0000*	*389,085.0000*	*1,034,001.7296*	*1,034,001.7296*	*1,292,502.1620*
1.8.2 331XX2202 Administration Job Office for Area A, new B-C, Southside, and Northside	**EA**	**1.0000**	**0.00**		**381,585.00**	**0.00**	**0.00**	**7,500.00**	**389,085.00**	**1,034,001.73**	**1,034,001.73**	**1,292,502.16**
			0.0000		*119,680.0000*	*0.0000*	*0.0000*	*0.0000*	*119,680.0000*	*321,431.7568*	*321,431.7568*	*401,789.6960*
1.8.2.2 331XX220292 Admin and Data Management	**EA**	**1.0000**	**0.00**		**119,680.00**	**0.00**	**0.00**	**0.00**	**119,680.00**	**321,431.76**	**321,431.76**	**401,789.70**
(Note: Includes 2 FTE and no travel to the site.)												

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*20.0000*	*0.0000*	*0.0000*	*0.0000*	*20.0000*	*53.7152*	*53.7152*	*67.1440*
1.8.2.2.1 USR Admin/Data Mgmnt. (Hourly Labor Rate)	HR	5,984.0000	0.00	1.4 Prime Professional Labor	119,680.00	0.00	0.00	0.00	119,680.00	321,431.76	321,431.76	401,789.70
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*261,905.0000*	*0.0000*	*0.0000*	*7,500.0000*	*269,405.0000*	*712,569.9728*	*712,569.9728*	*890,712.4660*
1.8.2.3 331XX220293 Community Relations	**EA**	**1.0000**	**0.00**		**261,905.00**	**0.00**	**0.00**	**7,500.00**	**269,405.00**	**712,569.97**	**712,569.97**	**890,712.47**
(Note: Includes 0.25 FTE and semi-annual trips to the site.)												
			0.0000		*35.0000*	*0.0000*	*0.0000*	*0.0000*	*35.0000*	*94.0016*	*94.0016*	*117.5020*
1.8.2.3.1 USR Community Relations (Hourly Labor Rate)	HR	7,483.0000	0.00	1.4 Prime Professional Labor	261,905.00	0.00	0.00	0.00	261,905.00	703,413.97	703,413.97	879,267.47
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.2.3.2 USR Community Relations (Hourly Travel Premium)	HR	6.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	7,500.00	7,500.00	9,156.00	9,156.00	11,445.00
			0.0000		*677,248.0000*	*0.0000*	*0.0000*	*322,810.5600*	*1,000,058.5600*	*2,319,009.7932*	*2,319,009.7932*	*2,898,762.2414*
1.8.3 331XX2204 Engineering, Surveying, & QC for Area A, new B-C, Southside, and Northside	**EA**	**1.0000**	**0.00**		**677,248.00**	**0.00**	**0.00**	**322,810.56**	**1,000,058.56**	**2,319,009.79**	**2,319,009.79**	**2,898,762.24**
			0.0000		*161,568.0000*	*0.0000*	*0.0000*	*191,248.6400*	*352,816.6400*	*773,406.2844*	*773,406.2844*	*966,757.8555*
1.8.3.1 331XX220409 Field Engineer	**EA**	**1.0000**	**0.00**		**161,568.00**	**0.00**	**0.00**	**191,248.64**	**352,816.64**	**773,406.28**	**773,406.28**	**966,757.86**
(Note: Includes 2 FTE at the site and travel to the site for 10 months per year.)												
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*90.2289*	*90.2289*	*112.7862*
1.8.3.1.1 USR Field Engineers, 2 FTE	HR	5,984.0000	0.00	1.4 Prime Professional Labor	161,568.00	0.00	0.00	0.00	161,568.00	539,929.94	539,929.94	674,912.43
(Note: Unit rate based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.3.1.2 USR Field Engineer, 2 FTE. (Hourly Travel Premium)	HR	5,984.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	191,248.64	191,248.64	233,476.34	233,476.34	291,845.42
			0.0000		*400,928.0000*	*0.0000*	*0.0000*	*42,500.0000*	*443,428.0000*	*1,128,680.3853*	*1,128,680.3853*	*1,410,850.4816*
1.8.3.2 331XX220411 Office Engineer for Area A, new B-C, Southside, and Northside	**EA**	**1.0000**	**0.00**		**400,928.00**	**0.00**	**0.00**	**42,500.00**	**443,428.00**	**1,128,680.39**	**1,128,680.39**	**1,410,850.48**

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
(Note: Includes 2 FTE Senior Engineers and one monthly trip to the site. This position includes senior engineering support and includes engineering, waste management, health physics, data validation, analytical, and lab support. Includes 3 FTE Junior Engineers and one monthly trip to the site. This position includes senior engineering support and includes engineering, waste management, health physics, data validation, analytical, and lab support.)												
