US Army Corps of Engineers®
Buffalo District
BUILDING STRONG®

RECORD OF DECISION FOR THE LANDFILL OPERABLE UNIT OF THE TONAWANDA LANDFILL VICINITY PROPERTY TONAWANDA, NEW YORK

AUTHORIZED PROJECT UNDER THE
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

September 2017

Prepared by:
U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, New York 14207-3199

This page is intentionally left blank.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDIX

Acronyms, Abbreviations, and Units of Measure

AEC	Atomic Energy Commission
ARARs	applicable or relevant and appropriate requirements
bgs	below ground surface
BNI	Bechtel National, Incorporated
BRA	baseline risk assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm	centimeter
COCs	constituents of concern
CSRA	cost schedule risk analysis
DOE	United States Department of Energy
EPA	U.S. Environmental Protection Agency
FS	feasibility study
ft	foot (feet)
ft^2	square foot (square feet)
ft/y	feet per year
FUSRAP	Formerly Utilized Sites Remedial Action Program
gpm	gallons per minute
GRA	general response action
HELP	Hydrologic Evaluation and Landfill Performance
in	inch (inches)
km	kilometer
L/d	liters per day
L/m	liters per minute
LUCs	land use controls
m	meter(s)
m^2	square meter(s)
m^3	cubic meter(s)
MED	Manhattan Engineer District
mi	miles
MOC	methods of characteristics
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NRC	Nuclear Regulatory Commission
NYCRR	New York Code of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	operation and maintenance
ORNL	Oak Ridge National Laboratory
OU	operable unit
PAH	polycyclic aromatic hydrocarbon compound(s)
pCi/g	picocuries per gram
$pCi/m^2/s$	picocuries per square meter per second
pCi/L	picocuries per liter
POTW	publicly owned treatment works

Acronyms, Abbreviations, and Units of Measure

PP	proposed plan
Ra-226	radium-226
Ra-228	radium-228
RAOs	remedial action objectives
RD/RA	remedial design/remedial action
RCRA	Resource Conservation and Recovery Act
RG	remediation goal
RI	remedial investigation
ROD	record of decision
RESRAD	Residual Radioactivity computer code
Rn-222	radon-222
SPDES	State Pollutant Discharge Elimination System
TBC	to be considered
TDS	total dissolved solids
Th-230	thorium-230
Th-232	thorium-232
TOC	total organic carbon
TVD	total variation diminishing
TWP	temporary well point
U_{total}	total uranium
U-234	uranium-234
U-235	uranium-235
U-238	uranium-238
USACE	U.S. Army Corps of Engineers
USAGC	U.S. Army Geospatial Center
VOC	volatile organic compounds
WID	waterfront industrial zone
WWTP	wastewater treatment plant
yd^3	cubic yards

This page is intentionally left blank.

PART I: THE DECLARATION

SITE NAME AND LOCATION

Landfill Operable Unit
Tonawanda Landfill Vicinity Property
Town of Tonawanda, Erie County, New York

STATEMENT OF BASIS AND PURPOSE

This record of decision (ROD) presents the final selected remedy for the Landfill Operable Unit (OU) of the Tonawanda Landfill Vicinity Property in the Town of Tonawanda, Erie County, New York. The Town of Tonawanda Landfill is a vicinity property to the Linde FUSRAP Site. This project is authorized under the Formerly Utilized Sites Remedial Action Program (FUSRAP), which was established in 1974 to identify, investigate, and, if necessary, clean up or control sites that were contaminated as a result of activities conducted in support of the Nation's early atomic energy and weapons program.

These activities were performed by predecessors to the United States Department of Energy (DOE): the Manhattan Engineer District from 1942 through 1946 and/or the Atomic Energy Commission (AEC) from 1947 through 1975. In 1977, DOE assumed administration and execution of FUSRAP. In 1997, Congress transferred responsibility to administer and execute FUSRAP from DOE to the United States Army Corps of Engineers (USACE). As such, USACE is only authorized to address FUSRAP-related contaminants at the Landfill OU, and this ROD only addresses those contaminants.

As the lead agency, USACE chose the remedy in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan.

The information supporting this decision is in the administrative record file for the site, found at the following locations:

U.S. Army Corps of Engineers*
1776 Niagara Street
Buffalo, New York 14207
1-800-833-6390 (Option 4)
* By appointment only

Tonawanda Landfill Vicinity Property website:
http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/TonawandaLandfill.aspx

Please visit the City of Tonawanda local library for access to the Tonawanda Landfill Vicinity Property website to view the administrative record.

Comments on the proposed plan (PP) for the Landfill OU of the Tonawanda Landfill Vicinity Property were provided by the United States Environmental Protection Agency Region 2; New York State Department of Environmental Conservation; the New York State Department of Health; Erie County Executive Mark Poloncarz, Esq.; the City of Tonawanda; the Town of Tonawanda; Citizens United for Justice; and the general public.

The USACE selected Alternative 3, Targeted Shallow Removal and Off-Site Disposal of FUSRAP-Related Material. The New York State Department of Environmental Conservation does not concur with the selected remedy. However, consistent with CERCLA, the selected alternative (Alternative 3) satisfies the threshold criteria and provides the best balance of long-term effectiveness, short-term effectiveness and cost, and the highest implementability of the three considered alternatives.

ASSESSMENT OF THE LANDFILL OU

The USACE, as lead agency, has determined that the response action selected in this ROD is necessary to protect the public health or welfare or the environment from threatened releases of hazardous substances into the environment.

DESCRIPTION OF THE SELECTED REMEDY

The remedy selected in the ROD for the Landfill OU is Alternative 3, Targeted Shallow Removal and Off-Site Disposal of FUSRAP-Related Material. Implementing this remedy will involve excavating FUSRAP-related materials exceeding cleanup goals within the top 1.5 meters (m) (5 feet [ft]) of the surface, transporting them off-site, and disposing of them at a permitted disposal facility. Waste minimization practices during removal (radiological scanning and sorting) under the selected remedy may reduce the volume of soil requiring off-site disposal, and potential treatment of characteristically hazardous waste as required for disposal purposes may reduce the toxicity and mobility of those soils. Non-FUSRAP-related materials and waste, along with clean overburden soils, will be staged at the site for final disposition by the site owner.

The major components of the selected remedy for the Landfill OU include:

- Excavating impacted soil above cleanup goals within the first 1.5 m (5 ft) of the surface and disposal at a permitted off-site disposal facility. All removed soils and potentially commingled landfill debris will be screened in the field for contamination, stockpiled, sampled, analyzed, and transported off-site for disposal if found to exceed the established cleanup goals for FUSRAP-related materials at the site. Excavated soil would be subjected to waste profiling and potential treatment to ensure compliance with the requirements of the off-site disposal facility's waste acceptance criteria and license.

- Collecting and analyzing groundwater that had infiltrated removal areas for potential sanitary discharge and treatment as necessary for off-site disposal at a facility permitted to accept the waste stream. Provisions would be made to protect removal areas from the collection of surface runoff until confirmatory sampling can be conducted, and the areas are determined to comply with remediation objectives.

- Establishing perimeter air monitoring and waste control measures to monitor and control the discharge of surface water runoff from the excavation areas to local conveyances. This will be conducted for health and safety purposes during excavation.

- Backfilling with clean, low-permeability soil, contoured to promote surface water runoff, and seeding in accordance with the approved site restoration plan after samples within the sidewalls of the excavation to define the lateral extent of the excavation areas have confirmed that each removal area has met cleanup criteria.

- Collection of confirmatory samples within the sidewalls of the excavation and backfilling these excavations. After this is complete, USACE will use radon flux monitoring of uncapped portions of the Landfill OU to verify residual radioactive material at depth (i.e., greater than 1.5 m [5 ft]) meets the radon flux limit of 20 $pCi/m^2/s$ at the ground surface.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment. It complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action. It is cost-effective, and it utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Alternative 3 does not satisfy the statutory preference for treatment as a principal element of the remedy. However, treatment of characteristically hazardous waste may be required for disposal purposes. Since this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted every five years after initiating the selected remedial action to ensure the remedy will remain protective of human health and the environment for the 1,000-year period of performance.

RECORD OF DECISION DATA CERTIFICATION CHECKLIST

The following information is included in the decision summary of this ROD. Additional information can be found in the administrative record file for this site.

- Constituents of concern (COCs) and their respective concentrations

- Baseline risk represented by the COCs

- Cleanup levels established for the COCs and the basis for these levels

- How source materials constituting principal threats are addressed

- Current and reasonably anticipated future land use assumptions used in the baseline risk assessment and ROD

- Potential land use that will be available at the site as a result of the selected remedy
- Estimated capital, annual operation and maintenance, and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected
- Key factors that led to selecting the remedy

[redacted]

29 Sep 2017
Date

Director, Programs Directorate
U.S. Army Corps of Engineers Great Lakes and Ohio River Division

PART II: DECISION SUMMARY

1. SITE NAME, LOCATION, AND DESCRIPTION

The Tonawanda Landfill Vicinity Property is located in the Town of Tonawanda, Erie County, New York. It is approximately 16 kilometers (km) (10 miles) north of downtown Buffalo and 2.4 km (1.5 mi) north of the Linde Formerly Utilized Sites Remedial Action Program (FUSRAP) Site (Figure 1). In 1992, the DOE designated a portion of the Town of Tonawanda Landfill as a vicinity property to the Linde FUSRAP Site. The Tonawanda Landfill Vicinity Property consists of two parcels within the North Youngmann Commerce Center. The Town of Tonawanda owns these parcels: the Landfill Operable Unit (OU), which houses the town's inactive municipal solid waste landfill, and the Mudflats (Figure 2). In 2008, United States Army Corps of Engineers (USACE) issued a no-action record of decision (ROD) for the Mudflats OU after it determined that risks from FUSRAP-related constituents of concern (COCs) in that OU were within acceptable limits established in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The Landfill OU comprises approximately 22 hectares (55 acres); it is zoned commercial/industrial. The site is located at the northern end of East Park Drive. Residential developments border the site to the north and northwest. There is a railroad line to the east and a parcel containing National Grid transmission lines to the south. The residential development to the north and northwest of the Landfill OU lies within the City of Tonawanda.

2. SITE HISTORY

In the early 1900s, the western portion of the town's landfill property was the site of a quarry. The quarry was reportedly abandoned in the 1920s when operators encountered water at an 18-m (60 ft) depth. Waste disposal at the landfill by the Town of Tonawanda began during the 1930s and continued through 1989. Landfill wastes disposed of in the former quarry included ash generated by the town's incinerators, construction/demolition debris, and yard refuse (leaves, branches, etc.) collected from town residents. The landfill occasionally accepted municipal solid waste and wastewater sludge from the Town of Tonawanda's wastewater treatment plant when the incinerators were temporarily inoperable.

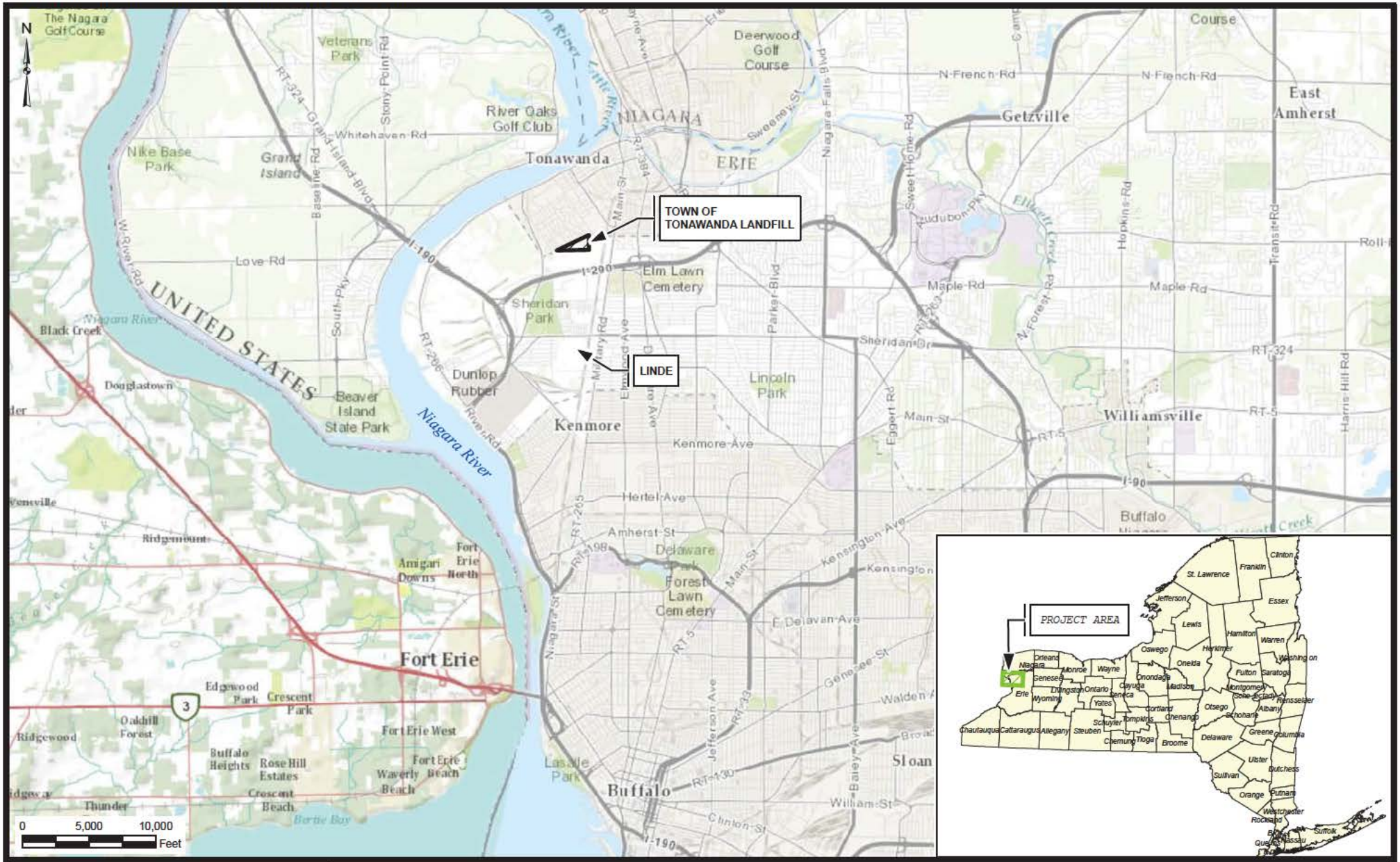
In 1992, the U.S. Department of Energy (DOE) designated the landfill and mudflats together as a FUSRAP vicinity property. The designation was based on a radiological survey conducted in 1991 to determine whether FUSRAP-related material from the nearby Linde FUSRAP Site was in the Town of Tonawanda's municipal solid waste landfill.

In October 1997, Congress transferred overall responsibility for implementing FUSRAP from DOE to USACE and directed that FUSRAP remediation be conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). With this transfer, USACE assumed responsibility for a response, if necessary, at the Tonawanda Landfill Vicinity Property.

Since that time, USACE completed a number of studies at the Tonawanda Landfill Vicinity Property. These included a human health risk assessment, a remedial investigation, and a proposed plan (PP) for the property (USACE 1999, 2005, and 2007). In 2008, USACE signed a no-action ROD for the Mudflats OU portion of the Tonawanda Landfill Vicinity Property after it determined that risks were within acceptable limits established in the NCP. The remainder of the USACE studies, which included a historical photo analysis, Phase 2 remedial investigation, updated baseline risk assessment, environmental monitoring, feasibility study (FS), and PP (USACE 2009, 2011, 2012, 2014, and 2015) focused on the Landfill OU.

In 2007, the Town of Tonawanda began the process of closing the municipal solid waste landfill in accordance with Title 6 of the New York Code of Rules and Regulations (NYCRR). The Town of Tonawanda undertook this action under New York State Department of Environmental Conservation (NYSDEC) oversight. The Town of Tonawanda installed a cap over the 10-hectare (25-acre) eastern portion of the solid waste municipal landfill in 2011. In 2013, the Town of Tonawanda began constructing the final cap over the western portion of the solid waste municipal landfill, but has since halted the work until USACE completes implementation of the selected remedy.

Document Path: K:\TTLF\GIS\ArcMap\2013\FS_Figures\130417_FS_SiteLocation.mxd



U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS BUFFALO, NY	SITE LOCATION MAP	
Document Name: 130417_FS_SiteLocation.mxd [redacted] Date Saved: 21 Jan 2014 Time Saved: 3 03:40 PM	TONAWANDA LANDFILL FUSRAP VICINITY PROPERTY TONAWANDA, NEW YORK	FIGURE 1

Legend

- Landfill Operable Unit Boundary
- Mudflats Boundary
- Municipal Boundary

0 200 400 800 Feet

Document Path: K:\TTLFUGIS\ArcMap\2015\ROD\280715_SiteFeatures.mxd

US Army Corps of Engineers Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

Document Name: 280715_SiteFeatures.mxd
[redacted]
Date Saved: 28 Jul 2015
Time Saved: 8:02:28 AM

TONAWANDA LANDFILL VICINITY PROPERTY APPROXIMATE LOCATIONS

TONAWANDA LANDFILL
FUSRAP VICINITY PROPERTY
TONAWANDA, NEW YORK

FIGURE 2

2.1. PREVIOUS INVESTIGATIONS AND REPORTS

Several entities investigated the Tonawanda Landfill Vicinity Property to determine the nature and extent of the radioactivity in the Town of Tonawanda municipal solid waste landfill. A summary is provided below, and more detailed information on the earliest of these reports can be found in the remedial investigation (RI) report (USACE 2005).

DEPARTMENT OF ENERGY 1990 MOBILE GAMMA SCAN

In 1990, the DOE performed a mobile gamma scanning survey of three properties and associated roadways near the Linde Site, including the Town of Tonawanda Landfill. The DOE detected radionuclide levels above background within the landfill. Later sampling of the elevated locations showed them to be uranium-238 (U-238) and radium-226 (Ra-226). These are two isotopes consistent with the material expected to be in ore processing byproducts generated at the Linde Site (Oak Ridge National Laboratory [ORNL] 1990).

DEPARTMENT OF ENERGY 1991 RADIOLOGICAL SURVEY

The DOE conducted a limited radiological investigation in September 1991 that consisted of gamma walkover scans, radiation dose rate measurements, and the collection and analysis of systematic and biased soil samples to a maximum depth of 0.76 m (2.5 ft) (ORNL 1992). Results of the investigation detected soils in the landfill and mudflats exceeding the radionuclide concentrations guideline established by the DOE for the Tonawanda FUSRAP sites (Linde, Ashland 1, Ashland 2, and Seaway).

Laboratory results indicated some soil samples exhibited characteristics similar to Manhattan Engineer District (MED) product formerly produced at the Linde facility, and others were consistent with the byproducts of the refinery process conducted at the same Linde facility. Impacted areas of the landfill and mudflats were subsequently designated together as a vicinity property of the Linde FUSRAP Site (DOE 1992).

DEPARTMENT OF ENERGY 1994 SOIL SAMPLING

The DOE conducted additional soil sampling activities at the landfill and mudflats in 1994 to determine the vertical extent of FUSRAP-related material at the vicinity property (Bechtel National Incorporated [BNI] 1995).

USACE 1999 HUMAN HEALTH ASSESSMENT

Using data from the DOE's 1991 and 1994 investigations, USACE completed a human health risk assessment for both the landfill and mudflats parcels of the Tonawanda Landfill Vicinity Property (USACE 1999). For the recreational site user scenario, risks were within the acceptable risk range established in the NCP. After reviewing several closure scenarios for the landfill and their associated radiation doses and health risks, USACE concluded that if the landfill was closed with radiologically impacted soil left in place and was properly maintained after closure, risk of exposure to site users would be well within the acceptable risk range established in the NCP.

USACE 2005 Remedial Investigation

Following discussions with the state regulator and other stakeholders, USACE decided there was not enough data available to definitively conclude that action was required at the Tonawanda Landfill Vicinity Property. Therefore, USACE proceeded with a remedial investigation (RI). The USACE conducted field sampling of surface and subsurface soil, groundwater, surface water, and sediment in 2001. The USACE investigation did not indicate any elevated radioactivity within the same order of magnitude that DOE had identified earlier. Based on the RI and the results of the baseline risk assessment (BRA) conducted as part of the RI, USACE concluded that soils containing uranium, radium, and thorium could safely remain in place in their current condition (USACE 2005).

USACE 2007 Proposed Plan

On March 26, 2007, USACE released the *Proposed Plan for the Tonawanda Landfill Vicinity Property Site* (PP). This PP recommended no action for the FUSRAP-related material (uranium, radium, and thorium) found at the site (USACE 2007a). The USACE conducted a public meeting to present this PP on Wednesday, April 25, 2007, at the City of Tonawanda High School Auditorium on Hinds Street (USACE 2007b).

During the April 25, 2007, public meeting, 19 speakers came forward to present comments on the PP (USACE 2007b). In addition, written comments came from federal, state, and local stakeholders, nearby residents, and members of the Riverview Elementary School community, as well as New York State environmental and health agencies. Due to significant public interest, USACE provided an extended public comment period of 203 days. All comments opposed the no-action plan proposed by USACE for the Landfill OU.

Many of the comments argued that because of the Landfill OU's proximity to the school and residential development, the BRA's exposure parameters for the recreational/trespasser land use scenario underestimated the actual potential exposures to adults and children traversing the landfill. Specific comments from various stakeholders (neighbors, school representatives, elected officials, and state environmental and health agencies) indicated that the input parameter values used in the BRA for both exposure frequency and exposure duration could be increased, based on population dynamics of the community. The comments indicated that people reside longer in the adjacent neighborhood and spend more time on landfill property than had previously been assumed.

The comments received on the PP indicated that further evaluation was needed for the exposure assessment for current and future land use and to resolve the discrepancy between the DOE 1991 and 1994 and USACE 2001 data. Therefore, USACE determined it needed further sampling to confirm the extent of radioactive contamination at the Landfill OU. The general response to public comments received on the PP was to reinvestigate the extent of FUSRAP-related material in the Landfill OU and reevaluate the exposure parameters in the BRA.

NYSDEC 2007 Residential Gamma Walkover Survey

Following the release of the no-action PP for FUSRAP-related material in the landfill, the City of Tonawanda requested that NYSDEC conduct additional testing to determine the potential for radioactivity to migrate into the neighboring residential properties. In response, NYSDEC conducted two radiological investigations of adjacent properties, where the property owners gave them permission to investigate.

The first investigation involved radiological gamma walkover surveys of several residential properties and the Riverview Elementary School property in the vicinity of the Landfill OU (NYSDEC 2007). Of those properties that border the Landfill OU, the area within approximately 6 meters (m) (20 feet [ft]) of the boundary was surveyed using a 5 centimeter (cm) x 5 cm (2 inch [in] x 2 in) sodium iodide detector. The NYSDEC also surveyed one nearby property that does not border the Landfill OU and all of the Riverview Elementary School property. No gamma walkover survey results from any of the residential properties exceeded the NYSDEC's investigative level of 2,000 counts per minute above the average background for the area (11,200 counts per minute). However, on the Riverview Elementary School grounds, the investigative level was exceeded; it was confirmed with one-minute static counts in two locations. The NYSDEC then collected soil samples from each of these areas and sent them to an NYSDEC-approved laboratory for analysis. The soil samples contained naturally occurring levels of radioactivity and did not exhibit characteristics of FUSRAP-related material. As NYSDEC stated, "The analytical results for these samples indicate that the soil contains naturally occurring radioactive material, in normal concentrations, and cesium-137, which is a residue from the radioactive fallout from atmospheric testing of nuclear weapons in the past. There is no indication of radiological contamination." These results are consistent with the readings obtained. They illustrate the fact that the investigative level used in this survey was very conservative. The survey concluded that there was no evidence of radioactive waste from uranium ore processing in the areas surveyed (NYSDEC 2007).

NYSDEC 2008 Residential Sump Sampling

The second NYSDEC investigation involved sampling and analyzing sump water in basements of representative residential properties adjacent to the landfill (NYSDEC 2008). Ten residential properties ranging in locations from the far western end of Wadsworth Court to the eastern end of Hackett Drive were sampled. In addition, the NYSDEC sampled two homes several blocks to the north as *background* or *control* locations. The results of this sump sampling program indicated that contaminants from the landfill were not entering the sumps of homes bordering the landfill.

USACE 2008 Mudflats Operable Unit Record of Decision

Following the public comment period on the PP, USACE signed a no-action ROD for the Mudflats OU after it determined that risks from FUSRAP-related COCs in that OU were within acceptable limits established in the NCP (USACE 2008b).

USACE 2009 Historical Photographic Analysis

The USACE completed a geographic information system-based historical photographic analysis of the Landfill and Mudflats OUs (United States Army Geospatial Center [USAGC] 2009). The results of this historical photographic analysis were used in conjunction with results from previous DOE and USACE investigations in the Landfill OU in planning the supplemental RI sampling.

USACE 2011 Phase 2 Remedial Investigation

From 2009 through 2011, USACE conducted additional sampling of on-site surface and subsurface soils, on-site tree vegetation, on-site groundwater, and on-site and off-site surface water and sediment for the Landfill OU of the Tonawanda Landfill Vicinity Property (USACE 2011). This Phase 2 RI sampling of the Landfill OU media occurred in three separate efforts. The first effort was led by USACE personnel, who sampled sediment, surface water, existing groundwater wells, and vegetation in the summer and fall of 2009. The second effort was to further investigate surface and subsurface soil, sediment, and groundwater in 2010. The USACE collected surface water and sediment samples from off-site portions of a site drainage ditch in November 2011. The USACE investigations from 2009 through 2011 confirmed the presence of buried FUSRAP-related material in the Landfill OU at concentrations similar to those the DOE found in the early 1990s (USACE 2011). The USACE also confirmed that uranium in Landfill OU soils appears to be leaching into groundwater and subsequently discharging to surface water.

USACE 2012 Baseline Risk Assessment

In 2012, USACE used the results from the Phase 2 RI sampling to prepare an updated BRA. This included developing an updated site-specific exposure assessment to determine the duration and frequency of potential exposure of site users to FUSRAP-related material in the Landfill OU. The updated BRA used the 2009 through 2011 dataset because that dataset most accurately represented the nature and extent of contamination at the site and because it provided a more comprehensive number of samples than that obtained by USACE in 2001. It was also closer in magnitude to DOE 1991 and 1994 data. The updated BRA concluded that for current site users of the Landfill OU (i.e., trespasser or construction worker), as the landfill was then configured, the risks to human health from potential exposures to FUSRAP-related material buried within the Landfill OU were within the acceptable limits established in the NCP. However, if no action was taken to address the FUSRAP-related material, then for the reasonable future-use scenario of a recreational user, the human health risk may exceed the NCP limit; this was because deeper buried contamination could become exposed through natural erosion. The BRA also assessed the potential risk from incidental ingestion of surface water and groundwater at the site and found the risk to be well within the acceptable NCP limit.

The screening level ecological risk assessment, performed as part of the updated BRA, evaluated both on-site exposures within the Landfill OU and off-site exposures in the northern drainage ditch where it leaves the Landfill OU and intersects Two Mile Creek. The conclusion was that ecological risks were negligible, and no further action was warranted for protection of ecological

receptors. The updated BRA concluded that aquatic life in surface water bodies downgradient of the northern drainage ditch, such as the aquatic habitat in Two Mile Creek, was not likely to be impacted by uranium (USACE 2012a).

USACE 2012 AND 2013 ENVIRONMENTAL MONITORING

The USACE conducted annual environmental monitoring activities at the Landfill OU in 2012 and 2013. They included groundwater sampling and surface water and sediment sampling in the drainage ditch both on-site and off-site (USACE 2012b, 2014). While the groundwater and sediment sampling results from these events were consistent with previous sampling efforts, surface water samples collected in April 2013 from the off-site portion of the drainage ditch exhibited levels of uranium above the ecological screening level for aquatic life. However, subsequent surface water sampling of Two Mile Creek (in November 2013, April 2014, and March 2015) found levels of uranium below the ecological screening level.

USACE 2015 FEASIBILITY STUDY AND PROPOSED PLAN

On September 10, 2015, USACE released the FS along with the PP for the Landfill OU of the Tonawanda Landfill Vicinity Property. The FS presented the identification, development, and detailed analysis of four remedial alternatives designed to address FUSRAP-related constituents of concern (COCs) in the Landfill OU of the Tonawanda Landfill Vicinity Property. The USACE recommended Alternative 3, targeted shallow removal to 1.5 m (5 ft) with off-site disposal for the FUSRAP-related material (uranium, thorium, and radium) found at the site (USACE 2015a, 2015b).

3. COMMUNITY PARTICIPATION

The USACE made the Landfill OU FS and PP available to the public in September 2015. The PP; FS; *Updated Baseline Risk Assessment for the Landfill Operable Unit of the Tonawanda Landfill Vicinity Property, Tonawanda, New York*; and *Final Report for the Phase 2 Remedial Investigation at the Tonawanda Landfill FUSRAP Vicinity Property in Tonawanda, New York*; as well as other technical and site-related documents can be found in the administrative record file, which is located at the following locations:

U.S. Army Corps of Engineers (by appointment only)
1776 Niagara Street
Buffalo, New York 14207

Tonawanda Landfill Vicinity Property website:
http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/TonawandaLandfill.aspx

Please visit the City of Tonawanda local library for access to the Tonawanda Landfill Vicinity Property website to view the administrative record.

The notice of availability of the PP and opportunity to comment was published in the Buffalo News Sunday, September 13, 2015, and the Ken-Ton Bee Wednesday, September 16, 2015. The initial public comment period for the PP was 60 days (September 14, 2015, to November 14, 2015).

The USACE conducted a public meeting on Thursday, October 15, 2015, at 3200 Elmwood Avenue, Kenmore, New York 14217, to present the PP to the public. Representatives from the USACE, Buffalo District, were available at the public meeting to answer questions about the site and PP.

During the October 15, 2015, public meeting, six speakers came forward to present comments on the PP. In addition, written comments were received from federal, state, and local stakeholders, nearby residents, as well as New York State environmental and health agencies. Based on comments received during the public meeting for the PP, USACE extended the public comment period to 90 days (September 14, 2015, to December 14, 2015).

The USACE's responses to comments received during the public comment period are included in the responsiveness summary of this ROD (Part III). The meeting transcript and written comments also are included in the responsiveness summary.

4. SCOPE OF THE OPERABLE UNIT

To manage CERCLA activities at the Tonawanda Landfill Vicinity Property, USACE established the following operable units, as shown in Figure 2:

- Landfill OU applies to the parcel that houses the Town of Tonawanda municipal solid waste landfill.

- Mudflats OU applies to the parcel that housed the former incinerators.

In 2008, USACE issued a no-action ROD for the Mudflats OU after it determined that risks from FUSRAP-related COCs in that OU were within acceptable limits established in the NCP.

This ROD sets forth the final selected remedy for the Landfill OU and serves as the basis for remedial design and action. This ROD addresses FUSRAP-related contaminants outside the bounds of the capped portions of the Town of Tonawanda municipal landfill. These response actions specifically address the following FUSRAP-related COCs in site soils: Ra-226, thorium 230 (Th-230), and total uranium (U_{total}). The USACE cannot address any chemical or radiological contamination that is not commingled with FUSRAP-related radioactive contaminants under FUSRAP.

Sections 11 and 12 of this ROD describe the components of the selected remedy and the acceptability and performance of the selected remedy against NCP criteria. This ROD will be

followed by a remedial design/remedial action (RD/RA) phase to develop specific standards for construction, monitoring, and maintenance.

5. SITE CHARACTERISTICS

5.1. GEOLOGY

The general subsurface geology of the Landfill OU includes unconsolidated glacial deposits at the surface that vary from 17 to 29.1 m (56 to 95.5 ft) in thickness. Unconsolidated sediments around and below the Landfill OU are composed of dense silty glacial till, glaciolacustrine silts and clays, and a coarse-grained glaciofluvial deposit that together overlie the Camillus Shale bedrock.

5.2. GROUNDWATER HYDROGEOLOGY

The majority of the overburden deposits encountered at the Landfill OU are fine-grained silts and clays interbedded with occasional thin (less than 1.2 m [4 ft] thick) silty to sandy lenses that are not considered laterally extensive. This glacial till layer is a low-permeability unit with minimal water-producing capacity. Underlying this till is a high-permeability sand and gravel layer that blankets bedrock. The Camillus Shale is the basal bedrock aquifer that underlies the site and region.

Groundwater-producing units near and below the Landfill OU consist of two hydrogeologic systems: confined course-grained lenses within the fine-grained glacial till and the coarse-grained sand and gravel layer that is hydraulically interconnected with the upper portions of the Camillus Shale bedrock. This coarse-grained layer is referred to as a contact-zone aquifer. Monitoring wells and well points used to obtain groundwater levels from the landfill wastes, overburden, and bedrock showed that, in general, groundwater averages about 0.6 to 2.1 m (2 to 7 ft) below ground surface (bgs) in the landfill wastes and surrounding natural sediments, and about 11.9 m (39 ft) bgs in the confined contact-zone aquifer below the Landfill OU. Groundwater flow within the contact-zone aquifer is in a generally northward direction toward the Niagara River, which is the principal discharge zone for regional groundwater flow (Wehran 1994 and Malcolm Pirnie 1999). The groundwater levels and sampling results from the contact-zone aquifer do not indicate a hydraulic connection with the landfill wastes. The intervening fine-grained glacial sediments provide an aquitard that separates the near-surface groundwater system from the contact-zone unit.

5.3. SURFACE WATER HYDROLOGY

The surface water hydrology in the Landfill OU is controlled by the man-made features that characterize the site. On the Landfill OU, runoff flows radially from the top of the landfill. It collects in intermittent swales along the northwestern, northeastern, and eastern edges of the landfill. The northeastern swale discharges to the marshy area northeast of the site, and the eastern swale discharges to a drainage ditch along the railroad tracks.

The northwestern swale collects runoff from the northern portion of the Landfill OU, west and northwest of the highest point of the landfill. During storm events, surface water collected in this swale flows along to the northeastern property boundary and eventually discharges into Two Mile Creek. Two Mile Creek flows to the north and empties into the Niagara River approximately one mile north of the Tonawanda Landfill. A secondary engineered swale, separate from but parallel to the natural drainage, captures surface runoff from the Phase 2 cap construction area; this swale discharges into a sedimentation basin connected to the municipal sanitary sewer system.

Runoff along the southern border of the Landfill OU occurs as sheet flow into the wet area in the National Grid right-of-way. Surface water is held in the right-of-way by a berm along the southern boundary until it discharges westerly into a culvert beneath the landfill access road. This culvert leads to an east-west trending drainage ditch that flows to the stormwater collection system that conveys surface water to Two Mile Creek.

The swales are temporary in nature and are not a drinking water source, and they do not provide significant habitat for aquatic life.

5.4. CHARACTERISTICS OF THE LANDFILL WASTE MATERIAL

The Landfill OU, also referred to as the Town of Tonawanda Landfill, houses a municipal landfill operated by the Town of Tonawanda since the mid-1930s through October 1989. In the early 1900s, a clay quarry was located in the western portion of the landfill property; it was reportedly abandoned at a depth of 18 m (60 ft), when water was encountered. Wastes disposed of in the landfill included ash generated by nearby incinerators (formerly located in the Mudflats OU as shown in Figure 2), construction/demolition debris, and yard refuse (leaves, branches, etc.) collected from town residents. The landfill occasionally accepted municipal solid waste and wastewater sludge from the Town of Tonawanda's wastewater treatment plant, when the incinerators were temporarily inoperable. The incinerators were operated by the Town of Tonawanda from the 1940s to 1980s and demolished in 2002.

In 2007, the Town of Tonawanda began the process of closing the municipal landfill in accordance with the current Title 6 NYCRR Part 360. The Town of Tonawanda is undertaking this action with NYSDEC regulatory oversight. The phased capping efforts include waste consolidation along the edges of the landfill to ensure no waste is found within 100 feet of an adjacent property line. The Town of Tonawanda installed the Phase 1 cap over the 10-hectare (25-acre) eastern portion of the solid waste municipal landfill in 2011. In 2013, the Town of Tonawanda began constructing the final cap over the western portion of the solid waste

municipal landfill, but has since halted the work until USACE completes implementation of the preferred alternative.

The Phase 1 cap of the solid waste landfill is outside the area of the landfill impacted by FUSRAP-related material being addressed in this ROD. The planned Phase 2 cap appears to slightly overlap the modeled extent of the area impacted by FUSRAP-related material, as presented in Figure 3.

Boring locations northeast of the FUSRAP-impacted area indicate landfill wastes still exist north of the current Phase 1 cap. The Town of Tonawanda excluded this area due to its proximity to the FUSRAP impacts (i.e., the town excised this area from the Phase 2 capping activities in anticipation of future USACE actions).

The disparity in hydrogeologic character between the wastes and native soils produces a bathtub effect in the wastes (Malcolm Pirnie 1999). Before the initiation of capping efforts, the resulting leachate pool would mound and then seep from areas of least resistance along the periphery of the landfill to alleviate the positive head. In 2010, the initial capping process began and included surface water management modifications designed to decrease recharge to the landfill material.

Leachate levels still promote discharge to the northwestern swale due to the bottom of the swale being at or slightly below the ambient groundwater levels. This swale was receiving contaminated groundwater or leachate seepage when sampled in April 2012, although less flow was evident in April 2013; some surface water concentrations increased from 2012 to 2013. As leachate slowly dissipates from the Landfill OU due to capping measures and drainage to the leachate collection system, discharge via the swale will lessen but may not ever cease until leachate recharge to the FUSRAP area is impeded. The leachate levels in the FUSRAP area show a shallow gradient, which indicates the system continues to equilibrate with capping and drainage.

Once the landfill equilibrates with the phased caps (i.e., long-term flow directions emerge), recharge to the FUSRAP area will continue to generate radiologic leachate. The groundwater flow model estimates there should be a 1.2 m (4 ft) decline in groundwater levels in the FUSRAP area once the phased caps are completed. The northwestern drainage swale is predicted to decline from an annual predicted discharge of 43.2 liters per minute (L/m) to 20.8 L/m (11.4 gallons per minute [gpm] to 5.5 gpm), or a 52-percent reduction. Recent observed groundwater levels and swale flow conditions indicate the onset of these expected water level declines.

5.5. NATURE AND EXTENT OF FUSRAP-RELATED CONTAMINATION

The various FUSRAP soil sampling efforts identified soils in the Landfill OU with elevated levels of the FUSRAP COCs: Ra-226, Th-230 and U_{total}. Maximum detected concentrations included 3,485 picocuries per gram (pCi/g) for Ra-226, 4,300 pCi/g for Th-230, and 2,048 pCi/g for U-238. Soils with elevated FUSRAP constituents were generally confined to an area in the northwestern portion of the Landfill OU, near the center of and roughly paralleling the

northwestern fence line separating the Landfill OU from the adjacent residential properties, as shown in Figure 4. The highest levels were generally detected 0.6 m (2 ft) or more bgs, with elevated levels detected as deep as 7.6 m (25 ft) bgs.

Investigations focused on the northwestern drainage swale running parallel to the northeastern property boundary (as shown in Figure 5), which eventually discharges into Two Mile Creek. The combined results of all of the surface water sampling efforts found concentrations of radium and thorium at or near background levels for all surface water sampling locations. Concentrations of uranium in surface water from the drainage swale are elevated above background. However, the northwestern drainage swale is temporary in nature (i.e., an ephemeral ditch) and is not a drinking water source. Nor does it provide significant habitat for aquatic life. Samples collected from Two Mile Creek, the most likely aquatic habitat into which the ditch discharges, exhibited uranium levels that were below the ecological screening level for aquatic life. Therefore, surface water is not a medium of concern for the Landfill OU of the Tonawanda Landfill Vicinity Property and is not addressed in this ROD.

The USACE collected sediment samples from the same northwestern drainage swale where it collected surface water samples, as shown in Figure 5. The combined results of all of the sediment sampling efforts showed concentrations of radium and thorium at or near background levels. Uranium concentrations were elevated compared to background in five on-site sediment sample locations; however, uranium concentrations in samples collected from all of the remaining sediment sample locations, including from off-site portions of the drainage swale, were at or near background levels. This indicated that uranium is not migrating off-site in the drainage swale sediment. Therefore, sediment is not a medium of concern for the Landfill OU of the Tonawanda Landfill Vicinity Property and is not addressed as part of this ROD.

The USACE collected several rounds of groundwater, specifically the landfill leachate samples from permanent and temporary monitoring wells installed in and surrounding the Landfill OU, as shown in Figure 5. The combined results of all sampling efforts found concentrations of radium and thorium at or near background levels for all permanent monitoring well and temporary well point (TWP) sampling locations. Uranium concentrations in groundwater and leachate samples collected from several of the permanent monitoring well and TWP sampling locations were elevated above background levels. However, site groundwater is not a current drinking water source since there are no receptors using the groundwater and landfill leachate beneath the vicinity property as a potable water source. In addition, the Town of Tonawanda Landfill is a state-listed, chemically-impacted landfill, which precludes groundwater use by near-term future receptors (construction workers and recreational users) and long-term use under the reasonable future land use assumptions. Groundwater and leachate were also excluded as a potential future drinking water source based on current site-specific characteristics including:

- Current groundwater conditions in the two uppermost aquifers beneath the Tonawanda Landfill Vicinity Property exhibit high salinity, sulfate, and total dissolved solids concentrations, as well as organic contamination due to landfill operations, that preclude its use without significant treatment.

- The availability of fresh drinking water from off-site sources (i.e., the upper Niagara River) near the Landfill OU of the Tonawanda Landfill Vicinity Property makes future use of the site groundwater for municipal or private drinking water well systems unlikely.

Therefore, groundwater and leachate are not media of concern for the Landfill OU of the Tonawanda Landfill Vicinity Property and are not addressed as part of this ROD.

Baker Ter
Sharon Dr
Bellinger Dr
Karen Dr
Taylor Dr
Hamilton Ave
Coshway Pl
Mosher Dr
Rogers Ave
Hackett Dr
Plymouth Dr
Wadsworth Ave
Wadsworth Ct
Brookside Ter
NATIONAL GRID RIGHT OF WAY
N

Legend

- Landfill Operable Unit Boundary
- Phase 1 Landfill Cap (Environmental Solutions - Jan 2011)
- Phase 2 Landfill Cap (Environmental Solutions - 2013)
- Modeled Extent of FUSRAP Waste Areas

0 125 250 500 Feet

Document Path: K:\TTLFGIS\ArcMap\2013\FS_Figures\150713_FS_CapPhase12.mxd

US Army Corps of Engineers Buffalo District

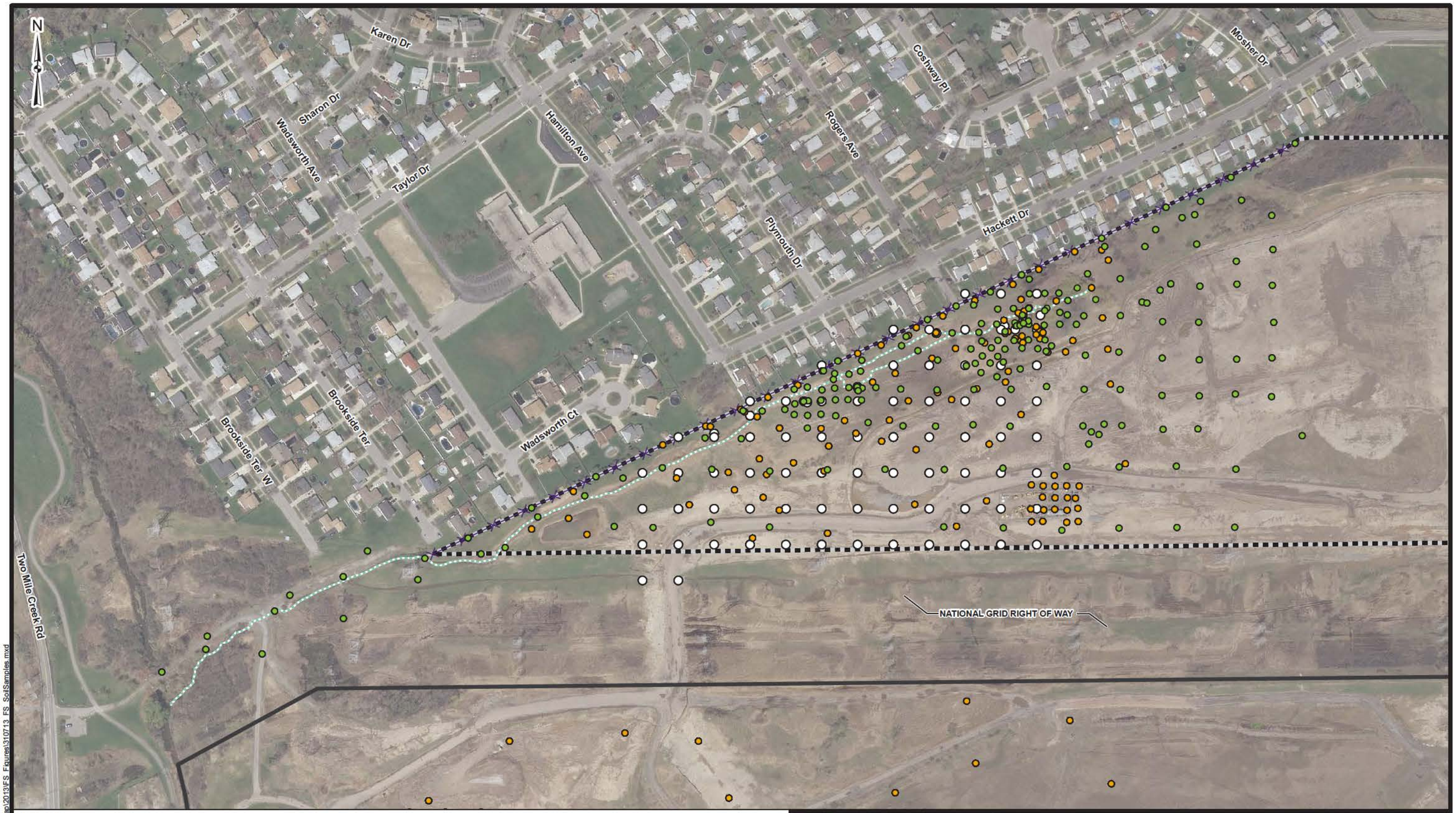
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

Document Name: 150713_FS_CapPhase12 mxd
[redacted]
Date Saved: 15 Apr 2014
Time Saved: 10:55:38 AM

MODELED EXTENT OF FUSRAP WASTE AREAS

TONAWANDA LANDFILL
FUSRAP VICINITY PROPERTY
TONAWANDA, NEW YORK

FIGURE 3



Legend

- Soil Sample (DOE, 1991 - 1994)
- Soil Sample (USACE, 2001)
- Soil Sample (USACE, 2010)
- Landfill Operable Unit Boundary
- Mudflats Operable Unit Boundary
- Fenceline
- Northern Drainage Ditch

0 125 250 500 Feet

US Army Corps of Engineers Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

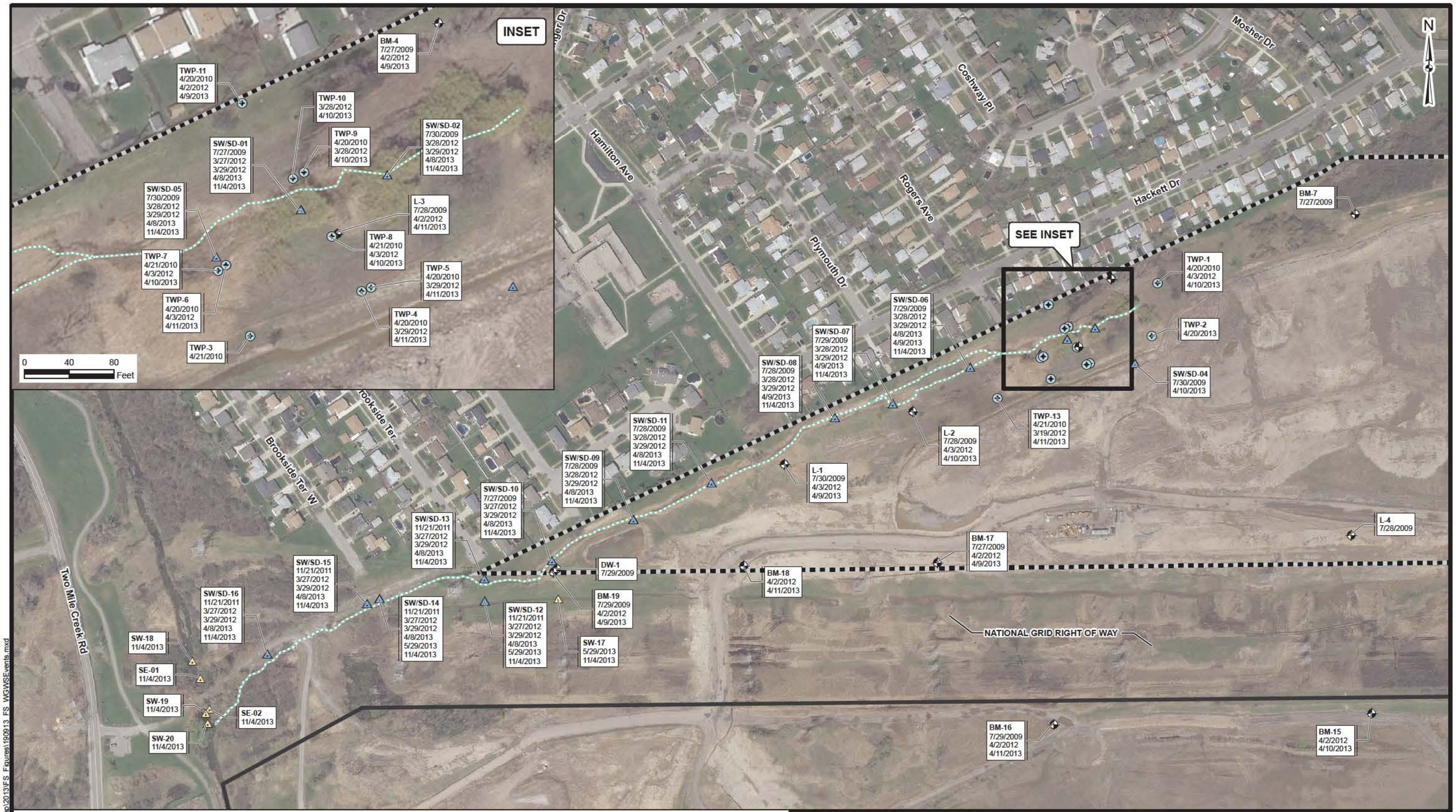
1991 THROUGH 2010 SOIL SAMPLE LOCATIONS

Document Name: 310713_FS_SoilSamples.mxd
[redacted]
Date Saved: 14 Mar 2014
Time Saved: 9:24:26 AM

TONAWANDA LANDFILL
FUSRAP VICINITY PROPERTY
TONAWANDA, NEW YORK

FIGURE 4

Document Path: K:\TTLF\GIS\ArcMap\2013\FS_Figures\310713_FS_SoilSamples.mxd



Legend

- Monitoring Well
- Temporary Well Point
- Surface Water Sample Location
- Surface Water/Sediment Sample Location
- Northern Drainage Ditch
- Landfill Operable Unit Boundary
- Mudflats Operable Unit Boundary

U.S. ARMY ENGINEER DISTRICT
US Army Corps of Engineers® Buffalo District
CORPS OF ENGINEERS
BUFFALO, NY

2009 THROUGH 2013 SURFACE WATER, SEDIMENT AND GROUNDWATER SAMPLE LOCATIONS AND SAMPLE DATES

Document Name: 190913_FS_WGWSEvents.mxd
[redacted]
Date Saved: 14 Mar 2014
Time Saved: 9:22:59 AM

TONAWANDA LANDFILL
FUSRAP VICINITY PROPERTY
TONAWANDA, NEW YORK

FIGURE 5

Document Path: K:\TTLFGIS\ArcMap\2013\FS_Figures\190913_FS_WGWSEvents.mxd

This Page Intentionally Left Blank

6. CURRENT AND POTENTIAL FUTURE LAND USES

The Landfill OU currently houses a NYSDEC-listed, chemically impacted solid waste landfill that the Town of Tonawanda is in the process of closing in accordance with the NYSDEC solid waste regulations, 6 NYCRR Part 360. As such, the solid waste landfill is subject to state land use controls (LUCs) enforceable by the NYSDEC. The Landfill OU is bordered on the north by City of Tonawanda residents.

There are several openings in the fence that separates the Landfill OU from the adjacent residential neighborhood. There is evidence of mowing in an area within the Landfill OU just inside this fence. It is evident that people walk, ride bikes, and walk dogs in this area of the landfill. In further support of these observations of activity, several community members provided comments on the PP (USACE 2007) indicating that children traverse the landfill on the way to the nearby Riverview Elementary School.

According to Map 3 of the Town of Tonawanda's 2014 Comprehensive Plan Update (Tonawanda Town Board 2015), the Landfill OU is zoned as a waterfront industrial district (WID). Chapter 215-70 of the Town of Tonawanda's zoning laws identifies the following permitted uses of a WID-zoned site: public and private parklands and trails, boat storage, light industry, assembly of components, wholesale business and storage, warehousing and storage of goods for distribution, public utilities, research facilities (including laboratories and testing facilities), and business offices or medical professional buildings. Use restrictions associated with a WID-zoning designation are residential dwelling units other than temporary quarters, such as for a plant watchman or caretaker, in addition to junk yards, waste transfer or disposal, land mining, and stockyards. Map 9 of the Town of Tonawanda's 2014 Comprehensive Plan Update (Tonawanda Town Board 2015) indicates that the planned future land use for the Landfill OU is for commercial/light industrial purposes.

Based on this information, USACE has determined that the reasonable future land use of the Landfill OU is recreational.

7. SUMMARY OF POTENTIAL SITE RISKS

7.1. HUMAN HEALTH RISKS

In 2012, USACE published an updated BRA report (USACE 2012a) that utilized the results of the Phase 2 soil investigation (USACE 2011) as well as the most recent groundwater, surface water, sediment, and vegetation sampling results (all described in Section 2.1 of this ROD and published in USACE 2012a). This refined the estimate of potential human health and ecological risks from exposure to FUSRAP-related material in the landfill.

As a part of that updated BRA, USACE performed a site-specific exposure assessment to determine the duration and frequency of potential exposure to Landfill OU environmental media by residents living in the neighborhood adjacent to the landfill. This was developed in part from feedback from the community and stakeholders about the duration and frequency of their potential exposures to landfill media.

Current exposure pathways for this receptor include:

- Inhalation of fugitive dust from surface soil and dry sediment.
- Incidental ingestion of surface soil, sediment, and surface/groundwater.
- External gamma exposure to surface soil and dry sediment.
- Dermal contact with surface soil, surface water, sediment, and surface/groundwater (considered as a minor complete pathway for evaluating the chemical toxicity of uranium metal).

The USACE also evaluated future baseline risks of exposure to deeper material in the Landfill OU because no formal closure plan had yet been shared by the Town of Tonawanda with USACE about the capping and maintenance activities in the Landfill OU (at the time of the updated BRA). Future potential exposure pathways for a trespasser or recreational user include additional exposure to subsurface soil (via the same complete exposure pathways above for surface soil), which could occur if the landfill were not capped.

The Town of Tonawanda is currently capping other areas of the landfill and will eventually close out the area when USACE completes implementation of the selected remedy. As part of this anticipated closure, NYSDEC landfill regulations require a 30-m (100-ft) buffer between the end of the landfill cap and the edge of the property (fence line). Therefore, as part of the near-future exposure, a construction worker scenario was also evaluated for exposure to the material that currently exists within this 30-m (100-ft) buffer. The construction worker receptor was evaluated to ascertain risks potentially incurred when the final landfill slope is graded to include a minimum 30-m (100-ft) buffer between the edge of the landfill and the property (fence) line.

The construction worker was only evaluated for exposure to fill material within the 30-m (100-ft) buffer, and not in the rest of the landfill.

Specifically, exposure pathways for a construction worker include:

- Inhalation of fugitive dust from surface and subsurface soil and dry sediment.
- Incidental ingestion of surface and subsurface soil, sediment, and water (ground and surface water).

- External gamma exposure to surface and subsurface soil and dry sediment.

- Dermal contact with surface and subsurface soil, surface water, sediment, and groundwater (considered as a minor complete pathway for evaluating the chemical toxicity of uranium metal).

This worker was assumed to be involved in construction activities for a full year (8 hours per day, 250 workdays per year). S/he would have elevated inhalation and soil ingestion rates commensurate with intense activities associated with moving soil and soil-like material.

Tables 1 and 2 summarize incremental lifetime risks for exposure to soil in the landfill for current conditions and future baseline conditions (erosion of surface soil) for the evaluated receptors. No summary tables for uranium chemical hazards are provided because the hazard indices for all exposure scenarios were all much less than 1 (below the acceptable threshold). The exposure to surface water and groundwater resulted in cancer risks well below 10^{-6}(1 in a million); these risks are also not shown in the tables below.

TABLE 1—SUMMARY OF INCREMENTAL LIFETIME CANCER RISKS FOR CURRENT CONDITIONS

Receptor	Exposure Unit (Area) and Exposure Depth	Year	Soils Risk
Trespasser	Exposure Unit 1 (FUSRAP area), 0–2 ft bgs	0	$5x10^{-5}$
Trespasser	Exposure Unit 1 (FUSRAP area), 0–2 ft bgs	1,000	$4x10^{-5}$
Construction Worker	Exposure Unit 3 (100-ft buffer), 0–4 ft bgs	0	$1x10^{-5}$
Construction Worker	Exposure Unit 3 (100-ft buffer), 0–4 ft bgs	1,000	$8x10^{-6}$

Notes:
The trespasser results here account for exposures that begin in youth and extend through adulthood.
The exposure depth in Exposure Unit 3 (4 ft bgs) is the approximate depth to native soil in the 100-ft buffer area.

TABLE 2—SUMMARY OF INCREMENTAL LIFETIME CANCER RISKS FOR FUTURE BASELINE CONDITIONS

Receptor	Exposure Unit (Area) and Exposure Depth	Year	Soils Risk
Trespasser	Exposure Unit 1 (FUSRAP area), clean cover over the contaminated area	0	$6x10^{-7}$
Trespasser	Exposure Unit 1 (FUSRAP area), contamination at all depths	600	*$5x10^{-4}$*

Notes:
The trespasser results here account for exposures that begin in youth and extend through adulthood.
The onset of the evaluation period and time of maximum risk are presented in this table.
All sampling results from all depths bgs were used in the calculation of the exposure point concentration for future baseline conditions.
Risks greater than $1x10^{-4}$ are italicized.

The risks from external gamma radiation from exposure to Ra-226 in soil dominate the cancer risk results. The risk to the trespasser under future baseline conditions (where the top 2 feet of surface soils are allowed to erode, exposing FUSRAP-related materials) is above the acceptable cancer risk range of 10^{-6} (1 in a million) to 10^{-4} (1 in ten thousand). Therefore, action is required to ensure protection of human health and the environment. The BRA established Ra-226, Th-230, and total uranium, discussed below, as COCs at the site.

Radium is a naturally occurring element, found in small concentrations in soil, rocks, surface water, groundwater, plants, and animals. Radium can be ingested or inhaled, and although much of the radium is excreted from the body, some of it may remain in the bloodstream or lungs and be carried throughout the body. Radium is also a source of radon gas, and exposure to radon is known to cause bone and lung cancer.

Thorium is a naturally occurring element, found in soil, rocks, surface water, groundwater, and plants. Thorium can be ingested or inhaled, and can cause lung, pancreatic, and hematopoietic cancers. Thorium is also known to attach to the skeletal system and cause bone cancer.

Uranium is also a naturally occurring element, found throughout the world in soils, geologic formations, water, animals, and even some natural foods. As with the other COCs, uranium can be ingested or inhaled. The most prevalent human health concerns of uranium exposure occur through ingestion and can lead to bone cancer and kidney damage.

7.2. ECOLOGICAL RISKS

The screening-level ecological risk assessment concluded ecological risks are negligible, and no further action is warranted for protection of ecological life. The Landfill OU is not currently managed for ecological purposes and is not expected to be so managed in the future. Current habitat at the site consists of disturbed low-quality habitat areas, and the northwestern drainage swale is characterized by invasive species and currently does not afford a high-quality habitat to aquatic receptors. A current terrestrial ecological exposure to deeper levels of soil radioactivity is likely not occurring. Given the proximity of the site to Two Mile Creek, where better aquatic habitat is available for foraging, the actual use of the northwestern drainage swale by riparian and aquatic receptors is likely to be very limited. Finally, the current swale habitat will likely be altered or could be eliminated (i.e., culvert or tiled) when the Town of Tonawanda closes the landfill thereby making it inaccessible to ecological receptors.

7.3. BASIS FOR ACTION

The response action selected in this ROD is necessary to protect the public health and the environment from actual or potential releases of hazardous substances into the environment.

8. REMEDIAL ACTION OBJECTIVES

The NCP sets forth a requirement to "establish remedial action objectives (RAOs) specifying contaminants and media of concern, potential exposure pathways, and remediation goals" (40 CFR 300.430[e][2][i]). Remedial action objectives are specific goals that remedial alternatives must fulfill to be protective of human health and the environment. The media-specific RAOs provide the basis for selecting remedial technologies and developing and evaluating remedial alternatives.

8.1. IDENTIFICATION OF REMEDIAL ACTION OBJECTIVES

The updated BRA report (USACE 2012a) concluded that FUSRAP-related COCs in soil at the Landfill OU may pose potential unacceptable risk should the Landfill OU not be maintained and allowed to erode over time. Therefore, the RAO developed to address this potential unacceptable future risk to human receptors is to prevent human exposure to FUSRAP-related COCs in soil above applicable or relevant and appropriate requirement (ARAR)-based cleanup goals.

As discussed in the feasibility study (FS), groundwater, surface water, and sediment were all eliminated from further evaluation as media of concern, and therefore media-specific RAOs have not been developed for them.

8.2. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

8.2.1. INTRODUCTION TO APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Section 121(d)(1) of CERCLA requires that upon completion, remedial actions must achieve a level or standard of control that at least attains legally applicable or relevant and appropriate standards, requirements, criteria, or limitations promulgated under federal environmental law. State environmental or facility siting laws may be ARARs under CERCLA if they are (1) promulgated and of general applicability, (2) identified by the state in a timely manner, and (3) more stringent than federal standards.

In addition to federal and state requirements that have been determined to be ARARs, there may be *to be considered* (TBC) criteria, which include proposed rules and nonpromulgated advisories or guidance issued by federal or state governments. The TBC criteria are not legally binding but may be included at the discretion of the lead agency if no federal or state ARAR is available to help determine the necessary level of cleanup for protection of human health and the environment.

Identifying ARARs involves determining whether a requirement applies to physical circumstances of the site and contaminants present, and characteristics of the remedial action.

The following definitions are found in Section 300.5 of the NCP:

> *Applicable requirements* means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.
>
> *Relevant and appropriate requirements* means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not ‘‘applicable’’ to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

Section 121(e) of CERCLA provides that no permit is required for the portion of any removal or remedial action conducted on-site. Although no permit is required, on-site actions must comply with substantive requirements determined to be ARARs.

The USACE did not identify any state environmental or facility siting laws that were consistently applied and more stringent than the federal ARAR listed below. Additionally, USACE did not identify any TBC criteria that would help determine the necessary level of cleanup for protection of human health and the environment.

8.2.2. FEDERAL ARAR – 10 CFR PART 40, APPENDIX A

The Nuclear Regulatory Commission (NRC) regulation, 10 CFR Part 40, Appendix A, establishes technical, financial, ownership, and long-term site surveillance criteria relating to siting, operation, decontamination, decommissioning, and reclamation of licensed uranium and thorium mills and tailings. For a number of reasons, including the fact that the Corps is not a licensee; the landfill is not a licensed site; and residual material will stem from nonlicensed activities, 10 CFR Part 40 is not applicable.

Since the regulation contains some substantive criteria pertaining to the hazardous substances or the circumstances of their suspected release at the Landfill OU of the Tonawanda Landfill Vicinity Property, USACE has determined that parts of 10 CFR Part 40, Appendix A, listed in Table 3, are relevant and appropriate to the cleanup. Specifically, radionuclides found at the site

(radium, thorium, and to a lesser extent uranium) are similar in nature to tailings or wastes produced by the extraction of source material from ores primarily for their source content (i.e., uranium processing activities).

TABLE 3—SELECTED ARARS FOR ALTERNATIVE 3 LANDFILL OU

ARAR	Description
10 CFR Part 40, Appendix A: Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content.	
Criterion 6(6)	Closure of Waste Disposal Areas
Criterion 12	Long-Term Site Surveillance

The relevant and appropriate portions of 10 CFR Part 40, Appendix A, are discussed below. 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, circumstances of their release at the site, or standard of control. In addition, they do not address circumstances sufficiently similar to the Landfill OU of the Tonawanda Landfill Vicinity Property.

10 CFR Part 40, Appendix A, Criterion 6: Criterion 6(6) establishes residual soil concentration requirements for radium in surface and subsurface soil, unless the radon flux limit of 20 $pCi/m^2/s$ in Criterion 6(1) is met.

The design requirements in Criterion 6 for longevity and control of radon releases (i.e., radon flux limit of 20 $pCi/m^2/s$ in Criterion 6[1]) apply to any portion of a licensed and/or disposal site unless the portion contains a concentration of radium in land, averaged over areas of 100 square meters (1076.4 sq ft), which, as a result of byproduct material, does not exceed the background level by more than: (i) 5 picocuries per gram (pCi/g) Ra-226, averaged over the first 15 centimeters (cm) (6-in) below the surface, and (ii) 15 pCi/g of Ra-226, averaged over 15-cm (6-in) thick layers more than 15-cm (6-in) below the surface.

Criterion 6(6) also identifies benchmark dose requirements used to develop cleanup goals for addressing radionuclides other than radium so that:

> Byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose equivalent (TEDE) exceeding the dose from clean-up of radium contaminated soil to the above standard (benchmark dose), and must be at levels which are as low as is reasonably achievable.

Under this approach, dose assessments (excluding radon) are conducted to convert the radium soil standards into a benchmark dose for all the radionuclides at the site. Criterion 6(6) requirements also address the NRC approval of benchmark dose calculations and approval of benchmark doses exceeding 100 millirems per year (mrem/yr). The NRC approval portion of

6(6) is administrative and not an ARAR, and USACE does not require NRC approval in implementing FUSRAP. However, the remaining requirements of Criterion 6(6) are relevant and appropriate for any remedial alternative that involves excavation.

Criterion 6(1) is not identified as an ARAR for Alternative 3 since the selected remedy does not propose the design and construction of a cover to reduce gamma radiation and radon emissions to ensure the protectiveness of the remedy. However, since residual radioactive material will remain above the 15 pCi/g Ra-226 cleanup goal in soil greater than 1.5 m (5 ft) in depth upon completion of the remedial action under Alternative 3, the radon flux limit in Criterion 6(1) would be used to demonstrate compliance with Criterion 6(6).

Criterion 6(1) establishes performance criteria for covers to be placed over tailings or wastes at the end of milling operations. Criterion 6(1) requires waste disposal areas to be closed with a design which provides reasonable assurance of control of radiological hazards to:

(i) Be effective for 1,000-years, to the extent reasonably achievable, and, in any case, for at least 200 years.

(ii) Limit releases of radon-222 from uranium byproduct materials, and radon-220 from thorium byproduct materials, to the atmosphere so as not to exceed an average release rate of 20 picocuries per square meter per second (pCi/m^2s) to the extent practicable throughout the effective design life.

In addition to collecting confirmatory samples within the sidewalls of the excavation and after backfill of these excavations is complete, USACE will conduct verification radon flux sampling of uncapped portions of the Landfill OU during the remedial action. This sampling will ensure residual radioactive material at depth (i.e., greater than 1.5 m [5 ft]) would meet the radon flux limit of 20 $pCi/m^2/s$ at the ground surface.

The USACE estimated that the surface radon emission flux after implementation of Alternative 3 (Targeted Shallow Removal and Off-Site Disposal), and after backfill of the excavations are complete, was 6 $pCi/m^2/s$. This calculated radon flux, which would result from residual FUSRAP-related COCs remaining at a depth below 1.5 m (5 ft) bgs, is well below the 20 $pCi/m^2/s$ limit in 10 CFR Part 40, Appendix A, Criterion 6(1), which is further discussed in Section 9.3 and Appendix E of the FS.

10 CFR Part 40, Appendix A, Criterion 12: Criterion 12 mandates that the final disposition of tailings, residual radioactive material, or wastes at milling sites should be such that ongoing active maintenance is not necessary to preserve isolation. The substantive provisions require annual inspections of closed disposal sites to verify that controls continue to be protective. Periodic inspections are an important component of institutional controls and are considered appropriate.

Although there are some administrative requirements (i.e., all of the reporting requirements) in Criterion 12 that are not ARARs, the remaining substantive requirements, such as the mandatory site inspections, are considered to be relevant and appropriate for containment in place alternatives.

8.3. SELECTED CLEANUP GOALS

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 Landfill OU. As described above, 10 CFR Part 40, Appendix A, includes both performance standards and a mechanism to establish cleanup standards for various radionuclides present at the site. The USACE evaluated the Criteria 10 CFR Part 40, Appendix A, Criterion 6(6), to develop cleanup criteria. Based on the results of the USACE evaluation, the soil removal cleanup criteria for the Landfill OU would be to limit the residual radionuclide concentrations remaining in soils within a 100 m^2 (1,076 ft^2) area to concentrations that shall not exceed 1 for the sum of ratios of these radionuclide concentrations to the associated concentration limits above background.

Constituents of concern include Ra-226, Th-230, and U_{total}. The ARARs related to the soil removal are averaged over 100 m^2 (1,076 ft^2) resulting in the cleanup goals in Table 4.

TABLE 4—CLEANUP GOALS FOR FUSRAP-RELATED COCS AT THE LANDFILL OU

FUSRAP-Related Constituents of Concern	**Units**	**Background**[a]	**Recreational Adult Surface Soil Goal**[b]	**Recreational Adult Subsurface Soil Goal**[b]
Ra-226	pCi/g	0.95	5	15
Th-230	pCi/g	0.92	14	42
U_{total}[c]	pCi/g	1.75	152	457
U-238 as U_{total} surrogate	pCi/g	0.86	75	224

a. Average background values for the Landfill OU (Reference: Table 2-7 of the updated BRA [USACE 2012a]).
b. The depth and area requirements as specified in 10 CFR Part 40 Criterion 6(6). Surface soil is defined as 0–15 centimeters (cm) (0–6 inches [in]) bgs. Subsurface soil is considered to be at depths greater than 15 cm (6 in) bgs. The cleanup goals must be achieved (on average) over a 100 square meter (m^2) (1,076 square feet [ft^2]) area and is limited to the top 1.5 m (5 ft) below ground surface.
c. U_{total} is a sum of the isotopes U-234, U-235, and U-238.

9. DESCRIPTION OF ALTERNATIVES

This section summarizes remedial alternatives developed in the FS for the Landfill OU to address FUSRAP-related soil contamination. Remedial alternatives should ensure adequate protection of human health and the environment, achieve RAOs, and meet ARARs. The alternatives are as follows:

- Alternative 1—No Action
- Alternative 2—Single Layer Capping of FUSRAP-Related Material
- Alternative 3—Targeted Shallow Removal and Off-Site Disposal of FUSRAP-Related Material
- Alternative 4—Deep Excavation and Off-Site Disposal of FUSRAP-Related Material

Figures 6, 7, and 8 present a visual illustration of Alternatives 2, 3, and 4 respectively. The remedial action alternatives are protective of human health and the environment and do not assume action by the landfill owner to install a final landfill cap to complete and enclose the landfill.

Remedial action alternatives 1, 2, 3, and 4 were subjected to a detailed analysis to identify a likely preferred alternative. This analysis consisted of a comparison against nine CERCLA evaluation criteria grouped into three categories: threshold, balancing, and modifying criteria. Threshold criteria (overall protection of human health and the environment, and compliance with ARARs) had to be satisfied for a remedial alternative to be considered a viable remedy. The five balancing criteria (long-term effectiveness and permanence; short-term effectiveness; reduction of toxicity, mobility, and volume through treatment; implementability; and cost) represented the primary criteria upon which the detailed analysis was based. Modifying criteria (state acceptance and community acceptance) were evaluated following comment on the FS and PP and are addressed and presented in the responsiveness summary presented in Appendix A of this ROD.

9.1. ALTERNATIVE 1: NO ACTION

The no-action alternative is considered in the detailed analysis in accordance with requirements as a baseline against which all other alternatives are compared. Under this alternative, no remedial actions would be undertaken to address radiological FUSRAP-related COCs in soil at the Landfill OU of the Tonawanda Landfill Vicinity Property. Engineering and land use controls would not be implemented.

9.2. ALTERNATIVE 2: SINGLE-LAYER CAPPING OF FUSRAP-RELATED MATERIAL

Alternative 2 assumes that the impacted soil exceeding cleanup goals outside of the bounds of the capped portions of the Town of Tonawanda municipal landfill would be capped by USACE using a single-layer cap, which would include layers of vegetation, topsoil, and compacted low-permeability clay. Most materials for the cap would be available from local sources and would be sampled before use to ensure they were not contaminated. The cap would be designed and constructed to minimize the migration of liquids through the cover materials. The cap design would mirror the design currently in use for the Phase 1 capping of the landfill. A 0.15 m (6 in)

layer of "subgrade" is to be placed over the waste before installation of the single-layer cap. This cap will be a 0.6 m (2 ft) thin barrier protection layer with a hydraulic conductivity of less than $1x10^{-7}$cm/s soil layer that reduces the infiltration of precipitation and external gamma radiation and radon emissions from underlying waste. It will also include a 0.15 m (6 in) vegetative soil cover to promote surface runoff from the capped areas, vegetative growth to stabilize the soil cover and protect the underlying barrier protection layer from degradation due to freeze-thaw cracking.

A long-term management plan would be developed to address notification requirements for the property owner for changes in land use, as well as future monitoring and maintenance requirements. The plan would include provisions addressing the process by which property owners can contact the federal government agency responsible for long-term control of impacted areas, as well as provide for periodic reviews, maintenance, and monitoring. The USACE is responsible for monitoring for two years after the remedy is implemented, after which the U.S. Department of Energy's Office of Legacy Management will assume responsibility. To the extent the existing land use restrictions are ineffective at the completion of the remedial action, restrictions limiting the use of the property to industrial commercial uses (negative easement) would be appropriate. A more detailed discussion of the LUCs (administrative, legal, and physical mechanisms) would be developed as part of the long-term management plan including notification requirements for changes in land use. Continued site surveillance would ensure any land use changes or disturbances of contaminated areas are identified throughout the 1,000-year performance period.

Environmental monitoring would be conducted to assess the continued performance of the cap and would include air monitoring for radon. Since contamination would remain on-site, long-term monitoring is assumed to continue for 1,000 years. An effective cap design would minimize direct contact with impacted soils.

Components of this alternative include:

- Remediation work plans.
- Capping.
- Confirmatory sampling.
- Site restoration.
- Long-term management plan.
- Operations and maintenance (O&M).
- Land use controls.

- Environmental monitoring.

9.3. ALTERNATIVE 3: TARGETED SHALLOW REMOVAL AND OFF-SITE DISPOSAL OF FUSRAP-RELATED MATERIAL

This alternative involves the targeted shallow removal of impacted soil above cleanup goals within the first 1.5 m (5 ft) bgs only, and disposal at a permitted off-site disposal facility. The disposal facility assumed in the evaluation of the alternative in the FS is located in Idaho. However, the material from the actual remediation at the Tonawanda Landfill could be disposed of at any appropriately permitted disposal facility. The removal of 1.5 m (5 ft) of soil is the amount of soil that needs to be removed so any erosion of the clean backfill soil remains protective over the 1,000-year assumed remedial life (assumed erosion of 0.1 mm per year for 1,000 years). All removed soils and potentially commingled landfill debris will be screened for contamination in the field, stockpiled, sampled, analyzed, and transported off-site for disposal if found to exceed the established cleanup criteria for the site. Removed soil would be subjected to waste profiling and potential treatment to ensure compliance with the requirements of the off-site disposal facility's waste acceptance criteria and license.

After confirmatory sampling within the sidewalls of the excavation to ensure that the lateral extent of the contamination has been captured, the area would be backfilled and seeded in accordance with the site restoration plan. In addition to collecting confirmatory samples within the sidewalls of the excavation, and after backfilling of these excavations was complete, USACE would conduct verification radon flux monitoring of uncapped portions of the Landfill OU to ensure residual radioactive material at depth (i.e., greater than 1.5 m [5 ft]) would meet the radon flux limit of 20 $pCi/m^2/s$ at the ground surface. Before placement into the open excavations, the backfill material would be tested to ensure the design criteria specified within the RD/RA work plans are met.

Confirmatory sampling and site restoration would progress area by area to minimize erosion, dust generation, and removal of water. The restoration components and configuration would be coordinated with the site owner to ensure general compatibility with the final closure of the landfill.

The USACE is responsible for monitoring for two years after the remedy is implemented, after which the U.S. Department of Energy's Office of Legacy Management will assume responsibility. Continued site surveillance, by the landowner and through the five year review process, would ensure any land use changes or disturbances of contaminated areas are identified throughout the 1,000-year performance period.

Components of this alternative include:

- Remediation work plans.
- Excavation.
- Water collection and control.
- Transportation.
- Off-site disposal.
- Confirmatory sampling.
- Site restoration.

9.4. ALTERNATIVE 4: DEEP EXCAVATION AND OFF-SITE DISPOSAL OF FUSRAP-RELATED MATERIAL

This alternative involves excavating impacted soil above cleanup goals and disposal at a permitted off-site disposal facility. The disposal facility assumed in the evaluation of the alternative in the FS is located in Idaho. However, the material from the actual remediation at the Tonawanda Landfill could be disposed of at any appropriately permitted disposal facility. All excavated soils and potentially commingled landfill debris would be screened in the field for contamination, stockpiled, sampled, analyzed, and transported off-site for disposal if found to exceed the established cleanup criteria for the site. Excavated soil would be subjected to waste profiling and potential treatment to ensure compliance with the requirements of the off-site disposal facility's waste acceptance criteria and license. This alternative would include the installation and operation of four 9.14 m (30 ft) by 0.3 m (12 in) diameter groundwater extraction wells that would be operated during excavation activities to lower/control the groundwater elevation in the vicinity of the excavation.

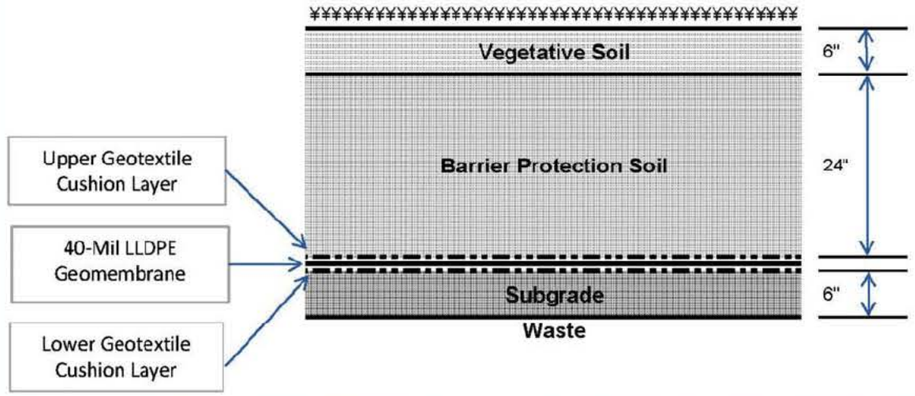
After confirmatory sampling has shown that an excavation area has met cleanup criteria, the area would be backfilled and seeded in accordance with the approved site restoration plan. Before placement, the backfill would be tested to ensure the design criteria are met. Confirmatory sampling and site restoration would progress area by area to minimize erosion, dust generation, and excavation water. The restoration components and configuration would be coordinated with the site owner to ensure general compatibility with future Town of Tonawanda capping actions. The Landfill OU would not require any further long-term action with respect to the FUSRAP-related contamination.

Components of this alternative include:

- Remediation work plans.

- Excavation.
- Water collection and control.
- Transportation.
- Off-site disposal.
- Confirmatory sampling.
- Site restoration.

FINAL COVER SYSTEM
GENERALIZED CROSS SECTION



Legend

- Estimated Extent of Contamination
- Existing Landfill Cap (from GPS)
- Proposed Landfill Cap
- Landfill Operable Unit Boundary

0 100 200 400 Feet

US Army Corps of Engineers Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

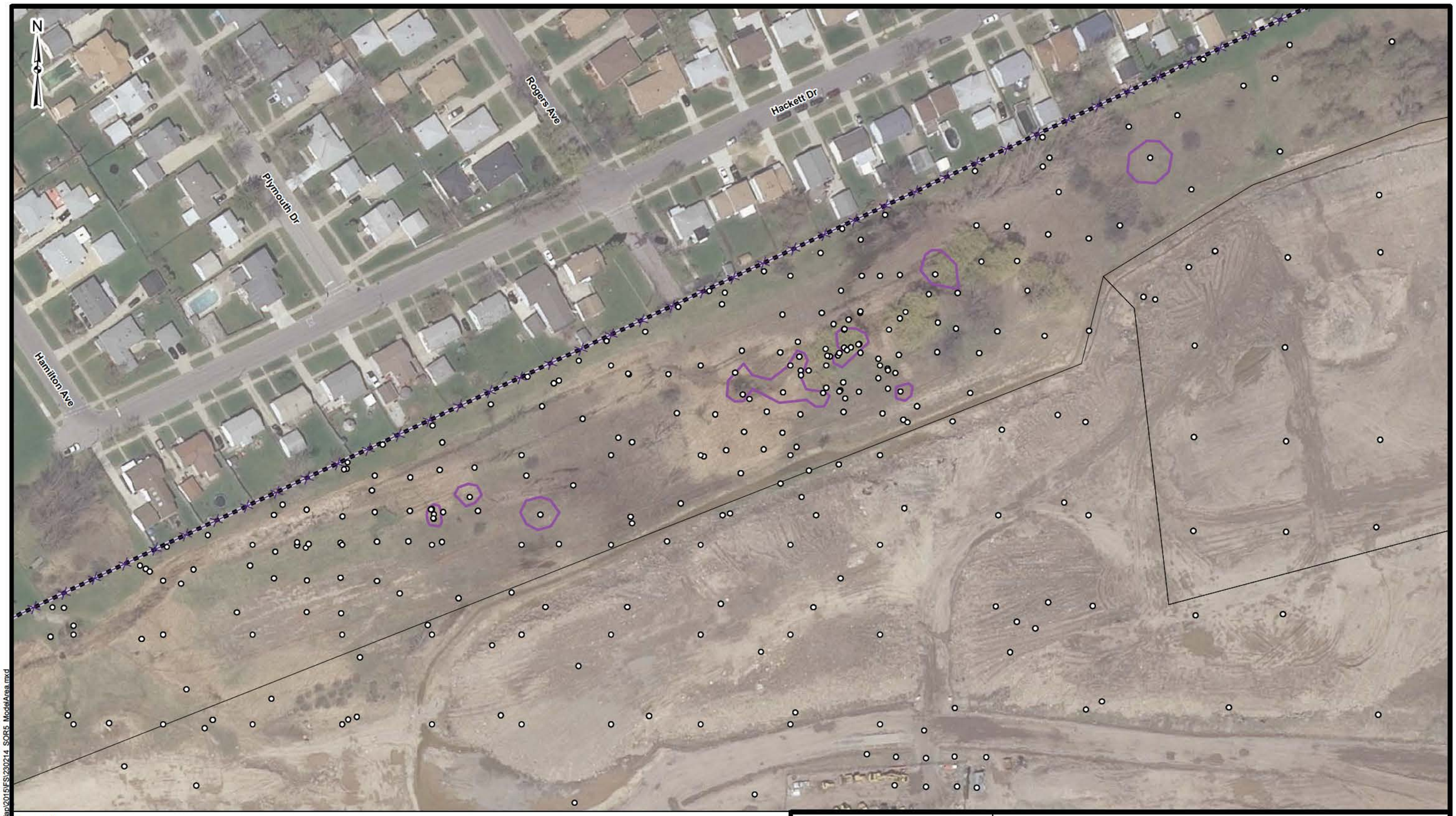
CONCEPTUAL ILLUSTRATION OF ALTERNATIVE 2 SINGLE LAYER CAPPING OF FUSRAP-RELATED MATERIALS

Document Name: 130417_FS_CapExtents.mxd
[redacted]
Date Saved: 23 Sep 2013
Time Saved: 10:44:22 AM

TONAWANDA LANDFILL
FUSRAP VICINITY PROPERTY
TONAWANDA, NEW YORK

FIGURE 6

Document Path: K:\TTLF\GIS\ArcMap\2013\FS_Figures\130417_FS_CapExtents.mxd



Legend

- Soil Sample Location
- Spatial Extent of Excavation
- Town's Landfill Cap (Designed)

Total Volume: 1528.09 yd³

0 50 100 200 Feet

Document Path: K:\TTLFGIS\ArcMap\2015\FS\230214_SOR5_ModelArea.mxd

US Army Corps of Engineers® Buffalo District

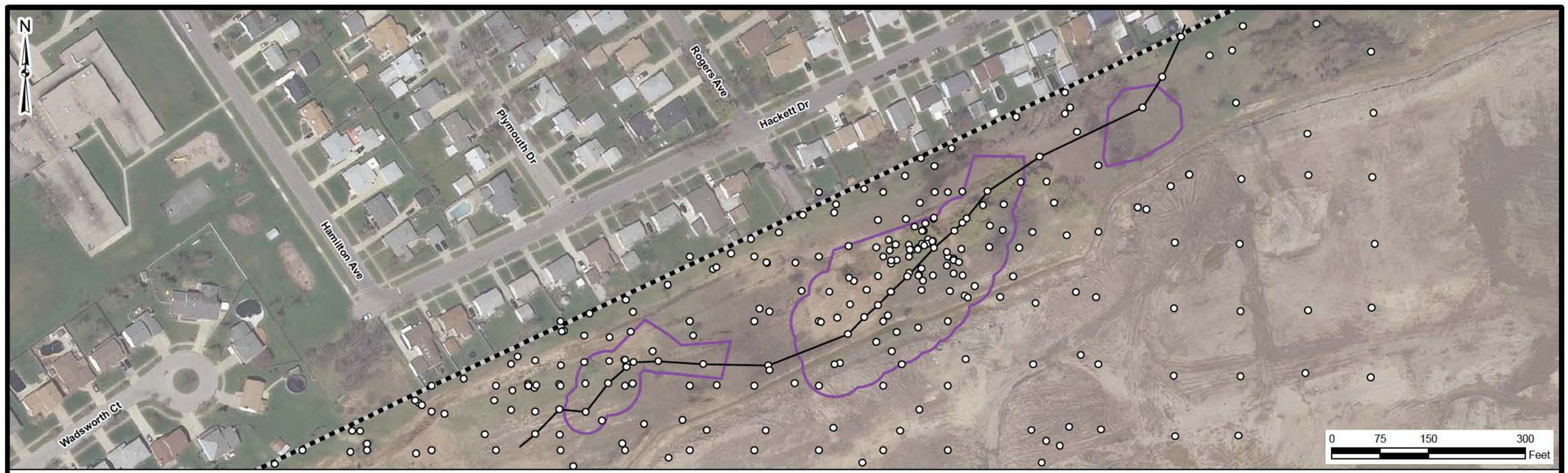
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

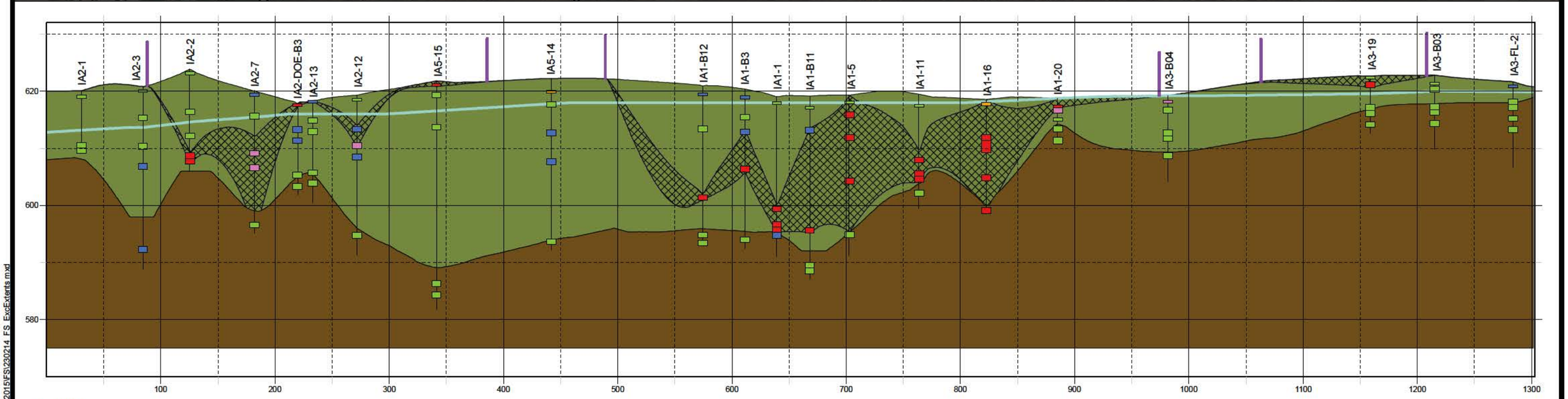
Document Name: 230214_SOR5_ModelArea.mxd
Date Saved: 28 Aug 2015
Time Saved: 7:09:52 AM

CONCEPTUAL ILLUSTRATION OF ALTERNATIVE 3 TARGETED SHALLOW REMOVAL AND OFF-SITE DISPOSAL OF FUSRAP-RELATED MATERIAL

TONAWANDA LANDFILL
FUSRAP VICINITY PROPERTY
TONAWANDA, NEW YORK

FIGURE 7





Legend

- Soil Sample Location
- Spatial Extent of Excavation
- Cross Section Line

Sum of Ratios

- < 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- > 1

- Fill
- Lens of Contamination
- Clay (Native Soil)
- Water Table

Note:
The cross section is drawn at 5X vertical exaggeration.