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
1.8.3.2.1 USR Senior Engineer (Hourly Labor Rate)	HR	5,984.0000	0.00	1.4 Prime Professional Labor	239,360.00	0.00	0.00	0.00	239,360.00	642,863.51	642,863.51	803,579.39
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.3.2.2 USR Senior Engineer Travel	EA	17.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	21,250.00	21,250.00	25,942.00	25,942.00	32,427.50
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*72.5155*	*72.5155*	*90.6444*
1.8.3.2.3 USR Junior Engineer (Hourly Labor Rate)	HR	5,984.0000	0.00	1.4 Prime Professional Labor	161,568.00	0.00	0.00	0.00	161,568.00	433,932.87	433,932.87	542,416.09
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.3.2.4 USR Junior Engineer Travel	EA	17.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	21,250.00	21,250.00	25,942.00	25,942.00	32,427.50
			0.0000		*37,400.0000*	*0.0000*	*0.0000*	*7,500.0000*	*44,900.0000*	*109,603.4240*	*109,603.4240*	*137,004.2800*
1.8.3.3 331XX220416 Schedulers	**EA**	**1.0000**	**0.00**		**37,400.00**	**0.00**	**0.00**	**7,500.00**	**44,900.00**	**109,603.42**	**109,603.42**	**137,004.28**
(Note: Includes 0.5 FTE and quarterly trips to the site.)												
			0.0000		*25.0000*	*0.0000*	*0.0000*	*0.0000*	*25.0000*	*67.1440*	*67.1440*	*83.9300*
1.8.3.3.1 USR Prjt. Control/Scheduler (Hourly Labor Rate)	HR	1,496.0000	0.00	1.4 Prime Professional Labor	37,400.00	0.00	0.00	0.00	37,400.00	100,447.42	100,447.42	125,559.28
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*
1.8.3.3.2 USR Prjt. Control/Scheduler Travel	HR	6.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	7,500.00	7,500.00	9,156.00	9,156.00	11,445.00
			0.0000		*36,960.0000*	*0.0000*	*0.0000*	*33,749.7600*	*70,709.7600*	*140,467.3966*	*140,467.3966*	*175,584.2458*
1.8.3.4 331XX220419 Waste Management Technicians	**EA**	**1.0000**	**0.00**		**36,960.00**	**0.00**	**0.00**	**33,749.76**	**70,709.76**	**140,467.40**	**140,467.40**	**175,584.25**
(Note: Includes 2 FTE at the site and travel to the site for 3 months. Only required during the transportation operations.)												
			0.0000		*35.0000*	*0.0000*	*0.0000*	*0.0000*	*35.0000*	*94.0016*	*94.0016*	*117.5020*
1.8.3.4.1 USR Waste Management, 2 FTE. (Hourly Labor Rate)	HR	1,056.0000	0.00	1.4 Prime Professional Labor	36,960.00	0.00	0.00	0.00	36,960.00	99,265.69	99,265.69	124,082.11
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.3.4.2 USR Waste Management, 2 FTE. (Hourly Travel Premium)	HR	1,056.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	33,749.76	33,749.76	41,201.71	41,201.71	51,502.13

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*40,392.0000*	*0.0000*	*0.0000*	*47,812.1600*	*88,204.1600*	*166,852.3028*	*166,852.3028*	*208,565.3786*
1.8.3.5 331XX220424 Quality Control Engineer	**EA**	**1.0000**	**0.00**		**40,392.00**	**0.00**	**0.00**	**47,812.16**	**88,204.16**	**166,852.30**	**166,852.30**	**208,565.38**
(Note: Includes 0.50 FTE at the site and travel to the site for 10 months per year.)												
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*72.5155*	*72.5155*	*90.6444*
1.8.3.5.1 USR QA/QC Technician (Hourly Labor Rate)	HR	1,496.0000	0.00	1.4 Prime Professional Labor	40,392.00	0.00	0.00	0.00	40,392.00	108,483.22	108,483.22	135,604.02
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.3.5.2 USR QA/QC Technician (Hourly Travel Premium)	HR	1,496.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	47,812.16	47,812.16	58,369.08	58,369.08	72,961.36
			0.0000		*96,745.0000*	*69,850.0000*	*30,853.0000*	*95,624.3200*	*293,072.3200*	*494,230.4052*	*494,230.4052*	*617,788.0066*
1.8.4 331XX2207 Health & Safety	**EA**	**1.0000**	**0.00**		**96,745.00**	**69,850.00**	**30,853.00**	**95,624.32**	**293,072.32**	**494,230.41**	**494,230.41**	**617,788.01**
			0.0000		*89,760.0000*	*0.0000*	*0.0000*	*95,624.3200*	*185,384.3200*	*357,811.9875*	*357,811.9875*	*447,264.9843*
1.8.4.1 331XX220707 Site Safety & Health Officer	**EA**	**1.0000**	**0.00**		**89,760.00**	**0.00**	**0.00**	**95,624.32**	**185,384.32**	**357,811.99**	**357,811.99**	**447,264.98**
(Note: Includes 1 FTE at the site and travel to the site for 10 months per year.)												