US Army Corps of Engineers
Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

CONCEPTUAL ILLUSTRATION OF ALTERNATIVE 4 DEEP EXCAVATION AND OFF-SITE DISPOSAL OF FUSRAP-RELATED MATERIAL

Document Name: 230214_FS_ExcExtents.mxd
[redacted]
Date Saved: 28 Jul 2015
Time Saved: 8:11:30 AM

TONAWANDA LANDFILL
FUSRAP VICINITY PROPERTY
TONAWANDA, NEW YORK

FIGURE 8

Document Path: K:\TTLFG\SIS\ArcMap\2015\FS\230214_FS_ExcExtents.mxd

This Page Intentionally Left Blank

10. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 300.430 (e) of the NCP lists nine criteria by which each remedial alternative must be assessed. The acceptability and performance of each alternative against the criteria is evaluated individually so that relative strengths and weaknesses may be identified. Also a comparative analysis among the alternatives is performed to identify the advantages and disadvantages of each alternative relative to one another. Assessments against two of the criteria (overall protection of human health and the environment, and compliance with ARARs) relate directly to statutory findings and therefore are categorized as threshold criteria. The threshold criteria must be satisfied for an alternative to be eligible for selection.

Five of the criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost) represent the balancing criteria upon which much of the analysis is based. These balancing criteria are used to weigh major tradeoffs among alternatives.

The remaining two criteria, state acceptance and community acceptance, are categorized as modifying criteria. The modifying criteria are evaluated following comments on the PP and are addressed in the responsiveness summary presented in Part III of this ROD. The nine criteria are briefly defined as follows:

Overall Protection of Human Health and the Environment

The analysis of each alternative with respect to overall protection of human health and the environment illustrates how the alternative eliminates, reduces, or controls short- and long-term unacceptable risks by controlling exposures to levels at or below the cleanup goals using treatment, engineering controls, or land use controls.

Compliance with Applicable or Relevant and Appropriate Requirements

This means that USACE must consider whether a remedy will meet all of the applicable or relevant and appropriate requirements of federal and state environmental statutes and/or whether there are grounds for invoking a waiver.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence reflect the magnitude of residual risk remaining at the site after remedial efforts are complete, and the adequacy and reliability of controls to manage the risk over the performance period, if appropriate.

Reduction of Toxicity, Mobility, or Volume Through Treatment

The statutory preference is a remedial action that employs treatment or recycling on-site to reduce the toxicity, mobility, and/or volume of the COCs. This evaluation assesses the performance of the alternative in achieving this preference. Relevant factors in this criterion include the quantity of contaminated materials to be treated, destroyed, or recycled; the degree of expected reduction in toxicity, mobility, or volume; the irreversibility of the treatment process;

the type and quantity of residuals remaining after the treatment process; and, the degree to which treatment is used as the principal element of the alternative.

Short-term Effectiveness

The short-term effectiveness criterion addresses how the alternative affects human health and the environment during its implementation. The factors typically assessed include protection of the community during the remedial action, associated environmental impacts, time required until protection is achieved, and protection of workers during the remedial action.

Implementability

Implementability analysis examines the technical and administrative feasibility of implementing the alternative, as well as the availability of necessary goods and services. This evaluation includes the feasibility of construction and operation; the reliability of the proposed technology; the ease of undertaking additional remedial action (if necessary); monitoring considerations; activities needed to coordinate with regulatory agencies; availability of adequate equipment, services, and materials; and, if necessary, the availability of off-site treatment, storage, and disposal services.

Cost

Cost estimates for each alternative include direct and indirect capital costs, and O&M costs. Costs are based on information obtained from a variety of sources, including quotes from suppliers, published cost information from similar previously completed projects, generic unit costs, vendor information, conventional cost-estimating guides and prior experiences at similar sites. The actual cost of the project will depend on actual labor and material charges, actual site conditions, competitive market conditions, final project scope, engineering design, the implementation schedule, and other variables. Present value calculations are widely used to provide a means to compare cash flows at different times. Further details on present value costs are provided in Section 11.5.

State Acceptance

State acceptance of the PP and the preferred alternative are assessed following a review of the public comments received on the PP. State comments on the PP are formally addressed in the responsiveness summary, which are presented in Part III this ROD.

Community Acceptance

This is assessed following a review of the public comments received on the PP. Public comments on the PP are formally addressed in the responsiveness summary, which are presented as Part III in this ROD.

A summary of the relative performance of each alternative against the nine criteria, noting how it compares to other options under consideration, is provided below.

10.1. Overall Protection of Human Health and the Environment

All remedial alternatives, except Alternative 1: No Action, are protective of human health and the environment. If no action is taken and soil at the surface of the Landfill OU is allowed to erode over time, exposing buried FUSRAP-related material, the risks to future recreational users of the site would exceed the NCP acceptable risk range within the 1,000-year evaluation period. Alternative 2, Alternative 3, and Alternative 4 all effectively prevent exposure to FUSRAP-related COCs above cleanup goals.

10.2. Compliance with ARARs

Alternative 1 does not comply with the ARARs. Alternative 2, Alternative 3, and Alternative 4 would comply with ARARs since they meet the ARAR-based performance standards.

10.3. Long-Term Effectiveness and Permanence

The deep excavation and off-site disposal of FUSRAP-related material alternative (Alternative 4) provides the greatest long-term effectiveness because it would remove, for permanent off-site disposal, all soils above ARAR-based cleanup goals. The targeted shallow removal and off-site disposal of FUSRAP-related material alternative (Alternative 3) is effective at reducing exposure, since it would remove all contamination that could possibly become exposed due to natural forces within the 1,000-year evaluation period. The single-layer capping of FUSRAP-related material alternative (Alternative 2) is effective at reducing exposure to soils above ARAR-based cleanup goals, but relies on LUCs, cap maintenance, and environmental monitoring to continue to be protective in the long term. The no-action alternative (Alternative 1) would not be effective in the long term since the contaminated materials would remain at the site and would not be controlled.

10.4. Reduction of Toxicity, Mobility, or Volume through Treatment

None of the alternatives incorporate the treatment of soil to reduce contaminant volume, toxicity, or mobility. However, waste minimization practices (radiological scanning and sorting) and potential treatment of characteristically hazardous waste as required for disposal purposes under Alternative 3 and Alternative 4 may reduce the volume of soil requiring off-site disposal.

10.5. Short-Term Effectiveness

Alternative 1 is rated the highest in short-term effectiveness since there are no actions that would increase the potential for accidental exposure or accidents due to activities on the site as a result of the remedial alternative. Alternative 2 is rated high in short-term effectiveness; Alternative 3 is rated moderate; and Alternative 4 is rated low. The biggest difference in short-term effectiveness is due to the potential for accidents from the removal/excavation and transportation of soil. The potential for exposure to contaminated media, as well as encountering unknown

chemical hazards, odor issues, and nuisance pest issues in the landfill, also increases under soil excavation, handling, and transportation scenarios. With Alternatives 2, 3, and 4, there would be weekly sampling of surface water for off-site chemical and radiological laboratory analysis during remedial action. Surface water sampling and analysis would begin at the start of mobilization and preparatory work, and conclude at the completion of demobilization. Although both involve excavation within the landfill, Alternative 3 is rated higher than Alternative 4 due to the shallower excavation, smaller soil volume being removed, and shorter excavation duration.

10.6. IMPLEMENTABILITY

Alternative 1 is rated the highest in implementability since there are no actions taken. Among the alternatives where action is undertaken, Alternative 3 is rated highest in implementability because removal/excavation and off-site disposal activities use common equipment, materials, and supplies, and are readily implemented. No significant problems related to coordinating remediation activities with the landowner or other agencies are anticipated. Alternative 2 is rated moderate in implementability. No technical difficulties are anticipated for Alternative 2 since most materials for the cap would be available from local sources, and capping activities use readily available resources. However, administrative implementability issues are anticipated for Alternative 2 since it may impede the Town of Tonawanda's ability to comply with 6 NYCRR Part 360-2.13(a)(1), and the town may be required to obtain a waiver. While Alternative 4 uses common equipment and materials like Alternative 3, it is rated low in implementability, due to the high water table in the areas of concern, which could generate significant groundwater control issues during deeper excavations. With the implementation of Alternative 4, there would be increased difficulty in maintaining sidewall stability due to the depth of the excavation and geotechnical uncertainty and variability in the composition of the landfill.

10.7. COST

Among the alternatives where action is undertaken, Alternative 2 has the lowest capital and total present worth costs, but it has the highest annual O&M cost over a duration of 1,000 years. Alternative 4 has the highest capital and total present worth cost, but it has no annual O&M costs. Alternative 3 sits between Alternatives 2 and 4 with respect to capital, annual O&M, and total present worth costs.

10.8. STATE ACCEPTANCE

Two state stakeholders submitted comments on the PP. State comments on the PP are formally addressed in the responsiveness summary, which are presented in Part III of this ROD. State stakeholders expressed concerns about the USACE-preferred remedial alternative, Alternative 3 (targeted shallow removal and off-site disposal of FUSRAP-related material). The NYSDEC has taken the position that only Alternative 4 meets the two threshold criteria of overall protectiveness of human health and the environment and compliance with ARARs, criteria, and guidance; Alternative 3 will not prevent radiological contamination in groundwater from

migrating off-site. As a result, Alternative 4 is NYSDEC's preferred remedial alternative for the Landfill OU. The NYSDEC indicated the following concerns with Alternative 3:

- The NYSDEC stated concerns with uranium in the landfill leachate and its subsequent discharge into the drainage ditch leading off-site or the leachate collection system leading to the sewer.

- The NYSDEC requests additional removal of uranium-contaminated soil to at least below the source material limit (0.05 percent by weight, which translates to about 339 pCi/g for natural uranium or 116 pCi/g for natural thorium) due to the potential for groundwater impacts.

10.9. COMMUNITY ACCEPTANCE

Several community stakeholders submitted comments on the PP. The community stakeholders' comments provide an overwhelming preference for the implementation of Alternative 4: Deep Excavation and Off-Site Disposal of FUSRAP-Related Material. Concerns with the USACE-preferred remedial alternative, Alternative 3: Targeted Shallow Removal and Off-Site Disposal of FUSRAP-Related Material were as follows:

- The public perceives that the best way to protect human health and the environment is deep excavation and off-site disposal of FUSRAP-related contaminants.

- Containment of the FUSRAP-related contaminants would hamper future development within the surrounding areas.

11. SELECTED REMEDY

The remedy selected for the Landfill OU of the Tonawanda Landfill Vicinity Property is Alternative 3: Targeted Shallow Removal and Off-Site Disposal of FUSRAP-Related Materials.

11.1. SUMMARY OF RATIONALE FOR THE SELECTED REMEDY

Based on the administrative record and in accordance with all applicable laws and regulations, USACE selects Alternative 3: Targeted Shallow Removal and Off-Site Disposal of FUSRAP-Related Materials to address FUSRAP-related contamination in soil at the Landfill OU. This alternative satisfies the CERCLA threshold criteria of protectiveness and compliance with selected ARARs. This remedial alternative is more protective than Alternative 4 in the short-term, and is rated higher for long-term effectiveness and permanence than Alternative 2. Alternative 3 is ranked highest for implementability.

The USACE concluded that Alternative 3, Targeted Shallow Removal with Off-Site Disposal of FUSRAP-Related Materials, is the best remedy for the following reasons:

- Alternatives 2, 3, and 4 all provide equal long-term protection and reliability since they all include the containment of the FUSRAP-related contaminants either at an off-site disposal facility or at the Landfill OU. All containment of FUSRAP-related contaminants, including at the site, will be subject to long-term governmental controls related to a permanently closed waste disposal facility.

- None of the alternatives use treatment to reduce toxicity, volume, or mobility. All three alternatives rely on containment to eliminate toxicity and mobility, and so the three alternatives are considered equal for this criterion.

- The short-term effectiveness of Alternative 3 is greater than that of Alternative 4 since the depth of excavation and duration of implementation is less, and there is less potential exposure to workers, the public, and the environment. Alternative 2 does have a higher short-term effectiveness due to the lack of excavation.

- The implementation of Alternative 3 is simpler and poses no greater risks when compared to the other alternatives. Alternative 4 ranks lower in both implementability and short-term effectiveness due to the depth and size of the excavations. There is increased difficulty of keeping deep excavations dewatered and geotechnically stable, and managing the collected water and volume of material being removed.

- Alternative 3 is the most cost effective with a cost proportional to its overall effectiveness.

In choosing Alternative 3 as the preferred alternative, USACE has considered the nature of waste within the Tonawanda Landfill. The FUSRAP-related contaminants are not found in a discrete, well-defined layer, but are distributed irregularly in the subsurface in a configuration that includes accessible shallow zones and poorly accessible deeper zones that are also overlain by nonimpacted landfill material and thus buffered from long-term exposure. The areas to be excavated under Alternative 3 contain FUSRAP-related materials that could become exposed to the public within the 1,000 period of performance of the remedy.

Based on the evaluation of the factors discussed above, USACE has concluded there is no basis for changing the preferred remedy from Alternative 3: Targeted Shallow Removal and Off-Site Disposal of FUSRAP-Related Materials. This alternative is protective of human health and the environment and is consistent with EPA's presumptive remedy for CERCLA municipal landfill sites by preventing direct contact with (or exposure to) residual FUSRAP-related COCs in soils at depths greater than 1.5 m (5 ft) bgs.

11.2. DESCRIPTION OF SELECTED REMEDY

Alternative 3 involves the targeted shallow removal of FUSRAP-related contaminants that exceed the cleanup criteria within the top 1.5 m (5 ft) bgs, with disposal at an appropriate off-site disposal facility. Materials not containing FUSRAP-related materials and any clean soils will be left for disposition by the property owner, or used as backfill with concurrence of the property owner and NYSDEC.

Perimeter air monitoring and water control measures will be conducted during excavation activities for the health and safety of workers. Any soil will be subjected to confirmatory soil sampling to meet the cleanup criteria. Dust suppression and erosion control measures will also be implemented as needed during the remedial action to protect the workers and minimize airborne migration of radionuclides (or other hazardous contaminants). Site access restrictions and environmental monitoring will be maintained throughout the remedial action.

Under the chosen remedial alternative, approximately 1,518 cubic meters (m^3) (1,986 cubic yards [yd^3]) of FUSRAP-related material will be removed and shipped off-site for disposal. The excavated areas will be backfilled, graded for proper surface water control, and seeded. This will eliminate any exposure to FUSRAP-related material and ensure the protectiveness of the remedy for the long term for the land uses contemplated in this ROD.

As required under CERCLA, implementation will include review of site conditions and remedy integrity every five years to ensure that the remedy, remain protective of human health and the environment. The estimated construction cost of Alternative 3 is $10,341,038, and the estimated annual O&M cost is $62,237. The estimated total present worth cost of Alternative 3 is $12,157,626.

11.3. REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN

The USACE will develop a remedial design/remedial action (RD/RA) work plan to describe how it will implement this ROD. Therefore, the RD/RA work plan will provide an evaluation, design, and implementation plan for the removal and restoration/backfill at the site. The remedial design and construction is dependent on available funding, which may increase the period between signing of this ROD and implementation of the remedy.

The backfill, runoff, erosion control, post closure inspection, and remediation compliance design details will be detailed in the RD/RA work plan. Surface drainage diversions as appropriate will be augmented, designed, and constructed to expeditiously route stormwater runoff to the water drainage systems during remediation activities and minimize the potential for precipitation to infiltrate the open excavations. Periodic site inspections will be performed to monitor and maintain the selected remedy.

A long-term management plan also will be developed as part of the RD/RA work plan. The long-term management plan will cover, five-year reviews, notification and coordination, community relations, activity schedules, and reporting. Maintenance of the cover material and vegetation may take place as warranted by site conditions. If the landfill owner is no longer

required to operate, maintain, or monitor the site as currently required by state regulatory requirements, the federal government will evaluate the necessity of operating, maintaining, and monitoring the site to ensure protectiveness of human health and the environment.

11.4. FUTURE PROTECTIVENESS

Alternative 3 is protective of human health and the environment for current and reasonably anticipated future use. After removal of FUSRAP-related contaminated materials from the site, all excavated areas will be restored to their original topography and vegetation. Since contamination will be left behind above levels that would allow unlimited use and unrestricted exposure, full reviews of the site will take place at least every five years. These reviews will consider any change to land use and any change to protectiveness at the site.

11.5. COST ESTIMATE FOR THE SELECTED REMEDY

The estimated capital cost to implement Alternative 3 is $10,341,038, and the estimated annual O&M cost is $62,237. The capital costs include preparation of a remedial design work plan, excavation, confirmatory sampling, transport, off-site disposal, site restoration, and preparation of a remedial action completion report and long-term management plan. The O&M costs include the cost for performance of regular inspections and conducting five-year reviews. The estimated total present worth cost of Alternative 3 is $12,157,626. Detailed cost-estimate information can be found in Appendix D of the FS.

It should be noted that these cost estimates are order-of-magnitude engineering cost estimates that are expected to be within +50 to –30 percent of the actual project cost. These cost estimates are based on the best available information regarding the anticipated scope of the selected remedy. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedy.

11.6. ESTIMATED OUTCOMES OF SELECTED REMEDY

This section presents the expected outcomes of the selected remedy in terms of resulting land uses and risk reduction achieved as a result of the selected response action.

- Following completion of the remedy, the Landfill OU would be protective for long-term use under the most reasonable future land use assumptions (i.e., for recreational users of the site).

- Future residential use of the Landfill OU would not be appropriate because the site is a municipal landfill. Provisions for periodic inspections of the remedy will be necessary.

- After completion of the soils remedy, human health risks posed by soil at the site will be significantly reduced.

- Cleanup levels for soil COCs are presented in Table 4. Cleanup levels for the individual contaminants in soil were selected based on the ARARs. Since targeted removal will not remove all soil on-site with COCs above the cleanup levels, reviews of the site will occur no less often than every five years.

12. STATUTORY DETERMINATIONS

The selected remedy, Alternative 3: Targeted Shallow Removal and Off-Site Disposal of FUSRAP-Related Material, satisfies the statutory requirements of Section 121 (b) of CERCLA as follows:

- The remedy must be protective of human health and the environment.
- The remedy must comply with ARARs or define criteria for a waiver.
- The remedy must be cost effective.
- The remedy must use permanent solutions and alternative treatment technologies to the maximum extent practicable.

The manner in which the selected remedy satisfies each of these requirements is discussed in the following sections.

12.1. PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative 3 is protective of human health and the environment. Removing radiologically contaminated soil exceeding cleanup goals within the first 1.5 m (5 ft) bgs would limit exposure risk to contaminated soil to within acceptable levels, remove the contaminated soils that could potentially be exposed in the future via erosion, and limit potential exposure to residual FUSRAP material below a depth of 1.5 m (5 ft) bgs.

12.2. COMPLIANCE WITH ARARS

The objective of the selected remedy at the Tonawanda Landfill Vicinity Property is to prevent potential future exposure to FUSRAP-related contamination that would result in an unacceptable hazard to human health. This potential future exposure is based on the natural erosion of the top 0.9 m (3 ft) of the current landfill surface over the 1,000-year evaluation period, resulting in future recreational site user exposure to the 0.6 m (2 ft) of those soils beneath, which contain FUSRAP-related contamination.

The selected remedy achieves the level of necessary protectiveness from this potential future exposure by removing FUSRAP-related contamination in the top 1.5 m (5 ft) of site soils to levels that will be protective of human health for the reasonable future site user. Although not directly applicable to the Landfill OU, Criterion 6(6) of 10 CFR Part 40, Appendix A, establishes residual soil concentration requirements for radium, as well as benchmark dose requirements for

radionuclides other than radium, which were developed to be protective of human health. Alternative 3 would comply with Criterion 6(6) within the first 1.5 m (5 ft) bgs since soils with FUSRAP-related COCs exceeding Criterion 6(6)-based remediation goals would be removed and disposed of off-site and the excavation would be backfilled and seeded in accordance with an approved site restoration plan. The USACE would collect confirmatory samples within the sidewalls of the excavation to ensure that the lateral extent of the FUSRAP-related COCs would comply with the Criterion 6(6)-based remediation goals within the first 1.5 m (5 ft) bgs.

Criterion 6(1) is not identified as an ARAR for Alternative 3 since the selected remedy does not propose the design and construction of a cover to reduce gamma radiation and radon emissions to ensure the protectiveness of the remedy. However, since residual radioactive material will remain above the 15 pCi/g Ra-226 cleanup goal in soil greater than 1.5 m (5 ft) in depth upon completion of the remedial action under Alternative 3, the radon flux limit in Criterion 6(1) would be used to demonstrate compliance with Criterion 6(6) and ensure protectiveness.

As detailed in Appendix E of the FS (USACE 2015a), USACE estimated that the surface radon emission flux, after implementation of Alternative 3, and after backfill of the excavations are complete, was 6 pCi/m^2/s. This calculated radon flux, which would result from residual FUSRAP-related COCs remaining at a depth below 1.5 m (5 ft) bgs, is well below the radon flux limit of 20 pCi/m^2/s in 10 CFR Part 40, Appendix A, Criterion 6(1) that would be used to demonstrate compliance with Criterion 6(6).

Alternative 3 would comply with Criterion 6(12) since annual site inspections would be conducted throughout the project life to ensure that the remedy remains effective.

12.3. COST EFFECTIVENESS

Cost effectiveness is an evaluation of whether the overall remedy cost is proportional to its effectiveness (NCP Section 300.430[f][1][ii][D]). The selected remedy must first meet the two CERCLA threshold criteria, and then should have the best balance of the five balancing criteria, including cost. Alternative 3 is considered cost effective because it provides the best balance of effectiveness, permanence, and cost of the remedial alternatives evaluated and meets the two CERCLA threshold criteria.

12.4. UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES

The selected remedy represents the maximum extent to which permanent solutions and treatment are practicable. Possible treatment of any kind is very limited for radioactive contamination.

12.5. PREFERENCE FOR TREATMENT AS A PRINCIPLE ELEMENT

The selected remedy does not satisfy the statutory preference for treatment as a principal element of the remedy (NCP §300.430[f][5][ii][F]). However, Alternative 3 may require treatment of characteristically hazardous waste for disposal purposes.

12.6. FIVE-YEAR REVIEW REQUIREMENTS

Under CERCLA Section 121 (c), a five-year review is required for remedial actions conducted at sites where hazardous substances, pollutants, or contaminants are above levels that allow for "unlimited use and unrestricted exposure."

Five-year reviews are performed in a manner consistent with the CERCLA Section 121 (c) and the NCP (40 CFR 300).

Five-year CERCLA reviews will be performed at the Landfill OU in accordance with applicable laws and regulations following remedial action. The five-year review process integrates information taken from decision documents and operation data with experiences of those responsible for and affected by actions at the site.

The five-year CERCLA review will determine whether the remedy remains protective of human health and the environment. The USACE will be responsible for five-year reviews until the Landfill OU is transferred to DOE following remedial construction. The DOE's Office of Legacy Management will be responsible for the five-year reviews after that point.

13. DOCUMENTATION OF SIGNIFICANT CHANGES

Implementation of land use controls was specified as part of Alternative 3 in the Proposed Plan. As described in Section 6, based on current and future zoning and planned land use, the reasonable future land use is recreational. Once implemented, Alternative 3 is protective for this future land use, so implementation of land use controls is not necessary. The federal government will monitor protectiveness of the remedy to ensure any land use changes or disturbances of contaminated areas are identified throughout the 1,000-year performance period.

14. REFERENCES

Bechtel National, Inc. (BNI) 1993. *Remedial Investigation Report for the Tonawanda Site, Tonawanda, New York*. Bechtel National, Inc., February 1993.

BNI 1995. Technical memorandum from Joann Sims, BNI Oak Ridge, TN (Tonawanda Landfill Field Sampling Results) to Eric T. Newberry, BNI Oak Ridge, TN, October 9.

Malcolm Pirnie 1999. *Landfill Closure Investigation*, Malcolm Pirnie, Inc., February 1999.

New York State Department of Environmental Conservation (NYSDEC) 2007. *Site Visit Report, Town of Tonawanda Landfill Neighboring Properties*. Division of Solid and Hazardous Materials, Bureau of Hazardous Waste and Radiation Management, Radiation Section, May 15, 2007 – June 13, 2007.

NYSDEC 2008. *Town of Tonawanda Landfill Vicinity Residential Sump Water Testing Report*, Division of Solid and Hazardous Materials, Region 9, August 2008.

Oak Ridge National Laboratory (ORNL) 1990. *Results of Mobile Gamma Scanning Activities in Tonawanda, New York*, Measurements Applications and Development Group, Oak Ridge, TN. December.

ORNL 1992. *Results of the Radiological Survey at the Town of Tonawanda Landfill, Tonawanda, New York* (TNY001), ORNL/RASA-92/12, Measurements Applications and Development Group, Oak Ridge, TN. October.

Town of Tonawanda 2015. *Town of Tonawanda 2014 Comprehensive Plan Update. January.*

United States Army Corps of Engineers (USACE) 1999. *Technical Memorandum. Radiological Human Health Assessment for the Town of Tonawanda Landfill, Tonawanda, New York.* USACE Buffalo District, February.

USACE 2005. *Remedial Investigation Report Tonawanda Landfill Vicinity Property, Tonawanda, New York.* USACE Buffalo District, April.

USACE 2007a. *Proposed Plan for the Tonawanda Landfill Vicinity Property Site, Tonawanda, New York*. USACE Buffalo District, January.

USACE 2007b. *Transcript of Public Meeting for the Proposed Plan for the Tonawanda Landfill Vicinity Property, Tonawanda High School, Tonawanda, NY April 25, 2007*, USACE Buffalo District, April.

USACE 2008b. *Record of Decision for the Mudflats Operable Unit of the Tonawanda Landfill Vicinity Property, Tonawanda, NY*. USACE Buffalo District, September.

USACE 2011. *Final Report for the Phase 2 Remedial Investigation at the Tonawanda Landfill FUSRAP Vicinity Property in Tonawanda, NY*, USACE Buffalo District, February.

USACE 2012a. *Updated Baseline Risk Assessment for the Landfill Operable Unit of the Tonawanda Landfill Vicinity Property, Tonawanda, NY*. USACE Buffalo District, June.

USACE 2012b. *Tonawanda Landfill Vicinity Property Environmental Monitoring Data Release, 2012 Sampling Event, Tonawanda, NY*, USACE Buffalo District, December.

USACE 2014. *Tonawanda Landfill Vicinity Property Environmental Monitoring Data Release, 2013 Sampling Event, Tonawanda, NY*, USACE Buffalo District, April.

USACE 2015a. *Feasibility Study Report for the Landfill Operable Unit of the Tonawanda Landfill Vicinity Property, Tonawanda, NY.* USACE Buffalo District, September.

USACE 2015b. *Proposed Plan for the Landfill Operable Unit of the Tonawanda Landfill Vicinity Property, Tonawanda, NY.* USACE Buffalo District, September.

United States Army Geospatial Center (USAGC) 2009. *Tonawanda Landfill and Mudflats Area Geographic Information System-Based Historical Photographic Analysis.* April 2009.

United States Department of Defense, U.S. Department of Energy, U.S. Environmental Protection Agency, and the U.S. Nuclear Regulatory Commission (DOD, et.al.) 2000, *Multi-Agency Radiation Survey and Site Investigation Manual* Revision 1. August.

United States Department of Energy (DOE) 1992. Document No. 098386, *Memorandum – Designation of Tonawanda Vicinity Properties*. U.S. Department of Energy. December.

United States Environmental Protection Agency (U.S. EPA) 1990. *National Oil and Hazardous Substances Pollution Contingency Plan*, Final Rule, FR Vol. 55, No. 46, available from U.S. Government Printing Office, Washington, D.C. U.S. EPA 402-R-99-004(A&B). March 8, 1990.

U.S. EPA 2008. *Child-Specific Exposure Factors Handbook*, EPA/600/R-06/096F, September 2008 www.epa.gov/ncea

Wehran 1994. *Town of Tonawanda Landfill—Draft Closure Plan*. March 1994.

This page is intentionally left blank.

PART III: RESPONSIVENESS SUMMARY

INTRODUCTION

The responsiveness summary serves the dual purpose of (1) presenting stakeholder concerns about the site and preferences regarding remedial alternatives, and (2) explaining how those concerns were addressed and how stakeholder preferences were factored into the remedy selection process.

RESPONSE TO COMMENTS

1. UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 2

The U.S. EPA Region 2 provided comments in a letter to USACE during the public comment period. The comment letter is attached in the appendix. This section provides the U.S. EPA Region 2 comments and the USACE responses to comments as numbered in the letter.

Comment 1: As has been stated by others previously, it is not clear why a trespasser scenario and not a resident intruder has been used.

> Response 1: Using the CERCLA process, USACE identified the critical group based on the most likely future land use of the site according to the Town of Tonawanda's proposed future land use plan. Because the site houses a NYSDEC-regulated landfill and is identified for potential future recreational use, USACE did not explicitly evaluate someone living on the Landfill OU (i.e., a residential receptor). The reasonable future land use of the landfill would preclude residential use. However, please note that the amount of time USACE assumed the trespasser/recreational user to spend outdoors on the Landfill OU is commensurate with the EPA's recommended outdoor exposure time for a resident (e.g., 2 hours per day). In other words, although building a home directly on the landfill was not considered, the landfill was considered an extension of the backyards of the neighboring community since there is evidence that this is how the landfill is currently being used. Therefore, the exposure assumed in the baseline risk assessment is reasonably conservative so as to protect the neighboring residents.

Comment 2: The Feasibility Study uses the term 'natural erosion' (FS p. 14 and elsewhere). Yet on Page 45, the Baseline Risk Assessment states: "In the landfill there is evidence of the following trespasser activities: walking, riding dirt bikes, and building tree forts and fire pits. This evidence was noted especially in the area along the fence line and also in the vicinity of the stand of willow trees within the Landfill OU." It is not clear how these activities can be considered natural erosion. Would modeling more aggressive use of the site result in increased doses and therefore changes in the compliance characteristics of the different alternatives?

Response 2: The recreational activities identified in the comment are not considered natural erosion, and are activities that are currently prohibited by current land use controls already in place by the owners of the property, the Town of Tonawanda. While more aggressive use of the site would potentially result in the possibility of disturbing material down to where the FUSRAP material is currently buried (approximately 2 feet) with the implementation of the Alternative 3 this depth would be increased to approximately 5 feet. These types of uses of the site, including the use of dirt bikes, are not expected to disturb the ground surface down to this depth. Additionally with the projected future land use being activities that do not include aggressive use, changes in compliance characteristics of the alternatives are not required.

Comment 3: The activity during the 1,000 year post-closure period is not described uniformly. In some cases it is described as monitoring and maintenance and in others just a monitoring program. While both seem to include the 5 year review period, it is not clear if the other O&M Activities are the same. See for example Proposed Plan Page 11 in the Feasibility Study Pages xi and xiii. Please clarify the differences, if there are any, or use the same wording to describe identical activities.

Response 3: Alternative 3 requires regular site inspections as part of five-year reviews to ensure that no activities are occurring on-site that would create an exposure pathway to the buried FUSRAP-related materials, such as excessive use of a trail by motorized bikes or construction. Any disturbances or loss of integrity of the cover material would be corrected and repaired to the original restored site conditions

Comment 4: Since the Department of Energy will be doing the Legacy Management for this site, it is appropriate that 40 CFR 61 National Emission Standards for Hazardous Air Pollutants be considered. This should not be an issue since it is already being used elsewhere by the Buffalo District.

Response 4: The USACE looked at 40 CFR 61 during the FS as an ARAR for the Landfill OU; it is evaluated in Appendix B of the FS. However, it was determined not to be applicable since the Landfill OU is not a federally owned facility, nor was it a disposal site that was licensed by the NRC. Additionally, after remedial actions take place at the site, the FUSRAP-related materials would be in a condition that meets the long-term stabilization definition of 40 CFR 61. The USACE will conduct verification radon flux monitoring of the uncapped portions of the Landfill OU to ensure residual radioactive materials at depth (i.e., greater than 1.5 m [5 ft]) would meet the radon flux limit of 20 $pCi/m^2/s$ to ensure that the remedy is in compliance with the selected ARARs for the site.

2. NEW YORK DEPARTMENT OF HEALTH

Comment: New York State Department of Health does not recognize the effectiveness of institutional controls or maintenance of physical barriers beyond a period of 100 years from initial establishment. Any dose assessments beyond 100 years should be based on

unrestricted public access to the area. In the case of a RESRAD assessment of radiation dose, this would mean using the "resident farmer" scenario for dose assessment.

Response to Comment: The USACE selected the scenarios based on the most likely future land use of the site according to the Town of Tonawanda's proposed future land use plan in accordance within CERCLA and the NCP (42 USC 9601 et seq, 40 CFR 300). Because the site is a closed, regulated landfill, a resident farmer scenario (i.e., a residential receptor) was not explicitly evaluated since the reasonable future land use of the landfill would preclude this use.

3. NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

The NYSDEC provided comments in a letter to USACE during the public comment period. This comment letter is in the report appendix. This section provides the NYSDEC comments and the USACE responses to NYSDEC's comments as presented in the letter.

Comments on the Feasibility Study Executive Summary

Remedial Action Alternatives

Executive Summary Comment 1: The document proposed four remedial action alternatives, including no action, single-layer capping of FUSRAP-related material, targeted shallow removal and off-site disposal of FUSRAP-related material, and deep excavation and off-site removal of FUSRAP-related material. The preferred alternative selected was shallow removal and off-site disposal. Under this alternative impacted soil with FUSRAP-related constituents of concern exceeding preliminary remediation goals would be excavated to a depth of five feet from ground surface and transported off-site for disposal, and the excavation would be backfilled with non-impacted soils. This would still leave deeper soils with FUSRAP constituents in place. There was no discussion of the alternative of shallow removal and capping by the Corps with an engineered cap to address future infiltration of precipitation into the deeper-in-place soils which still contain FUSRAP contamination. Did the Corps look at this combined alternative in terms of minimizing further migration of FUSRAP contamination over the long term? Did the Corp [sic] account for Part 360 cap? Even if a Part 360 cap is placed over this area, the Part 360 cap may not be adequate for a 1000-year post-closure monitoring period. In addition, the town of Tonawanda has not prepared a closure plan for the FUSRAP area, pending a record of decision by the Corps.

Response Executive Summary Comment 1: The USACE believes that a partial excavation and capping alternative would be no more protective of human health and the environment than a capping-only alternative or shallow removal alternative with backfilling with clean fill to grade. The USACE intends to use a low-permeability backfill and grading soil that will serve to minimize migration of liquids through the overburden material, as well as reduce external gamma radiation and radon emissions. After reviewing the contents of the regulation, USACE determined 6 NYCRR 360 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. Nor did USACE rely on the Part 360 cap to ensure the protectiveness of the selected remedy.

Executive Summary Comment 2: Table 1, which compares remedial alternatives for soil, characterizes the ability to implement alternative 4 (deep excavation and removal) as low. Is this due to the issue of the high groundwater table and need for dewatering in a deep excavation, or are other factors affecting this determination?

Response Executive Summary Comment 2: Yes, this is due to the issue of the high water table (2 to 7 feet below grade) and the need for dewatering in a deep excavation, as well as due to the presence of loose landfill material. The geotechnical conditions in the deeper landfill material (i.e., high compressibility, with loosely packed and highly porous texture) and the saturated nature of the deeper material would not appear amenable to controlled excavation. This would present a greater risk to worker safety in the excavation due to potential sidewall slumping/sloughing and would require more extensive excavation cutbacks and/or sidewall shoring. The possible slumping of excavation walls dug into the landfill would also present a greater chance for the mixing of uncontaminated sidewall soils with contaminated soils in the excavation, which would then require a sorting technology to screen the mixed excavation material. Additionally, the use of sheet pile as shoring to dam the excavation areas would preclude radiologically screening the pit walls for contamination that is not delineated. These challenges warrant a low rating for implementability.

Executive Summary Comment 3: Under alternative 3 (targeted shallow removal) what does the statement "Does not create impacts to 100 foot buffer" mean? It appears that solid waste occurs almost up to the property line on the north. Also the property line is a somewhat arbitrary boundary. Is the Corps sure that some FUSRAP waste does not extend beyond the property boundary at depth? If other waste has to be pulled back from the 100 foot buffer, how will this affect the Corps plans with respect to the FUSRAP waste?

Response Executive Summary Comment 3: Based on the boring logs from the soil investigations that USACE conducted at the landfill in 2001 and 2010, the area of the landfill along the fence line contains native soil or soil-like fill, but not landfill waste. In addition, a review of historical aerial photographs indicates that FUSRAP-related material coincides with areas of the landfill disturbed in the 1950s. Please see Figure 3 of Appendix A of the 2015 feasibility study or Figure 2-5 of the 2012 baseline risk assessment report (which also provides the location of the landfill boundary) for a display of soil samples exhibiting elevated radioactivity superimposed on a 1951 aerial photograph of the site. Available data suggests that Alternative 3 will not leave FUSRAP-related material above remediation goals at any depth within the 100-foot buffer. As stated in Section 3.5.7 of the FS, the restoration components and configuration (of the FUSRAP remedial action) would be coordinated with the site owner to help

ensure general compatibility with the final landfill closure plan by the Town of Tonawanda.

Section 1.0 Introduction

Section 1.0 Comment 1: The report should explain what triggered the DOE's radiological survey of the landfill in 1991. According to the March 2002 Closure Investigation Report prepared by Malcolm Pirnie, waste byproducts from the production of uranium were contained in stream sediment dredged from Two Mile Creek and disposed of in a different portion of the landfill (page 1-3).

Response Section 1.0 Comment 1: The purpose of the survey was to determine if radioactive materials from work performed under government contract at the Linde Air Products Division of Union Carbide Corporation, Tonawanda, New York, had been deposited in the landfill. However, USACE has not found any substantiated documentation on how the material made it into the Landfill OU.

Section 1.0 Comment 2: The report notes that the proposed Phase 2 cap slightly overlaps the "modeled extent of the area impacted by FUSRAP-related material." Since the FUSRAP perimeter fence appears to be the northern boundary of "Phase 2," this implies that the FUSRAP waste extends south of the perimeter fence. Is this the case? Will the potential placement of a town cap in this area create an issue with respect to the selection of the proposed remedial alternative of targeted shallow soil removal?

Response Section 1.0 Comment 2: Figure 3 of the FS shows the total modeled extent of the FUSRAP waste in conjunction with the planned location of the Phase 2 cap. The FUSRAP waste appears to extend south of the perimeter fence that was erected by the Town. However, under Alternative 3, the proposed excavation footprint for FUSRAP waste does not overlap with the Phase 2 cap as shown in Figure 4 of this ROD. Also, see the response to NYSDEC Comment 4 to Appendix C of the FS.

Section 1.0 Comment 3: The report also quotes a previous NYSDEC comment on the Corps 2007 proposed plan. The NYSDEC comment stated that in order to provide a 100-foot buffer between the deposited solid waste and the property line, all of the MED wastes in Areas A and B of the landfill would have to be excavated. Does preferred Alternative 3 accomplish this?

Response Section 1.0 Comment 3: Alternative 3, as presented in the FS, would not remove all of the FUSRAP-related material in the previously designated Areas A and B of the landfill. It should be noted that the areas previously designated Areas A and B of the landfill in the 2007 proposed plan do not fall completely within the 100-foot buffer zone. Also, based on USACE sampling and modeling, Alternative 3 will remove all of the FUSRAP-related material above cleanup goals within the designated 100-foot buffer zone.

Section 1.0 Comment 4: The report states that the Corps' 2012 baseline risk assessment utilized the data from the Corps' 2009–2011 dataset. Does this mean the previous data obtained by the DOE and the Corps in 1991, 1994, and 2001 was not included? If so, would any of the conclusions have changed as a result of including the historic data?

Response Section 1.0 Comment 4: The earlier data obtained by the DOE in 1991 and 1994, as well as the Corps of Engineers' 2001 sampling results, were not used in the 2012 baseline risk assessment. As discussed in Sections 1.4.3.2 and 1.4.4 of the 2012 baseline risk assessment, including the DOE's earlier data in the 2012 baseline risk assessment would not change any of the conclusions of the 2012 risk assessment. If the baseline risk assessment considered only the 2001 USACE data, the Corps of Engineers would have concluded that the risks to people spending time on the landfill were within the U.S. EPA's acceptable risk range. The soil data set from 2009–2011 used in the 2012 baseline risk assessment was more comprehensive than any of the previous sampling events. While that latest sampling event did confirm the DOE's earlier elevated results, it also expanded the area identified to contain FUSRAP-related material in the landfill. The DOE did not analyze soil samples via alpha spectroscopy, and some of the detection limits obtained for some radionuclides (e.g., thorium-230) were too high to make the data very reliable. However, as seen in Table 2 of the FS, the maximum detected concentrations of all constituents in soil in the 2009–2011 USACE sampling event were similar to the maximum detected concentrations detected by DOE in 1991 and 1994.

Section 1.0 Comment 5: The 2012 baseline risk assessment concluded that uranium was migrating in groundwater to the northern drainage ditch at levels above drinking water standards. How will the targeted shallow removal of FUSRAP materials mitigate this situation (even if the Corps concludes that the exposure risk is not an issue since the water is not being ingested)?

Response Section 1.0 Comment 5: Alternative 3 may mitigate the migration of uranium in leachate to the drainage ditch because USACE intends to use low-permeability fill and positive gradient to promote surface runoff, which may result in less base flow to the drainage ditch from leachate. The site surface water sources are not a sustainable drinking water resource due to the intermittent (or ephemeral) nature of the surface water flow (i.e., the site surface water drainage is designed for stormwater control).

Section 1.0 Comment 6: The report states that the Corps of Engineers 2012 and 2013 groundwater, surface water, and sediment sampling in 2013 revealed the presence of uranium in the northern drainage ditch offsite at levels above the ecological screening level for aquatic life. The Department's Part 360 regulations prohibit the discharge of landfill contaminants into surface waters and ground waters (Part 360-1.13[b]). The sampling indicates that uranium is migrating through groundwater to surface water and then exiting the landfill property.

Response Section 1.0 Comment 6: As discussed in Appendix A of the feasibility study report (USACE 2015), groundwater seeps feed the north drainage ditch in the FUSRAP-impacted area for up to ten months per year. However, the levels of uranium present in surface waters on, and extending from, the Landfill OU are and will remain protective of human health and the environment and meet federal or more stringent state ARARs for the Landfill OU.

As owner and operator under NYSDEC Part 360 regulations, the Town of Tonawanda is responsible for controlling discharges from their landfill. However, NYSDEC does not have promulgated standards for the discharge of uranium to surface waters of the state that are more stringent than federal requirements.

The seepage of landfill leachate from groundwater to surface water in the northern drainage ditch occurs where more permeable landfill wastes contact the less permeable natural soils that are composed of dense silty glacial till and lacustrine sediments. The planned final capping and stormwater control measures by the Town will lessen recharge to the Landfill OU and lower site-wide groundwater levels, which are anticipated to lower discharge volumes from groundwater to the northern drainage ditch in the FUSRAP area of concern.

Section 1.0 Comment 7: What are the applicable background radium, thorium, and uranium levels for this site for all media sampled? These values should be included in the results tables so that comparisons can be made. Table 6 on page 42 does provide background data, but for soil only.

Response Section 1.0 Comment 7: The USACE did not collect site-specific background data for any medium other than soil at or in the vicinity of the Town of Tonawanda landfill. The shallow groundwater in the silty/clay native sediments around the landfill is not a productive unit and thus is nonexploitable, so USACE did not specifically designate a background groundwater condition for the Landfill OU. Additionally, the groundwater from the lower zone within the Camillus Shale is not impacted by the landfill due to hydraulic separation by the overlying glacial tills and can be considered reflective of the ambient, or background, conditions, which are highly mineralized.

Section 1.0 Comment 8: Figure 7 displays the groundwater sampling point results from 2001 to 2013, and indicates which are above the federal drinking water maximum contaminant level (MCL) of 30 µg/l for total uranium. What is the background level for total uranium in groundwater on the site, and which wells are above the background levels? This should also be shown on the figure.

Response Section 1.0 Comment 8: The USACE did not collect site-specific background data for any medium other than soil at or in the vicinity of the Town of Tonawanda Landfill. Please see the response to the previous comment for additional information.

Section 1.0 Comment 9: Are filtered samples more appropriate for analysis of radiological parameters than unfiltered samples? Figure 7 includes only filtered sample results, according to the text. There is a discussion of filtered vs. unfiltered samples in Appendix A, which should be brought into the body of the report. Unfiltered data should be included in the Appendix.

Response Section 1.0 Comment 9: An analysis of both filtered and unfiltered results indicate the two phases are generally in agreement via a filtered/unfiltered ratio of 1:1. Levels of total uranium from filtered and unfiltered water samples indicate that uranium exists in a dissolved form in the Landfill OU. Filtered samples more effectively extract dissolved forms. Consequently, using filtered or unfiltered values to delineate uranium impacts does not bias the plume delineation. Filtered and unfiltered data are located in Appendix A of the feasibility study.

Section 1.0 Comment 10: The report dismisses groundwater as a medium of concern based on existing poor natural groundwater quality and impacts from other wastes in the landfill, as well as the lack of potential future influence on any future municipal well or private well groundwater usage. The report does admit that uranium will continue to migrate to groundwater under the targeted shallow soil removal alternative, and would continue to discharge into the surface water drainage ditch until capping operations cut off enough surface water infiltration to cause groundwater levels to decline and cease recharging the ditch (if that actually happens). If groundwater levels do not decline, then surface waters may continue to be impacted, and there is a potential for uranium to continue to migrate offsite.

Response Section 1.0 Comment 10: Alternative 3 may mitigate the migration of uranium in leachate to the drainage ditch because USACE intends to use low-permeability fill and positive gradient to promote surface runoff, which may result in less base flow to the drainage ditch from leachate. The site surface water sources are not sustainable drinking water resources due to the intermittent (or ephemeral) nature of the surface water flow (i.e., the site surface water drainage is designed for stormwater control). The presumptive remedy for a nonengineered Subtitle D landfill, such as the Town of Tonawanda Landfill, is capping to preclude leachate generation, lowering existing leachate levels to limit discharges, and using a leachate collection system that commonly discharges to a local sewerage treatment facility. These conditions are targets of the existing Town activities. The capping designs the Town provided include all these components. In addition, the reengineering of site drainage appears in the Town's designs, so the current drainage conditions will greatly change (lessen leachate contributions to drainages) and thus, this pathway will be reengineered to mitigate discharges to the environment.

Section 1.0 Comment 11: The discussion of changes in gradients on page 34 is confusing. The fourth paragraph discusses the impact of phased capping on the gradients, including a reduction in the groundwater mound associated with the landfill. The discussion implies that the FUSRAP area will be the only uncapped area after the phased capping by the town, and

that the FUSRAP area will become the primary recharge area to the landfill wastes. This would seem to imply that the potential to leach uranium to groundwater would remain the same or increase as long as the FUSRAP area is not capped, but the last paragraph on the page states that after phase one and two capping, the mound would decrease, resulting in a potential reduction in uranium leaching. While it may be true that the overall bigger landfill groundwater mound would decrease, there would still be recharge to the uranium source areas until the FUSRAP area was capped.

Response Section 1.0 Comment 11: The narrative could have been clearer regarding the timeline between the phased capping, groundwater response, and resulting changes to uranium transport. The hydrogeologic timeline may be interpreted as this for the No Action Alternative: (1) current (baseline) conditions persist in the FUSRAP area, (2) the Town completes its planned Phase 2 cap that does not include the FUSRAP area, (3) site drainage is modified per that scenario and does not include drainage designs in the FUSRAP area, (4) uranium transport continues and alters to a southerly flow path in response to capping and leachate collection along the southern boundary of the landfill, and (5) uncontrolled surface water discharges along the north boundary decline but are still viable where the water table and topography allow.

For Alternative 2 : Single Layer Capping of FUSRAP-related Material: (1) the current (baseline) contaminant conditions persist in the FUSRAP area, (2) the Town completes its planned Phase 2 cap that does not include the FUSRAP area, (3) the Town modifies the site drainage per the alternative and does not include drainage in the FUSRAP area, (4) the USACE caps the FUSRAP area and modifies drainage to marry with Town's stormwater controls, (5) uranium transport continues and alters to a southerly flow path in response to capping and leachate collection along the southern boundary of the landfill, and (6) engineered surface water discharges decline and potentially are precluded due to lowering water elevations and drainage swale isolation from leachate (although, to be conservative, the model did not isolate the drainage.).

For the removal Alternatives 3 and 4: (1) the current (baseline) contaminant conditions persist in the FUSRAP area, (2) the Town completes its planned Phase 2 cap that does not include the FUSRAP area, (3) the Town modifies the site drainage per capping design and does not include drainage in the FUSRAP area, (4) the USACE removes the targeted FUSRAP-related wastes based on alternative (partial or full), (5) the Town completes the Phase 2 and FUSRAP-area capping of the landfill, (6) all site drainage is married to the planned Town's stormwater controls (prevents leachate discharges to environment), (7) uranium transport continues and alters to a southerly flow path in response to capping and leachate collection along the southern boundary of the landfill, and (8) engineered surface water discharges decline and are potentially precluded due to lowering water elevations and drainage swale isolation from leachate (although, to be conservative, the model did not isolate the drainage).

For the preferred Alternative 3, although the uncapped FUSRAP area would become the dominant recharge zone and continue to leach uranium to the landfill, the Town's Phase 2 capping plan for the landfill provides the physical constraint on landfill leachate and associated drainage controls (precluding leachate loss to the environment). Additionally, Alternative 3 may mitigate the migration of uranium in leachate to the drainage ditch because USACE intends to use low-permeability fill and positive gradient to promote surface runoff, which may result in less base flow to the drainage ditch from leachate.

Independent of the selected remedy, the site surface water sources are not sustainable drinking water resources due to the intermittent (or ephemeral) nature of the surface water flow (i.e., the site surface water drainage is designed for stormwater control) currently, and with the implementation of the preferred remedy as stated above, there may be even less base flow into the drainage ditch than the current situation.

Section 2.0 Identification and Screening of Remedial Technologies

Section 2.0 Comment 1: The section discussing the definition of ARARS (applicable or relevant and appropriate requirements) states that "the actions must also meet any promulgated substantive standard, requirement, criteria, or limitation under a state environmental or facility siting law that is more stringent than any federal standard, requirement, criteria, or limitation and is identified by a state in a timely manner. The fact that uranium will continue to migrate to surface water and potentially flow off site is not in conformance with our regulations. (See comment 6. For Section 1.0, above.)

Response Section 2.0 Comment 1: The ARARs for the Landfill OU are discussed in Section 2.2.2.2 with a detailed analysis being conducted in Appendix B of the FS. The state regulations were deemed not applicable to the federal government's response action to the FUSRAP-related materials within the landfill. As stated in Section 3.5.7 of the feasibility study, the restoration components and configuration of the FUSRAP remedial action plan would be coordinated with the site owner to help ensure general compatibility with the final closure of the landfill by the Town of Tonawanda, which would result in a decline in uranium concentrations in groundwater over time.

Section 2.0 Comment 2: Remedial action alternatives were not developed for groundwater, surface water, and sediment, as all were dismissed as potential pathways for human exposure above levels of concern. Remedial action alternatives were only developed for soil. As noted in the previous comment, uranium is migrating to groundwater and surface water, so unless the remedial action alternatives for soil also would serve to mitigate impacts to groundwater and surface water, this would be a shortcoming of the feasibility study.

Response Section 2.0 Comment 2: As explained in Appendix A of the FS, impacts to surface water and groundwater were evaluated and considered. It was determined that surface water and groundwater (leachate) are not media of concern. Specifically regarding groundwater, the local and regional hydrogeology indicates the surficial red

till/lacustrine sediments are not a viable groundwater resource at the site due to low hydraulic conductivity, poor well yields, and high salinity. Groundwater leachate is not a viable consumptive resource due to high total dissolved solids, low oxygenation, and high sulfate. For example, the naturally poor quality of Camillus Shale water would preclude direct discharge to a surface water body without a State Pollutant Discharge Elimination System (SPDES) permit or pretreatment to meet SPDES for chloride, sulfate, aluminum, iron, manganese, sodium and dissolved oxygen. The USACE recognizes that while the State considers all groundwater in a site to be a potential source of drinking water, the Corps considers site groundwater to fall under the U.S. EPA Class IIIb criteria.

Section 2.0 Comment 3: On page 40 why is it assumed that the recreational adult would have a greater yearly exposure to radionuclides than a recreational youth?

Response Section 2.0 Comment 3: Language within Section 2.2.3 of the FS was erroneous. The recreational youth is actually assumed to have greater yearly exposure to radionuclides than an adult, due to an assumed greater time spent outdoors.

Section 2.0 Comment 4: In the contaminated soil volume estimate, there is a reference to a soil contamination footprint derived from the 50 percent confidence level (0.5 probability) exceedance of sum of ratios. According to Appendix C the 50 percent confidence level means a 50 percent confidence that the area includes all soil that exceeds PRGs. Thus there is a 50 percent chance that the delineated area won't include all of the contaminated soil.

Response Section 2.0 Comment 4: The interpretation provided in the comment is correct. The 50 percent confidence level volume represents the risk-neutral volume estimate. The risk of encountering volumes greater than the 50 percent confidence level volume is addressed via the cost estimate contingency developed by the abbreviated cost and schedule risk analysis. A post remedial action survey around the excavated areas will be performed after the initial excavation is completed to ensure that all soils within the top 1.5 m (5 ft) exceeding cleanup goals have been removed. If the survey indicates the presence of soils exceeding RGs in the top 1.5 m (5 ft), further excavation will be completed until all soils in the top 1.5 m (5 ft) bgs exceeding cleanup goals have been excavated. Therefore, the final area excavated will include all of the contaminated soil within the top 1.5 m (5 ft) outside of the solid waste landfill cap.

Section 2.0 Comment 5: One of the General Response Actions (GRAs) in section 2.4 is containment. However, the discussion appears to imply that capping is the option being discussed, and there is no mention of any options for subsurface containment. Table 8 does list vertical barriers as a containment option, but the subsequent discussion of options retained for further consideration eliminates slurry walls, grout curtains, and sheet-pile walls because "groundwater is not a medium of concern at the site." New York State considers all groundwater to be a potential source of drinking water (Class GA) and vertical barriers should have been retained to address migrating groundwater.

Response Section 2.0 Comment 5: Groundwater was not considered a medium of concern because groundwater leachate within the landfill is not currently suitable for drinking water purposes, and it will not become a drinking water source in the future. The groundwater in the area of the Tonawanda Landfill Vicinity Property is characterized by several chemical analytes that exceed the U.S. EPA primary or secondary drinking water standards, including aluminum, iron, manganese, sodium, general turbidity, total dissolved solids (TDS), and partially low oxygenation.

Section 2.0 Comment 6: Another GRA is described as use of the "existing engineered structure." We do not consider the Tonawanda Landfill and engineered structure. It was not designed as a containment system. There is no liner system beneath the landfill and the leachate collection was a retrofit. This area is not capped. Previously, the waste was simply dumped on-site and compacted. Certainly, the landfill would not likely meet the current requirements for disposal of radioactive waste at a new engineered structure.

Response Section 2.0 Comment 6: As stated in Section 2.6.7 this GRA was not retained for further consideration due to administrative implementability complexity associated with regulatory requirements. Any FUSRAP-related material above remediation goals, which will be removed from the Landfill OU during remediation according to the preferred alternative, will be disposed of off-site. Additionally, this area is going to be partially capped by the site owners during the Phase 2 landfill closure plans.

Section 2.0 Comment 7: One of the possibilities raised with respect to land use controls is federal government purchase of the property. Is this a realistic option that the Corps is raising and intends to pursue?

Response Section 2.0 Comment 7: The USACE does not intend to pursue federal government purchase of the property.

Section 2.0 Comment 8: The environmental monitoring discussion for FUSRAP wastes left in place removes monitoring of groundwater, surface water, and sediment from further consideration, since the Corps considers them not to be media of concern. However, it is clear from previous sampling that groundwater and surface water are being impacted currently. How will the Corps evaluate the effectiveness of the selected remedy, and determine whether any waste left in place (if the selected remedy allows waste to be left in place) is further impacting groundwater, surface water, or sediments? The normal Part 360 landfill post closure monitoring program does not normally include sampling for radiological parameters. The Corps plans to monitor only air quality as part of the long-term environmental monitoring program (page 65).

Response Section 2.0 Comment 8: The decision to discontinue sampling surface water, sediment, and groundwater was made because there are no FUSRAP-related constituents in these media that are posing a risk to human health or the environment. Modeling performed to evaluate future surface water and groundwater conditions and discharges

(Appendix A of the FS) also indicates that these media are not expected to pose a risk to human health or the environment in the future. The only remedial action needed is to ensure that no direct exposure to the FUSRAP-related wastes occur in the future. Alternative 3 accomplishes this by removing the top 1.5 m (5 ft) of FUSRAP-related material and ensuring that the wastes remain buried under low-permeability fill. The effectiveness of the selected remedy will be evaluated by verifying that the FUSRAP-related material remains buried.

Section 2.0 Comment 9: The study states that capping would encroach into the 100 foot buffer to the northern property line, and that the Town would be required to obtain a waiver from the 100 foot buffer provision of the Department's regulations. Why would the town have to shoulder obtaining this waiver, rather than the federal government, particularly if capping in place is chosen rather than the preferred alternative 3?

Response Section 2.0 Comment 9: The United States does not own or operate the landfill and therefore legally cannot seek a waiver and is not subject to the State's regulations governing the closure of the landfill. The owner and operator of the landfill is responsible for closing it in accordance with all applicable laws and regulations.

Section 3.0 Development and Screening of Remedial Alternatives

Section 3.0 Comment 1: In Table 13, three alternatives are presented, including Alternative 2 (single-layer capping of FUSRAP-related material, Alternative 3 (Targeted Shallow Removal and Off-Site Disposal of FUSRAP-related Material) and Alternative 4 (deep excavation and offsite disposal of FUSRAP-related material). Alternative 1 (no action) was not listed in the table. Alternative 3 does not indicate that a cap will be utilized over the areas of shallow removal. Why is that? One would think that either a town constructed cap or a Corps constructed cap would be placed over the area where the FUSRAP waste was only partially excavated.

Response Section 3.0 Comment 1: Alternative 1 is not listed on the table because it is not protective of human health and the environment. Alternative 3 does not indicate a cap because the 1.5 m (5 ft) of low permeability earthen fill that will be placed in the excavation areas is sufficient to protect against exposure to the FUSRAP-related materials. The Town plans to cap the landfill in accordance to 6 NYCRR Part 360.

Section 3.0 Comment 2: Alternative 2 (Single-Layer Capping of FUSRAP-related Material) discusses how the cover system "should effectively protect human health and the environment through waste isolation for up to 1000 years, to the extent reasonably achievable, and, in any case, for at least 200 years". Therefore it appears that the clay cap may not last the 1000 years described by the Corps as the post-closure period for the FUSRAP waste areas, and it appears that the Corps is committing to only 200 years. In addition, the only environmental monitoring proposed to assess cap performance is air monitoring for radon.

Response Section 3.0 Comment 2: The description of the duration of the remedy is taken from the ARAR 10 CFR Part 40 Appendix A, Criterion 6. However, the costs of the O&M described in the section were estimated to last for 1,000 years. Radon flux monitoring would be conducted throughout the performance period to ensure ARARS are met. The federal government will continue site inspections, operations and maintenance of the landfill cap under Alternative 2, and five-year reviews to ensure that the remedy is performing as designed throughout the performance period. Land use controls will be implemented at the site to help ensure protectiveness.

Section 3.0 Comment 3: Under alternative 3, only impacted soil above PRGs (preliminary remediation goals) would be excavated and removed from the upper five feet in the FUSRAP areas. So five feet of soil would not be removed across the whole extent of Areas A, B, and C (see the limited excavation area as shown in Figure 8). Then, soil sorting would be used to further reduce the volume of soil requiring off-site disposal, and soils still containing FUSRAP materials but below PRG's and that are hazardous would be left on site "for final disposition by the site property owner", in other words the town of Tonawanda. The study proposes using a Multi-Agency Radiation Survey and Site Investigation Manual guidance/statistical sampling approach to determine if those soils could be used as backfill or if they are regulated as hazardous waste. Soils that contain listed or characteristic hazardous waste must be disposed of within 90 days of generation unless the facility obtains a Treatment, Storage or Disposal Permit (Part 373).

The Corps is proposing to leave behind radiologically contaminated soils that have been excavated but not removed for disposal, stating that management of such waste falls on the property owner to address. It is the Departments position that the federal government should address final disposition of federal waste exhumed during a remedial action, not a property owner. Management of this radiologically contaminated soil is subject to regulation under 6 NYCRR Part 380-4.1(b) which prohibits land disposal of radioactive waste within New York, except in a State regulated radioactive waste disposal facility. Thus, the Corps proposal would leave the Town of Tonawanda to either seek a variance from 380 or dispose of the soil out of State.

Response Section 3.0 Comment 3: Under FUSRAP, USACE only has authority to address FUSRAP-related contamination. The USACE cannot use FUSRAP funding to remediate or dispose of material that does not exceed the cleanup goals for the FUSRAP-related constituents of concern. Therefore, final disposition of any non-FUSRAP-related material that is excavated to access FUSRAP-related contamination, or radiological contamination below the cleanup goals will not be addressed by USACE.

The USACE anticipates that for Alternative 3, the volume of non-FUSRAP-related material that would be excavated and left for other disposition would be minimal, due to the targeted and shallow nature of the excavation areas and low estimated volume of FUSRAP-contaminated soil requiring excavation. Conversely, for Alternative 4, USACE

anticipates that a significant volume of excavated overburden and cutback soils, which do not contain FUSRAP-related contamination above cleanup goals, would be left for final disposition by the others, presumably the property owner. The USACE intends to coordinate with the owner on the placement of this material.

Section 3.0 Comment 4: Under Alternative 3, the first paragraph on page 81 is confusing as to the order of actions. The paragraph states: "All excavated soils and potentially comingled landfill debris will be screened in the field for contamination, stockpiled, sampled, analyzed and transported off site for disposal if found to exceed the established cleanup criteria for the site. " The Department is concerned that the mere act of excavation would dilute the material such that upon analysis the soil would be below the PRGs. The Department prefers an in-situ determination as to exceeding or meeting the sites PRGs.

Response Section 3.0 Comment 4: Excavation activities would be guided by various methods to detect radionuclides, including the use of handheld radiation meters, *in situ* gamma spectrometry, and a specific quantity of analytical samples. *Ex situ* sampling and analysis of excavated soils, including cutback soils, has been successfully implemented at various FUSRAP sites including Linde in Tonawanda, New York. The USACE will also use waste minimization processes to limit the overall volume of material that needs to be disposed of off-site to reduce the impact to limited landfill capacity with material not required to be disposed of at a regulated disposal facility.

Section 3.0 Comment 5: Under Alternative 3, it is stated that excavated soil would be subjected to potential treatment to ensure compliance with the offsite disposal facility's waste acceptance criteria. What types of treatment would be undertaken, and where would treatment occur?

Response Section 3.0 Comment 5: The types of treatment would include waste minimization along with any other applicable steps. The details of these steps along with the location where they would be carried out would be determined during the remedial design phase of the CERCLA process. An example of a treatment option that may be used is solidification/stabilization where soil is mixed with stabilizing agents to immobilize contaminants within the soil matrix.

Section 3.0 Comment 6: Alternative 3 discusses the handling of groundwater coming into the waste removal areas, and the potential for discharging it to surface water or the sanitary sewer system, or disposing of it offsite at a permitted disposal facility. If this water containing radionuclides is sent to the municipal wastewater treatment plant it needs to meet State discharge limits and POTW approval. What are the concentration limits for discharge to the surface water drainage ditch? Since the ditch carries surface water off-site, radionuclides could also travel offsite. A SPDES (or equivalent) permit would be required for discharge to the ditch.

Response Section 3.0 Comment 6: The on-site discharges under CERCLA require that the entity performing the remedial action comply with the appropriate substantive requirements but not the administrative requirements. There would therefore be no requirement for a SPDES permit, discharge to a publicly owned treatment works (POTW) would require a POTW permit. The on-site discharge limit would be the applicable nuclide uncontrolled area concentrations calculated as a sum of ratios; for example, using 300 pCi/L for U-238.

Section 3.0 Comment 7: After removal of the radiological wastes under Alternative 3, the site would be "restored" by backfilling and seeding. It is not stated on page 82 how much backfill would be placed, but there is a discussion in Appendix D, which should be referenced in the main body of the report. The ultimate closure of the landfill in this area is being left to the Town of Tonawanda, according to page 82 of the study. According to Table 13 no environmental monitoring is being proposed after the shallow contamination has been removed.

Response Section 3.0 Comment 7: The assumption of 1,986 loose cubic yards of backfill was used for the cost estimate for Alternative 3 (as included in Appendix D of the FS). This will be added to the description of the remedy in the record of decision. The closure of the landfill will be conducted by the owner. During remediation, there will be environmental monitoring conducted. There are no plans to conduct environmental monitoring after remediation since there was no shown impact of radon on air quality, and groundwater and surface water are not media of concern for the site.

Section 3.0 Comment 8: On page 82, what is "RCRA-hazardous unimportant quantity source material"?

Response Section 3.0 Comment 8: RCRA-hazardous unimportant quantity source material is a Resource Conservation and Recovery Act (RCRA) waste that is considered hazardous if it exhibits a certain characteristic (i.e., toxicity or reactivity) or if it is included on a specific list of wastes. The waste is a low-activity radioactive waste that is comingled, containing both hazardous constituents regulated under RCRA and source material. Materials containing uranium or thorium are considered source material and may be subject to U.S. Nuclear Regulatory Commission (NRC) licensing requirements, depending on the weight of the material. If the source material makes up less than 0.05 percent by weight of the residuals it is considered an "unimportant quantity" (10 CFR 40.13) and is exempt from NRC regulation.

Section 3.0 Comment 9: Under Alternative 4 (Deep Excavation and Off-site Disposal of FUSRAP-related Material) only soils exceeding the preliminary remediation goals would be removed, so some FUSRAP material would be left on site. Again, the study states that FUSRAP contaminated soils that have radiological concentrations below the preliminary remediation goals, but that are hazardous, would be the responsibility of the Town of Tonawanda to dispose of properly.

Response Section 3.0 Comment 9: The USACE does not have the authority to address non-FUSRAP impacted soils, or to include those soils that contain radionuclides below the remediation goals that do not require a remedial response.

Section 3.0 Comment 10: A series of groundwater extraction wells is proposed on page 89 under Alternative 4. More detail on where these wells would be installed, and how they would be constructed and operated, is needed.

Response Section 3.0 Comment 10: Should this alternative be selected in the record of decision, the details on these wells would be provided in the remedial design phase of the CERCLA process. The purpose of the wells would be to dewater the excavation.

Section 4.0 Detailed Analysis of Remedial Alternatives

Section 4.0 Comment 1: The capital cost for Alternative 3 is $10,341,038, with an annual O&M cost of $62,237. The O&M costs include annual inspections, maintenance of land use controls, and conduct of 5 year reviews. Air quality sampling is not mentioned here, although it was stated in section 2.5.3 Land-use Controls Environmental Monitoring, that the Corps would be performing air quality monitoring for radiological wastes left in place. The monitoring of groundwater was also mentioned in section 2.5.3. Was this included in the annual O&M costs? What about ground water monitoring to demonstrate the hypothetical lowering of the groundwater table and thus diminished uranium concentrations?

Response Section 4.0 Comment 1: The discussion of environmental monitoring presented in Section 2.5.3 was a general discussion of potential response actions, and it was not specific to any given remedial alternative. The environmental monitoring associated with Alternative 3 is discussed in Section 3.5.8 of the FS. The monitoring of groundwater is not included in the costs because groundwater is not a media of concern.

Section 4.0 Comment 2: The capital cost for Alternative 4 is $55,400,759, with an annual O&M cost of $0. There is no planned follow-up environmental monitoring since all radiological wastes exceeding preliminary remediation goals are to be removed. When overall costs are compared over the 1000 year post-remediation period, the cost of Alternative 3, assuming no increases in O&M costs for inflation, would be $10,341,038 plus $62,237,000, or $72,578,038, which is substantially higher than the capital cost of Alternative 4. Therefore, when considering 1000 years of post-remediation care, the alternative that removes all the radiological wastes exceeding preliminary remediation goals is the more cost-effective alternative.

Response Section 4.0 Comment 2: The present worth cost for O&M for Alternative 3 is approximately $2 million. This cost is calculated using a present worth cost equation available in Appendix D of the feasibility study. That is the cost in today's dollars to do the monitoring over a 1,000-year time period. Monitoring procedures for Alternative 3

are site inspections to ensure that there is not any future disturbance of the FUSRAP-related material left in the Tonawanda Landfill.

Section 5.0 Comparative Analysis of Remedial Alternatives
Section 5.2.3 Long-Term Effectiveness and Permanence

Section 5.0 Comment 1: In section 5.2.3 it states: "The target shallow removal and off-site disposal of FUSRAP-related material (Alternative 3) is effective in minimizing exposure as it would remove all contamination that could possibly become exposed due to natural forces within the 1000-year evaluation period, but relies on LUCs to continue to be protective in the long term. " Without a detailed discussion of the implementation of LUCs it is hard to determine either effectiveness or permanence. However it should be noted that this action would require a Part 375 environmental easement.

Response to Section 5.0 Comment 1: The comment is correct that the Proposed Plan had an inadequate discussion of LUCs, however it has since been determined that no LUCs are needed to provide overall protectiveness of human health by this alternative. As such, all references to LUCs have been deleted from the ROD.

Section 5.0 Comment 2: Alternative 3 relies on institutional controls to comply with environmental standards and to maintain radiation doses to the public at acceptable levels. It relies on them out to 1,000 years. However, the language on that is ambiguous in that it does not make it clear as to whether the Corps expects to rely on State regulatory control over the landfill for that control, or whether the federal government will responsible for those controls. While the proposed plan does not specifically state it, it would appear that the intent is to rely on State required controls. State site controls are not crafted to provide control over the long time frames that radiological materials such as those in the FUSRAP waste under consideration here would require. The State does not agree that the reliance on institutional controls not designed for radiological disposal facilities, the use of such controls beyond 100 years, or placing the responsibility for maintaining those controls on a local government are appropriate.

Response to Section 5.0 Comment 2: The comment is correct that the Proposed Plan had an inadequate discussion of LUCs, however it has since been determined that no LUCs are needed to provide overall protectiveness of human health by this alternative. As such, all references to LUCs have been deleted from the ROD.

Appendix A: Surface Water and Groundwater Flow and Contaminant Transport Analysis

Section 2.3.1 Regional Hydrogeology

Appendix A Comment 1: The report continues to state that the groundwater in the waste and monitoring wells is not considered a groundwater resource due to ambient water quality and

anthropogenic impacts. However, the state considers groundwater beneath the site to be class GA (potential source of drinking water). 6 NYCRR Part 701.18b states that the class GSB (saline groundwater) shall not be assigned to any ground waters of the State, unless the Commissioner finds that the adjacent and tributary ground waters and the best usages thereof will not be impaired by such classification. Therefore all standards associated with a class GA designation apply.

Response to Appendix A Comment 1: The local and regional hydrogeology indicates the surficial red till/lacustrine sediments are not a viable groundwater resource at the site due to low hydraulic conductivity, poor well yields, and high salinity. The underlying confined Camillus Shale groundwater zone has greater hydraulic conductivity that would supply a domestic well. However, both at the Tonawanda Landfill Vicinity Property and Linde Sites, this groundwater is not a viable consumptive resource due to high total dissolved solids, low oxygenation, and high sulfate. For example, the naturally poor quality of Camillus Shale water would preclude direct discharge to a surface water body without a SPDES permit or pretreatment to meet SPDES for chloride, sulfate, aluminum, iron, manganese, sodium, and dissolved oxygen. While the State considers all groundwater on-site to be a potential source of drinking water, the Corps considers site groundwater to fall under the U.S. EPA Class IIIb criteria.

Section 2.3.2 Site Hydrogeology

Appendix A Comment 2: The report discusses the data in Table 1, which compares groundwater elevations from 2001 to 2013. The report states that this data shows an overall lowering of groundwater elevations in the waste zone, which has not yet manifested in the surrounding native soils. However, the elevation data for the more distant monitoring wells was taken in September 2001, and the elevation data from 2012 and 2013 was taken in March and April of those years. Seasonal differences in elevations could cloud the analysis, and could result in the apparent increases in groundwater elevations seen at many of the landfill wells that are located some distance from the waste mass.

Response to Appendix A Comment 2: The seasonal effect is noted, and the well placements, along with the water-level data, were not originally obtained for cap evaluations. The USACE wells/well points are the only locations remaining within the waste form, so the overall body of data are not landfill-wide. The intent was to best assess the effects of the current capped extents (i.e., are any artifacts emerging?) and provide a potential basis to compare against future conditions and predictions. The USACE agrees that the levels in the glacial-sediment wells surrounding the landfill will be influenced by drainage modifications and nearby land use. The USACE does not anticipate a gross change in groundwater elevations outside the landfill in the glacial sediments nor with deeper Camillus Shale water even with full landfill capping since the soil is very hydraulically tight, and recharge from standing water on the flat topography will maintain shallow groundwater levels.

Appendix A Comment 3: The report states that the phased capping includes waste consolidation along the edges of the landfill to ensure that no waste is found within 100 feet of an adjacent property line. How will this buffer zone be created if only certain soils within the upper few feet of FUSRAP wastes are removed from the areas that were investigated by the Corps?

Response to Appendix A Comment 3: The wording was intended to articulate the criteria that the Town is employing for their capping effort. This was not referencing potential FUSRAP activities. In addition, a review of historical aerial photographs indicate that FUSRAP-related material coincides with areas of the landfill disturbed in the 1950s. Please see Figure 3 of Appendix A of the 2015 feasibility study or Figure 2-5 of the 2012 baseline risk assessment report (which also provides the location of the landfill boundary) for a display of soil samples exhibiting elevated radioactivity superimposed on a 1951 aerial photograph of the site. Alternative 3 will not leave any FUSRAP-related material above remediation goals at any depth within the 100-foot buffer.

Section 3.0 Groundwater and Surface Water Quality and Usage

Appendix A Comment 4: The report states that since site groundwater is not a viable drinking water source, that the maximum contaminant level (MCL) of 30 micrograms per liter for total uranium does not apply. As stated previously, all groundwater in the state is considered class GA and those standards do apply, whether or not the groundwater is being actively used as a source of potable water. The report notes that the MCL has been exceeded in surface water and groundwater at this site.

Response to Appendix A Comment 4: Please see response to comment on Appendix A Comment 1.

Section 4.0 Groundwater Transport

Appendix A Comment 5: The report states that the presence of organic carbon can lessen uranium transport, and suggests that since the landfill received incinerated waste and sewer sludge, that the fraction of total carbon may be significant in these wastes. A review of the groundwater monitoring data for the site reveals that in most locations total organic carbon in the groundwater is not particularly high, with the exception of well BM-18, where the March 2015 result was 64.1 mg/l, and BM-17R, where the March 2015 result was 20.4 mg/l. As an observation, results from leachate piezometer P-1 indicate that TOC ranged in concentration from 308 mg/l to 654 mg/l. Results from leachate piezometer P-2 indicated a TOC range from 538 to 621 mg/l, so it does appear that there is a significant amount of TOC in the landfilled wastes themselves.

Response to Appendix A Comment 5: This condition is a positive characteristic to limit both the mobility and bioavailability of multiple contaminants evident in the waste form

and leachate. To be conservative, USACE limited total organic carbon (TOC) influence in the transport modeling.

Appendix A Comment 6: The report also states that there is a geochemically-reductive environment present in the source area, which will inhibit the generation and transport of uranium-carbonate species in and near the landfill operable unit. A review of the semi-annual groundwater monitoring data for the last two years shows that there is often an oxygenating environment in groundwater around the landfill. The October 2014 and March 2015 semi-annual monitoring results reported to the Department's Materials Management program indicated positive ORP in all sampling locations. Results for the leachate piezometers have ranged from moderately- to slightly-reducing, to slightly-oxidizing. Table 5 of Appendix A indicates that the redox category for most of the sampling points, including those sampled by the Corps in the FUSRAP area is mixed (oxic-anoxic). The transport model, however, does not take into account the effects of a reducing environment, according to Section 6.2, and therefore is conservative, since all uranium was assumed to be present in a mobile form.

Response to Appendix A Comment 6: The reductive condition in the FUSRAP area does vary in wells outside of the waste form, where greater oxidation-reduction potential promotes higher uranium solubility. This is exemplified in Figure 10, where legacy landfill conditions (i.e., the leachate mound not contained by a peripheral collection system) promoted the dispersion of uranium into areas south of the current landfill leachate containment. The low uranium concentrations in the reduced leachate under the FUSRAP area are expected to persist with eventual full capping of the landfill by the Town after partial excavation by USACE.

Appendix A Comment 7: The Corps has calculated that surface water discharge from the FUSRAP area will decline 52% with phased capping, and that groundwater flow will become more southerly, to the leachate collection system along the southern border of the site, which discharges to the town sewer system. What is the expected loading of radiological contaminants to this sewer system, and will this discharge be of concern (and acceptable) to the treatment facility?

Response to Appendix A Comment 7: The baseline model with the Town caps in place (still leaving MED material uncovered) shows a 1,000-year plume transport will contribute uranium concentrations to the leachate collector that vary from near zero (0) to 14.5 µg/L (Figure 36). The average uranium concentration for the inflow to the simulated leachate drain is 0.28 µg/L, which does not vary more than 0.05 µg/L due to flow regime under the cap. The starting plume for all simulations includes low-concentration zones in the southern portion of the landfill (Figure 10 and 28) that both attenuate into waste and are captured by the collector during the long simulation. As the plume realigns, it consolidates due to lower dispersion (less recharge under the cap), and migrates southward, more low-concentration leachate enters the collector on the periphery of the long-term plume, thus balancing the overall inflow concentration to a

near steady-state condition. Prior manhole sampling at the landfill (MH01) indicated a uranium concentration ranging between 2.24 and 3.38 µg/L, which is greater than the expected condition, but within the range of background. Consequently, the contribution will produce variability in this range but not highly additive concentrations.

Appendix A Comment 8: The report continues to assert that groundwater is flowing upward from the deeper zone to the shallower zone and cites well couplets TWP 9/10, 7/6, 5/4, and 8/L-3, where the first well is the shallower well, and the second well is the deeper well. Where is a table showing the actual depths of the well points? If one looks at the data from the April 2013 sampling event in Table 1 and compares groundwater elevations in the well couplets listed above, it is evident that there is not a consistent upward flow as described. In fact, only one of the couplets (TWP 9/10) exhibits a higher groundwater elevation in the deeper well. When one looks at the March 2012 data in Table 1, all of the shallower piezometers had groundwater elevations higher than the deeper piezometers, suggesting downward flow.

Response to Appendix A Comment 8: A table of well construction information was not included.

- The well couplets should be classified as follows:
  - TWP-4 Shallow/TWP-5 Deep
  - TWP-6 Deep/TWP-7 Shallow
  - TWP-8 Shallow/L-3 Deep
  - TWP-10 Shallow / TWP-9 Deep

- This indicates that TWP-9/-10 and TWP-5/-4 listed in the report are transposed per shallow/deep designator and should read TWP-10/-9 and TWP-4/-5.

- An evaluation of pre- and post-FS water level data (up to four rounds) indicate that the couplets are generally split 50/50 percent between upwards and downward flow vectors.

- An evaluation of uranium concentrations (also four rounds) for the couplets indicate 11 of 16 rounds (~70 percent) show increases from deep to shallow depths (upwardly increasing) irrespective of the coincident water level differences. This indicates that upward transport through MED contaminants to the surface water ditch is still ongoing since the landfill capping is incomplete.

Appendix A Comment 9: Why does it appear that volatiles and PAHs in the soil are concentrated in the low redox zone depicted in Figure 24, which also encompasses the FUSRAP contamination area (Figure 27a indicates that total volatile organic concentrations in soil were fairly low in other areas of the site)? Was this related to other wastes generated by Linde and dredged from the creek sediments? The PAH concentrations appear to be more widespread and not restricted to the FUSRAP area. How much actual reduction in uranium

solubility and transport would be expected from the levels of volatiles as shown on Figure 27a?

Response to Appendix A Comment 9: The USACE did not assess the collocated volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbon compounds (PAHs) for depositional origin, but rather to qualify the potential health and safety concerns that may be associated with potential excavation alternatives.

The USACE did not perform reactive transport modeling nor geochemical speciation modeling, so the VOC-concentration threshold for uranium reduction and the site-specific decay rate are unknown. However, Figure 21 shows a Pourbaix diagram and Figure 24 shows the distribution of low oxidation reduction potential values taken during sampling. Both these datasets indicate the majority of uranium would be in reduced (immobile) species, so the observed concentrations are likely derived from shallower soil impacts that are exposed to both groundwater and oxygenated recharge that together promote migration to the nearby ditches. Upon full capping by the Town, the groundwater will reduce further due to stagnation in the waste form and the degradation of organic carbon, along with chlorinated and nonchlorinated hydrocarbons, in the landfill.

Appendix A Comment 10: How were the contour lines on Figure 22 (Combined Uranium Concentration Map for Surface Water and Groundwater) constructed? Were the lines drawn using data averaged over the number of sampling events at a given point? From the map it is evident the groundwater in some of the site wells a significant distance from the FUSRAP waste area have shown total uranium levels above or near the 30 µg/L. MCL (e.g., wells BM-19, BM-16). Also the data summarized in Figure 22 is from the years 2009-2013, with no previous data included. Would the inclusion of older data affect the depiction of total uranium concentrations as shown on the map?

Response to Appendix A Comment 10: The contours were hand-annotated using the maximum of the dataset as the guiding values (i.e., a conservative plume).

The 2005 RI data and ranges are generally similar to recent values, except for well L-3, which was greater in the 2005 RI report. The addition of these older data (2001 sampling) would have produced some minor changes in the extent of the 100 µg/L contour near L-3 and a minor change in the 30 µg/L contour near BM-18, but would not grossly affect the output of the modeling effort (i.e., the additional mass would have the same fate as in the current model—eventual southward migration towards the leachate collection system).

Appendix A Comment 11: In section 4.2.3 (Soil Partitioning in the Landfill) the measured groundwater concentration at TWP-7 is one quarter of the concentration at the source, as per the calculated dilution factor from the formula at the bottom of Table 6. This assumption results in a Kd, which is lower in value, implying that less uranium would be adsorbed onto

soils and more would be available for transport in groundwater, so this assumption actually results in a more conservative transport model (i.e., there would be a greater potential for uranium migration through groundwater). The model uses an even lower Kd of 12.0 mL/g, so the model does appear to be biased conservatively in predicting greater dissolved fractions of uranium in groundwater that would be available for transport. However, it should be noted that this Kd value is associated only with the landfilled wastes and layer 3 contact zone, and not with the native soils, where the Kd value is set to 120 mL/g.

Response to Appendix A Comment 11: The native glacial tills/lacustrine sediments were increased in order of magnitude to reflect the fine-grained nature of the sediments. Total uranium results from location TWP-11, which is in the native sediment adjacent to the high concentrations in the leachate flowing to surface water, vary between 3.2 and 9.4 µg/L. Well BM-4 also varies between 26 and 34 µg/L, but this older well penetrates a shallow fill layer that was apparently exposed to ponded water near the MED area. Location TWP-11 does not show the same fill layer and appears more representative of the transport potential in the native sediment (this low-yielding well point also requires multiple days of sampling to achieve lab-volume requirements).

Appendix A Comment 12: On page A-24, in the calculation of flow through the FUSRAP area vs. flow through the contaminated material, why was the FUSRAP waste zone thickness set at 12 feet, whereas the waste extends to 25 feet below the surface? Was this an average value over the contaminated zone?

Response to Appendix A Comment 12: Twelve feet is the average thickness of the FUSRAP material exceeding sum of ratios.

Appendix A Comment 13: The calculations on page A-24 show that in the groundwater flow regime only an additional 2521 liters/day of flow from the total FUSRAP area are available in addition to the calculated 10137 liters/day of flow through the contaminated waste, resulting in a maximum dilution factor of only 25% (0.025) rather than the dilution factor of 4 calculated by the formula in Table 6. The text states that additional dilution is available from precipitation through the surface, and the volume of flow is 27,751 liters/day over the area in which excavation of contaminated soil will occur. On what assumptions is this estimate based? If one adds the 27751 liters/day to the additional 2521 liters/day available from the total FUSRAP area, one gets an additional 30,272 liters/day of water available for dilution of the source contamination water (10137 liters/day). This would result in a dilution factor of just about 4 times, as stated.

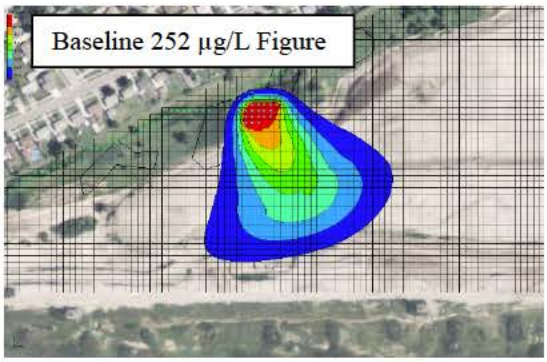
Response to Appendix A Comment 13: The dilution of 27,571 L/dis derived from the calibrated recharge variables in the groundwater model for the area over the MED-impacted zones (i.e., the full-scale excavation areas). The dilution factor of 4 was reached using two processes, so it was applied to the transport discussion.