			0.0000		*30.0000*	*0.0000*	*0.0000*	*0.0000*	*30.0000*	*80.5728*	*80.5728*	*100.7160*
1.8.4.1.1 USR SSHO, 1 pers. (Hourly Labor Rate)	HR	2,992.0000	0.00	1.4 Prime Professional Labor	89,760.00	0.00	0.00	0.00	89,760.00	241,073.82	241,073.82	301,342.27
			0.0000		*0.0000*	*0.0000*	*0.0000*	*31.9600*	*31.9600*	*39.0168*	*39.0168*	*48.7710*
1.8.4.1.2 USR SSHO, 1 pers. (Hourly Travel Premium)	HR	2,992.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	95,624.32	95,624.32	116,738.17	116,738.17	145,922.71
1.8.4.2 331XX220791 Health and Safety Equipment for Area A, new B-C, Southside, and Northside	**LS**	**1.0000**	**0.00**		**6,985.00**	**69,850.00**	**30,853.00**	**0.00**	**107,688.00**	**136,418.42**	**136,418.42**	**170,523.02**
(Note: Line item includes a lump sum item for provision of disposal health and safety equipment, rental, operation and maintenance of H&S monitoring equipment, and emergency PPE and breathing air equipment.)												
			0.0000		*5,285.0000*	*52,850.0000*	*23,103.0000*	*0.0000*	*81,238.0000*	*102,893.1429*	*102,893.1429*	*128,616.4286*
1.8.4.2.1 USR H&S Equipment	EA	1.0000	0.00	1.2 CL Craft Labor	5,285.00	52,850.00	23,103.00	0.00	81,238.00	102,893.14	102,893.14	128,616.43
			0.0000		*1,700.0000*	*17,000.0000*	*7,750.0000*	*0.0000*	*26,450.0000*	*33,525.2749*	*33,525.2749*	*41,906.5936*
1.8.4.2.2 USR H&S Equipment	EA	1.0000	0.00	1.2 CL Craft Labor	1,700.00	17,000.00	7,750.00	0.00	26,450.00	33,525.27	33,525.27	41,906.59
			0.0000		*0.0000*	*0.0000*	*0.0000*	*9,350.0000*	*9,350.0000*	*11,554.8465*	*11,554.8465*	*14,443.5581*
1.8.5 331XX2210 Project Utilities	**EA**	**1.0000**	**0.00**		**0.00**	**0.00**	**0.00**	**9,350.00**	**9,350.00**	**11,554.85**	**11,554.85**	**14,443.56**

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
1.8.5.1 331XX221091 Monthly Utilities - Area A, B, C, Southside, and Northside	**LS**	**1.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**9,350.00**	**9,350.00**	**11,554.85**	**11,554.85**	**14,443.56**
(Note: Assume power/utilities to 2 trailers.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*250.0000*	*250.0000*	*308.9531*	*308.9531*	*386.1914*
1.8.5.1.1 USR Temp Power/Lighting/Month (1000 sf)	MO	17.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	4,250.00	4,250.00	5,252.20	5,252.20	6,565.25
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*100.0000*	*100.0000*	*123.5812*	*123.5812*	*154.4766*
1.8.5.1.2 USR Temp Water Service	MO	17.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	1,700.00	1,700.00	2,100.88	2,100.88	2,626.10
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*100.0000*	*100.0000*	*123.5812*	*123.5812*	*154.4766*
1.8.5.1.3 USR Temp Telephone Service	MO	17.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	1,700.00	1,700.00	2,100.88	2,100.88	2,626.10
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*100.0000*	*100.0000*	*123.5812*	*123.5812*	*154.4766*
1.8.5.1.4 USR Internet Service	MO	17.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	1,700.00	1,700.00	2,100.88	2,100.88	2,626.10
(Note: Cost based on an Engineering Estimate.)												
			0.0000		*14,393.0000*	*692.0000*	*34,219.6800*	*41,657.0000*	*90,961.6800*	*0.0000*	*94,689.5036*	*118,361.8795*
1.8.6 331XX2208 Temp Const Facilities-Ownership	**EA**	**1.0000**	**0.00**		**14,393.00**	**692.00**	**34,219.68**	**41,657.00**	**90,961.68**	**0.00**	**94,689.50**	**118,361.88**
			0.0000		*0.0000*	*0.0000*	*8,846.1200*	*19,800.0000*	*28,646.1200*	*0.0000*	*29,865.5687*	*37,331.9609*
1.8.6.1 331XX220801 Office Trailers and Facilities	**EA**	**1.0000**	**0.00**		**0.00**	**0.00**	**8,846.12**	**19,800.00**	**28,646.12**	**0.00**	**29,865.57**	**37,331.96**
1.8.6.1.1 331XX22080101 Office Trailers for Area A, B, C, Southside, and Northside	**LS**	**1.0000**	**0.00**		**0.00**	**0.00**	**8,846.12**	**19,800.00**	**28,646.12**	**0.00**	**29,865.57**	**37,331.96**
(Note: Assume 2 trailers.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*3.5000*	*3.5000*	*0.0000*	*3.5000*	*4.3750*
1.8.6.1.1.1 RSM 015213200800 Transportation Of Rental Units	MI	800.0000	0.00		0.00	0.00	0.00	2,800.00	2,800.00	0.00	2,800.00	3,500.00
(Note: Assume 200 mi. ea way. Cost Based on MEANS 2006, 4th quarther, US Natl Average.)												

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*0.0000*	*0.0000*	*0.0000*	*500.0000*	*500.0000*	*0.0000*	*500.0000*	*625.0000*
1.8.6.1.1.2 USR Field Office Expense, office equipment rental, supplies, postage, etc.	MO	34.0000	0.00		0.00	0.00	0.00	17,000.00	17,000.00	0.00	17,000.00	21,250.00
(Note: Cost based on Engineering Estimate)												
			0.0000		*0.0000*	*0.0000*	*260.1800*	*0.0000*	*260.1800*	*0.0000*	*296.0461*	*370.0577*
1.8.6.1.1.3 AF 015205000450 Office Trailer, furnished, rent per month, 50' x 10', excl. hookups	MO	34.0000	0.00		0.00	0.00	8,846.12	0.00	8,846.12	0.00	10,065.57	12,581.96
			0.0000		*0.0000*	*0.0000*	*5,723.5600*	*0.0000*	*5,723.5600*	*0.0000*	*6,512.5599*	*8,140.6999*
1.8.6.2 331XX220808 Construction Portable Toilets	**EA**	**1.0000**	**0.00**		**0.00**	**0.00**	**5,723.56**	**0.00**	**5,723.56**	**0.00**	**6,512.56**	**8,140.70**
			0.0000		*0.0000*	*0.0000*	*84.1700*	*0.0000*	*84.1700*	*0.0000*	*95.7729*	*119.7162*
1.8.6.2.1 AF 015205001400 Toilet, portable, chemical, rent per month	EA	68.0000	0.00		0.00	0.00	5,723.56	0.00	5,723.56	0.00	6,512.56	8,140.70
(Note: Assume 4 ea.)												
			0.0000		*14,393.0000*	*692.0000*	*19,650.0000*	*21,857.0000*	*56,592.0000*	*0.0000*	*58,311.3750*	*72,889.2188*
1.8.6.3 331XX220811 Decon Facilities	**EA**	**1.0000**	**0.00**		**14,393.00**	**692.00**	**19,650.00**	**21,857.00**	**56,592.00**	**0.00**	**58,311.38**	**72,889.22**
1.8.6.3.1 331XX22081101 Decon Trailers	**LS**	**1.0000**	**0.00**		**14,393.00**	**692.00**	**19,650.00**	**21,857.00**	**56,592.00**	**0.00**	**58,311.38**	**72,889.22**
			0.0000		*14,393.0000*	*692.0000*	*19,650.0000*	*0.0000*	*34,735.0000*	*0.0000*	*36,454.3750*	*45,567.9688*
1.8.6.3.1.1 USR Decon Facility and Labor	EA	1.0000	0.00		14,393.00	692.00	19,650.00	0.00	34,735.00	0.00	36,454.38	45,567.97
(Note: Cost based on RACER 2006 cost model for Decon Facility and includes geomembrane constructed pad for heavey equipment, pumps, and tanks. Includes 2 months labor for decon activities.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*21,857.0000*	*21,857.0000*	*0.0000*	*21,857.0000*	*27,321.2500*
1.8.6.3.1.2 RAC Off-site Disposal of Decon Water	EA	1.0000	0.00		0.00	0.00	0.00	21,857.00	21,857.00	0.00	21,857.00	27,321.25
(Note: Cost based on RACER 2006 cost model for Transportation and disposal based on 10,000 gal of decon water to be transported 500 mi and disposed using the high disposal fee. No stabilization was included.)												