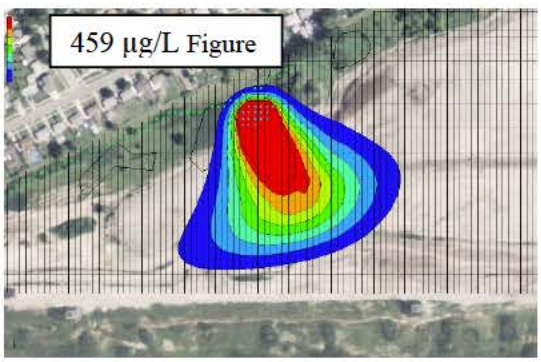
Appendix A Comment 14: On page A-24, it is not clear to the reviewer how a solubility limit of 100 mg/l was set for source-area estimating.

Response to Appendix A Comment 14: The 2005 RI noted a potential uranium solubility estimate (for uranyl peroxide) of up to 6 mg/L (6,000 µg/L). This was applied to the Tonawanda Landfill Vicinity Property. Other nearby FUSRAP sites (NFSS, Guterl) have modeled uranium solubility in the 100-250 mg/L range, thus, to be conservative, Tonawanda Landfill Vicinity Property modeling used the upper bound of local data to be conservative.

Appendix A Comment 15: The highest observed concentration of total uranium in the 2009-2013 data (252 µg/L. at surface water sampling point SW/SD-011 in March 2012) was used as the source concentration over the entire area outlined on Figure 28, according to the discussion on page A-24. This would appear to be conservative unless there is previous data showing higher concentrations from previous site investigations. Were any of the pre-2009 results higher?

Response to Appendix A Comment 15: September 2001 surface water data (see TLFA1-S2 on Table 4-24 of 2005 RI) showed a maximum of 459 µg/L, which is geographically equivalent to the current location, SW/SD-01, which also produced the 252 µg/L value used in the model. An analysis using this higher value as the source term produced similar results (i.e., the added mass was attenuated in the landfill). See baseline and 459 µg/L below.





Section 5.0 Groundwater Modeling

Appendix A Comment 16: On page A-26 the report states that during model calibration the recharge to the native sediments and landfill waste was allowed to vary between .54 ft/yr. and 1 X 10 to the minus12 ft/yr. (capped condition). Please provide a basis for this comment. This latter low recharge under a capped condition appears improbable. The model was calibrated by varying the recharge component of the input parameters, and the optimal calibration was shown in Figure 33, which included a recharge value of 4.7 X 10 to the minus 6 ft/year for the Phase 2 capped area. How does this value compare to any actual data on permeability and flow through the Phase 1 cap, if such data is available?

Response to Appendix A Comment 16: Section 5.4 of the 2005 RI indicated a Hydrologic Evaluation and Landfill Performance (HELP) model transferred about 17 percent of the available rainfall to recharge the uncapped landfill, which equates to 0.54 ft/yr of normal regional rainfall. This data range bound the stochastic values employed to help achieve calibration by asking whether the range encompasses all likely values. Figure 33 indicates some areas required additional changes to optimize calibration (i.e., areas of recharge greater than 0.54 ft/y).

The USACE does not have cap performance data on whether leachate production has slowed, whether well heads are declining in elevation, and whether runoff water balance indicates significant capture and discharge, etc. This performance data will not be measureable until the Town's capping remedy is complete.

Appendix A Comment 17: How does the development of the mud flats area, with a great deal of paving for parking lots and a large warehouse building, affect the model inputs and assumptions?

Response to Appendix A Comment 17: This development may affect some components in the mudflats area (possibly lower localized heads), yet the landfill does not receive runoff from the mudflats and thus, is independent from the local clay-based hydrogeology.

Appendix A Comment 18: The observed heads in April 2012 were compared to the model simulated heads in Figure 34. The comparison showed that there were areas where the simulated head differed from the actual head by more than two feet, particularly in the southeastern portion of the landfill and mudflats area. North of the landfill, in the residential areas, the difference in elevations was within 2 feet. The graph of observed vs model-generated heads on Figure 34 showed a linear trend but often a significant difference in heads at individual points. The layer 1 (waste material) heads show quite a bit of variation. Based on the comparison between the actual heads and computed heads in Table 8, it appears that the model generally overestimates the groundwater elevation in the waste. There also doesn't appear to be very good agreement between the computed and actual heads in model layer 3 (contact layer consisting of the sand-silt and upper bedrock zone). The report states that the model shows an acceptable calibration because the ratios of the root mean squared error, mean absolute residual, and residual standard deviation to the observed head range over the entire site-wide model, is less than 10%. However, the observed head range is significantly influenced by layer 3, which has the highest head range. If one compares the statistics for layer 1 to the observed head range in layer 1 (9.0 ft), then the root mean squared error over the head range is 30.4%, the mean absolute residual over the head range is 20.3%, and the residual standard deviation over the head range is 28.4%.

Response to Appendix A Comment 18: As explained in Table 8 the calibration to observed and interpolated locations was used to best estimate a regional flow field where

little water level data exist beyond the project site. This constraint, in conjunction with using data from before the existing conditions (partially capped with new drainage) increases the deviation from field to calibration data. Optimally, a site-wide dataset would be in equilibrium and have longevity for monitoring head reaction to capping, but neither of these optimal conditions exist. Consequently, the model goodness of fit focused on the flow field nearest the source in the waste.

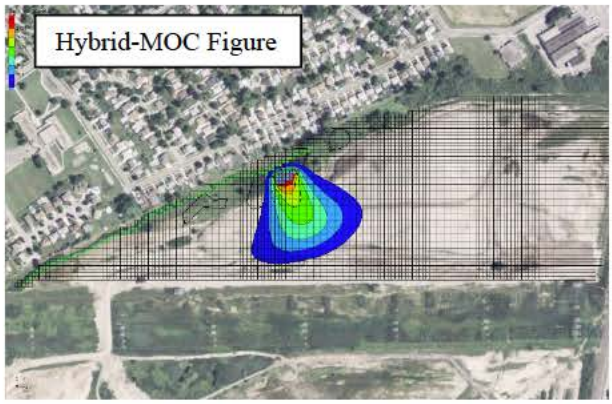
Section 6.0 Groundwater Transport Analysis

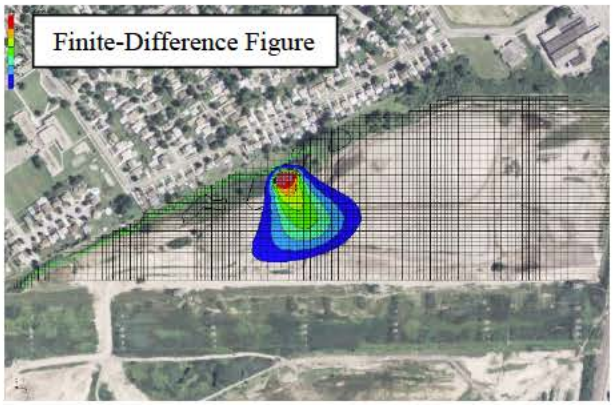
Appendix A Comment 19: On page A-31, it is stated that the higher-order finite-volume TVD method in the transport model was selected over two other methods included in the model, in order to avoid overestimating dispersion in the more permeable waste zone. Please clarify why the other two methods are not appropriate for the site.

Response to Appendix A Comment 19: The USACE chose the total variation diminishing (TVD) advection solution method in lieu of the standard finite difference or methods of characteristics (MOC) since the TVD employs the minimum time step for the transport simulation for all time steps. This thereby minimizes the Courant numbers and makes them uniform for the transport simulation (i.e., stabilizing the simulation throughout time). This adds computation time, but the simulation is more accurate (i.e., longer user-defined time steps that can increase the Courant number to undesirable values are avoided). Additionally, the TVD method employs a piecewise linear interpolation that ensures intercell transport is linear, irrespective of the particle location in the finite-difference cell (the scheme tries to minimize concentration oscillations between adjacent cells where concentration gradients are high). The solver then integrates the advection results with diffusion and additions in a more stable manner.

The standard finite difference method can augment dispersion due to the advection-dominated condition in the landfill waste (high K); thus, the model grid would have to be finer to avoid this (and minimize Peclet and Courant numbers).

The MOC-based solvers prefer a regular (if not uniform) grid for optimal solving and cannot guarantee that mass conservation at a particular time step is achieved (i.e., the expansion of particles increases throughout the solution, thereby increasing computational resources). The following examples of these advective transport solvers (finite-difference on right, hybrid-MOC on left) show they are not significant to the quality of the simulation, and the most stable computational structure (TVD) is preferred.





Appendix A Comment 20: The report states that the highest value of total uranium sampled at each well or surface water sampling point through 2013 was used to develop the most conservative plume to represent the starting point in the model, as shown in Figure 22. It should be noted that as previously pointed out, only data from 2009 on was shown on Figure 22, and any higher concentrations detected in earlier sampling were not included and would not be depicted in the plume utilized for the simulations.

Response to Appendix A Comment 20: The 2005 RI reported higher surface water values in the vicinity of SW-01 and SW-05, which were due to the uncapped condition at the landfill forcing more leachate through the MED material. The response to NYSDEC Appendix A Comment 11 shows the use of these data as a source term, which would not grossly change the size or longevity of the starting plume since the source mass is driving long-term conditions.

Appendix A Comment 21: The calibrated model was run for several different scenarios. The first, Targeted Shallow Removal (Alternative A), models the baseline no-action alternative and the situation where only certain areas of contamination are removed in the upper five feet of the waste, and as stated in the text, will leave a "significant contaminant mass" in the landfill which is assumed to be a source area over the 1000-year modeling period. The results of the modeling are shown in Figure 36, where according to the text, the maximum concentration in the northern drainage ditch will decline to 25 µg/L in 10 years due to the effects of town of Tonawanda capping, leaving the FUSRAP area as the main recharge area to groundwater, which will change the groundwater flow direction from westerly to southerly. The town cap is also projected to lower groundwater elevations by about 4 feet, resulting in less discharge to the drainage ditch. Uranium contamination is still projected to migrate southward through the waste materials into areas where it was not present before. Within 500 years the plume will nearly reach the access road on the south side of the landfill near the EnSol trailer, and within 1000 years the plume will migrate past the access road and be closer to the industrial development area which is now in the former mudflats area. According to the text the uranium contaminated groundwater will enter the leachate

collection system, but below a 10CFR 20 sewer-discharge limit of 2700 µg/L. This also needs to be below the State limit.

Response to Appendix A Comment 21: The referenced State limit for uncontrolled uranium discharge (uranyl ions) is not considered an ARAR.

Appendix A Comment 22: Both the no action alternative and the shallow targeted removal alternative were modeled together as one. Does this imply that targeted shallow removal will have no real impact on future migration of uranium at this site?

Response to Appendix A Comment 22: The USACE anticipates that material removal to 5 feet below grade will lessen the potential for shallow groundwater contamination during high-water periods (winter melt and spring rains). However, these conditions were not specifically modeled, as mass will be retained in the deeper landfill and affecting leachate as noted. The loss of transportable mass in the shallow soil should have a lowering effect on the discharges to the surface water.

Appendix A Comment 23: The second alternative modeled was capping in place with a cap over the FUSRAP area to tie into the town of Tonawanda's Phase 1 and Phase 2 caps over the rest of the landfill. According to the text, this results in a 60% reduction in recharge to the waste/groundwater, and a reduction in groundwater levels of 11 feet along the north side of the landfill. According to the text and Figure 37, the plume in the northern drainage ditch would dissipate to 26 µg/L in 10 years if the ditch were still in existence, due to a projected 96% reduction in flow to the ditch. The figure shows a plume migration to the southeast at the 500 and 1000 year marks, but not as far as the targeted removal option in Figure 36. The text states that at around 150 years the plume will extend into areas previously showing few groundwater impacts. At 1000 years the uranium contaminated groundwater will enter the leachate collection system.

Response to Appendix A Comment 23: Correct. The slow transformation of the leachate levels to a long-term condition indicates the plume will follow a new flow vector governed by the southern leachate collection system. The slow flattening of heads in the fully capped landfill also lessen transport potentials; thus, the capped plume does not expand.

Appendix A Comment 24: The third modeled alternative was full removal of the uranium contaminated soils and the existing plume within the excavation area (but not uranium that has migrated beyond the excavation area), as shown in Figure 4 It is unclear what level of uranium in mg/kg will require soil excavation and off-site disposal. The third alternative includes three sub- alternatives, the first being excavation and removal with no capping, the second excavation and disposal, with a town cap integrated into the existing town caps, and the third excavation and disposal along with construction dewatering and a town cap integrated into the existing town caps. The conclusion of the simulations was that the groundwater residuals would not be sources for further uranium migration due to lack of a

concentrated source, low Kd actual values that would not promote dissolution of uranium above 30 µg/L, and projected continuing reducing conditions the area with PAH contaminants still present in other portions of the landfill. A lack of a cap would reduce uranium concentrations, simply due to dilution and migration, but a cap over the area would extend the period of time that it would take to bring all locations to a level below 30 µg/L by 385 years.

Response to Appendix A Comment 24: Noted. The capping of remaining uranium-impacted leachate will minimize dispersion (dilution/attenuation) and thus produce a more recalcitrant condition in the landfill, although the plume size is much reduced. Please see Section 3.4 of the FS report for further information.

Appendix A Comment 25: On page A-35 the fifth bullet states that the maximum concentration entering the ditch at initial groundwater-level equilibrium after source removal is "X µg/L". What does the X represent?

Response to Appendix A Comment 25: This value should have read 64 µg/L.

Appendix A Comment 26: The text on page A-36 states that the simulated dewatering of the excavation to a level at the base of contamination had no effect on the plume longevity, but it seems logical that pumping uranium-contaminated groundwater from the source area would have a positive effect on overall remediation of the contamination. In any event, wouldn't dewatering be necessary in order to excavate the contaminated soils?

Response to Appendix A Comment 26: The simulation did remove uranium mass from the system, yet the impacted residual wastes and Kd values retained mass for subsequent transport. The leachate levels in the landfill under the MED area vary from near grade to over 7 feet below grade, and the deeper wastes (say below about 7 feet) become loose and saturated (under pressure); thus, significant amounts of leachate would be recovered to excavate to the deeper MED constituents.

Appendix A Comment 27: Section 6.3 discusses other influences on contaminant transport in the landfill. A soil bioremediation operation is currently being constructed on the western portion of the landfill. How will this influence the model predictions?

Response to Appendix A Comment 27: The USACE assumed the capped condition over the landfill. Other operations are assumed to be compatible with the final capping scenario (i.e., planned cap extent and maintenance are enforced).

Appendix A Comment 28: In Table 3 (page A-44) it appears that the column labels for maximum and minimum values were switched.

Response to Appendix A Comment 28: Thank you for your comment. The column labels in Table 3 are incorrect.

Appendix A Comment 29: The current Phase I capped area is larger than the area shown in Figure 3. The current Phase I cap extends south to the site haul road, and covers 27.8 acres as opposed to the 25 acre cap shown in the Corps figures and discussed in the text. Does this influence any of the model predictions, with respect to timing of plume movement?

Response to Appendix A Comment 29: The USACE does not believe the 10 percent addition would affect the modeling outcome.

Appendix C: Detailed Soil Volume Estimate Methodology
Section 1.0 Introduction Appendix C Comments:

Appendix C Comment 1: It is stated that the risk of encountering volumes of contaminated soil needing removal greater than the 50% confidence level is addressed via the cost estimate contingency developed by the abbreviated Cost and Schedule Risk Analysis (Appendix D). If one looks at the Table on page D-53, the contingency factor added in is 7-9.37%, depending on the activity for Alternative 3, targeted shallow removal, and 7% to 40.53% for Alternative 4, deep excavation and off-site removal. Would these contingency factors include all soils included in the 90% confidence limit which are not included in the 50% confidence limit?

Response to Appendix C Comment 1: The contingency added by the abbreviated cost and schedule risk analysis (CSRA) does not correlate directly to the confidence levels in the soil volume estimate. Project risks are evaluated based on their likelihood of occurrence and impact if they occur, and then the abbreviated CSRA calculates a cost contingency for each identified project risk. Higher project risks will result in a greater contingency. This can be seen in the risk of encountering additional contaminated soil volumes requiring removal; for Alternative 3, which has a smaller estimated volume and a more defined excavation limit (i.e., excavation only to 5 feet deep), there is a lower risk of volume growth, and thus a lower contingency, than for Alternative 4, which has a much higher risk of volume growth due to the greater volume and depth of excavation and the uncertainty of accurate characterization in a heterogeneous landfill.

Appendix C Comment 2: In this analysis, data for the volume estimate included data from DOE investigations in 1991 and 1994, as well as Corps investigations in in 2001 and 2010. Thus more data was used here than in other parts of the report, where only 2009 to more recent data was presented.

Response to Appendix C Comment 2: For purposes of preparing the baseline risk assessment, USACE used the FUSRAP data collected from 2009 and after as the most current and comprehensive data set to accurately determine whether the FUSRAP-related material in the landfill posed a human health risk requiring action (see above response to NYSDEC Comment 4 on Section 1.0 of the feasibility study). For purposes of estimating the volume of soil contaminated above the preliminary remediation goals, the relevance

of using current data was not as significant, so though not necessary, USACE chose to include the older FUSRAP data as well in the soil volume estimate.

Appendix C Comment 3: If the concern is about contamination in the upper five feet under Alternative 3, why are surface soils defined as extending to a depth of only one foot below the surface, with a corresponding preliminary remediation goal of 5 pCi/g or less, whereas the soils from one foot and below were considered subsurface soils with an allowable higher pCi/g limit of 15?

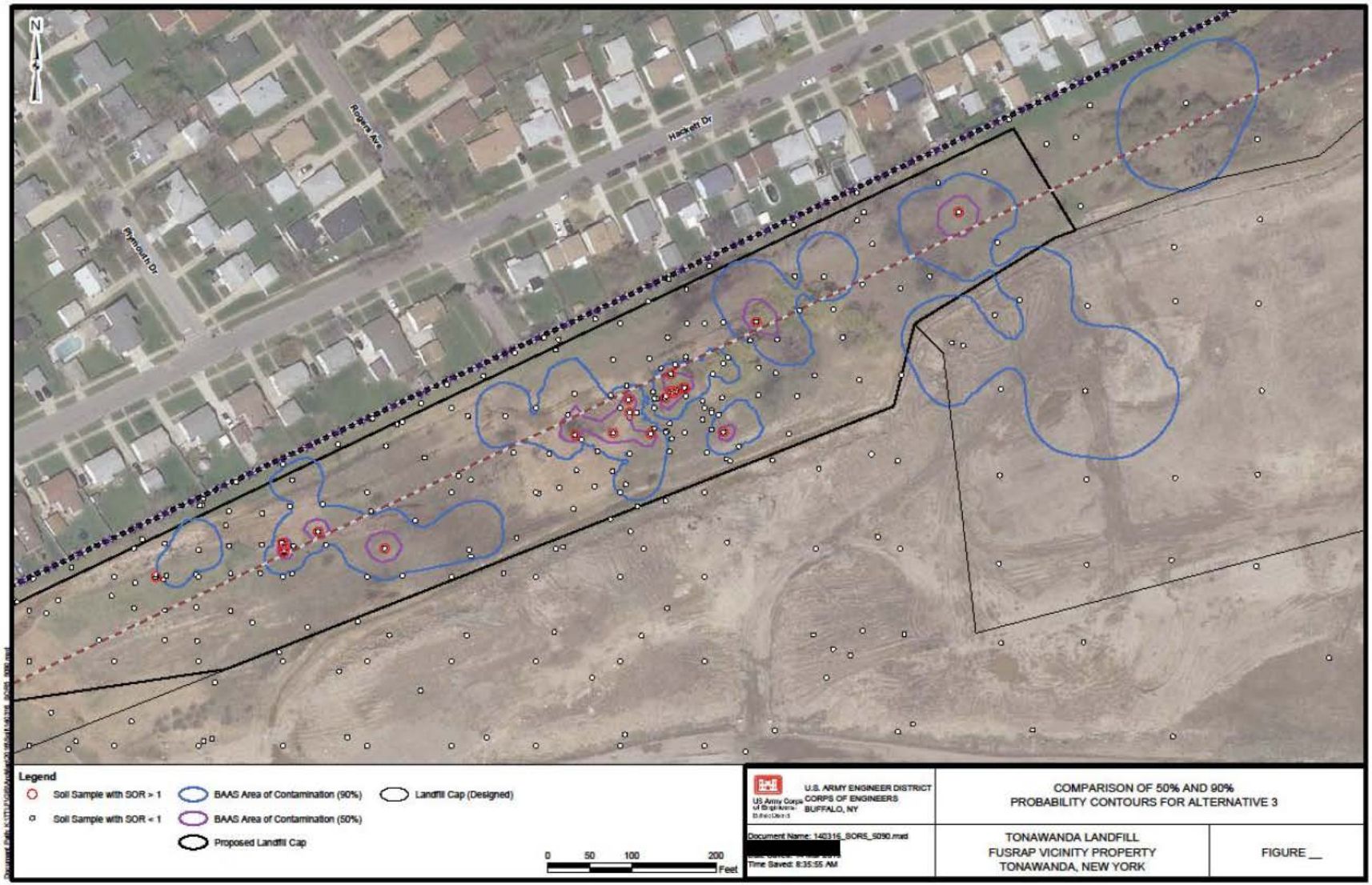
Response to Appendix C Comment 3: The ARAR used to establish preliminary remediation goals, 10 CFR Part 40 Appendix A Criterion 6(6) states that:

The design requirements in this criterion for longevity and control of radon releases apply to any portion of a licensed and/or disposal site unless such portion contains a concentration of radium in land, averaged over areas of 100 square meters, which, as a result of byproduct material, does not exceed the background level by more than: (i) 5 picocuries per gram (pCi/g) of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over the first 15 centimeters (cm) below the surface, and (ii) 15 pCi/g of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over 15-cm thick layers more than 15 cm below the surface.

To be conservative, all samples with an ending depth down to 1 foot below ground surface were treated as surface soils and evaluated against the surface criterion of 5 pCi/g radium-226 (or the benchmark dose equivalent of other radionuclides).

Appendix C Comment 4: Figure 3 shows the 50% probability distribution of contaminated soils needing remediation. What would the 90% probability distribution look like?

Response to Appendix C Comment 4: See figure for comparison of 50 percent and 90 percent probability contours for Alternative 3. A portion of the 90 percent probability contour extends under the Phase 1 cap and planned Phase 2 cap of the municipal solid waste landfill regulated by NYSDEC under 6 NYCRR Part 360. During the RD/RA phase of the CERCLA process, USACE will conduct predesign sampling before excavation to reduce the uncertainty in our needed excavation footprint. Under Alternative 3, confirmatory sampling within the sidewalls of the excavation will ensure that the lateral extent of the contamination has been captured. The USACE will only be responsible for remediating FUSRAP-related material above remediation goals that exist for soil, outside of the bounds of the capped portions of the Town of Tonawanda municipal landfill.


N
Rogers Ave
Hackett Dr
Plymouth Dr
Legend
Soil Sample with SOR > 1
Soil Sample with SOR < 1
BAAS Area of Contamination (90%)
BAAS Area of Contamination (50%)
Proposed Landfill Cap
Landfill Cap (Designed)
0 50 100 200
Feet
U.S. ARMY ENGINEER DISTRICT
US Army Corps of Engineers
CORPS OF ENGINEERS
BUFFALO, NY
COMPARISON OF 50% AND 90%
PROBABILITY CONTOURS FOR ALTERNATIVE 3
Document Name: 140316_SORS_5090.mxd
[redacted]
Time Saved: 8:35:55 AM
TONAWANDA LANDFILL
FUSRAP VICINITY PROPERTY
TONAWANDA, NEW YORK
FIGURE __

Appendix D: Detailed Cost Estimates for the Feasibility Study for the Landfill Operable Unit of the Tonawanda Landfill Vicinity Property

Remedial Alternative 2—Single Layer Capping of FUSRAP-Related Material

Appendix D Comment 1: Figure 1 shows a proposed Corps single-layer cap, consisting of six inches of subgrade, 24 inches of barrier protection soil, and six inches of vegetative soil. There are no specifics as to the permeability of the barrier protection soil, although there is a statement in the main body of the report that the hydraulic conductivity would be less than 1 X 10^{-7} cm/sec. There is no discussion in the main body of the report on the six inch subgrade.

Response to Appendix D Comment 1: Those specifications have been added to the description of the remedy and are included in Part II Section 9.2 of the record of decision.

Appendix D Comment 2: This section proposes weekly surface water sampling of the ditch during construction of the cap. This is not reflected in the main body of the report on page 80 (Environmental Monitoring).

Response to Appendix D Comment 2: Specifications that are germane to the short-term effectiveness of the remedy, such as environmental monitoring that will take place during remedial action, are in Part II Section 10.5 of the record of decision.

Appendix D Comment 3: Apparently gas vents would be included but there is no detail on the number of vents which would be installed.

Response to Appendix D Comment 3: No gas vents are included in Alternative 2. As stated in Section 3.4 of the FS, due to the limited area of the cap, there would be no need for passive gas venting to be installed.

Remedial Alternative 3—Targeted Shallow Removal and Off-Site Disposal of FUSRAP-related Material

Appendix D Comment 4: Again, weekly surface water sampling of the ditch is not included in the discussion of activities in the main body of the report (Section 3.5 on page 80).

Response to Appendix D Comment 4: Specifications that are germane to the short-term effectiveness of the remedy, such as environmental monitoring that will take place during remedial action, are included in Part II Section 10.5 of the record of decision.

Remedial Alternative 4—Deep Excavation and Off-Site Disposal of FUSRAP-related Material

Appendix D Comment 5: Weekly surface water sampling of the ditch is not included in the discussion of activities in the main body of the report (Section 3.6).

Response to Appendix D Comment 5: Specifications that are germane to the short-term effectiveness of the remedy, such as environmental monitoring that will take place during remedial action, are included in Part II Section 10.5 of the record of decision.

Appendix D Comment 6: This alternative includes the installation and operation of four 12-inch diameter groundwater extraction wells. More detail needs to be provided on this proposal, and a discussion should be included in the main body of the report, as noted previously.

Response to Appendix D Comment 6: Specifications used in the generation of the cost estimates have been added to the description of the remedy and are included in Part II Section 9.4 of the record of decision. The specific details for this proposal will be further expounded upon during the RD/RA phase of the CERCLA process.

Appendix E. Radon Flux Evaluation

Appendix E Comment 1: The calculated radon flux through the cap proposed by the Corps under Alternative 2 (capping in place) is 19 pCi/m^2, which is close to the allowable flux limit of 20 pCi/m2 in 10CFR40. While it was stated that background levels of radon were not removed from the analysis, making the calculated radon flux conservative (higher than it would be if the background level of radon was removed), any degradation of the cap is likely to put the radon flux at or over the allowable limit.

Response to Appendix E Comment 1: Alternative 2 will reduce the near surface radioactive concentrations from the no-action concentrations and therefore reduce the radon flux to a level below the allowable flux limit of 20 pCi/m^2/sec in 10 CFR Part 40. In addition, routine cap maintenance, as needed, and five-year reviews will be conducted after remediation that will assess the condition of the landfill and erosion/disturbance of the landfill surface.

Comments on the Proposed Plan

Proposed Plan Comment 1: The Department disagrees with the selection of proposed Alternative 3 because it does not comply with the two threshold criteria of overall protectiveness of human health and the environment and compliance with SCG's. Under Alternative 3 because it will not prevent radiological contamination in groundwater from migrating offsite. Only Alternative 4, Deep Excavation and Disposal of FUSRAP-related material would be acceptable and would be compliant with federal and State environmental regulations.

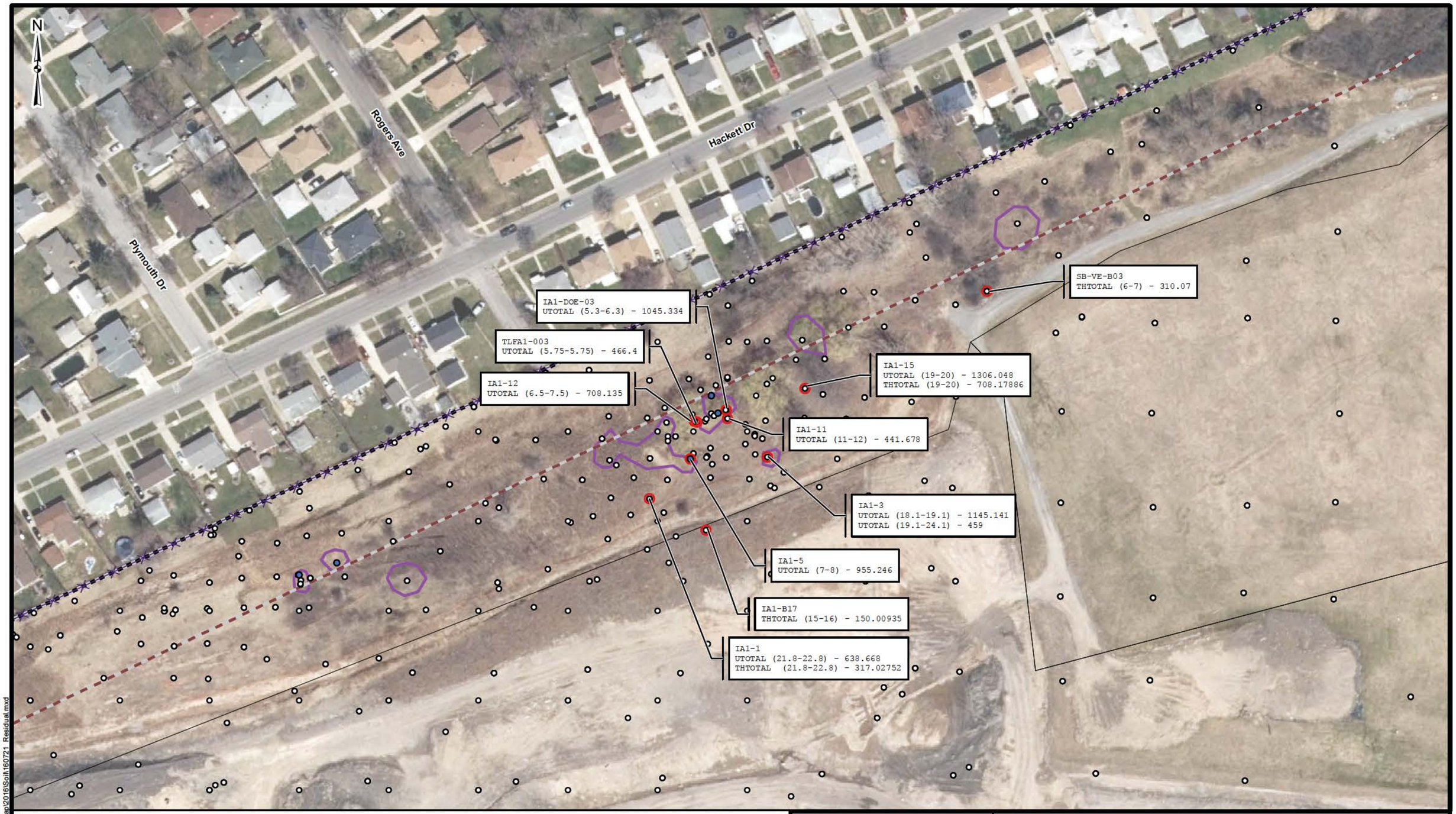
Response to Proposed Plan comment 1: Alternative 3 is protective of human health and the environment because it will prevent exposure to FUSRAP-related material in the Tonawanda Landfill. It also complies with applicable or relevant and appropriate

requirements (ARARs). Groundwater was not considered a FUSRAP-medium of concern because groundwater (leachate) within the landfill is not currently suitable for drinking water purposes, and it will not become a drinking water source in the future. The property is zoned as an industrial property, and future extraction and consumption of groundwater is unlikely since the proximal Niagara River and municipal systems provide higher quality supplies.

Proposed Plan Comment 2: If the Corps selects Alternative 3 in the Record of Decision, DEC requests some additional removal of Uranium contaminated soil to at least below the source material limit because of our position on residual uranium greater than source material concentrations and because of the solubility of Uranium and potential groundwater impacts. We would be happy to discuss this in detail.

Response to Proposed Plan Comment 2: The USACE evaluated the implications of NYSDEC's request for additional removal of uranium-contaminated soil to at least below the source material limit (0.05 percent by weight, which translates to about 339 pCi/g for natural uranium or 116 pCi/g for natural thorium) due to potential groundwater impacts. Uranium and thorium concentrations in soil before and remaining after implementation of Alternative 3 (i.e., residual uranium and thorium) are presented in the figure below.

Approximately five soil sample locations above the source term limits will be removed by the implementation of Alternative 3. As shown in the figure below, residual uranium and/or thorium will exceed source term limits in less than 3 percent (10 of 400) of soil sample locations collected on the Landfill OU after Alternative 3 is implemented. Additionally, groundwater (leachate) from the landfill is not a medium of concern since it does not pose a risk to human health or the environment and is not expected to do so in the future.



Legend

- Soil Sample with Total Uranium Residual > 339 pCi/g or Total Thorium Residual > 116 pCi/g
- Remediated Soil Sample with Total Uranium > 339 pCi/g or Total Thorium > 116 pCi/g
- Soil Sample
- BAAS Area of Contamination (50%)
- Landfill Cap (Designed)

0 50 100 200 Feet

Document Path: K:\TTLF\GIS\ArcMap\2016\Soil\160721_Residual.mxd

US Army Corps of Engineers Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

ALTERNATIVE 3
RESIDUAL CONCENTRATIONS - TOTAL URANIUM AND TOTAL THORIUM

Document Name: 160721_Residual mxd
[redacted]
Date Saved: 12 Oct 2017
Time Saved: 9:53:18 AM

TONAWANDA LANDFILL
FUSRAP VICINITY PROPERTY
TONAWANDA, NEW YORK

FIGURE __

Land Use Controls

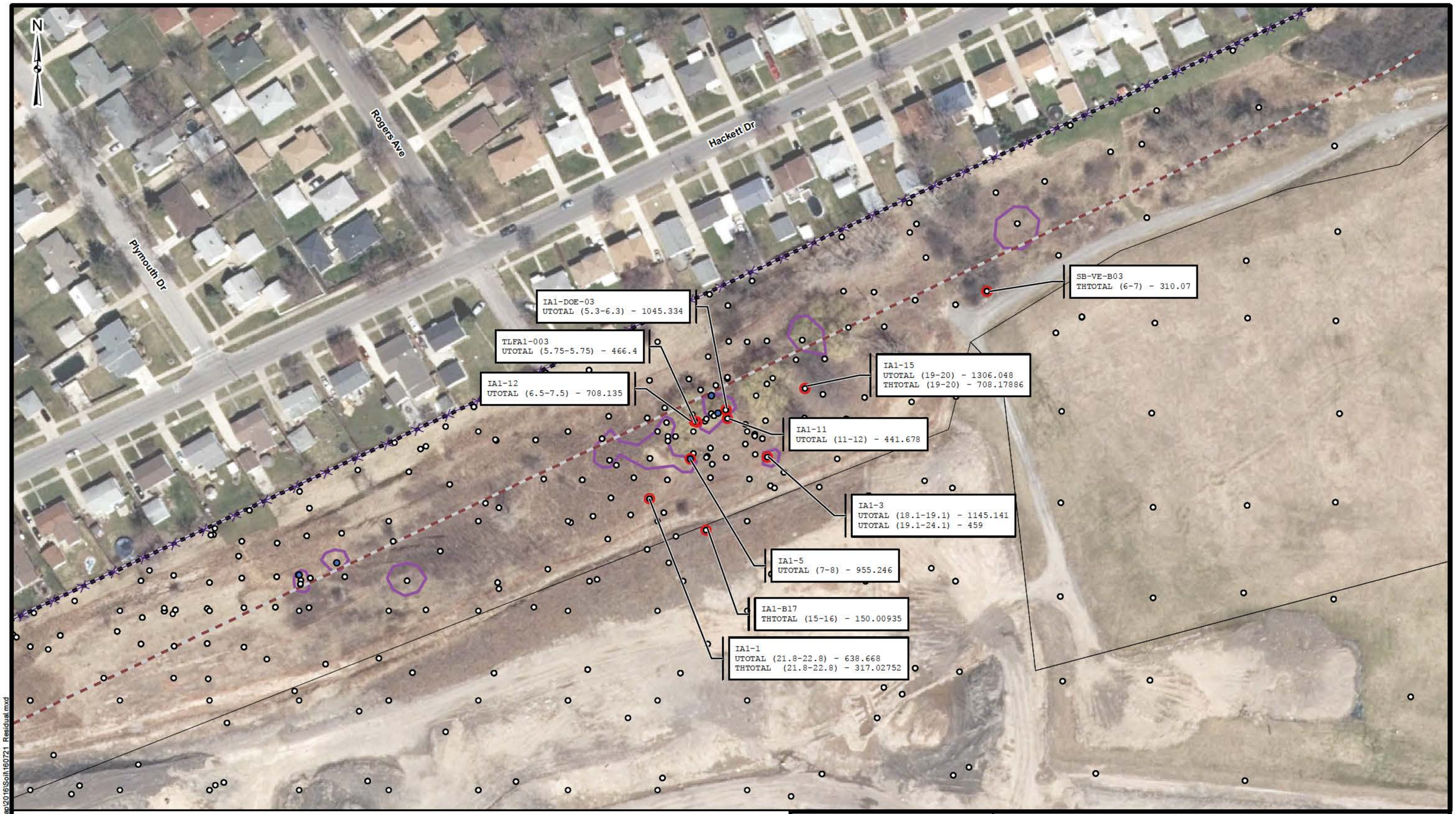
Proposed Plan Comment 3: Alternatives 2 and 3 rely on land-use controls as a general response action to limit exposure. The Department is concerned regarding the reliance on land-use controls that are not designed for radioactive disposal sites, and the lack of commitment to federal responsibility for maintaining land use controls or committing the resources necessary for monitoring of the site during the proposed 1000 year control period. If land use controls are included in the final remedy, Part 375 requires that they are in the form of an Environmental Easement.

Response to Proposed Plan Comment 3: It has been determined since the release of the Proposed Plan that no LUCs are needed to provide overall protectiveness of human health by Alternative 3. As such, all references to LUCs have been deleted from the ROD.

Cleanup Levels

Proposed Plan Comment 4: As indicated many times previously to the Corp, this Department does not accept remedies that leave uranium concentrations above the source material concentration limit. The 0.05-percent by weight limit is equivalent to approximately 339 picocuries uranium/gram (pCi U/gram) for natural uranium or 116 picocuries thorium/gram (pCi Th/gram) for natural thorium. To that end, based on the Corps preferred alternative, Alternative 3 Targeted Shallow and Off-site Disposal of FUSRAP related material the Department does not support the Utotal preliminary remediation goal (PRG) of 457 pCi/g.

Response to Proposed Plan Comment 4: 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 Landfill OU. Source material concentration limit derived from 10 CFR 20 Subpart E is not an ARAR for the Landfill OU. As stated in Appendix B of the FS, "The provisions of the NRC decommissioning rule provided in 10 CFR 20 Subpart E specifically exclude uranium and thorium recovery facilities already subject to 10 CFR Part 40 Appendix A. …. Since 10 CFR Part 40 Appendix A has been determined to be relevant and appropriate for the remedial alternatives being considered for the Landfill OU, 10 CFR 20 Subpart E may be relevant but by its own term, is not appropriate for the site." Additionally, as shown in the figure below, 11 out of 397 soil sample locations will remain at a depth greater than 1.6 m (5 ft) at concentrations greater than 339 pCi/g uranium or 116 pCi/g thorium after remedial action is completed. After remediation is completed, these samples will have been covered with low-permeability backfill that will help reduce leachate flow to the drainage ditch. Additionally, it was determined that surface water and groundwater (leachate) are not media of concern. Specifically regarding groundwater, the local and regional hydrogeology indicates the surficial red till/lacustrine sediments are not a viable groundwater resource at the site due to low hydraulic conductivity, poor well yields, and high salinity.



Legend

- Soil Sample with Total Uranium Residual > 339 pCi/g or Total Thorium Residual > 116 pCi/g
- Remediated Soil Sample with Total Uranium > 339 pCi/g or Total Thorium > 116 pCi/g
- Soil Sample
- BAAS Area of Contamination (50%)
- Landfill Cap (Designed)

0 50 100 200 Feet

Document Path: K:\TTLF\GIS\ArcMap\2016\Soil\160721_Residual.mxd

US Army Corps of Engineers Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

ALTERNATIVE 3
RESIDUAL CONCENTRATIONS - TOTAL URANIUM AND TOTAL THORIUM

Document Name: 160721_Residual mxd
[redacted]
Date Saved: 12 Oct 2017
Time Saved: 9:53:18 AM

TONAWANDA LANDFILL
FUSRAP VICINITY PROPERTY
TONAWANDA, NEW YORK

FIGURE __

Environmental Monitoring

Proposed Plan Comment 5: The environmental monitoring discussion for FUSRAP wastes left in place removes monitoring of groundwater, surface water, and sediment from further consideration, since the Corps considers them not to be media of concern. The State believes for Alternative 3 environmental monitoring should include at least air quality and groundwater monitoring and should be performed by the federal government.

Response to Proposed Plan Comment 5: As explained in Section 8.2.2 of the ROD, USACE will conduct verification radon flux sampling of uncapped portions of the Landfill OU during remedial action to ensure residual radioactive material at depth (i.e., greater than 1.5 m [5 ft]) would meet the radon flux limit of 20 $pCi/m^2/s$ at the ground surface. Groundwater was not considered a medium of concern because groundwater leachate within the landfill is not currently suitable for drinking water purposes, and it will not become a drinking water source in the future. The natural groundwater quality for the Landfill OU is poor and nonpotable without treatment. The deep groundwater underlying the site (Camillus Shale origin) exhibits very poor water quality due to high salinity and total dissolved solids. The groundwater within the landfill material is considered leachate and not a potable resource due to the finite volume of groundwater in the landfill and poor water quality derived from the hazardous and municipal wastes placed in the Landfill OU. The groundwater in the area of the Tonawanda Landfill Vicinity Property is characterized by several chemical analytes that exceed the U.S. EPA primary or secondary drinking water standards, including aluminum, iron, manganese, sodium, general turbidity, total dissolved solids, and partially low oxygenation. Consequently, groundwater is not considered a resource for drinking water.

Cost Estimates

Proposed Plan Comment 6: Cost estimates for Alternatives 3 and 4 are presented in Section 4.0 Detailed analysis of remedial alternatives, and specifically in subsection 4.2.3.7 and 4.2.4.7 respectively. The capital cost for Alternative 3 is $10,341,038, with an annual O&M cost of $62,237. According to the FS, the O&M costs include annual inspections, maintenance of land use controls, and conduct of 5 year reviews. Monitoring costs have been underestimated because the costs of necessary air and groundwater monitoring (see above) do not appear to have been accounted for. The State would like to see those cost carried out for the 200 year and 1000 year timeframe and then a comparison made to the capital cost for Alternative 4 of $55,400,759, with an annual O&M cost of $0.

Response to Proposed Plan Comment 6: Groundwater was not considered a medium of concern because groundwater leachate within the landfill is not currently suitable for drinking water purposes, and it will not become a drinking water source in the future. Consequently, groundwater is not considered a resource for drinking water, and groundwater monitoring is not required. As explained in Section 8.2.2 of the ROD, USACE will measure postremediation radon flux concentrations to verify that radon

emanating from the uncapped portions of the Landfill OU demonstrate compliance with the ARAR. No LUCs are necessary for Alternative 3 to provide complete protectiveness for current and reasonably anticipated future users.