2 333XX01 FUSRAP Mgmnt. & Integration	**LS**	**1.0000**	**0.00**		**2,282,775.00**	**0.00**	**0.00**	**0.00**	**2,282,775.00**	**0.00**	**2,282,775.00**	**2,853,468.75**
(Note: This item has been included in estimate as of Revision 2 per request of USACE. USACE has provided estimated M&I costs for completion of remedial work under this alternative. Item include all project management, engineering analysis, supervision and administration, and design services to be undertaken by USACE in implementing this remedial alternative. Costs are based on estimates provided to SAIC by USACE on 3/24/00. Price adjustment from 3/2000 to 12/2006 is included. Represents costs to USACE from conceptual stage through completion of field activities. Costs have been broken down into 3 phases: 1. Design 2. PreConstruction 3. Construction)												
2.1 333XX0101 Project Management	**LS**	**1.0000**	**0.00**		**647,500.00**	**0.00**	**0.00**	**0.00**	**647,500.00**	**0.00**	**647,500.00**	**809,375.00**

Labor ID: EQ ID: Currency in US dollars TRACES MII Version 2.2

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
2.1.1 USR Design Phase	LS	1.0000	0.00		130,000.00	0.00	0.00	0.00	130,000.00	0.00	130,000.00	162,500.00
			0.0000		*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
2.1.2 USR Preconstruction Phase	EA	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			0.0000		*345,000.0000*	*0.0000*	*0.0000*	*0.0000*	*345,000.0000*	*0.0000*	*345,000.0000*	*431,250.0000*
2.1.3 USR Construction Phase	EA	1.5000	0.00		517,500.00	0.00	0.00	0.00	517,500.00	0.00	517,500.00	646,875.00
2.2 333XX0102 Project Design	**LS**	**1.0000**	**0.00**		**745,650.00**	**0.00**	**0.00**	**0.00**	**745,650.00**	**0.00**	**745,650.00**	**932,062.50**
2.2.1 3 2 1 Design Phase	**LS**	**1.0000**	**0.00**		**348,000.00**	**0.00**	**0.00**	**0.00**	**348,000.00**	**0.00**	**348,000.00**	**435,000.00**
2.2.1.1 USR Design Costs	LS	1.0000	0.00		348,000.00	0.00	0.00	0.00	348,000.00	0.00	348,000.00	435,000.00
2.2.2 3 2 6 Preconstruction Phase	**LS**	**1.0000**	**0.00**		**192,500.00**	**0.00**	**0.00**	**0.00**	**192,500.00**	**0.00**	**192,500.00**	**240,625.00**
2.2.2.1 USR QA/QC Plan	LS	1.0000	0.00		27,500.00	0.00	0.00	0.00	27,500.00	0.00	27,500.00	34,375.00
2.2.2.2 USR SOW/Drawings	LS	1.0000	0.00		66,000.00	0.00	0.00	0.00	66,000.00	0.00	66,000.00	82,500.00
2.2.2.3 USR BCOE/ITR	LS	1.0000	0.00		33,000.00	0.00	0.00	0.00	33,000.00	0.00	33,000.00	41,250.00
2.2.2.4 USR Value Engineering	LS	1.0000	0.00		33,000.00	0.00	0.00	0.00	33,000.00	0.00	33,000.00	41,250.00
2.2.2.5 USR Prep Gov't Cost Estimate	LS	1.0000	0.00		33,000.00	0.00	0.00	0.00	33,000.00	0.00	33,000.00	41,250.00
2.2.3 3 211 Construction Phase	**LS**	**1.0000**	**0.00**		**205,150.00**	**0.00**	**0.00**	**0.00**	**205,150.00**	**0.00**	**205,150.00**	**256,437.50**
2.2.3.1 USR Submittal Review and Coordination	LS	1.0000	0.00		55,000.00	0.00	0.00	0.00	55,000.00	0.00	55,000.00	68,750.00
			0.0000		*82,500.0000*	*0.0000*	*0.0000*	*0.0000*	*82,500.0000*	*0.0000*	*82,500.0000*	*103,125.0000*
2.2.3.2 USR On-Site Technical Assistance	EA	1.5000	0.00		123,750.00	0.00	0.00	0.00	123,750.00	0.00	123,750.00	154,687.50
			0.0000		*17,600.0000*	*0.0000*	*0.0000*	*0.0000*	*17,600.0000*	*0.0000*	*17,600.0000*	*22,000.0000*
2.2.3.3 USR Construction Estimate Support	EA	1.5000	0.00		26,400.00	0.00	0.00	0.00	26,400.00	0.00	26,400.00	33,000.00
2.3 333XX00103 Engineering Analysis Branch	**LS**	**1.0000**	**0.00**		**389,625.00**	**0.00**	**0.00**	**0.00**	**389,625.00**	**0.00**	**389,625.00**	**487,031.25**
2.3.1 3 3 5 Design Phase	**LS**	**1.0000**	**0.00**		**79,200.00**	**0.00**	**0.00**	**0.00**	**79,200.00**	**0.00**	**79,200.00**	**99,000.00**
2.3.1.1 USR Project Preparation	LS	1.0000	0.00		72,000.00	0.00	0.00	0.00	72,000.00	0.00	72,000.00	90,000.00