Groundwater Impacts

Proposed Plan Comment 7: The report discusses groundwater at the site and states that the groundwater in the waste and monitoring wells is not considered a groundwater resource due to ambient water quality and anthropogenic impacts. However, the state considers groundwater beneath the site to be class GA (potential source of drinking water). 6 NYCRR Part 701.18b states that the class GSB (saline groundwater) shall not be assigned to any ground waters of the State, unless the Commissioner finds that the adjacent and tributary ground waters and the best usages thereof will not be impaired by such classification. Therefore, all standards associated with a class GA designation should apply. As such, the State is concerned with leaving the more highly concentrated material within the landfill.

Response to Proposed Plan Comment 7: Groundwater was not considered a medium of concern under the methodology of CERCLA because groundwater leachate within the landfill is not currently suitable for drinking water purposes, and it will not become a drinking water source in the future. The deep groundwater underlying the site exhibits very poor water quality due to high salinity and total dissolved solids (Camillus Shale origin). The natural groundwater quality for the Landfill OU is poor and nonpotable without treatment. The groundwater within the landfill is not considered a potable resource due to the finite volume in the landfill and poor water quality derived from the hazardous and municipal wastes placed in the Landfill OU. The groundwater in the area of the Tonawanda Landfill Vicinity Property is characterized by several chemical analytes that exceed the U.S. EPA primary or secondary drinking water standards, including aluminum, iron, manganese, sodium, general turbidity, total dissolved solids, and partially low oxygenation.

4. [redacted] ERIE COUNTY EXECUTIVE

[redacted] Erie County Executive, provided comments to the USACE during the public comment period. These comments are attached in this appendix. This section provides the responses to the comments as numbered in his letter.

Comment 1: Erie County is in general agreement with the Plan as presented which selected Alternative 3, Targeted Shallow Removal and Off-Site Disposal of FUSRAP related Material.

Response 1: Thank you for your comment and support of the preferred alternative (Alternative 3).

Comment 2: Erie County asks that the ACE make every effort necessary, and hold as a priority, actions related to minimizing or eliminating nuisance and exposure risks to residences located adjacent to the landfill work area during remedial activities. Such actions may include dust and noise abatement, fugitive dust monitoring, and stormwater runoff mitigation.

Response 2: These concerns are important to USACE and will be fully addressed during the remedial design phase.

Perimeter air monitoring and water control measures, along with dust suppression and erosion control measures, will be conducted as needed during the remedial action to protect the workers and nearby residents and minimize migration of radionuclides (or other hazardous contaminants). Site access restrictions will be maintained throughout the remedial action.

Comment 3: Should this Plan be found to be acceptable by all stakeholders, Erie County asks the ACE to expedite the process by which final design is completed. In addition, this issue has caused a delay in Landfill closure and has been a source of concern for nearby residents for a number of years. Erie County asks that this project, if acceptable, receive priority for funding to avoid any further delay in project implementation and completion.

Response 3: Progress and the schedule for each site is dependent on prioritization among all active FUSRAP sites taking into account the CERCLA phase they are in and the availability of FUSRAP funds nationally.

Comment 4: The Town of Tonawanda is required to complete a NYSDEC approved closure of the landfill subsequent to completion of the ACE removal. Excavation, sorting and removal of material will affect elevations, grades and contours of the Landfill. Erie County strongly recommends that the ACE work with the Town of Tonawanda in advance of final remedial design to ensure the compatibility of these actions and, where possible, to identify and implement any possible synergies to reduce overall costs of the two projects.

Response 4: The USACE looks forward to continue working with project stakeholders to help ensure that the final remedial design is compatible with the future landfill closing and land use plans of the Town of Tonawanda. Discussions to date have been positive and USACE anticipates successful execution of necessary agreements to execute the remedy.

Comment 5: The selected Alternative 3 incorporates a 1000 year post closure monitoring program… to ensure the remedy remains protective. Please describe the actions associated with the monitoring, how these actions will ascertain remedial effectiveness and who will be provided with the results of the monitoring.

Response 5: For Alternative 3, the federal government would conduct periodic reviews that would focus on monitoring land use and whether there has been any disturbance of buried FUSRAP-related materials. The results will be compiled into a report that will be available on the Corps of Engineers' website.

Comment 6: Alternative 3 as described on Page 11 of the Plan does not mention radiological scanning and sorting. Paragraph 4 on Page 13 of the Plan, however, mentions radiological scanning and sorting as a means of volume reduction for waste minimization. Please describe how this will be accomplished. What will be the procedure for staging and sorting material? How will non-radiological material be handled? Will the excavated material be analyzed for other hazardous characteristics? Will the analytical results be shared? Have the Town and the NYSDEC agreed to the Plan for returning non-radiological material to the excavation?

Response 6: These details will be fully developed and described in the remedial design phase of the CERCLA process. Plans will be shared with NYSDEC and the Town of Tonawanda for their review during the remedial design phase. The analytical results will be compiled in the project completion report and posted to the Corps of Engineers' website.

Comment 7: Please provide backup calculations, including assumptions, associated with the determination of the Total Present Worth Cost calculated for each alternative and presented on Page 14.

Response 7: The basis of cost estimates can be found as a summary in that section of the current working estimate breakdown of costs. These detailed cost estimates are located in Appendix D of the feasibility study located in the administrative record file. The administrative record file is located on the Corps of Engineers' website at:

http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/Tonawanda-Landfill/

or

U.S. Army Corps of Engineers (by appointment only)
1776 Niagara Street
Buffalo, New York 14207

5. THE TOWN OF TONAWANDA, ERIE COUNTY

The Town of Tonawanda provided comments to the USACE during the public comment period. These comments are attached in this appendix. This section provides the responses to their comments as numbered in their letter.

Comment 1: Shallow Waste Relocation - The NYSDEC approved Closure Plan for the Landfill includes the relocation of an area of shallow waste located immediately east of the

FUSRAP area. This waste will be excavated from the indicated area and re-graded into the existing Landfill. Will the Town need to take any special precautions during the waste relocation activities?

Response 1: Under Alternative 3, FUSRAP-related material exceeding cleanup goals within the top 1.5 m (5 ft) of soil would be removed from the landfill. The areas of the landfill impacted by FUSRAP materials are identified on Figure 7 in Part II of this ROD. The USACE will coordinate with the Town of Tonawanda and NYSDEC to ensure that the USACE remedial design is compatible with the Town's final cap design.

Comment 2: Post-Closure Leachate Collection - The Closure Plan also requires the installation of a leachate collection line along the northern boundary of the Landfill. See Attachment 1 for portions of the Closure Plan regarding this proposed leachate collection line. As per the plan, this line will be installed at the approximate depth of seasonal-low groundwater elevations. Based on historical groundwater elevation data, this depth is estimated at approximately seven feet below grade. This proposed leachate collection line will intercept any leachate and/or shallow groundwater emanating from the Landfill prior to off-site migration. Collected leachate/groundwater will be directed to the Western Collection Pond (depicted on Figure 1) which ultimately discharges to the Town of Tonawanda wastewater treatment plant (WWTP). The following concerns are noted regarding this issue:

Comment 2a: Groundwater in the FUSRAP area/the vicinity of the proposed leachate collection line is documented to be impacted with elevated levels of Uranium (as indicated in the Proposed Plan). Although the Proposed Plan dismisses this groundwater contamination as there is no public use of the groundwater there is still the issue of eventual discharge of radiological-contaminated groundwater to the WWTP. Further evaluation of this issue is needed.

Response 2a: This was evaluated further in the surface water and groundwater flow and contaminant transport analysis that was conducted as part of the FS (please see Appendix A of the FS). These maximum leachate concentrations of uranium will not adversely impact operations at the WWTP. The Corps intends to coordinate closely with the Town and can discuss such concerns.

Comment 2b: As the leachate collection line is proposed to be installed to a depth (seven feet) below the maximum excavation depth proposed by Alternative 3 (five feet), there are concerns related to worker protection and proper materials management during the installation work. What additional precautions, monitoring, and disposal methods will be required during portions of this work conducted in areas previously excavated as part of Alternative 3? Also, what additional measures will be required in areas not excavated as part of the selective excavation proposed in Alternative 3?

Response 2b: The areas of the landfill impacted by FUSRAP materials are identified on Figure 3 of this ROD. The Town is responsible for ensuring the safety of workers and

the public associated with Town activities. The backfill after remediation should be at least 0.6 m (2 ft) on top of the excavation depth in the FUSRAP waste areas to ensure the long-term protectiveness of the FUSRAP remedy. The USACE will coordinate with the Town of Tonawanda and NYSDEC to ensure that the USACE remedial design is compatible with the Town's final cap design.

Comment 3: Grading for Surface Water Drainage - In accordance with the Closure Plan, the capping of the landfill will require grading the northern area to ensure surface water drainage to Two-Mile Creek. Currently, grading plans are not prepared for this proposed work. There is concern that once this grading is completed it may require the removal of some of the backfill/cover placed during the execution of Alternative 3 - resulting in less than three feet of minimum required cover.

Response 3: The backfill after remediation will be 1.5 m (5 ft) on top of the FUSRAP excavation depth. Alternative 3 will restore excavations back to grade. The USACE will coordinate with the Town of Tonawanda and NYSDEC to ensure that the USACE remedial design is compatible with the Town's final cap design.

Comment 4: Grading to meet Part 360 Closure Objectives- In addition to Item 3 above, NYSDEC Part 360 regulations require post-closure grading of a minimum grade of 4%. The same concern as noted above is present in regards to this proposed work.

Response 4: The backfill after remediation will be 1.5 m (5 ft) on top of the FUSRAP excavation depth. Alternative 3 will restore excavations back to grade. The USACE will coordinate with the Town of Tonawanda and NYSDEC to ensure that the USACE remedial design is compatible with the Town's final cap design.

Comment 5: Off-Site Waste-The Closure Plan also requires, pending property owner access, the excavation and disposal of any waste material that may exist outside of the limits of the landfill property, i.e. backyards of residences to the North. A portion of the Closure Plan requiring this work is included as Attachment 2. As historical disposal activities occurred prior to the construction of these residences, it is probable that disposal activities were not limited to present day property boundaries. If off-site waste excavation and disposal activities are conducted, what additional investigative and/or precautionary measures will be required in regards to the potential for radiological contamination?

Response 5: Based upon several weights of evidence, it is not apparent that radiological contamination, which is assumed to be coincident with landfill waste, extends into the properties or neighboring residents. Boring logs from the soil investigations that USACE conducted of the landfill in 2001 and 2010, the area of the landfill along the fence line contains native soil and not fill nor landfill waste. In addition, a review of historical aerial photographs indicate that the location of FUSRAP material coincides with areas of the landfill disturbed in the 1950s that are within the limits of the landfill. Please see Figure 2-5 of the 2012 baseline risk assessment report or Figure 3 of Appendix A of the

2015 feasibility study for a display of soil samples exhibiting elevated radioactivity superimposed on a 1951 aerial photograph of the site. In addition, the geological information system-based historical photographic analysis (HPA) shows the limits of the landfill over time, which do not appear to encroach on what is now the residential area. The HPA report can be found on the Corps of Engineers' website: http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/Tonawanda-Landfill/.

Comment 6: Environmental Monitoring Plan-As noted in comment #2 above, Alternative 3 does not call for any post-excavation groundwater monitoring. In light of the concerns related to the quality of water to be ultimately discharged at the WWTP it is suggested to consider a post-excavation groundwater monitoring plan to, at minimum, document the quality of water being discharged to the WWTP through the leachate/shallow groundwater collection system.

Response 6: Groundwater was not considered a medium of concern because groundwater (leachate) within the landfill is not currently suitable for drinking water purposes, and it will not become a drinking water source in the future. The groundwater underlying the site is a productive unit that exhibits very poor water quality due to high salinity and total dissolved solids. The natural groundwater quality for the Landfill OU is poor and nonpotable without treatment. The groundwater within the landfill is not considered a potable resource due to the limited volume of groundwater (finite volume in the landfill) and poor water quality derived from the hazardous and municipal wastes placed in the Landfill OU. The groundwater in the area of the Tonawanda Landfill Vicinity Property is characterized by several chemical analytes that exceed the U.S. EPA primary or secondary drinking water standards, including aluminum, iron, manganese, sodium, general turbidity, total dissolved solids, and partially low oxygenation. Consequently, this groundwater is not considered a resource for drinking water without significant treatment. The USACE will work with NYSDEC and the Town during the development of the remedial design, which will include the long-term monitoring plan and land use controls. Groundwater is not a media of concern and is not addressed under FUSRAP.

Comment 7: Site Security - As not all material will be removed under Alternative 3, will the orange fencing delineating the FUSRAP area continue to be maintained after the completion of work? What other security measures/site restrictions might be imposed?

Response 7: The orange fencing is not owned by USACE, and USACE was not responsible for its erection or maintenance. The USACE will work with NYSDEC and the Town during the development of the remedial design to prevent future exposure to the buried FUSRAP-related material.

Additional Overall Comment 1: Will the Town's ability to execute land use plans be compromised for public welfare?

Response Additional Overall Comment 1: The USACE took into account the Town's proposed future land use plans for the closed landfill during the development of the

proposed alternatives. The USACE will coordinate with the Town of Tonawanda and NYSDEC to ensure that the USACE remedial design is compatible with the Town's final cap design.

Additional Overall Comment 2: Significant additional costs to the Town due to inflation are anticipated as a result of the delay to finalize the landfill closure. What is the timeline projection for obtaining funding to complete the contemplated work? Can the Town anticipate restitution for this delay?

Response Additional Overall Comment 2: The landfill is the Town's property. The USACE does not have the authority to prevent or delay the Town's closure of the landfill. The timeframe for USACE to conduct the remediation is largely based upon the national FUSRAP budget, including the projects currently undergoing remediation and the priorities of the remaining projects awaiting remediation. As such, no restitution would be due and is not authorized from FUSRAP funding.

Additional Overall Comment 3: What is the disposition plan of hazardous or contaminated landfill waste encountered during Alternate 3 operations which are outside of federal jurisdiction? Can the USACOE ensure no additional costs will be borne by the Town due to these materials?

Response Additional Overall Comment 3: The USACE does not have the authority to address materials that are not impacted by FUSRAP-related contamination above the cleanup goals. Any non-FUSRAP-related material that may be excavated during the remedial action is the responsibility of the Town and will be placed back into the excavations or left to the Town's discretion as to its final disposition. During remedial design, USACE will coordinate with the Town to account for the possibility of encountering such materials.

6. THE COMMON COUNCIL AND MAYOR [redacted] OF THE CITY OF TONAWANDA, ERIE COUNTY

Whereas, the Army Corp of Engineers released the updated Proposed Plan for the Tonawanda Landfill and Whereas, the Army Corp gave four alternatives; no action, capping the FUSRAP area, shallow excavation of the FUSRAP area and full remediation of the FUSRAP area, now, therefore be it Resolved, that the Common Council of the City of Tonawanda and Mayor [redacted] does hereby desire full remediation of the FUSRAP area if adequate funding can be appropriated by Congress to complete this alternative sooner rather than later and be it further Resolved, in the event that that may not be possible, then the shallow excavation alternative would be desired to finally bring closure not only to residents that live along Hackett Drive but all City of Tonawanda residents, and be it further Resolved, that a certified copy of this resolution is submitted to the Army Corps for the Public Comment Period and Senator Schumer and Senator Gillibrand.

Response to comment by Common Council of the City of Tonawanda and Mayor [redacted]: Thank you for your comment.

The USACE acknowledges your preference for Alternative 4: deep excavation and off-site disposal of FUSRAP-related material. While Alternative 4 would remove all sources of FUSRAP-related contamination, Alternative 3 provides the same protectiveness to human health and the environment while being less intrusive during the remediation. Further, as the comment makes note, the lower cost of Alternative 3 means that it is likely to be funded and implemented faster than Alternative 4.

While future land use decisions for the Town of Tonawanda landfill property ultimately reside with the landowner, the USACE-selected remedy of Alternative 3 (targeted shallow removal and off-site disposal of FUSRAP-related material) is protective of both industrial (e.g., landfilling) and recreational (e.g., nature trails) future use of the site.

7. PUBLIC MEETING COMMENTS AND RESPONSES

The following were received as either written comments or oral comments during the public comment period. Each comment is followed by a response to that comment. A full transcript of the public meeting and all comments received has been collected at the end of this appendix.

Comment: [redacted], resident. (Comments provided before the meeting)
I walked along and talked with people who lived along that property and I've heard stories of people who had cancer, I know people that have had cancer and I think -- I know it's not the Corps of Engineer's responsibility to do a health -- real health survey of people along that stretch but I think there needs to be some further study done to see is there a higher incidence of cancer for people who live along that area versus people who live in other parts of the city or the county.

Response to Comment: Thank you for your comment. As a follow-up to air quality issues related to the Tonawanda Coke facility, the NYS Department of Health conducted a review of birth defects and cancer incidence in the Town of Tonawanda and surrounding areas. The fact sheet and report can be found at:

http://www.health.ny.gov/environmental/investigations/tonawanda/finalinfo_sheet.htm (fact sheet)

Comment: [redacted], resident. The other issue I came across was water runoff from that landfill and it was my understanding that how that radioactive material got there, nobody knows how that got there and it seems to have moved over the course of time. If there's runoff from that landfill into people's backyards, I think that should be a concern that would be addressed. It's not coming from any of the city plumbing. The county, Erie County Water Authority came out and it's not coming from any of their pipes so the only place that water

can be coming from is from the landfill and I don't know if the project is going to address keeping any runoff from that landfill from going into people's yards or the water from that landfill seeping into their basements or affecting their property at all because there doesn't seem to be any kind of drainage or trench or anything to stop runoff from that landfill going into people's property.

Response to Comment: The surface water hydrology in the Landfill OU is controlled by man-made features (i.e., landfill and resultant leachate, drainage ditch, etc.), precipitation/snow melt, and the site geology. As owner and operator, the Town of Tonawanda is responsible for controlling discharges from their property.

The FUSRAP surface water investigations focused on a drainage ditch running parallel to the northeastern property boundary as shown in Figure 5, which eventually discharges into Two Mile Creek. Concentrations of uranium in surface water from the drainage ditch are elevated above background. The updated BRA (2012) assessed the potential risk from incidental ingestion of surface water and groundwater at the site and found the risk to be well within the acceptable NCP limit. Therefore, surface water is not a FUSRAP media of concern at the Landfill OU.

The NYSDEC conducted two radiological investigations of adjacent properties. The first investigation involved radiological gamma walkover surveys of several residential properties and the Riverview Elementary School property in the vicinity of the Landfill OU (NYSDEC 2007). No gamma walkover survey results from any of the residential properties exceeded the investigative level set by the NYSDEC. The second investigation involved the sampling and analysis of sump water from basements of representative residential properties adjacent to the Landfill OU (NYSDEC 2008). Ten residential properties in locations ranging from the far western end of Wadsworth Court to the eastern end of Hackett Drive were sampled. The results of this sump sampling program indicate that contaminants from the Landfill OU are not entering the sumps of homes immediately bordering the Landfill OU.

Comment: [redacted] resident. I think that if you're looking for what's to do that's in the best interest of the people that live there, I think it's in their best interest to remove it all. I know it may not be cost effective or it may be too expensive, but the best solution would be I think to get rid of it all.

Response to Comment: Thank you for your comment.

The type of material in the landfill is not cohesive. Because of that, water infiltrating the excavation makes the side slopes unstable and increases risks that they will collapse. Additionally, due to the depth of the excavation, the large volume, and the high leachate water table at the site, there will be a large volume of water infiltrating from the rest of the landfill into the excavation area that would need to be managed, treated, and disposed

of. This volume of stockpiled soil would be greater with Alternative 4 than Alternative 3.

Comment: [redacted], resident. Will the Record of Decision be posted on-line?

Response to Comment: The record of decision, once released to the public, will include the transcript from this public meeting and will be stored in the administrative record file. The administrative record file on the Corps of Engineers' website at:

http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/Tonawanda-Landfill/

or

U.S. Army Corps of Engineers (by appointment only)
1776 Niagara Street
Buffalo, New York 14207

Comment: [redacted], resident. I read the material, some of the material and is it my understanding that if you did go for option 4 it would be the entire FUSRAP budget for an entire year for cleanup?

Response to Comment: The FUSRAP is a national program. Its overall funding level is determined by Congress. From the allocated funds, USACE headquarters decides based upon several factors where the national priorities are and determines funding for the individual USACE districts based upon several factors. The total projected costs for Alternative 4 are in excess of what the Buffalo District has historically received in any one fiscal year for the multitude of FUSRAP projects that Buffalo District manages.

Comment: [redacted] resident. But the entire pot is only $50 million, somewhere around there?

Response to Comment: The annual national FUSRAP budget has ranged from $100 million to $112 million over the past four fiscal years. The program budget for FUSRAP is determined by Congress and can vary each year.

Comment: [redacted], resident. And the determining factor in how much funding is put into that pot is congress?

Response to Comment: Correct. Congress determines the annual funding for FUSRAP.

Comment: [redacted], with the City of Tonawanda. The Army Corps has presented us with three quality options moving forward, each has their pros and cons. While I would love to stand up here tonight and demand a full cleanup of all contaminating material, I'm also a realist. This would also further delay the closure and capping of the Tonawanda Landfill

which in itself poses daily quality of life issues for many of our residents that live near and adjacent to the landfill. This is why I fully support the Army Corps shallow excavation option. And as a side note, with the shallow excavation, any efforts by the Army Corps should be worked in unison with the town and the DEC to make sure that their efforts aren't hampering the town's efforts to be able to properly cap and close the landfill. Thank you.

Response to Comment: Thank you for your comments. The USACE acknowledges your support of Alternative 3: targeted shallow removal and off-site disposal of FUSRAP-related material. The USACE will communicate with the Town of Tonawanda and NYSDEC regarding what is required to ensure that the selected remedy remains protective during the Town of Tonawanda's landfill closure activities and into the future.

Comment: [redacted], President of Citizens United for Justice. The first thing I want to say is radiation does not go away. It will continue to build in each person's body, it's cumulative, it doesn't wash away, time doesn't take it away. Radiation is being carried away in the groundwater to Two Mile Creek finding its way to the Niagara River. Over time it's going to accumulate there and ruin one of our best natural resources and potentially hurting people further down that river. This does not just impact the generation living on the hill now, most of us that are living there now have willed our homes to our children. You are affecting not just this generation, my son's generation, my grandkids' great grandkids. If number 4 is done the potential for an environmentally friendly and community nature trails which is what this site was used for years, the potential is there. Wildlife is already there, we already have deer, fox, turkey, multiple birds, pheasants. It could be used for educational purposes for the future for our children to show the right way how to handle an environmental mess. The potential for that site for future education is phenomenal.

Response to Comment: Thank you for your comments. The USACE acknowledges your preference for Alternative 4: Deep Excavation and Off-Site Disposal of FUSRAP-Related Material. The USACE evaluated the potential risks from FUSRAP-related material at the Landfill OU according to U.S. EPA and U.S. Nuclear Regulatory Commission protocols. These risks were documented in the updated baseline risk assessment (USACE 2012).

The updated BRA concluded that for the current site users of the Landfill OU (i.e., trespasser or construction worker), as it is currently configured, the risks to human health from potential exposures to FUSRAP-related material buried within the Landfill OU are within the acceptable limits established in the NCP. However, if no action is taken to address the FUSRAP-related material, then for the reasonable future-use scenario of a recreational user, the human health risk may exceed the NCP limit because deeper buried contamination could become exposed through natural erosion. The BRA also assessed the potential risk from incidental ingestion of surface water and groundwater at the site and found the risk to be well within the acceptable NCP limit. Groundwater and surface water at the Landfill OU do not promote potable conditions, are not used as a drinking

water source, and the potential risk from incidental ingestion of uranium in surface water and groundwater at the site is well within acceptable limits established in the NCP.

The updated BRA also concluded that aquatic life in surface water bodies downgradient of this ditch, such as the aquatic habitat in Two Mile Creek, are not likely to be impacted by uranium. The surface water and groundwater flow and contaminant transport model developed by USACE for Alternative 3 predicts that there would not be sufficient uranium mass remaining after remedy implementation to cause uranium concentrations in Two Mile Creek to exceed the drinking water (30 µg/L) or ecological protection criteria (15 µg/L).

While Alternative 4 would remove all sources of FUSRAP-related contamination, Alternative 3 provides the same protectiveness to human health and the environment while being less intrusive during the remediation. The USACE sampling of Two Mile Creek indicates that uranium in its surface waters continues to be below both the drinking water and ecological protection criteria.

While future land use decisions for the Town of Tonawanda landfill property ultimately reside with the landowner, the USACE-selected remedy of Alternative 3: Targeted Shallow Removal and Off-Site Disposal of FUSRAP-Related Material is protective of both industrial (e.g., landfilling) and recreational (e.g., nature trails) future use of the site.

Comment: [redacted], President of Citizens United for Justice. I would also ask that in light of how long this took to come and the amount of material that has to be absorbed, that you consider extending the comment period to the end of December to give people a chance to learn, to question and to absorb everything you're telling us. Thanks again.

Response to Comment: Thank you for your comment. The public comment period was extended 30 days based upon the request received during the public meeting.

Comment: [redacted], President of Citizens United for Justice. No matter whether you do 3 or 4, we discussed screening, 8 foot screening to be put up to protect the neighborhood from any of the soil, dirt, whatever coming into the neighborhood. We put up with this stuff for so many years now, a lot of us are fed up with it. Is there any plan in place to put a screening up to protect the Riverview neighborhood, the school, playground, everything that's there, 17 months, 28 months, it doesn't matter how long it's going to take. The neighborhood still needs to be protected from whatever is being excavated out of there. What is the Army Corps' plan to protect the neighborhood as the stuff is being done, what measures are going to be put in place?

Response to Comment: The detailed worker safety and community protection plans will be developed as part of the remediation work plans. The USACE would implement various methods, such as airborne monitoring during remediation, to ensure protection and contamination control as the remediation is being conducted.

Comment: [redacted], resident. I moved to the City of Tonawanda in the early '60s, by the mid '60s Stamp and Spot Brother were building the Youngman. They in turn excavated and made the Tonawanda Flats in order to make the roadbed from Delaware to Niagara Falls Boulevard. In that process, they had to scrape some of your stuff. We got the only nuclear highway in the United States that I know of. On what he's saying, 2 foot of clay, we live on clay hill and we are lower than what the so called dump is. Are you going to get together with the town and grade away from our property or going to elevate it and drain towards us as we have now. That's what we're looking for. Thank you.

Response to Comment: Thank you for your comment. Our charge is to evaluate radiation risk for the Landfill OU and to implement remedial actions, if necessary, to protect human health and the environment for the site. The USACE will coordinate with the Town of Tonawanda and NYSDEC to ensure that the USACE remedial design is compatible with the Town's final cap design.

Comment: [redacted], resident. Secondary looking for evidently you're all for bid, that takes time. 2010 you took the samplings and it's five years, that takes time. Everything takes time. Thank you.

Response to Comment: The timeframe to conduct the remediation is based upon the national FUSRAP program and yearly budget. This budget is distributed among the active FUSRAP projects currently undergoing remediation and the priorities of the remaining projects awaiting remediation.

Comment: [redacted] Town of Tonawanda citizen. The Corps spoke about the risks of number 4 but he didn't say what the risks were outside of that they're deeper and the people working on it. What I'm worried about what are the risks environmentally and what's in number 4 that you said 3 would evolve avoiding those risks, what risks are we avoiding?

With the deeper excavation and the risks that are happening with that, if 3 is taken, what about the groundwater and what is -- obviously everything flows towards rivers heading to Niagara River and to surrounding area, without -- you know, how does that balance between 3 and 4 as far as radiation which I'm sure has been for many years leaching into that area and the stoppage of that.

Response to Comment 5: The risks with Alternative 4 are primarily due to the depth of the excavation and the amount of material that would be removed/managed as part of the deep excavation. The safety risks increase due to the depth. The type of material in the landfill is not cohesive. Because of that, water infiltrating into the excavation makes the side slopes unstable and increases risks that they will collapse. Additionally, due to the depth of the excavation, the large volume, and the shallow leachate water table at the site, there will be a large volume of water infiltrating from the rest of the landfill into the excavation area that would need to be managed, treated, and disposed of. The FUSRAP-

related material, material that is above the FUSRAP material, and the other landfill material would need to be managed and stockpiled while doing the excavation. Alternative 3 demonstrates that the remediation of deeper soils is not necessary for the remedy to be protective of human health and the environment.

Comment: [redacted], Town of Tonawanda citizen. What about the groundwater and what is heading to Niagara River and to surrounding area? How does that balance between 3 and 4 as far as radiation which has been for many years leaching into that area and the stoppage of that.

Response to Comment: Appendix A of the FS states that the amount of FUSRAP contamination removed in Alternative 3 is not enough to significantly reduce the source term from leaching to groundwater. Therefore, the deeper residual FUSRAP contamination would be a potential source for future leaching into groundwater. However, Alternative 3 would remove some of that source, and then the town's final closure of the landfill would reduce any potential future infiltration or leaching from the soils. Alternative 4 would remove all of the soil source for potential future leaching in the groundwater. Groundwater was not considered a medium of concern because groundwater (leachate) within the landfill is not currently suitable for drinking water purposes, and it will not become a drinking water source in the future. The groundwater underlying the site is a productive unit that exhibits very poor water quality due to high salinity and total dissolved solids. The natural groundwater quality for the Landfill OU is poor and nonpotable without treatment. The groundwater within the landfill is not considered a potable resource due to the limited volume of groundwater (finite volume in the landfill) and poor water quality derived from the hazardous and municipal wastes placed in the Landfill OU. The groundwater in the area of the Tonawanda Landfill Vicinity Property is characterized by several chemical analytes that exceed the U.S. EPA primary or secondary drinking water standards, including aluminum, iron, manganese, sodium, general turbidity, total dissolved solids, and partially low oxygenation. Consequently, this groundwater is not considered a resource for drinking water without significant treatment. The USACE will work with state and local stakeholders during the development of the remedial design. Groundwater is not a media of concern and is not addressed under FUSRAP. The leachate collected is part of the landfill closure process; it is the Town's responsibility to properly treat the leachate.

Comment: Unidentified Citizen. Who's going to make the final decision on which one of these to use, who makes the final decision?

Response to Comment: The public comments are received, responded to, and are used to develop a record of decision for the site. The Brigadier General from the Great Lakes and Ohio River Division signs the record of decision, and that documents the Army's decision regarding the selected remedy. *(Note: A representative from the Great Lakes and Ohio River Division will be signing the ROD.)*

Comment: [redacted], former resident of the City of Tonawanda. Beyond the fence line, was any testing done beyond the fence line?

Response to Comment: The City of Tonawanda requested that NYSDEC conduct additional testing to determine the potential for radioactivity to migrate into the neighboring residential properties. The NYSDEC conducted two radiological investigations of adjacent properties. The first investigation involved radiological gamma walkover surveys of several residential properties and the Riverview Elementary School property in the vicinity of the Landfill OU (NYSDEC 2007). No gamma walkover survey results from any of the residential properties exceeded the investigative level set by the NYSDEC. As stated by NYSDEC:

> The analytical results for these samples indicate that the soil contains naturally occurring radioactive material, in normal concentrations, and cesium-137, which is a residue from the radioactive fallout from atmospheric testing of nuclear weapons in the past. There is no indication of radiological contamination. These results are consistent with the readings obtained. They illustrate the fact that the investigative level used in this survey was very conservative.

The survey concluded that there was no evidence of radioactive wastes from uranium ore processing in the areas surveyed (NYSDEC 2007).

The second investigation involved the sampling and analysis of sump water from basements of representative residential properties adjacent to the Landfill OU (NYSDEC 2008). Ten residential properties in locations ranging from the far western end of Wadsworth Court to the eastern end of Hackett Drive were sampled. The results of this sump sampling program indicate that contaminants from the Landfill OU are not entering the sumps of homes immediately bordering the Landfill OU.

Comment: [redacted] former resident of the City of Tonawanda. Saturated fill goes right up to the fence line, what happens to it after that? There's no doubt that testing needs to be done beyond the fence line and that if there's saturated fill going right up to the fence line it doesn't just stop because there's a fence above the ground.

Response to Comment: The City of Tonawanda requested that NYSDEC conduct additional testing to determine the potential for radioactivity to migrate into the neighboring residential properties. The NYSDEC conducted two radiological investigations of adjacent properties. The first investigation involved radiological gamma walkover surveys of several residential properties and the Riverview Elementary School property in the vicinity of the Landfill OU (NYSDEC 2007). No gamma walkover survey results from any of the residential properties exceeded the investigative level set by the NYSDEC. As stated by NYSDEC:

The analytical results for these samples indicate that the soil contains naturally occurring radioactive material, in normal concentrations, and cesium-137, which is a residue from the radioactive fallout from atmospheric testing of nuclear weapons in the past. There is no indication of radiological contamination. These results are consistent with the readings obtained. They illustrate the fact that the investigative level used in this survey was very conservative.

The survey concluded that there was no evidence of radioactive wastes from uranium ore processing in the areas surveyed (NYSDEC 2007).

The second investigation involved the sampling and analysis of sump water from basements of representative residential properties adjacent to the Landfill OU (NYSDEC 2008). Ten residential properties in locations ranging from the far western end of Wadsworth Court to the eastern end of Hackett Drive were sampled. The results of this sump sampling program indicate that contaminants from the Landfill OU are not entering the sumps of homes immediately bordering the Landfill OU.

Comment: [redacted], former resident of the City of Tonawanda. In the future, stuff that's left deeper than 5 feet is going to be in a saturated fill zone where it could actually make its way past that fence line in the future is that correct?

Response to Comment: In this area, the groundwater flow direction is away from the fence line towards the south.

Comment: [redacted], former resident of the City of Tonawanda. Well, eventually it can go to the creek in the river or somewhere that it shouldn't be if it's left there.

Response to Comment: Surface water in the drainage ditch is temporary in nature and not a drinking water source. Neither does it provide significant ecological habitat for aquatic life. Samples collected from Two Mile Creek, the most likely aquatic habitat into which the ditch discharges, exhibited uranium levels that were below the ecological screening level for aquatic life. Further details can be found in the yearly environmental monitoring data release for the Tonawanda Landfill Vicinity Property, which is available on the Corps of Engineers' website at:

http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/Tonawanda-Landfill/.

Comment: [redacted], former resident of the City of Tonawanda. What exactly is that material made up of? Is it construction material, is it eye beams, is it walls, is it concrete floors, is it dirt, what is it?

Response to Comment: The FUSRAP-related material is contaminated soil and debris along with fill material with FUSRAP constituents. The radioactive materials are primarily uranium and its associated radioactive daughters.

Comment: [redacted], former resident of the City of Tonawanda. So if you took it all of it out of there, you would never had to monitor it ever again, no money would ever have to be spent but if you leave it down in there you're going to have to keep an eye on it for eternity?

Response to Comment: If all the material were removed (Alternative 4), there would be no requirement of any future site inspections or monitoring. Alternative 3 does require site inspections to ensure that the deeper FUSRAP material is not being disturbed for the duration of the remedy.

Comment: [redacted] former resident of the City of Tonawanda. When the town closes the landfill, aren't they going to be piling up a bunch of dirt and a bunch of clay on top of that like 30 feet of it?

Response to Comment: The USACE does not yet have details to share on the Town's final closure plan or capping plan for the landfill.

Comment: [redacted], former resident of the City of Tonawanda. Well, nearby it's like 30 feet above the ground level so I'm sure that's what they're going to do. Isn't that going to make it harder to monitor what's in the ground there?

Response to Comment: The monitoring process for the FUSRAP material is to ensure that there will not be a deep excavation at the landfill that would expose the deeper FUSRAP material. The Town's closure and monitoring of the landfill will ensure that deeper materials left in place are not disturbed.

Comment: [redacted], former resident of the City of Tonawanda. I got another question. So it's $10 million to do step 3, $55 million to do step 4. How much money is it going to cost to monitor that stuff from now to eternity?

Response to Comment: The present worth cost for the monitoring in Alternative 3 is approximately $2 million which is included in the present worth cost for the selected remedy. That is the cost in today's dollars to do the monitoring over a thousand-year time period. Monitoring procedures for Alternative 3 are site inspections to ensure that there is no future disturbance of the FUSRAP-related material left in the Tonawanda Landfill.

Comment: [redacted], former resident of the City of Tonawanda. If the Seaway Landfill is still open at that spot where that material is over there, why not just get this out and put it over there because you're going to leave that stuff over there?

Response to Comment: The record of decision for the Seaway Landfill is to cap the FUSRAP material in place. The USACE does do not have the authority to add additional material to the Seaway Landfill.

8. EMAIL COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD AND RESPONSES

Comment: [redacted], resident. I was in attendance last Thursday evening at the meeting regarding the Tonawanda Landfill-FUSRAP presentation. I would like to thank you for your time and commitment to this urgent matter. A few thoughts came to mind following the meeting that I ask you add to the public comment record.

What concerns me most is the amount of time it has taken to get to this point. For more than a decade my family and I, as well as other residents, have been unable to enjoy our homes and yards resulting from noisy construction equipment, dust, odors, and rodents due to the constant activity in the landfill. It was reported that a final ROD will not be issued until sometime in 2017, that no work will actually begin before 2020, and that it will take 17 months to complete once a contract is awarded. Then, subsequently the Town of Tonawanda will have to complete their final capping and grading/seeding. This is absolutely unacceptable. The residents effected by this contaminated landfill have waited for closure far too long already, and the thought of this dragging out for another five or more years is unfathomable. Behind my house at 331 Wadsworth Court, there is an enormous hill of dirt. Mixed in with this dirt hill is broken concrete, glass and plastic waste that is an absolute eyesore. My wife and I have considered selling our home relocating, although we anticipate this may be impossible considering our decreased property value and proximity. Our home was recently accessed [sic] $10,000 less than previously valued.

All considered I agree that Alternative Three is the best solution, although I don't agree with the time table presented. I understand there are funding issues and logistics involved, but this matter should be an USACE urgent priority.

The landfill needs to be closed without unnecessary delay. Every day that passes is another day of personal frustration and potential exposure to toxins. Please expedite the Tonawanda Landfill closure so my family and the effected residents can truly enjoy the homes and property we love and have so diligently worked for.

Response to Comment: The radioactive waste buried in the Landfill OU currently poses no immediate unacceptable risk to human health. Remedial action for this site is proposed to protect against future unacceptable risk, 600 years into the future. The Corps is mandated to use the CERCLA process to address all of the FUSRAP sites. We understand that this is a lengthy process. It is our goal to advance this site though the CERCLA process as efficiently as possible. In the meantime, there is no current unacceptable risk from FUSRAP material on the site. The purpose of the remedial action

is to address potential risk to future users at the site should the top 2 feet of soil over the residual FUSRAP material potentially erode.

Comment: [redacted], Partner Barclay Damon, LLP. If all you read is the first line then my choice is Alternative 4. Hopefully you will read further. The Manhattan Project saved billions of dollars and millions of lives yet the ongoing cost for this is being borne by the health and lives of the citizens of Tonawanda. Alternative 3 is a band aide approach which would be wholly unacceptable if this were a private situation. 1000 years of monitoring. How bizarre! If the problem has not been solved in the 65 years since the end of WW II, 1000 years of monitoring can't be a serious proposal. In the end all decisions are personal. Ask yourself if you, your children and grandchildren would voluntarily choose to live with Alternative 3. Put another way do you want to live with the shame of a decision you know is not a real solution to the problem for the sake of a few (in the overall scheme of government spending) dollars. In short, make the correct recommendation and let the politicians figure out where to get the money.

Response to Comment: Alternative 3 has been determined to be as protective as Alternative 4 in preventing exposure to FUSRAP-related materials over the 1,000-year evaluation timeframe. The selected remedy is protective of human health and the environment, complies with ARARs, is cost effective, and utilizes permanent solutions to the maximum extent practicable.

Comment: [redacted], resident. I am a new resident in the town of Tonawanda. I was interested to read that there is illegally dumped radioactive waste in the Tonawanda Landfill. I have nothing to add to the conversation about your action plan, but I am inquiring about the radiation. I would like to know more about the method used for identification of the 3 waste products (Radium, Thorium and Uranium) and if the amounts are quantified. Also, the detective work it took to conclude the origin of the waste. Can you share your reports from the Health Physicist or Radiation Safety Officer? Thank you.

Response to Comment: There is an extensive amount of information that is publicly available. All data collected during the remedial investigations and used in the formation of the FS and PP are located in the administrative record file, which is located at the USACE office (by appointment only) 1776 Niagara Street, Buffalo, New York 14207. In addition, the information is provided on the Corps of Engineers' website at: http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/Tonawanda-Landfill/.

Comment: [redacted], Resident. My vote for the only way to truly protect our future: Alternative 4 of Analysis of Remedial Alternatives Deep Excavation and Off-Site Disposal of FUSRAP - Related Material

Response to Comment: Alternative 3 has been determined to be as protective as Alternative 4 in preventing exposure to FUSRAP-related materials over the 1,000-year

evaluation timeframe. The selected remedy is protective of human health and the environment, complies with ARARs, is cost effective, and utilizes permanent solutions to the maximum extent practicable. The risks with Alternative 4 are primarily due to the depth of the excavation and the amount of material that would be removed/managed as part of the deep excavation. The safety risks increase due to the depth. The type of material in the landfill is not cohesive. Because of that, water infiltrating the excavation makes the side slopes unstable and increases risks that they will collapse. Additionally, due to the depth of the excavation, the large volume, and the high leachate water table at the site, there will be a large volume of water infiltrating from the rest of the landfill into the excavation area that would need to be managed, treated, and disposed of. The FUSRAP-related material, material above the FUSRAP material, and the other landfill material would need to be managed and stockpiled while doing the excavation.

Comment: [redacted], Resident. To Whom it May Concern, I am writing in regards to the Tonawanda Landfill Remedial Alternatives. I am in support of Deep Excavation and Off Site Disposal (Alternative #4).

I am a homeowner on Hackett Dr. and have a young child and I am concerned for both of our health living here. I purchased this home with the intent on staying in the neighborhood and raising her right here. Her school is Riverview Elementary School which is also affected by the landfill. Her grandparents live on the dead end side of Brookside Terrace and babysit her after school and during the summer. Purchasing a home on Hackett Dr. was perfect for us, with her school and grandparents so conveniently located and especially because it is a quiet, very nice and quaint little neighborhood. I know I am not the only parent who lives in this neighborhood and whose child attends this school and is also babysat here as well. These children are not given a break with all this contamination. We are very happy here and do not want to move but I will be honest, I was not aware of the landfill when purchasing our home.

I am concerned for my daughters future health as well as my own and the other many, many children that live in this neighborhood and attend Riverview Elementary. I truly hope that this situation FINALLY gets a resolution and I am hoping beyond hope that it is Alternative #4. Thank you for considering my comments.

Response to Comment: The radioactive waste buried in the Landfill OU currently possess no immediate unacceptable risk to human health. Remedial action for this site is proposed to protect against future unacceptable risk, 600 years into the future. Alternative 3 has been determined to be as protective as Alternative 4 in preventing exposure to FUSRAP-related materials over the 1,000-year evaluation timeframe. The selected remedy is protective of human health and the environment, complies with ARARs, is cost effective, and utilizes permanent solutions to the maximum extent practicable.

Comment: [redacted], resident. We cannot leave any material of concern in the middle of our community.

Response to Comment: Comment Noted.

Comment: J.P. Stone, resident. After reviewing 1943-2015 and wondering what 3015 will be like, the only logical alternative is #4. Thank you for all your hard work.

Response to Comment: Comment Noted.

APPENDIX

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

December 14, 2015
[redacted]
U.S Army Corps of Engineers, Buffalo District
1776 Niagara Street
Buffalo, New York 14207

Re: Feasibility Study and Proposed Plan for the Landfill Operable Unit of the Tonawanda Landfill Vicinity Property

Dear [redacted]:

Thank you for the opportunity to provide comments on the Feasibility Study and Proposed Plan for the Tonawanda Landfill Vicinity Property.