2.3.1.2 USR Contingency (10%)	LS	1.0000	0.00		7,200.00	0.00	0.00	0.00	7,200.00	0.00	7,200.00	9,000.00
2.3.2 3 310 Construction Phase	**LS**	**1.0000**	**0.00**		**310,425.00**	**0.00**	**0.00**	**0.00**	**310,425.00**	**0.00**	**310,425.00**	**388,031.25**

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*283,500.0000*	*0.0000*	*0.0000*	*0.0000*	*283,500.0000*	*0.0000*	*283,500.0000*	*354,375.0000*
2.3.2.1 USR Construction Support	EA	0.7500	0.00		212,625.00	0.00	0.00	0.00	212,625.00	0.00	212,625.00	265,781.25
2.3.2.2 USR Project Close Out	LS	1.0000	0.00		60,000.00	0.00	0.00	0.00	60,000.00	0.00	60,000.00	75,000.00
2.3.2.3 USR Contingency (10%)	LS	1.0000	0.00		37,800.00	0.00	0.00	0.00	37,800.00	0.00	37,800.00	47,250.00
2.4 333XX0104 Supervision and Administration	**LS**	**1.0000**	**0.00**		**500,000.00**	**0.00**	**0.00**	**0.00**	**500,000.00**	**0.00**	**500,000.00**	**625,000.00**
2.4.1 USR S&A Costs	LS	1.0000	0.00		500,000.00	0.00	0.00	0.00	500,000.00	0.00	500,000.00	625,000.00
			0.0000		*13,440,989.4135*	*438,070.4153*	*9,569,700.0000*	*15,500,000.0000*	*38,948,759.8289*	*55,434,267.6627*	*58,941,109.1642*	*73,676,386.4553*
3 33401 HTRW REMEDIAL ACTION (O&M)	**EA**	**1.0000**	**0.00**		**13,440,989.41**	**438,070.42**	**9,569,700.00**	**15,500,000.00**	**38,948,759.83**	**55,434,267.66**	**58,941,109.16**	**73,676,386.46**
			0.0000		*13,440,989.4135*	*438,070.4153*	*9,569,700.0000*	*15,500,000.0000*	*38,948,759.8289*	*55,434,267.6627*	*58,941,109.1642*	*73,676,386.4553*
3.1 3340191 Landfill Cover Maintenance and Reporting	**EA**	**1.0000**	**0.00**		**13,440,989.41**	**438,070.42**	**9,569,700.00**	**15,500,000.00**	**38,948,759.83**	**55,434,267.66**	**58,941,109.16**	**73,676,386.46**
(Note: This element defines Operations and Maintenance requirements for the landfill cover system. Components include the following: 1) Signs and sign maintenance 2) Annual site inspection 3) 5-Year Status Reports O&M costs will be performed for a 1000-year period.)												
			0.0000		*6,400.0000*	*0.0000*	*0.0000*	*0.0000*	*6,400.0000*	*17,188.8640*	*17,188.8640*	*21,486.0800*
3.1.1 334019101 O&M Home Office Support	**YR**	**1,000.0000**	**0.00**	**1.4 Prime Professional Labor**	**6,400,000.00**	**0.00**	**0.00**	**0.00**	**6,400,000.00**	**17,188,864.00**	**17,188,864.00**	**21,486,080.00**
(Note: Assumes a 1,000 year O&M period following completion of project.)												
			0.0000		*50.0000*	*0.0000*	*0.0000*	*0.0000*	*50.0000*	*134.2880*	*134.2880*	*167.8600*
3.1.1.1 USR Project Manager (Hourly Labor Rate)	HR	80,000.0000	0.00	1.4 Prime Professional Labor	4,000,000.00	0.00	0.00	0.00	4,000,000.00	10,743,040.00	10,743,040.00	13,428,800.00
(Note: Assume 80 hrs per year for project manager and no travel to the site.)												
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
3.1.1.2 USR Senior Engineer (Hourly Labor Rate)	HR	40,000.0000	0.00	1.4 Prime Professional Labor	1,600,000.00	0.00	0.00	0.00	1,600,000.00	4,297,216.00	4,297,216.00	5,371,520.00
(Note: Assume 40 hrs per year for senior engineer and no travel to the site.)												
			0.0000		*20.0000*	*0.0000*	*0.0000*	*0.0000*	*20.0000*	*53.7152*	*53.7152*	*67.1440*
3.1.1.3 USR Admin/Data Mgmnt. (Hourly Labor Rate)	HR	40,000.0000	0.00	1.4 Prime Professional Labor	800,000.00	0.00	0.00	0.00	800,000.00	2,148,608.00	2,148,608.00	2,685,760.00
(Note: Assume 40 hrs per year and no travel to the site.)												
			0.0000		*455.0000*	*0.0000*	*449.7000*	*0.0000*	*904.7000*	*1,343.4283*	*1,343.4283*	*1,679.2854*
3.1.2 334019102 Warning Signs	**YR**	**1,000.0000**	**0.00**	**1.2 CL Craft Labor**	**455,000.00**	**0.00**	**449,700.00**	**0.00**	**904,700.00**	**1,343,428.33**	**1,343,428.33**	**1,679,285.41**
(Note: This element details costs associated with the posting of signs and maintenance of signs for a 1,000 year period.)												