The additional sampling and updated Baseline Risk assessment show that a future Trespasser Youth would have a dose outside the CERCLA Risk range of about 38 millirem at 600 years out. That scenario has led to a proposed plan for Targeted Shallow Removal of FUSRAP related material. We concur with the conclusion to remove these FUSRAP materials.

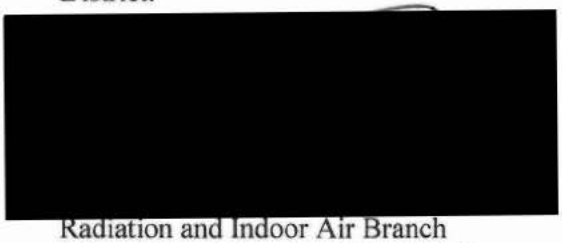
We have the following comments about the Feasibility Study and Proposed Plan documents:

1. As has been stated by others previously, it is not clear why a trespasser scenario and not a resident intruder has been used.

2. The Feasibility Study uses the term 'natural erosion' (FS p. 14 and elsewhere). Yet on Page 45, the Baseline Risk Assessment states:
"In the landfill there is evidence of the following trespasser activities: walking, riding dirt bikes, and building tree forts and fire pits. This evidence was noted especially in the area along the fence line and also in the vicinity of the stand of willow trees within the Landfill OU."
It is not clear how these activities can be considered natural erosion. Would modeling more aggressive use of the site result in increased doses and therefore changes in the compliance characteristics of the different alternatives?

3. The activity during the 1,000 year post-closure period is not described uniformly. In some cases it is described as monitoring and maintenance and in others just a monitoring program. While both seem to include the 5 year review period, it is not clear if the other O & M Activities are the same. See for example Proposed Plan Page 11 in the Feasibility Study Pages xi and xiii. Please clarify the differences, if there are any, or use the same wording to describe identical activities.

4. Since the Department of Energy will be doing the Legacy Management for this site, it is appropriate that 40 CFR 61 National Emission Standards for Hazardous Air Pollutants be considered. This should not be an issue since it is already being used elsewhere by the Buffalo District.



Radiation and Indoor Air Branch
Clean Air and Sustainability Division

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Remedial Bureau A
625 Broadway, 12th Floor, Albany, NY 12233-7015
P: (518) 402-9625 I F: (518) 402-9627
www.dec.ny.gov

December 14, 2015

[redacted]alo District
1776 Niagara Street
Buffalo, New York 14207

RE: Feasibility Study Report and Proposed Plan for the Landfill Operable Unit
Tonawanda Landfill Vicinity Property

Dear [redacted]

This will provide the New York State Department of Environmental Conservation's position to the U.S. Army Corp of Engineers (Corps) concerning its September 2015 Proposed Plan (PP) regarding the remediation of the Landfill Operable Unit of the Tonawanda Landfill Vicinity Property. New York State Department of Health comments are also provided. These comments are based upon a review of the PP and the Feasibility Study Report for the Tonawanda Landfill Vicinity Property. The Corps is tasked with remediation of the site under the federal government's Formerly Utilized Sites Remedial Action Program (FUSRAP) pursuant to the Comprehensive Environmental Response, Compensation and the Liability Act (CERCLA).

The Department disagrees with the selection of proposed Alternative 3 because it does not comply with the two threshold criteria of overall protectiveness of human health and the environment and compliance with SCG's. Under Alternative 3 because it will not prevent radiological contamination in groundwater from migrating offsite. Only Alternative 4, Deep Excavation and Disposal of FUSRAP-related material would be acceptable and would be compliant with federal and State environmental regulations.

If the Corp selects Alternative 3 in the Record of Decision, DEC requests some additional removal of Uranium contaminated soil to at least below the source material limit because of our position on residual uranium greater than source material concentrations and because of the solubility of Uranium and potential groundwater impacts. We would be happy to discuss this in detail.

Land-Use Controls

Alternatives 2 and 3 rely on land-use controls as a general response action to limit exposure. The Department is concerned regarding the reliance on land-use controls that are not designed for radioactive disposal sites, and the lack of commitment to federal responsibility for maintaining land use controls or committing the resources necessary for monitoring of the site during the proposed 1000 year control period. If land use controls are included in the final remedy, Part 375 requires that they are in the form of an Environmental Easement.

Clean-up Levels

As indicated many times previously to the Corp, this Department does not accept remedies which leaves uranium concentrations above the source material concentration limit. The 0.05-percent by weight limit is equivalent to approximately 339 picocuries uranium/gram (pCi U/gram) for natural uranium or 116 picocuries thorium/gram (pCi Th/gram) for natural thorium. To that end, based on the Corps preferred alternative, Alternative 3 Targeted Shallow and Off-site Disposal of FUSRAP related material the Department does not support the Utotal preliminary remediation goal (PRG) of 457 pCi/g.

Environmental Monitoring

The environmental monitoring discussion for FUSRAP wastes left in place removes monitoring of groundwater, surface water, and sediment from further consideration, since the Corps considers them not to be media of concern. The State believes for Alternative 3 environmental monitoring should include at least air quality and groundwater monitoring and should be performed by the federal government.

Cost Estimates

Cost estimates for Alternatives 3 and 4 are presented in Section 4.0 Detailed analysis of remedial alternatives, and specifically in subsection 4.2.3.7 and 4.2.4.7 respectively. The capital cost for Alternative 3 is $10,341,038, with an annual O&M cost of $62,237. According to the FS, the O&M costs include annual inspections, maintenance of land use controls, and conduct of 5 year reviews. Monitoring costs have been underestimated because the costs of necessary air and groundwater monitoring (see above) do not appear to have been accounted for. The State would like to see those cost carried out for the 200 year and 1000 year timeframe and then a comparison made to the capital cost for Alternative 4 of $55,400,759, with an annual O&M cost of $0.

Groundwater Impacts

The report discusses groundwater at the site and states that the groundwater in the waste and monitoring wells is not considered a groundwater resource due to ambient water quality and anthropogenic impacts. However, the state considers groundwater beneath the site to be class GA (potential source of drinking water). 6 NYCRR Part 701.18b states that the class GSB (saline groundwater) shall not be assigned to any ground waters of the State, unless the Commissioner finds that the adjacent and tributary ground waters and the best usages thereof will not be impaired by such classification. Therefore all standards associated with a class GA designation should apply. As such, the State is concerned with leaving the more highly concentrated material within the landfill.

Thank you for the opportunity to comment on these documents. Our detailed comments are enclosed. If you have any questions, call John Mitchell at (518) 402-8786.

Sincerely,

[redacted]

Director Remedial Bureau A
Division of Environmental Remediation

Enclosure

ecc: [redacted]

New York State Department of Environmental Conservation
Specific comments on the
Feasibility Study Report and the Proposed Plan for the Landfill Operable Unit of the
Tonawanda Landfill Vicinity Property

Executive Summary

Remedial Action Alternatives

1. The document proposed four remedial action alternatives, including no action, single-layer capping of FUSRAP-related material, targeted shallow removal and off-site disposal of FUSRAP-related material, and deep excavation and off-site removal of FUSRAP-related material. The preferred alternative selected was shallow removal and off-site disposal. Under this alternative impacted soil with FUSRAP-related constituents of concern exceeding preliminary remediation goals would be excavated to a depth of five feet from ground surface and transported off-site for disposal, and the excavation would be backfilled with non-impacted soils. This would still leave deeper soils with FUSRAP constituents in place. There was no discussion of the alternative of shallow removal and capping by the Corps with an engineered cap to address future infiltration of precipitation into the deeper-in-place soils which still contain FUSRAP contamination. Did the Corps look at this combined alternative in terms of minimizing further migration of FUSRAP contamination over the long term? Did the Corp account for Part 360 cap? Even if a Part 360 cap is placed over this area, the Part 360 cap may not be adequate for a 1000-year post-closure monitoring period. In addition, the town of Tonawanda has not prepared a closure plan for the FUSRAP area, pending a record of decision by the Corps.

2. Table 1, which compares remedial alternatives for soil, characterizes the ability to implement alternative 4 (deep excavation and removal) as low. Is this due to the issue of the high groundwater table and need for dewatering in a deep excavation, or are other factors affecting this determination?

3. Under alternative 3 (targeted shallow removal) what does the statement “Does not create impacts to 100 foot buffer” mean? It appears that solid waste occurs almost up to the property line on the north. Also the property line is a somewhat arbitrary boundary. Is the Corps sure that some FUSRAP waste does not extend beyond the property boundary at depth? If other waste has to be pulled back from the 100 foot buffer, how will this affect the Corps plans with respect to the FUSRAP waste?

Section 1.0 Introduction

1. The report should explain what triggered the DOE’s radiological survey of the landfill in 1991. According to the March 2002 Closure Investigation Report prepared by Malcolm Pirnie, waste byproducts from the production of uranium were contained in stream sediment dredged from Two Mile Creek and disposed of in a different portion of the landfill (page 1-3).

2. The report notes that the proposed Phase 2 cap slightly overlaps the “modeled extent of the area impacted by FUSRAP-related material”. Since the FUSRAP perimeter fence appears to be the northern boundary of “Phase 2”, this implies that the FUSRAP waste extends south of the perimeter fence. Is this the case? Will the potential placement of a town cap in this area create an issue with respect to the selection of the proposed remedial alternative of targeted shallow soil removal?

3. The report also quotes a previous NYSDEC comment on the Corps 2007 proposed plan. The NYSDEC comment stated that in order to provide a 100-foot buffer between the deposited solid waste and the property line, all of the MED (Manhattan Engineer District) wastes in Areas A and B of the landfill would have to be excavated. Does preferred Alternative 3 accomplish this?

4. The report states that the Corps' 2012 baseline risk assessment utilized the data from the Corps' 2009-2011 dataset. Does this mean the previous data obtained by the DOE and the Corps in 1991, 1994, and 2001 was not included? If so, would any of the conclusions have changed as a result of including the historic data?

5. The 2012 baseline risk assessment concluded that uranium was migrating in groundwater to the northern drainage ditch at levels above drinking water standards. How will the targeted shallow removal of FUSRAP materials mitigate this situation (even if the Corps concludes that the exposure risk is not an issue since the water is not being ingested)?

6. The report states that the Corps of Engineers 2012 and 2013 groundwater, surface water, and sediment sampling in 2013 revealed the presence of uranium in the northern drainage ditch offsite at levels above the ecological screening level for aquatic life. The Department's Part 360 regulations prohibit the discharge of landfill contaminants into surface waters and ground waters (Part 360-1.13(b)). The sampling indicates that uranium is migrating through groundwater to surface water and then exiting the landfill property.

7. What are the applicable background radium, thorium, and uranium levels for this site for all media sampled? These values should be included in the results tables so that comparisons can be made. Table 6 on page 42 does provide background data, but for soil only.

8. Figure 7 displays the groundwater sampling point results from 2001 to 2013, and indicates which are above the federal drinking water maximum contaminant level (MCL) of 30 ug/l for total uranium. What is the background level for total uranium in groundwater on the site, and which wells are above the background levels? This should also be shown on the figure.

9. Are filtered samples more appropriate for analysis of radiological parameters than unfiltered samples? Figure 7 includes only filtered sample results, according to the text. There is a discussion of filtered vs. unfiltered samples in Appendix A, which should be brought into the body of the report. Unfiltered data should be included in the Appendix.

10. The report dismisses groundwater as a medium of concern based on existing poor natural groundwater quality and impacts from other wastes in the landfill, as well as the lack of potential future influence on any future municipal well or private well groundwater usage. The report does admit that uranium will continue to migrate to groundwater under the targeted shallow soil removal alternative, and would continue to discharge into the surface water drainage ditch until capping operations cut off enough surface water infiltration to cause groundwater levels to decline and cease recharging the ditch (if that actually happens). If groundwater levels do not decline, then surface waters may continue to be impacted, and there is a potential for uranium to continue to migrate offsite.

11. The discussion of changes in gradients on page 34 is confusing. The fourth paragraph discusses the impact of phased capping on the gradients, including a reduction in the groundwater mound associated with the landfill. The discussion implies that the FUSRAP area will be the only uncapped area after the phased capping by the town, and

that the FUSRAP area will become the primary recharge area to the landfill wastes. This would seem to imply that the potential to leach uranium to groundwater would remain the same or increase as long as the FUSRAP area is not capped, but the last paragraph on the page states that after phase one and two capping, the mound would decrease, resulting in a potential reduction in uranium leaching. While it may be true that the overall bigger landfill groundwater mound would decrease, there would still be recharge to the uranium source areas until the FUSRAP area was capped.

Section 2.0 Identification and Screening of Remedial Technologies

1. The section discussing the definition of ARARS (applicable or relevant and appropriate requirements) states that "the actions must also meet any promulgated substantive standard, requirement, criteria, or limitation under a state environmental or facility siting law that is more stringent than any federal standard, requirement, criteria, or limitation and is identified by a state in a timely manner. The fact that uranium will continue to migrate to surface water and potentially flow off site is not in conformance with our regulations. (See comment 6. For Section 1.0, above.)

2. Remedial action alternatives were not developed for groundwater, surface water, and sediment, as all were dismissed as potential pathways for human exposure above levels of concern. Remedial action alternatives were only developed for soil. As noted in the previous comment, uranium is migrating to groundwater and surface water, so unless the remedial action alternatives for soil also would serve to mitigate impacts to groundwater and surface water, this would be a shortcoming of the feasibility study.

3. On page 40 why is it assumed that the recreational adult would have a greater yearly exposure to radionuclides than a recreational youth?

4. In the contaminated soil volume estimate, there is a reference to a soil contamination footprint derived from the 50 percent confidence level (0.5 probability) exceedance of sum of ratios (SOR). According to Appendix C the 50% confidence level means a 50% confidence that the area includes all soil that exceeds PRGs. Thus there is a 50% chance that the delineated area won't include all of the contaminated soil.

5. One of the General Response Actions (GRAs) in section 2.4 is containment. However, the discussion appears to imply that capping is the option being discussed, and there is no mention of any options for subsurface containment. Table 8 does list vertical barriers as a containment option, but the subsequent discussion of options retained for further consideration eliminates slurry walls, grout curtains, and sheet-pile walls because "groundwater is not a medium of concern at the site". New York State considers all groundwater to be a potential source of drinking water (Class GA) and vertical barriers should have been retained to address migrating groundwater.

6. Another GRA is described as use of the "existing engineered structure". We do not consider the Tonawanda Landfill and engineered structure. It was not designed as a containment system. There is no liner system beneath the landfill and the leachate collection was a retrofit. This area is not capped. Previously the waste was simply dumped on site and compacted. Certainly the landfill would not likely meet the current requirements for disposal of radioactive waste at a new engineered structure.

7. One of the possibilities raised with respect to land use controls is federal government purchase of the property. Is this a realistic option that the Corps is raising and intends to pursue?

8. The environmental monitoring discussion for FUSRAP wastes left in place removes monitoring of groundwater, surface water, and sediment from further consideration,

since the Corps considers them not to be media of concern. However, it is clear from previous sampling that groundwater and surface water are being impacted currently. How will the Corps evaluate the effectiveness of the selected remedy, and determine whether any waste left in place (if the selected remedy allows waste to be left in place) is further impacting groundwater, surface water, or sediments? The normal Part 360 landfill post-closure monitoring program does not normally include sampling for radiological parameters. The Corps plans to monitor only air quality as part of the long-term environmental monitoring program (page 65).

9. The study states that capping would encroach into the 100 foot buffer to the northern property line, and that the Town would be required to obtain a waiver from the 100 foot buffer provision of the Department's regulations. Why would the town have to shoulder obtaining this waiver, rather than the federal government, particularly if capping in place is chosen rather than the preferred alternative 3?

Section 3.0 Development and Screening of Remedial Alternatives

1. In Table 13, three alternatives are presented, including Alternative 2 (single-layer capping of FUSRAP-related material, Alternative 3 (Targeted Shallow Removal and Off-Site Disposal of FUSRAP-related Material) and Alternative 4 (deep excavation and offsite disposal of FUSRAP-related material). Alternative 1 (no action) was not listed in the table. Alternative 3 does not indicate that a cap will be utilized over the areas of shallow removal. Why is that? One would think that either a town constructed cap or a Corps constructed cap would be placed over the area where the FUSRAP waste was only partially excavated.

2. Alternative 2 (Single-Layer Capping of FUSRAP-related Material) discusses how the cover system "should effectively protect human health and the environment through waste isolation for up to 1000 years, to the extent reasonably achievable, and, in any case, for at least 200 years". Therefore it appears that the clay cap may not last the 1000 years described by the Corps as the post-closure period for the FUSRAP waste areas, and it appears that the Corps is committing to only 200 years. In addition, the only environmental monitoring proposed to assess cap performance is air monitoring for radon.

3. Under alternative 3, only impacted soil above PRGs (preliminary remediation goals) would be excavated and removed from the upper five feet in the FUSRAP areas. So five feet of soil would not be removed across the whole extent of Areas A, B, and C (see the limited excavation area as shown in Figure 8). Then, soil sorting would be used to further reduce the volume of soil requiring off-site disposal, and soils still containing FUSRAP materials but below PRG's and that are hazardous would be left on site "for final disposition by the site property owner", in other words the town of Tonawanda. The study proposes using a MARSSIM (Multi-Agency Radiation Survey and Site Investigation Manual) guidance/statistical sampling approach to determine if those soils could be used as backfill or if they are regulated as hazardous waste. Soils that contain listed or characteristic hazardous waste must be disposed of within 90 days of generation unless the facility obtains a Treatment, Storage or Disposal Permit (Part 373).

   The Corps is proposing to leave behind radiologically contaminated soils that have been excavated but not removed for disposal, stating that management of such waste falls on the property owner to address. It is the Departments position that the federal government should address final disposition of federal waste exhumed during a remedial action, not a property owner. Management of this radiologically contaminated soil is subject to regulation under 6 NYCRR Part 380-4.1(b) which prohibits land disposal of radioactive waste within New York, except in a State regulated radioactive waste

disposal facility. Thus, the Corps proposal would leave the Town of Tonawanda to either seek a variance from 380 or dispose of the soil out of State.

4. Under Alternative 3, the first paragraph on page 81 is confusing as to the order of actions. The paragraph states: "All excavated soils and potentially comingled landfill debris will be screened in the field for contamination, stockpiled, sampled, analyzed and transported off site for disposal if found to exceed the established cleanup criteria for the site. " The Department is concerned that the mere act of excavation would dilute the material such that upon analysis the soil would be below the PRGs. The Department prefers an in-situ determination as to exceeding or meeting the sites PRGs.

5. Under Alternative 3, it is stated that excavated soil would be subjected to potential treatment to ensure compliance with the offsite disposal facility's waste acceptance criteria. What types of treatment would be undertaken, and where would treatment occur?

6. Alternative 3 discusses the handling of groundwater coming into the waste removal areas, and the potential for discharging it to surface water or the sanitary sewer system, or disposing of it offsite at a permitted disposal facility. If this water containing radionuclides is sent to the municipal wastewater treatment plant it needs to meet State discharge limits and POTW approval. What are the concentration limits for discharge to the surface water drainage ditch? Since the ditch carries surface water offsite, radionuclides could also travel offsite. A SPDES (or equivalent) permit would be required for discharge to the ditch.

7. After removal of the radiological wastes under Alternative 3, the site would be "restored" by backfilling and seeding. It is not stated on page 82 how much backfill would be placed, but there is a discussion in Appendix D, which should be referenced in the main body of the report. The ultimate closure of the landfill in this area is being left to the Town of Tonawanda, according to page 82 of the study. According to Table 13 no environmental monitoring is being proposed after the shallow contamination has been removed.

8. On page 82, what is "RCRA-hazardous unimportant quantity source material"?

9. Under Alternative 4 (Deep Excavation and Off-site Disposal of FUSRAP-related Material) only soils exceeding the preliminary remediation goals would be removed, so some FUSRAP material would be left on site. Again, the study states that FUSRAP contaminated soils that have radiological concentrations below the preliminary remediation goals, but that are hazardous, would be the responsibility of the Town of Tonawanda to dispose of properly.

10. A series of groundwater extraction wells is proposed on page 89 under Alternative 4. More detail on where these wells would be installed, and how they would be constructed and operated, is needed.

Section 4.0 Detailed Analysis of Remedial Alternatives

1. The capital cost for Alternative 3 is $10,341,038, with an annual O&M cost of $62,237. The O&M costs include annual inspections, maintenance of land use controls, and conduct of 5 year reviews. Air quality sampling is not mentioned here, although it was stated in section 2.5.3 Land-use Controls Environmental Monitoring, that the Corps would be performing air quality monitoring for radiological wastes left in place. The monitoring of groundwater was also mentioned in section 2.5.3. Was this included in the annual O&M costs? What about ground water monitoring to demonstrate the

hypothetical lowering of the groundwater table and thus diminished uranium concentrations?

2. The capital cost for Alternative 4 is $55,400,759, with an annual O&M cost of $0. There is no planned follow-up environmental monitoring since all radiological wastes exceeding preliminary remediation goals are to be removed. When overall costs are compared over the 1000 year post-remediation period, the cost of Alternative 3, assuming no increases in O&M costs for inflation, would be $10,341,038 plus $62,237,000, or $72,578,038, which is substantially higher than the capital cost of Alternative 4. Therefore, when considering 1000 years of post-remediation care, the alternative that removes all the radiological wastes exceeding preliminary remediation goals is the more cost-effective alternative.

Section 5.0 Comparative Analysis of Remedial Alternatives

Section 5.2.3 Long-term Effectiveness and Permanence

1. In section 5.2.3 it states: "The target shallow removal and off-site disposal of FUSRAP-related material (Alternative 3) is effective in minimizing exposure as it would remove all contamination that could possibly become exposed due to natural forces within the 1000-year evaluation period, but relies on LUCs to continue to be protective in the long term. " Without a detailed discussion of the implementation of LUCs it is hard to determine either effectiveness or permanence. However it should be noted that this action would require a Part 375 environmental easement.

2. Alternative 3 relies on institutional controls to comply with environmental standards and to maintain radiation doses to the public at acceptable levels. It relies on them out to 1,000 years. However, the language on that is ambiguous in that it does not make it clear as to whether the Corps expects to rely on State regulatory control over the landfill for that control, or whether the federal government will responsible for those controls. While the proposed plan does not specifically state it, it would appear that the intent is to rely on State required controls. State site controls are not crafted to provide control over the long time frames that radiological materials such as those in the FUSRAP waste under consideration here would require.

   The State does not agree that the reliance on institutional controls not designed for radiological disposal facilities, the use of such controls beyond 100 years, or placing the responsibility for maintaining those controls on a local government are appropriate.

Appendix A: Surface Water and Groundwater Flow and Contaminant Transport Analysis

Section 2.3.1 Regional Hydrogeology

1. The report continues to state that the groundwater in the waste and monitoring wells is not considered a groundwater resource due to ambient water quality and anthropogenic impacts. However, the state considers groundwater beneath the site to be class GA (potential source of drinking water). 6 NYCRR Part 701.18b states that the class GSB (saline groundwater) shall not be assigned to any ground waters of the State, unless the Commissioner finds that the adjacent and tributary ground waters and the best usages thereof will not be impaired by such classification. Therefore all standards associated with a class GA designation apply.

Section 2.3.2 Site Hydrogeology

1. The report discusses the data in Table 1, which compares groundwater elevations from 2001 to 2013. The report states that this data shows an overall lowering of groundwater elevations in the waste zone, which has not yet manifested in the surrounding native soils. However, the elevation data for the more distant monitoring wells was taken in September 2001, and the elevation data from 2012 and 2013 was taken in March and April of those years. Seasonal differences in elevations could cloud the analysis, and could result in the apparent increases in groundwater elevations seen at many of the landfill wells that are located some distance from the waste mass.

2. The report states that the phased capping includes waste consolidation along the edges of the landfill to ensure that no waste is found within 100 feet of an adjacent property line. How will this buffer zone be created if only certain soils within the upper few feet of FUSRAP wastes are removed from the areas that were investigated by the Corps?

Section 3.0 Groundwater and Surface Water Quality and Usage

1. The report states that since site groundwater is not a viable drinking water source, that the maximum contaminant level (MCL) of 30 micrograms per liter for total uranium does not apply. As stated previously, all groundwater in the state is considered class GA and those standards do apply, whether or not the groundwater is being actively used as a source of potable water. The report notes that the MCL has been exceeded in surface water and groundwater at this site.

Section 4.0 Groundwater Transport

1. The report states that the presence of organic carbon can lessen uranium transport, and suggests that since the landfill received incinerated waste and sewer sludge, that the fraction of total carbon may be significant in these wastes. A review of the groundwater monitoring data for the site reveals that in most locations total organic carbon in the groundwater is not particularly high, with the exception of well BM-18, where the March 2015 result was 64.1 mg/l, and BM-17R, where the March 2015 result was 20.4 mg/l. As an observation, results from leachate piezometer P-1 indicate that TOC ranged in concentration from 308 mg/l to 654 mg/l. Results from leachate piezometer P-2 indicated a TOC range from 538 to 621 mg/l, so it does appear that there is a significant amount of TOC in the landfilled wastes themselves.

2. The report also states that there is a geochemically-reductive environment present in the source area, which will inhibit the generation and transport of uranium-carbonate species in and near the landfill operable unit. A review of the semi-annual groundwater monitoring data for the last two years shows that there is often an oxygenating environment in groundwater around the landfill. The October 2014 and March 2015 semi-annual monitoring results reported to the Department's Materials Management program indicated positive ORP in all sampling locations. Results for the leachate piezometers have ranged from moderately- to slightly-reducing, to slightly-oxidizing. Table 5 of Appendix A indicates that the redox category for most of the sampling points, including those sampled by the Corps in the FUSRAP area is mixed (oxic-anoxic). The transport model, however, does not take into account the effects of a reducing environment, according to Section 6.2, and therefore is conservative, since all uranium was assumed to be present in a mobile form.

3. The Corps has calculated that surface water discharge from the FUSRAP area will decline 52% with phased capping, and that groundwater flow will become more southerly, to the leachate collection system along the southern border of the site, which discharges to the town sewer system. What is the expected loading of radiological contaminants to this sewer system, and will this discharge be of concern (and acceptable) to the treatment facility?

4. The report continues to assert that groundwater is flowing upward from the deeper zone to the shallower zone and cites well couplets TWP 9/10, 7/6, 5/4, and 8/L-3, where the first well is the shallower well, and the second well is the deeper well. Where is a table showing the actual depths of the well points? If one looks at the data from the April 2013 sampling event in Table 1 and compares groundwater elevations in the well couplets listed above, it is evident that there is not a consistent upward flow as described. In fact, only one of the couplets (TWP 9/10) exhibits a higher groundwater elevation in the deeper well. When one looks at the March 2012 data in Table 1, all of the shallower piezometers had groundwater elevations higher than the deeper piezometers, suggesting downward flow.

5. Why does it appear that volatiles and PAHs in the soil are concentrated in the low redox zone depicted in Figure 24, which also encompasses the FUSRAP contamination area (Figure 27a indicates that total volatile organic concentrations in soil were fairly low in other areas of the site)? Was this related to other wastes generated by Linde and dredged from the creek sediments? The PAH concentrations appear to be more widespread and not restricted to the FUSRAP area. How much actual reduction in uranium solubility and transport would be expected from the levels of volatiles as shown on Figure 27a?

6. How were the contour lines on Figure 22 (Combined Uranium Concentration Map for Surface Water and Groundwater) constructed? Were the lines drawn using data averaged over the number of sampling events at a given point? From the map it is evident the groundwater in some of the site wells a significant distance from the FUSRAP waste area have shown total uranium levels above or near the 30 µg/L. MCL (e.g., wells BM-19, BM-16). Also the data summarized in Figure 22 is from the years 2009-2013, with no previous data included. Would the inclusion of older data affect the depiction of total uranium concentrations as shown on the map?

7. In section 4.2.3 (Soil Partitioning in the Landfill) the measured groundwater concentration at TWP-7 is one quarter of the concentration at the source, as per the calculated dilution factor from the formula at the bottom of Table 6. This assumption results in a Kd, which is lower in value, implying that less uranium would be adsorbed onto soils and more would be available for transport in groundwater, so this assumption actually results in a more conservative transport model (i.e., there would be a greater potential for uranium migration through groundwater). The model uses an even lower Kd of 12.0 mL/g, so the model does appear to be biased conservatively in predicting greater dissolved fractions of uranium in groundwater that would be available for transport. However, it should be noted that this Kd value is associated only with the landfilled wastes and layer 3 contact zone, and not with the native soils, where the Kd value is set to 120 mL/g.

8. On page A-24, in the calculation of flow through the FUSRAP area vs. flow through the contaminated material, why was the FUSRAP waste zone thickness set at 12 feet, whereas the waste extends to 25 feet below the surface? Was this an average value over the contaminated zone?

9. The calculations on page A-24 show that in the groundwater flow regime only an additional 2521 liters/day of flow from the total FUSRAP area are available in addition to the calculated 10137 liters/day of flow through the contaminated waste, resulting in a maximum dilution factor of only 25% (0.025) rather than the dilution factor of 4 calculated by the formula in Table 6. The text states that additional dilution is available from precipitation through the surface, and the volume of flow is 27,751 liters/day over the area in which excavation of contaminated soil will occur. On what assumptions is this estimate based? If one adds the 27751 liters/day to the additional 2521 liters/day

available from the total FUSRAP area, one gets an additional 30,272 liters/day of water available for dilution of the source contamination water (10137 liters/day). This would result in a dilution factor of just about 4 times, as stated.

10. On page A-24, it is not clear to the reviewer how a solubility limit of 100 mg/l was set for source-area estimating.

11. The highest observed concentration of total uranium in the 2009-2013 data (252 µg/L. at surface water sampling point SW/SD-011 in March 2012) was used as the source concentration over the entire area outlined on Figure 28, according to the discussion on page A-24. This would appear to be conservative unless there is previous data showing higher concentrations from previous site investigations. Were any of the pre-2009 results higher?

Section 5.0 Groundwater Modeling

1. On page A-26 the report states that during model calibration the recharge to the native sediments and landfill waste was allowed to vary between .54 ft/yr. and 1 X 10 to the minus12 ft/yr. (capped condition). Please provide a basis for this comment. This latter low recharge under a capped condition appears improbable. The model was calibrated by varying the recharge component of the input parameters, and the optimal calibration was shown in Figure 33, which included a recharge value of 4.7 X 10 to the minus 6 ft/year for the Phase 2 capped area. How does this value compare to any actual data on permeability and flow through the Phase 1 cap, if such data is available?

2. How does the development of the mud flats area, with a great deal of paving for parking lots and a large warehouse building, affect the model inputs and assumptions?

3. The observed heads in April 2012 were compared to the model simulated heads in Figure 34. The comparison showed that there were areas where the simulated head differed from the actual head by more than two feet, particularly in the southeastern portion of the landfill and mudflats area. North of the landfill, in the residential areas, the difference in elevations was within 2 feet. The graph of observed vs model-generated heads on Figure 34 showed a linear trend but often a significant difference in heads at individual points. The layer 1 (waste material) heads show quite a bit of variation. Based on the comparison between the actual heads and computed heads in Table 8, it appears that the model generally overestimates the groundwater elevation in the waste. There also doesn't appear to be very good agreement between the computed and actual heads in model layer 3 (contact layer consisting of the sand-silt and upper bedrock zone). The report states that the model shows an acceptable calibration because the ratios of the root mean squared error, mean absolute residual, and residual standard deviation to the observed head range over the entire site-wide model, is less than 10%. However, the observed head range is significantly influenced by layer 3, which has the highest head range. If one compares the statistics for layer 1 to the observed head range in layer 1 (9.0 ft), then the root mean squared error over the head range is 30.4%, the mean absolute residual over the head range is 20.3%, and the residual standard deviation over the head range is 28.4%.

Section 6.0 Groundwater Transport Analysis

1. On page A-31, it is stated that the higher-order finite-volume TVD method in the transport model was selected over two other methods included in the model, in order to avoid overestimating dispersion in the more permeable waste zone. Please clarify why the other two methods are not appropriate for the site.

2. The report states that the highest value of total uranium sampled at each well or surface water sampling point through 2013 was used to develop the most conservative plume to represent the starting point in the model, as shown in Figure 22. It should be noted that as previously pointed out, only data from 2009 on was shown on Figure 22, and any higher concentrations detected in earlier sampling were not included and would not be depicted in the plume utilized for the simulations.

3. The calibrated model was run for several different scenarios. The first, Targeted Shallow Removal (Alternative A), models the baseline no action alternative and the situation where only certain areas of contamination are removed in the upper five feet of the waste, and as stated in the text, will leave a "significant contaminant mass" in the landfill which is assumed to be a source area over the 1000-year modeling period. The results of the modeling are shown in Figure 36, where according to the text, the maximum concentration in the northern drainage ditch will decline to 25 µg/L in 10 years due to the effects of town of Tonawanda capping, leaving the FUSRAP area as the main recharge area to groundwater, which will change the groundwater flow direction from westerly to southerly. The town cap is also projected to lower groundwater elevations by about 4 feet, resulting in less discharge to the drainage ditch. Uranium contamination is still projected to migrate southward through the waste materials into areas where it was not present before. Within 500 years the plume will nearly reach the access road on the south side of the landfill near the EnSol trailer, and within 1000 years the plume will migrate past the access road and be closer to the industrial development area which is now in the former mudflats area. According to the text the uranium contaminated groundwater will enter the leachate collection system, but below a 10CFR 20 sewer-discharge limit of 2700 µg/L. This also needs to be below the State limit.

4. Both the no action alternative and the shallow targeted removal alternative were modeled together as one. Does this imply that targeted shallow removal will have no real impact on future migration of uranium at this site?

5. The second alternative modeled was capping in place with a cap over the FUSRAP area to tie into the town of Tonawanda's Phase 1 and Phase 2 caps over the rest of the landfill. According to the text, this results in a 60% reduction in recharge to the waste/groundwater, and a reduction in groundwater levels of 11 feet along the north side of the landfill. According to the text and Figure 37, the plume in the northern drainage ditch would dissipate to 26 µg/L in 10 years if the ditch were still in existence, due to a projected 96% reduction in flow to the ditch. The figure shows a plume migration to the southeast at the 500 and 1000 year marks, but not as far as the targeted removal option in Figure 36. The text states that at around 150 years the plume will extend into areas previously showing few groundwater impacts. At 1000 years the uranium contaminated groundwater will enter the leachate collection system.

6. The third modeled alternative was full removal of the uranium contaminated soils and the existing plume within the excavation area (but not uranium that has migrated beyond the excavation area), as shown in Figure 4 It is unclear what level of uranium in mg/kg will require soil excavation and off-site disposal. The third alternative includes three sub-alternatives, the first being excavation and removal with no capping, the second excavation and disposal, with a town cap integrated into the existing town caps, and the third excavation and disposal along with construction dewatering and a town cap integrated into the existing town caps. The conclusion of the simulations was that the groundwater residuals would not be sources for further uranium migration due to lack of a concentrated source, low Kd actual values that would not promote dissolution of uranium above 30 µg/L, and projected continuing reducing conditions the area with PAH contaminants still present in other portions of the landfill. A lack of a cap would reduce uranium concentrations, simply due to dilution and migration, but a cap over the area

would extend the period of time that it would take to bring all locations to a level below 30 µg/L by 385 years.

7. On page A-35 the fifth bullet states that the maximum concentration entering the ditch at initial groundwater-level equilibrium after source removal is "X µg/L". What does the X represent?

8. The text on page A-36 states that the simulated dewatering of the excavation to a level at the base of contamination had no effect on the plume longevity, but it seems logical that pumping uranium-contaminated groundwater from the source area would have a positive effect on overall remediation of the contamination. In any event, wouldn't dewatering be necessary in order to excavate the contaminated soils?

9. Section 6.3 discusses other influences on contaminant transport in the landfill. A soil bioremediation operation is currently being constructed on the western portion of the landfill. How will this influence the model predictions?

10. In Table 3 (page A-44) it appears that the column labels for maximum and minimum values were switched.

11. The current Phase I capped area is larger than the area shown in Figure 3. The current Phase I cap extends south to the site haul road, and covers 27.8 acres as opposed to the 25 acre cap shown in the Corps figures and discussed in the text. Does this influence any of the model predictions, with respect to timing of plume movement?

Appendix C: Detailed Soil Volume Estimate Methodology

Section 1.0 Introduction

1. It is stated that the risk of encountering volumes of contaminated soil needing removal greater than the 50% confidence level is addressed via the cost estimate contingency developed by the abbreviated Cost and Schedule Risk Analysis (Appendix D). If one looks at the Table on page D-53, the contingency factor added in is 7-9.37%, depending on the activity for Alternative 3, targeted shallow removal, and 7% to 40.53% for Alternative 4, deep excavation and off-site removal. Would these contingency factors include all soils included in the 90% confidence limit which are not included in the 50% confidence limit?

2. In this analysis, data for the volume estimate included data from DOE investigations in 1991 and 1994, as well as Corps investigations in in 2001 and 2010. Thus more data was used here than in other parts of the report, where only 2009 to more recent data was presented.

3. If the concern is about contamination in the upper five feet under Alternative 3, why are surface soils defined as extending to a depth of only one foot below the surface, with a corresponding preliminary remediation goal of 5 pCi/g or less, whereas the soils from one foot and below were considered subsurface soils with an allowable higher pCi/g limit of 15?

4. Figure 3 shows the 50% probability distribution of contaminated soils needing remediation. What would the 90% probability distribution look like?

Appendix D: Detailed Cost Estimates for the Feasibility Study for the Landfill Operable Unit of the Tonawanda Landfill Vicinity Property

Remedial Alternative 2 – Single Layer Capping of FUSRAP-related Material

1. Figure 1 shows a proposed Corps single-layer cap, consisting of six inches of subgrade, 24 inches of barrier protection soil, and six inches of vegetative soil. There are no specifics as to the permeability of the barrier protection soil, although there is a statement in the main body of the report that the hydraulic conductivity would be less than 1 X 10-7 cm/sec. There is no discussion in the main body of the report on the six inch subgrade.

2. This section proposes weekly surface water sampling of the ditch during construction of the cap. This is not reflected in the main body of the report on page 80 (Environmental Monitoring).

3. Apparently gas vents would be included but there is no detail on the number of vents which would be installed.

Remedial Alternative 3 – Targeted Shallow Removal and Off-site Disposal of FUSRAP-related Material

1. Again, weekly surface water sampling of the ditch is not included in the discussion of activities in the main body of the report (Section 3.5 on page 80).

Remedial Alternative 4 – Deep Excavation and Off-site Disposal of FUSRAP-related Material

1. Weekly surface water sampling of the ditch is not included in the discussion of activities in the main body of the report (Section 3.6).

2. This alternative includes the installation and operation of four 12-inch diameter groundwater extraction wells. More detail needs to be provided on this proposal, and a discussion should be included in the main body of the report, as noted previously.

Appendix E. Radon Flux Evaluation

1. The calculated radon flux through the cap proposed by the Corps under Alternative 2 (capping in place) is 19 pCi/m2, which is close to the allowable flux limit of 20 pCi/m2 in 10CFR40. While it was stated that background levels of radon were not removed from the analysis, making the calculated radon flux conservative (higher than it would be if the background level of radon was removed), any degradation of the cap is likely to put the radon flux at or over the allowable limit.

New York State Department of Health
Specific comments on the
Feasibility Study Report and the Proposed Plan for the Landfill Operable Unit of the
Tonawanda Landfill Vicinity Property

New York State Department of Health does not recognize the effectiveness of institutional controls or maintenance of physical barriers beyond a period of 100 years from initial establishment. Any dose assessments beyond 100 years should be based on unrestricted public access to the area. In the case of a RESRAD assessment of radiation dose, this would mean using the "resident farmer" scenario for dose assessment.

COUNTY OF ERIE

[redacted]

COUNTY EXECUTIVE

November 13, 2015

U.S. Army Corps of Engineers, Buffalo District
Special Projects Branch
Environmental Project Management Team
1776 Niagara Street
Buffalo, New York 14207-3199

Re: Proposed Plan for the Landfill Operable Unit of the Tonawanda Landfill Vicinity Property

Gentlemen:

Erie County Department of Environment and Planning has completed a review of the Proposed Plan for the Landfill Operable Unit of the Tonawanda Landfill Vicinity Property (Plan) issued by the U.S. Army Corps of Engineers (ACE) in September, 2015. Our comments with regards to the Plan are included below.

1. Erie County is in general agreement with the Plan as presented which selected Alternative 3, Targeted Shallow Removal and Off-Site Disposal of FUSRAP related Material.

2. Erie County asks that the ACE make every effort necessary, and hold as a priority, actions related to minimizing or eliminating nuisance and exposure risks to residences located adjacent to the Landfill work area during remedial activities. Such actions may include dust and noise abatement, fugitive dust monitoring and stormwater runoff mitigation.

3. Should this Plan be found to be acceptable by all stakeholders, Erie County asks the ACE to expedite the process by which final design is completed. In addition, this issue has caused a delay in Landfill closure and has been a source of concern for nearby residents for a number of years. Erie County asks that this project, if acceptable, receive priority for funding to avoid any further delay in project implementation and completion.

4. The Town of Tonawanda is required to complete a NYSDEC approved closure of the landfill subsequent to completion of the ACE removal. Excavation, sorting and removal of material will affect elevations, grades and contours of the Landfill. Erie County strongly recommends that the ACE work with the Town of Tonawanda in advance of final remedial design to ensure the compatibility of these actions and, where possible, to identify and implement any possible synergies to reduce overall costs of the two projects.

5. The selected Alternative 3 incorporates a 1,000 year post closure monitoring program...to ensure the remedy remains protective. Please describe the actions associated with the monitoring, how these actions will ascertain remedial effectiveness and who will be provided with the results of the monitoring.

6. Alternative 3 as described on Page 11 of the Plan does not mention radiological scanning and sorting. Paragraph 4 on Page 13 of the Plan, however, mentions radiological scanning and sorting as a means of volume reduction for waste minimization. Please describe how this will be accomplished. What will be the procedure for staging and sorting material? How will non-radiological material be handled? Will the excavated material be analyzed for other hazardous characteristics? Will the analytical results be shared? Have the Town and the NYSDEC agreed to the Plan for returning non-radiological material to the excavation?

7. Please provide backup calculations, including assumptions, associated with the determination of the Total Present Worth Cost calculated for each alternative and presented on Page 14.

Thank you for this opportunity to provide comments regarding the ultimate clean-up of this property which will significantly reduce the health risks to the area citizens.

Sincerely yours,

[redacted]

Erie County Executive

MCP/cw

Cc: [redacted]

266. By [redacted] seconded by [redacted]

Whereas, the Army Corp of Engineers released the updated Proposed Plan for the Tonawanda Landfill and

Whereas, the Army Corp gave four alternatives; no action, capping the FUSRAP area, shallow excavation of the FUSRAP area and full remediation of the FUSRAP area, now, therefore be it

Resolved, that the Common Council of the City of Tonawanda and Mayor [redacted] does hereby desire full remediation of the FUSRAP area if adequate funding can be appropriated by Congress to complete this alternative sooner rather than later and be it further

Resolved, in the event that that may not be possible, then the shallow excavation alternative would be desired to finally bring closure not only to residents that live along Hackett Drive but all City of Tonawanda residents, and be it further

Resolved, that a certified copy of this resolution is submitted to the Army Corps for the Public Comment period and Senator Schumer and Senator Gillibrand.

Ayes: [redacted]
Nays: None

Resolution declared adopted

12/1/2015 Mtg.

STATE OF NEW YORK
County of Erie, City of Tonawanda, N.Y. } ss

I, [redacted] Clerk of the City of Tonawanda, do hereby certify that I have compared the annexed copy of.....RESOLUTION..... duly offered and adopted by the .....COMMON COUNCIL..... of said City at a .....REGULAR.....meeting thereof held on the.....1ST.....day of.. ....DECEMBER, 2015.....with the original record on file in my office and the annexed.....RESOLUTION..... is a true correct copy thereof and the whole thereof.