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
			0.0000		*45.5000*	*0.0000*	*44.9700*	*0.0000*	*90.4700*	*134.3428*	*134.3428*	*167.9285*
3.1.2.1 MIL 028901000560 Signs, stock, reflectorized, UTMCD standard, warning sign, 24" x 24", with posts	EA	10,000.0000	0.00	1.2 CL Craft Labor	455,000.00	0.00	449,700.00	0.00	904,700.00	1,343,428.33	1,343,428.33	1,679,285.41
			0.0000		*1,435.6854*	*438.0704*	*1,680.0000*	*0.0000*	*3,553.7558*	*281.6015*	*3,788.4430*	*4,735.5537*
3.1.3 334019103 Fence Repair	**YR**	**1,000.0000**	**0.00**		**1,435,685.41**	**438,070.42**	**1,680,000.00**	**0.00**	**3,553,755.83**	**281,601.48**	**3,788,442.98**	**4,735,553.73**
(Note: Assume 200 lf of fence is replaced annually for this element.)												
			0.0000		*6.3837*	*2.0155*	*8.4000*	*0.0000*	*16.7992*	*0.0000*	*17.5342*	*21.9178*
3.1.3.1 MIL 028201306560 Chain link fence, industrial, galvanized, 9 ga. mesh, 1-5/8" top rail, 6' high, posts in concrete, excludes excavation	LF	200,000.0000	0.00		1,276,736.84	403,104.66	1,680,000.00	0.00	3,359,841.50	0.00	3,506,841.50	4,383,551.88
			0.0000		*7.9474*	*1.7483*	*0.0000*	*0.0000*	*9.6957*	*14.0801*	*14.0801*	*17.6001*
3.1.3.2 MIL 028201507925 Auger fence post hole, medium soil, 3' deep, by machine, includes excavation	EA	20,000.0000	0.00	1.2 CL Craft Labor	158,948.57	34,965.76	0.00	0.00	193,914.33	281,601.48	281,601.48	352,001.85
			0.0000		*0.0000*	*0.0000*	*7,440.0000*	*0.0000*	*7,440.0000*	*9,998.9586*	*9,998.9586*	*12,498.6983*
3.1.4 334019104 Seaway - Surveillance	**YR**	**1,000.0000**	**0.00**		**0.00**	**0.00**	**7,440,000.00**	**0.00**	**7,440,000.00**	**9,998,958.61**	**9,998,958.61**	**12,498,698.26**
(Note: Institutional controls in this cost item include monitoring and maintaining the leachate collection system and occasional replacement of pumps. Also includes deed restrictions or covenants to restrict the future use.)												
			0.0000		*0.0000*	*0.0000*	*620.0000*	*0.0000*	*620.0000*	*833.2466*	*833.2466*	*1,041.5582*
3.1.4.1 USR Inst. Controls, O&M, and Surveillance (O&M Phase)	MO	12,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	7,440,000.00	0.00	7,440,000.00	9,998,958.61	9,998,958.61	12,498,698.26
3.1.5 334019105 Annual Inspection	**LS**	**1,000.0000**	**0.00**		**4,320,000.00**	**0.00**	**0.00**	**3,000,000.00**	**7,320,000.00**	**8,943,762.23**	**8,943,762.23**	**11,179,702.79**
(Note: This element describes costs associated with an annual inspection of the capped area.)												
3.1.5.1 1151010 Field Engineer (2)	**LS**	**1.0000**	**0.00**	**1.5 Prime Professional Travel**	**4,320,000.00**	**0.00**	**0.00**	**2,500,000.00**	**6,820,000.00**	**8,325,856.00**	**8,325,856.00**	**10,407,320.00**
(Note: Assume two field engineers @ 80 hours each per year for site inspeciton and follow up report.)												
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*32.9616*	*32.9616*	*41.2020*
3.1.5.1.1 USR Field Engineer, 2 pers. (Hourly Labor Rate)	HR	160,000.0000	0.00	1.5 Prime Professional Travel	4,320,000.00	0.00	0.00	0.00	4,320,000.00	5,273,856.00	5,273,856.00	6,592,320.00
			0.0000		*0.0000*	*0.0000*	*0.0000*	*1,250.0000*	*1,250.0000*	*1,526.0000*	*1,526.0000*	*1,907.5000*

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
3.1.5.1.2 USR Field Engineer Travel	EA	2,000.0000	0.00	1.5 Prime Professional Travel	0.00	0.00	0.00	2,500,000.00	2,500,000.00	3,052,000.00	3,052,000.00	3,815,000.00
			0.0000		*0.0000*	*0.0000*	*0.0000*	*500.0000*	*500.0000*	*617.9062*	*617.9062*	*772.3828*
3.1.5.2 1151015 Materials and expenses	**EA**	**1,000.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**500,000.00**	**500,000.00**	**617,906.23**	**617,906.23**	**772,382.79**
(Note: Assumes $1,500 per inspection.)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*500.0000*	*500.0000*	*617.9062*	*617.9062*	*772.3828*
3.1.5.2.1 USR Materials and expenses.	EA	1,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	500,000.00	500,000.00	617,906.23	617,906.23	772,382.79
			0.0000		*4,151.5200*	*0.0000*	*0.0000*	*0.0000*	*4,151.5200*	*11,149.9864*	*11,149.9864*	*13,937.4829*
3.1.6 334019106 5-Year Status Report	**EA**	**200.0000**	**0.00**	**1 MA Prime**	**830,304.00**	**0.00**	**0.00**	**0.00**	**830,304.00**	**2,229,997.27**	**2,229,997.27**	**2,787,496.59**
(Note: 5-year status summary report of the annual inspection results and review of state/federal files. There will be a total of 200 reports generated over the 1,000-year period.)												
			0.0000		*36,000.0000*	*0.0000*	*0.0000*	*0.0000*	*36,000.0000*	*96,687.3600*	*96,687.3600*	*120,859.2000*
3.1.6.1 11515 5 File Review	**EA**	**6.0000**	**0.00**	**1.4 Prime Professional Labor**	**216,000.00**	**0.00**	**0.00**	**0.00**	**216,000.00**	**580,124.16**	**580,124.16**	**725,155.20**
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*72.5155*	*72.5155*	*90.6444*
3.1.6.1.1 USR Junior Engineer for file review.	HR	8,000.0000	0.00	1.4 Prime Professional Labor	216,000.00	0.00	0.00	0.00	216,000.00	580,124.16	580,124.16	725,155.20
(Note: Assumes 5 days for each file)												
3.1.6.2 1151510 Report Preparation	**LS**	**1.0000**	**0.00**		**614,304.00**	**0.00**	**0.00**	**0.00**	**614,304.00**	**1,649,873.11**	**1,649,873.11**	**2,062,341.39**
(Note: Assume the following hours to prepare the 5-Year Status Reports. Project Manager 16 hrs Senior Engineer 24 hrs Jr. Engineer 60 hrs Admin/Editing 16 hrs)												
			0.0000		*50.0000*	*0.0000*	*0.0000*	*0.0000*	*50.0000*	*134.2880*	*134.2880*	*167.8600*
3.1.6.2.1 USR Project Manager (Hourly Labor Rate)	HR	3,200.0000	0.00	1.4 Prime Professional Labor	160,000.00	0.00	0.00	0.00	160,000.00	429,721.60	429,721.60	537,152.00
			0.0000		*40.0000*	*0.0000*	*0.0000*	*0.0000*	*40.0000*	*107.4304*	*107.4304*	*134.2880*
3.1.6.2.2 USR Senior Engineer (Hourly Labor Rate)	HR	4,800.0000	0.00	1.4 Prime Professional Labor	192,000.00	0.00	0.00	0.00	192,000.00	515,665.92	515,665.92	644,582.40
			0.0000		*27.0000*	*0.0000*	*0.0000*	*0.0000*	*27.0000*	*72.5155*	*72.5155*	*90.6444*
3.1.6.2.3 USR Junior Engineer (Hourly Labor Rate)	HR	8,000.0000	0.00	1.4 Prime Professional Labor	216,000.00	0.00	0.00	0.00	216,000.00	580,124.16	580,124.16	725,155.20
			0.0000		*14.4700*	*0.0000*	*0.0000*	*0.0000*	*14.4700*	*38.8629*	*38.8629*	*48.5787*
3.1.6.2.4 USR Admin/Data Mgmnt. (Hourly Labor Rate)	HR	3,200.0000	0.00	1.4 Prime Professional Labor	46,304.00	0.00	0.00	0.00	46,304.00	124,361.43	124,361.43	155,451.79
			0.0000		*0.0000*	*0.0000*	*0.0000*	*12,500.0000*	*12,500.0000*	*15,447.6557*	*15,447.6557*	*19,309.5697*

Currency in US dollars

Description	UOM	Quantity	Productivity	Contractor	LaborCost	EQCost	MatlCost	SubBidCost	BareCost	CostToPrime	ContractCost	ProjectCost
3.1.7 334019107 Cap Maintenance and Repair	**YR**	**1,000.0000**	**0.00**	**1.2 CL Craft Labor**	**0.00**	**0.00**	**0.00**	**12,500,000.00**	**12,500,000.00**	**15,447,655.74**	**15,447,655.74**	**19,309,569.68**
(Note: This element includes maintenance of the cap over the 1,000 year O&M period. The cap may require erosion controls, repair from erosion issues, repair from settlement issues. The total area includes approximatey 25 acres. Mowing, watering, and fertilizing is assumed to be performed by the land owner. Below are the assumptions for repair. Erosion controls, repair from erosion issues, and settlement issues = $500/acre/year Annual Cost = 25 acres x $500/acre= $12,500)												
			0.0000		*0.0000*	*0.0000*	*0.0000*	*12,500.0000*	*12,500.0000*	*15,447.6557*	*15,447.6557*	*19,309.5697*
3.1.7.1 USR Cover System Repair	YR	1,000.0000	0.00	1.2 CL Craft Labor	0.00	0.00	0.00	12,500,000.00	12,500,000.00	15,447,655.74	15,447,655.74	19,309,569.68

Currency in US dollars