In Testimony Thereof, I have hereunto set my hand and affixed the seal of said City this .....4TH.....day of.....DECEMBER 2015 .....

[redacted]

2015 DEC -7 PM 2:56

2919 Delaware Avenue
Room 20, Municipal Building
Kenmore, New York 14217-2308

town of tonawanda
technical support department

[redacted]

December 2, 2015

[redacted]
US Army Corps of Engineers
1776 Niagara Street
Buffalo, NY 14207-3199

Re: Tonawanda Landfill FUSRAP

This letter has been prepared in response to the September 9, 2015 letter sent to the Town of Tonawanda (Town) by the United States Army Corps of Engineers (USACOE) providing notification that the *Feasibility Study Report* and the *Proposed Plan for the landfill Operable Unit of the Tonawanda Landfill Vicinity Property* (Proposed Plan) has been prepared and is available for review and comment. The Town has submitted comments to the USACOE regarding previous submittals in 2005.

Landfill Operational Status

The Town of Tonawanda landfill (Landfill) is currently undergoing closure activities in accordance with a New York State Department of Environmental Conservation (NYSDEC) Order on Consent (consent order) which was executed on December 18, 2001. A copy of the Consent Order is included as Attachment 3. Closure activities are detailed in the Malcom Pirnie, Inc. Landfill Closure Investigation report, revised March 2002. In general, closure activities consist of the placement of alternate grading material (AGM) to bring the landfill up to proposed closure grades, final capping of closed portions of the Landfill, routine maintenance, and environmental monitoring. Specific closure activities, as they relate to USACOE's Proposed Plan are discussed further below.

Currently, approximately 28 acres of the Landfill have been capped and closed (eastern portion). AGM placement activities are ongoing on the remaining western portion of the landfill, which is located immediately south of the FUSRAP area. Once AGM placement has been completed, a soil bio-remediation facility will be constructed and operated upon the western portion of the Landfill. This facility will accept petroleum contaminated soils for bio-remediation under permit with the NYSDEC. Also of note, a solar power production facility is being constructed in 2016 on the easternmost portion of the capped area of the Landfill.

Comments on Proposed Plan

The following comments are in direct response to the Proposed Plan which documents the selection of Alternative 3: Targeted Shallow Removal and Off-site Disposal of FUSRAP-related Material as the preferred remedial method to address radiological contamination present in the FUSRAP area. Refer to Figure 1, attached, for a depiction of the following numbered comments.

1. Shallow Waste Relocation – The NYSDEC approved Closure Plan for the Landfill includes the relocation of an area of shallow waste located immediately east of the FUSRAP area. This waste will be excavated from the indicated area and re-graded into the existing Landfill. Will the Town need to take any special precautions during the waste relocation activities?

2. Post-Closure Leachate Collection – The Closure Plan also requires the installation of a leachate collection line along the northern boundary of the Landfill. See Attachment 1 for portions of the Closure Plan regarding this proposed leachate collection line. As per the plan, this line will be installed at the approximate depth of seasonal-low groundwater elevations. Based on historical groundwater elevation data, this depth is estimated at approximately seven feet below grade. This proposed leachate collection line will intercept any leachate and/or shallow groundwater emanating from the Landfill prior to off-site migration. Collected leachate/groundwater will be directed to the Western Collection Pond (depicted on Figure 1) which ultimately discharges to the Town of Tonawanda wastewater treatment plant (WWTP). The following concerns are noted regarding this issue:
   - 2a. – Groundwater in the FUSRAP area/the vicinity of the proposed leachate collection line is documented to be impacted with elevated levels of Uranium (as indicated in the Proposed Plan). Although the Proposed Plan dismisses this groundwater contamination as there is no public use of the groundwater there is still the issue of eventual discharge of radiological-contaminated groundwater to the WWTP. Further evaluation of this issue is needed.
   - 2b. – As the leachate collection line is proposed to be installed to a depth (seven feet) below the maximum excavation depth proposed by Alternative 3 (five feet), there are concerns related to worker protection and proper materials management during the installation work. What additional precautions, monitoring, and disposal methods will be required during portions of this work conducted in areas previously excavated as part of Alternative 3? Also, what additional measures will be required in areas not excavated as part of the selective excavation proposed in Alternative 3?

3. Grading for Surface Water Drainage – In accordance with the Closure Plan, the capping of the landfill will require grading the northern area to ensure surface water drainage to Two-Mile Creek. Currently, grading plans are not prepared for this proposed work. There is concern that once this grading is completed it may require the removal of some of the backfill/cover placed during the execution of Alternative 3 – resulting in less than three feet of minimum required cover.

4. Grading to meet Part 360 Closure Objectives – In addition to Item 3 above, NYSDEC Part 360 regulations require post-closure grading of a minimum grade of 4%. The same concern as noted above is present in regards to this proposed work.

5. Off-Site Waste – The Closure Plan also requires, pending property owner access, the excavation and disposal of any waste material that may exist outside of the limits of the landfill property, i.e. backyards of residences to the North. A portion of the Closure Plan requiring this work is included as Attachment 2. As historical disposal activities occurred prior to the construction of these residences, it is probable that disposal activities were not limited to present day property boundaries. If off-site waste excavation and disposal activities are conducted, what additional investigative and/or precautionary measures will be required in regards to the potential for radiological contamination?

6. Environmental Monitoring Plan – As noted in comment #2 above, Alternative 3 does not call for any post-excavation groundwater monitoring. In light of the concerns related to the quality of

water to be ultimately discharged at the WWTP it is suggested to consider a post-excavation groundwater monitoring plan to at minimum document the quality of water being discharged to the WWTP through the leachate/shallow groundwater collection system.

7. Site Security – As not all material will be removed under Alternative 3, will the orange fencing delineating the FUSRAP area continue to be maintained after the completion of work? What other security measures / site restrictions might be imposed?

Additional Overall Comments

1. Will the Town's ability to execute land use plans be compromised for public welfare?

2. Significant additional costs to the Town due to inflation are anticipated as a result of the delay to finalize the landfill closure. What is the timeline projection for obtaining funding to complete the contemplated work? Can the Town anticipate restitution for this delay

3. What is the disposition plan of hazardous or contaminated landfill waste encountered during Alternate 3 operations which are outside of federal jurisdiction? Can the USACOE ensure no additional costs will be borne by the Town due to these materials?

Summary

The Town has worked with the USACOE and the NYSDEC for over a decade on the landfill closure and final investigation of the FUSRAP areas. The Town would like to push forward with the final resolution of the FUSRAP areas in order to complete the landfill closure and end use.

Sincerely,

[redacted]

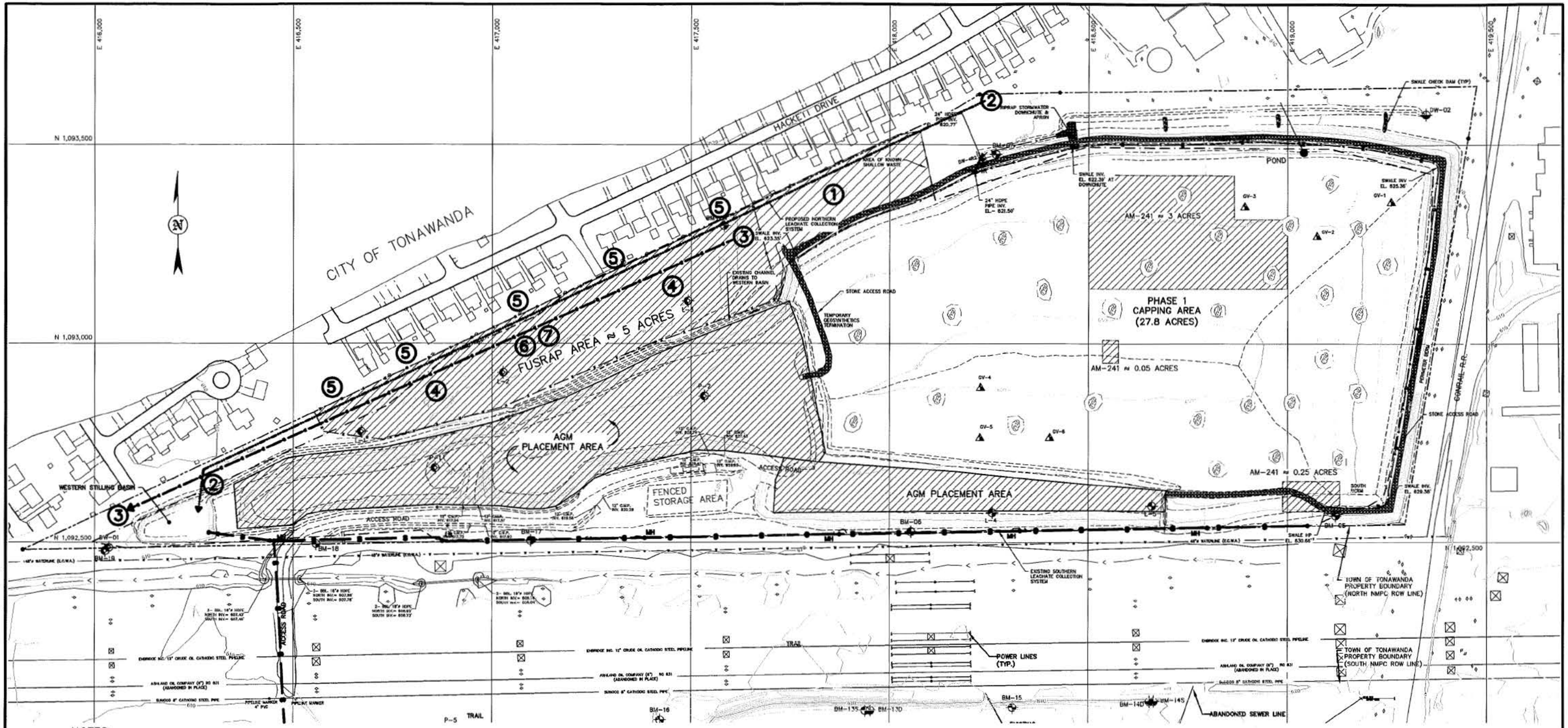
Director

Cc: [redacted]

Attachments

Figure 1 – FUSRAP Cleanup Comments
Attachment 1 – Portions of Closure Plan related to northern perimeter leachate line
Attachment 2 – Portion of Closure Plan related to off-site waste
Attachment 3 – NYSDEC Consent Order

Figure 1



NOTES:

1. BASEMAP BASED ON 1993 AERIAL SURVEY SUPPLEMENTED BY VARIOUS TOPOGRAPHIC SURVEYS. GRADES SHOWN WITHIN LANDFILL PROPERTY REPRESENT EXISTING CONDITIONS AS OF DATE OF MOST RECENT SURVEY BY ENSOL, DATED JUNE 2015.
2. SITE HORIZONTAL GRID NAD-27 NEW YORK STATE PLANE – WEST ZONE. SITE VERTICAL DATUM NGVD-29.
3. EXISTING UTILITIES REFERENCED FROM NIAGARA MOHAWK DRAWING INDEX NO. 6.1-H18-M, DATED 9-28-70 REVISED 6-30-92.
4. EXISTING WASTE BOUNDARY BASED ON TEST PITTING PERFORMED BY WEHRAN-NY, INC. IN 1993. BOUNDARY HAS BEEN UPDATED TO REFLECT CURRENT CONDITIONS (I.E., POST PHASE I WASTE RELOCATION PROJECT AND PERIMETER BERM CONSTRUCTION)

LEGEND:

- 620 — INDEX CONTOUR
- INTERMEDIATE CONTOUR
- PERIMETER FENCE ENCOMPASSING FUSRAP AREA
- BM-7 MONITORING WELL
- AMERICIUM-241 AREAS
- EXISTING WASTE BOUNDARY (SEE NOTE 5)
- APPROXIMATE PROPERTY LINE (FOR REFERENCE ONLY)
- P-1 PIEZOMETER
- ELECTRIC LINE POLE/TOWER
- SHALLOW ROOTED SHRUBS
- AGM WASTE PLACEMENT
- FUSRAP AND/OR AM-241 WASTE AREAS
- SHALLOW WASTE RELOCATION AREA (FUTURE EXCAVATION)
- 1 COMMENT LETTER ITEM NUMBER
- PROPOSED POST-CLOSURE LEACHATE COLLECTION LINE
- PROPOSED POST-CLOSURE SURFACE WATER FLOW

REVISION	BY	DATE

IT IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW, ARTICLE 145 SECTION 7209, FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER AN ITEM IN ANY WAY.

BRIAN D. SHIAH, P.E.
NYSPE LICENSE NO. 079072

EnSol, Inc.
Environmental Solutions
661 MAIN STREET
NIAGARA FALLS, NY 14301
PHONE (716) 285-3920 FAX (716) 285-3928

PROJECT NO: 00-0035 AGM
SCALE: 120' 0' 120' 240'
DWG: FUSRAP Cleanup Ltr Fig.dwg
DATE: NOVEMBER 2015

TITLE: FUSRAP CLEANUP COMMENTS
RESPONSE TO USACE SEPT. 2015 PROPOSED CLEANUP PLAN

PROJECT: TOWN OF TONAWANDA LANDFILL
PREPARED FOR: TOWN OF TONAWANDA

TOWN OF TONAWANDA | COUNTY OF ERIE | STATE OF NEW YORK

SHEET 1

X:\AA\bj\Tonawanda\Landfill\00-0035 FUSRAP Support (Task 8) \Correspondence\2015 FUSRAP Plan Comments\FUSRAP Cleanup Ltr Fig.dwg, 12/1/2015 10:50:45 AM, awellington

Attachment 1

EnSol, Inc. *Environmental Solutions*

professional engineering – business consulting

Portions of Closure Plan related to northern perimeter leachate line

vent by installing some type of impermeable cutoff within the catch basin.

Response 12:

- The Typical Gas Venting Trench Detail (Figure 6-4) has been revised to indicate a minimum depth of the gas venting trench of 5'0" into the waste material.

- The typical gas vent detail has been revised to show the 6" riser pipe as slotted within the waste so that gasses can enter the pipe from the crushed stone and gravel as well as from the horizontal gas collection pipe.

- A flush to grade grate with a drainage pad sloping away in all directions was chosen for each vent at this site instead of the above grade J-pipe type vent. This vent completion was chosen because of the planned end use of the site as a park or golf course. The flush vent completion provides sufficient gas ventilation, prevents surface runoff from entering the gas vent system, is less of a physical and visual obstruction and is less susceptible to damage and vandalism.

  Installing a barrier in the catch basin would not prevent water from entering the fill. Calculation of the amount of potential rainwater infiltration into the proposed flush mount vent completions indicates that the potential for rainwater infiltration is insignificant (see attached calculations).

Comment 13: *Please provide some additional discussion on how the perimeter leachate collection system will be designed to also function for landfill gas venting. For example, will there be gas vent risers installed within the collection trench and what will be the depth of the trench? The trench should be keyed into the seasonal low groundwater table, bedrock layer or first layer of impermeable soils as required by 3602.15(f)(1). MPI should provide a preliminary, typical detail drawing for the proposed leachate collection/gas venting trench system at this time.*

Response 13: The collection trench will be keyed into the seasonal low groundwater table. The perimeter leachate collection system will contain cleanouts that will also function as gas venting risers. These risers will be spaced approximately 200 feet apart to provide sufficient gas venting. A typical detail for the leachate collection gas venting trench has been included in as Figure 6-4b.

6.2 CONCEPTUAL CLOSURE PLAN

This conceptual closure plan was developed based on the findings of the closure investigations to initiate discussions and comments from involved parties regarding future courses of action for closure of the Town of Tonawanda Landfill. A final closure plan will be prepared in accordance with the requirements of 6 NYCRR Part 360 and NYSDEC Solid Waste Management Facility guidelines after the NYSDEC has reviewed and approved the Closure Investigation Report.

6.2.1 Closure Objectives

Based on the results of this closure investigation, the following closure objectives have been established:

- General Objectives - Since impacts to site groundwater quality have been determined to be minimal, the concept for the final cover system should be established based on an objective of minimizing potential leachate outbreaks and minimizing direct contact with potentially radioactive waste constituents. This is best accomplished with the construction of a low-permeability final cover system and a retrofit leachate collection system.

- Leachate Collection - Saturated waste conditions in the western portion of the landfill are contributing leachate seeps and downward leachate migration in areas where inadequate cover material exists. In addition, leachate may be migrating along the ECWA water main bedding on the southern perimeter of the landfill. Although leachate migration is generally controlled by the presence of low permeability glacial deposits beneath the landfill, a leachate collection system is recommended on Town of Tonawanda property along the northwestern property line adjacent to the residential area and along the southern property line adjacent to NMPC property to manage leachate migration potential.

- Final Cover - Construction of a final cover system is recommended to lower the water-table mound present in the eastern portion of the site, and reduce the current rate of infiltration so that the landfill can be continually drained via the leachate collection system. These objectives can be met using a final cover system comprised of:

    - 6-inches of topsoil
    - 12-inches of barrier protection material.

Attachment 2

EnSol, Inc. *Environmental Solutions*

professional engineering – business consulting

Portions of Closure Plan related to off-site waste

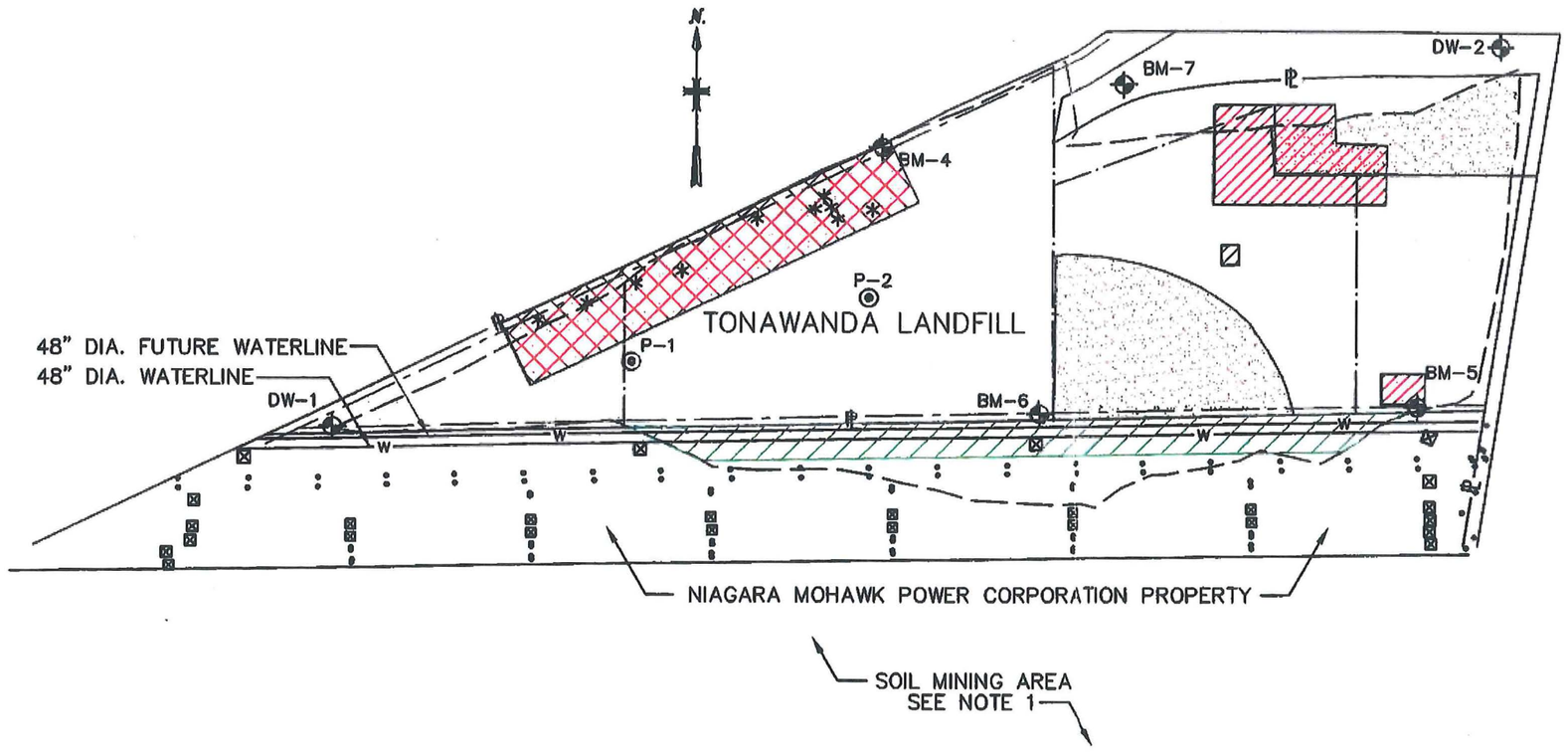
main will be excavated and relocated to the landfill footprint. Subsequent to the removal of waste material from NMPC property, verification sampling will be performed to ensure that all waste or contamination has been removed from the excavation. A verification sampling plan will be prepared for inclusion in the Final Closure Plan.

6.2.2 Site Closure Activities

The conceptual closure plan of the Tonawanda Landfill is illustrated on Figure 6-1. Closure of the Tonawanda Landfill will include the following detailed construction and post-closure activities:

Site Preparation Activities: Activities required to prepare the site for final closure include:

- Demolish the existing landfill maintenance building. Utilize the demolition debris as on-site fill material.
- Remove all brush and vegetation and place it below grade.
- Regrade the landfill to have a maximum slope of 1:3 (V:H) and a minimum slope of four percent with some contouring to provide a more natural look. Care will be taken to minimize, to the extent possible, the disturbance of all areas containing radioactive materials. Special consideration of dust controls and monitoring will be used when working in these areas.
- In areas that received Americium-241 contaminated ash, provide an additional three feet of clean fill material. The approximate limits of the Americium-241 areas are shown on Figure 6-1.
- In areas where uranium by-products were disposed, provide a minimum of three feet of cover material. The approximate location of the areas which received uranium by-products are shown on Figure 6-1.
- Provide perimeter site drainage swales for surface water runoff.
- Waste material, if any, that exists outside the Town's property along the northwestern property boundary near the residences will be excavated and redeposited within the landfill footprint subject to access approval by the landowners.



LEGEND

- APPROXIMATE LIMIT OF WASTE DETERMINED BY WEHRAN
- AM-241 WASTE AREA TO RECEIVE 3 FEET OF ADDITIONAL FILL
- USDOE WASTE HOT SPOT (ELEVATED SURFICIAL GAMMA EXPOSURE RATES)
- PUTRESCIBLE WASTE AREA
- MONITORING WELL INSTALLED BY THOMSEN
- UTILITY POLE
- TOWER
- PIEZOMETER
- AREAL LIMITS OF WASTE TO REMAIN ON NMPC ROW
- APPROXIMATE VOLUME OF WASTE TO REMAIN = 22,300 C.Y.
- APPROXIMATE TOTAL VOLUME OF WASTE MOVED = 59,900 C.Y.
- APPROXIMATE TOTAL ACREAGE WITH RESIDUAL WASTE = 4.0 ACRES
- TOTAL ACREAGE RECOVERED = 3.5 ACRES (SEE NOTE 2)
- LANDFILL AREA TO RECEIVE PROPOSED REDUCED COVER SYSTEM
- PROPOSED LEACHATE COLLECTION LINE
- USDOE WASTE AREA TO RECEIVE 3 FEET OF ADDITIONAL FILL

NOTES:

1. FOR ACTUAL LOCATION OF SOIL MINING AREA, SEE MINED LAND USE PERMIT APPLICATION REPORT (WEHRAN, APRIL 1991).
2. ADDITIONAL AREA MAY BE RECOVERED WHERE WASTE DEPTHS ARE SHALLOW.

APPROXIMATE SCALE: 1" ≅ 400'

MALCOLM PIRNIE

TON09SIT8

TONAWANDA LANDFILL CLOSURE REPORT
VARIANCE REQUEST

TOWN OF TONAWANDA, NEW YORK JANUARY 1999

Attachment 3

EnSol, Inc. *Environmental Solutions*

professional engineering – business consulting

Consent Order

STATE OF NEW YORK: DEPARTMENT OF ENVIRONMENTAL CONSERVATION

In the Matter of the Alleged Violation of New York Environmental Conservation Law (ECL) by:

TOWN OF TONAWANDA
Municipal Building
2919 Delaware Avenue
Kenmore, New York 14217
(Erie County)

Respondent

ORDER ON CONSENT
No 90-38

DEC File No.
R9-3121-90-05

WHEREAS:

1. Article 27 of the Environmental Conservation Law of the State of New York (hereinafter "ECL") sets forth certain provisions governing the disposal of solid waste within the State of New York and provides for the adoption of implementing codes, rules, and regulations therefor and the enforcement thereof by the Department of Environmental Conservation (hereinafter "Department").

2. Respondent is a municipal corporation duly organized under the laws of the State of New York.

3. Respondent owns, operates, and/or maintains control of real property located on East Park Drive in the Town of Tonawanda, New York in the County of Erie.

4. Until on or about October 31, 1989, Respondent operated a solid waste management facility at the aforesaid East Park Drive location (hereinafter, the "Site").

5. In early 1990 the Site was referred to the Department's Division of Solid Waste to effect a landfill closure in accordance with the Department's Part 360 regulations.

6. Despite the efforts of the Town and the Department to effect closure, site constraints including the existence of an adjacent water supply line, the deposition of waste on adjacent property owned by an unrelated utility company, and the detection of elevated radioactivity levels in a portion of the landfill, have delayed closure.

7. It now appears that, having reached agreement with the aforesaid utility companies and having obtained a commitment from the U.S. Army Corps of Engineers (hereinafter, "USACOE") to conduct a remedial investigation/feasibility study of the landfill area where elevated radioactivity levels were detected, Respondent can proceed with Site closure activities in accordance with 6 NYCRR Part 360 and the attached compliance schedule.

8. Respondent has affirmatively waived its right to a hearing on these matters as provided by law and has consented to the issuance and entry of this Order and has agreed to be bound by the provisions, terms, and conditions contained herein.

NOW, having considered this matter and being duly advised, it is ORDERED THAT:

I. **RELIEF**

Respondent shall, on or before the dates indicated therein, complete the activities required in Schedule A which is attached hereto, incorporated herein, and is an enforceable part of this Order.

II. **ACCESS**

For the purpose of monitoring or determining compliance with this Order, employees and agents of the Department shall be provided access, upon request, to the landfill site and to all records maintained by the Respondent regarding the site and its closure, including the right to inspect and copy the aforesaid records.

III. **FAILURE, DEFAULT, AND VIOLATION**

Respondent's failure to comply with any provision of this Order shall constitute a default and a failure to perform an obligation under this Order and shall be deemed a violation of both this Order and the ECL.

IV. SETTLEMENT/RESERVATION OF RIGHTS

A. Upon completion of all obligations created in this Order, this Order settles only all claims for civil and administrative penalties concerning the above-recited violations against Respondent and its successors (including successors in title) and assigns.

B. Except as provided in Subparagraph A of this paragraph, nothing contained in this Order shall be construed as barring, diminishing, adjudicating or in any way affecting any of the civil, administrative, or criminal rights of the Department or of the Commissioner or the Commissioner's designee (including, but not limited to, nor exemplified by, the rights to recover natural resources damages and to exercise any summary abatement powers) or authorities with respect to any party, including Respondent.

V. BINDING EFFECT

The provisions of this Order shall inure to the benefit of and be binding upon the Department and Respondent and its successors (including successors in title) and assigns.

VI. MODIFICATION

No change in this Order shall be made or become effective except as set forth by a written order of the Commissioner or the Commissioner's designee.

VII. ENTIRE ORDER

The provisions of this Order constitute the complete and entire Order issued to the Respondent concerning resolution of the violations recited in this Order. No term, condition, understanding or agreement purporting to modify or vary any term hereof shall

be binding unless made in writing and subscribed by the party to be bound by this Order. No informal oral or written advice, guidance, suggestion or comment by the Department regarding any report, proposal, plan, specification, schedule, comment or statement made or submitted by Respondent shall be construed as relieving Respondent of its obligations to obtain such formal approvals as may be required by this Order.

VIII. **EFFECTIVE DATE**

The effective date of this Order is the date that the Commissioner or her designee signs it. The Department will provide Respondent (or the Respondent's counsel) with a fully executed copy of this Order as soon as practicable after the Commissioner or the Commissioner's designee signs it.

Buffalo, New York

DATE:

Erin M. Crotty, Commissioner
New York State Department of
Environmental Conservation

by: [redacted]
Regional Director

TOWN OF TONAWANDA
ORDER ON CONSENT NO. 90-38
FACILITY # 16S29

SCHEDULE A

Respondent shall, on or before the dates indicated, complete the following actions:

	ACTION ITEM	DATE DUE
1.	Submit draft work plan for completing closure investigation of the landfill in accordance with Part 360-2.15.	Submitted (2/23/94)
2.	Commence closure investigation of landfill in accordance With final Department approved work plan.	Commenced (7/94)
3.	Submit draft Closure Investigation Report (CIR) to Department for review.	Submitted (11/3/95)
4.	Submit final CIR in response to Department comment letters of February 26, 1996, April 26, 1996 and May 10, 1999.	April 1, 2002
5.	Submit a draft Operations and Maintenance (O&M) Manual for the placement of Alternative Grading Material (AGM) at the landfill.	Submitted (1/2001)
6.	Submit a final O&M Manual for Placement of AGM in response to the Department's comment letter of March 1, 2001. The O&M Manual must contain a site-specific Health and Safety Plan (H&SP) that addresses the procedures for the placement of AGM in the area of the landfill known to contain Americium^{241} waste.	Submitted (5/14/01)
7.	Commence placement of AGM in accordance with the final approved O&M Manual.	Upon receipt of Department approval of O&M Manual
8.	Submit quarterly reports to the Department providing detailed information on each source/quantity of AGM delivered to the landfill	Within 30 days of the end of each calendar quarter for duration of project

9.	Submit quarterly reports to the Department indicating fund balance in the closure escrow account maintained by the Town.	Within 30 days of the each calendar quarter for duration of project
10.	Cease acceptance and placement of AGM at the landfill.	Upon attaining final closure elevations or upon receipt of DEC notification.
11.	Submit Conceptual Closure Plan for entire landfill. The Closure Plan should be separated into two phases to address the FUSRAP and non-FUSRAP related areas of the landfill as determined by the US Army Corps of Engineers. Phase 1 should address the closure of the non-FUSRAP related areas	Within 3 months of issuance of USACOE Record of Decision
12.	Submit Post Closure Maintenance and Monitoring Plan for the entire landfill for the Department's review and approval.	Within 1 Month of submission of Conceptual Closure Plan
13.	Submit Final Closure Plan for Phase 1 (non-FUSRAP) Area.	Within 3 months of receipt of Department approval of Conceptual Closure Plan
14.	Implement the environmental monitoring plan in accordance with the Department-approved post closure maintenance and monitoring plan.	Upon commencing construction of Phase 1 closure
15.	Conduct post closure maintenance and monitoring activities in accordance with the approved monitoring plan.	For minimum of 30 years following completion of final closure

16.	Complete closure of the Phase 1 Area.	Within 24 months of receipt of Department approval of Phase 1 Final Closure Plan
17.	Submit a closure certification report, signed by a NYS licensed professional engineer, for the Phase 1 Area.	Within 45 days of completion of closure
18.	Submit Final Closure Plan for Phase 2 (FUSRAP related) Area.	Within 3 months of completion of USACOE remediation
19.	Complete closure of the Phase 2 Area.	Within 24 months of receipt of Department approval of Phase 2 Final Closure Plan
20.	Submit a closure certification report, signed by a NYS licensed professional engineer, for the Phase 2 Area.	Within 45 days of completion of closure
21.	Record deed restriction in Erie County Clerk's Office stating stating use of property as a landfill, dates of use, description as a landfill, dates of use, description of wastes contained therein, and fact that records for the facility are maintained by the Department of Environmental Conservation.	Within 45 days of completion of closure

CONSENT BY RESPONDENT

Respondent hereby consents to the issuing and entering of the foregoing Order, waives its right to a hearing herein as provided by law, and agrees to be bound by the provisions, terms and conditions contained therein

[redacted]

(Seal)

TOWN OF TONAWANDA
BOYD H. MUNICIPAL BLDG.
KENMORE, NEW YORK 14217

Corporate

State of New York)
County of Erie)

On this 18thday of December ,2001 , before me personally came [redacted] to me known, who being by me duly sworn did depose and say that he resides at Tonawanda New York that he is the Supervisor of the Town of Tonawanda the corporation described in and which executed the foregoing instrument; and that he signed his name as authorized by said corporation.

[redacted]

Notary Public, State of New York
ID# 01RU4974432
Qualified in Erie County
My Commission Expires 11/1/2002

Individual

State of)
County of)

On this day of , 2001 , before me came , to me known and known to me to be the individual described in and who executed the foregoing consent and he duly acknowledged to me that he executed the same.

NOTARY PUBLIC

Proposed Plan

Formerly Utilized Sites Remedial Action Program

Public Meeting

On October 15, 2015 held at 3200 Elmwood Avenue, Kenmore, New York 14217

[redacted] - Commander of the Buffalo district f Engineers

[redacted] - Team leader for the Project Management Team

[redacted] - Tonawanda Landfill Vicinity oject Manager

[redacted] - Project Engineer

PUBLIC COMMENT PROVIDED PRIOR TO THE PRESENTATION:

[redacted]

[redacted] I live on 478 Adam Street, Tonawanda. So I live in the area near the -- near the landfill in terms of City of Tonawanda. I'm running for public office for councilman in that district and I walked along and talked with people who lived along that property and I've heard stories of people who had cancer, I know people that have had cancer and I think -- I know it's not the Corps of Engineer's responsibility to do a health -- real health survey of people along that stretch but I think there needs to be some further study done to see is there a higher incidence of cancer for people who live along that area versus people who live in other parts of the city or the county.

The other issue I came across was water runoff from that landfill and it was my understanding that how that radioactive

material got there, nobody knows how that got there and it seems to have moved over the course of time. If there's runoff from that landfill into people's backyards, I think that should be a concern that would be addressed.

There's one gentlemen at the corner of Hackett and Rogers where he has standing water in the winter time that comes along the dead end portion of his street and into his driveway and it freezes over. So he's got decent thickness of it and the city came in and checked and it's not coming from any of the city plumbing. The county, Erie County Water Authority came out and it's not coming from any of their pipes so the only place that water can be coming from is from the landfill and I don't know if the project is going to address keeping any runoff from that landfill from going into people's yards or the water from that landfill seeping into their basements or affecting their property at all because there doesn't seem to be any kind of drainage or trench or anything to stop runoff

from that landfill going into people's property.

If it was up to me, I would go with the fourth option of removing everything. I think if you were going to ask somebody would they want to live next to that even though the material they would leave is buried significantly deeper, I don't think you would have people wanting that in their backyard. I think that if it's -- if you're looking for what's to do that's in the best interest of the people that live there, I think it's in their best interest to remove it all. I know it may not be cost effective or it may be too expensive, but the best solution would be I think to get rid of it all.

[redacted] Okay. We'll take that comment under advisement and then once we get all the -- when the comment period is over with, we will address the comments and you'll be able to see the record of decision, the response to the comments.

[redacted]: So that will be posted

on-line?

[redacted] Yeah, I believe that will be posted on-line along with the record of decision. That is something I can get clarification for you and if you would like we got your contact information, I can get back to you and let you know.

[redacted] Okay.

[redacted] Are you going to be staying for the presentation?

[redacted] I was going to, yes.

[redacted] That's good then you can get more information regarding Alternative 3 and Alternative 4. We do have our posters set up and we do have our crew manning the posters so they can explain the Alternative 3 and Alternative 4 and the risk associated with the FUSRAP material. So just feel free, we still have some time before the presentation starts and they can explain the posters and the different alternatives to that.

[redacted]: I read the material, some of the material and is it my understanding

that if you did go for option 4 it would be the entire FUSRAP budget for an entire year for cleanup?

[redacted]: Well, the one thing you got to understand is that it's a national program. So there's only so much money in the pot and that pot gets divided between the different districts for FUSRAP program. So we might get $20 million out of a $100 million dollar pot and then we got to address other projects that are ongoing.

[redacted]: But the entire pot is only $50 million, somewhere around there?

MR. ROWLEY: Well, the Alternative 4 is roughly $55 million to complete. So then we would have to wait for appropriate funding to actually complete that alternative if we end up going that route.

[redacted] And the determining factor in how much funding is put into that pot is congress?

[redacted]: That is mostly correct. You know and it's one thing that I can get

clarification regarding that just to verify. The funding does come from congress with the budget and stuff and then headquarters decides you know how much to divvy up the overall budget. In regards to if they give just hypothetically $50 million to the Army then the Army will give $10 million to the Army Corps for FUSRAP, something along those lines.

[redacted]: My only other suggestion would be is if you were going to hold a hearing like this, it would've been beneficial if there was another hearing in the city of Tonawanda because a lot of people that live along that stretch that are affected they're elderly residents and there is really no residents of the Town of Tonawanda who are within inches of that landfill. So I think to get the message out and to fully inform the people who live there of what they're living next to, it would've been more beneficial to have it in the school that's right down the street right where the residents are and right where the landfill is. I know this is

technically in the Town of Tonawanda versus the city but the city I think is -- there's more of a human impact on people in the city.

[redacted]: That is understandable. We did try to get the venue in the city, unfortunately there was scheduling conflicts for the place that we would use so at the last minute we had to come to Philip Sheridan. Our main goal was to have it in the city but due to scheduling conflicts we had to come here. We have to get the meeting done within the public comment period so you know our best interest was to have it done in the city but unfortunately the scheduling conflicts we had to have it at the Philip Sheridan Building.

[redacted] Thank you. I appreciate it.

[redacted] Thank you.

PUBLIC HEARING

[redacted]: Thank you and welcome. My name is [redacted] and I'm the Outreach

Program Specialist for the Army Corps for Engineers Buffalo District and I would like to introduce to you [redacted], the Buffalo District Commander of U.S. Army Corps of Engineers.

[redacted]: Thanks very much and can everybody hear me okay in the back. Great. Good evening, ladies and gentlemen. Thank you very much for joining us here tonight.

I offer a special welcome to Mayor [redacted] and Councilwoman [redacted] from the City of Tonawanda. Also, our colleagues from the New York State Department of Environmental Conservation, [redacted].

We're here this evening to discuss the Landfill Operable Unit of the Tonawanda Landfill Vicinity Property and our Proposed Remediation Plan. The Buffalo District serves the people and the watersheds of the lower Great Lakes from Massena New York out to the Indiana state line. We have many projects within this large area but this one hits very close to home. Many of our 265 employees are

members of this community and we all care deeply about serving our fellow citizens and safeguarding them.

As many of you are aware we have been at this point once before. In 2007 we proposed a no action preferred alternative. Careful consideration of the comments you provided steered us in a different direction and prompted additional investigations under the Formerly Used Site Remedial Action Program or FUSRAP for short.

In its current condition the FUSRAP material in the landfill which is low level radioactive residue does not present an unacceptable risk to human health or the environment. However, there is a potential future risk if hundreds of years of natural erosion would expose these residues. So we are proposing an alternative to eliminate this future risk. We call it the targeted shallow removal and offsite disposal and we're going to describe it and the other alternatives we considered this evening. I would like to

personally convey to you that we have no reason for a hidden agenda. Our motivation is simple, is public safety and it's following national level guidelines.

Just like in 2007, your comments are the most important part of the evening. I request that you save your comments until after the presentation so they can be properly recorded. The presentation lasts around 30 minutes and it includes 32 slides so you can gauge the progress as we go along by looking at the page numbers. If you have a comment that you'd like to be recorded tonight, please make sure you check the box on the card you filled out on the way in and Arleen who introduced me can assist you and can also provide additional cards to you.

You're also welcome to submit written comments by November 14 when the public comment period ends. Members of the project team will conduct the presentation tonight. They include [redacted] We have other team

members in the audience and if you could, please raise your hands. Thank you.

After the presentation and comment period all of us will be available at the posters to answer any additional questions that you may have and with that, I would like to turn it over to [redacted] thank you.

[redacted] Thank you, sir. Before getting into specifics tonight on the Tonawanda Landfill Vicinity Property, I'd just like to take a few moments to explain a little bit about the program under which we are working at the site.

The Formerly Utilized Sites Remedial Action Program or FUSRAP was initiated in 1974 to identify, investigate and if necessary, clean up or control sites that were contaminated from past activities related to the nation's Early Atomic Energy and Weapons Program.

The objectives the Corps of Engineers seeks to address in executing FUSRAP are shown here on this slide. Our number one priority

when performing actions to meet these objectives is the safety of the community, site workers and the environment.

When implementing FUSRAP, the Corps of Engineers is mandated by law to follow the process in the Comprehensive Environmental Response, Compensation and Liability Act or CERCLA. This slide shows the steps in the process for investigating and cleaning up FUSRAP sites under CERCLA.

As [redacted] mentioned, tonight we are here at the proposed plan and we've been at this point before in 2007 and that's why your input on proposed plan is so important to us. Last time we were here based on public input it lead us in a different direction to where we are back here again after completing feasibility study and a second proposed plan for the site.

The proposed plan is not the final decision on the remedy for the landfill. A final decision on the Tonawanda Landfill Vicinity Property will be made after

consideration of public comment on the proposed plan and that final decision will be documented in the record of decision.

I'll start getting into some specifics on the site. Tonawanda Landfill Vicinity Property consists of two parcels of property owned by the Town of Tonawanda. One is the Town of Tonawanda Landfill or the Landfill Operable Unit and the second is the Mudflats which is now known as the North Youngmann Commerce Center.

Tonight's focus is on the Landfill Operable Unit or OU on the Tonawanda Landfill Vicinity Property. It comprises about 55 acres and is bordered by a railroad line on the east, a National Grid corridor on the south and a residential area within the City of Tonawanda to the north and northwest.

The landfill is a New York State regulated landfill and the Town of Tonawanda is currently in the process of doing overall closure and capping of the landfill under New York State requirements.

The primary FUSRAP investigative area is this area highlighted in white. I'll talk a little bit about the history of the Landfill Operable Unit and the FUSRAP investigations there before I turn the presentation over to our next presenter.

The landfill was operated as a landfill by the Town of Tonawanda in the 1930s until its closure in 1989. From 1942 to 1946 at the Linde Air Products site in Tonawanda, the federal government had contracts to conduct uranium ore refinery work. In the early 1990s the Department of Energy as part of the FUSRAP program performed some preliminary investigations at the Town of Tonawanda Landfill as part of their overall investigations at the former Linde property.

These investigations culminated and the Department of Energy designated this site as a Vicinity Property in FUSRAP to the Linde Site in Tonawanda.

Following transfer of the FUSRAP program from the Department of Energy to the Corps of

Engineers, the Corps conducted initial investigations in the Landfill and Mudflats to build upon what DOE had already done. These culminated a completion of a remedial investigation in 2005 and the risk assessment that was part of that initial remedial investigation concluded that risks from FUSRAP related material to human health were within the established guidelines established by USEPA. That led to us the issuing of a 2007 proposed plan which has been mentioned recommending no action for both the Town of Tonawanda Landfill and the Mudflats.

Based on the public input and public comment received, Corps of Engineers decided to split the path on those two parcels. In 2008 issued a no action record of decision for the Mudflats Operable Unit.

We decided to conduct additional investigations of the Landfill Operable Unit which was done from 2009 to 2011 and those were to further refine our knowledge on the extent of FUSRAP related material within the

Landfill Operable Unit.

We use that information and some of the information we received as part of the public comment period under the first proposed plan to update the baseline risk assessment in 2012 which was released to the public at that time and we'll be talking a little bit more about the results of the assessment in the following slides.

Finally where we are today is that we recently released first a feasibility study which developed and evaluated several alternatives to address the FUSRAP related material in the Landfill. And following that and released at the same time actually was the proposed plan which presents Corps of Engineers preferred alternative to address those materials and is what we are presenting tonight.

I will now turn the meeting over to [redacted] the project manager for the site, talk a little bit about the baseline risk assessment.

[redacted]: Thank you, [redacted] The purpose of this slide is to help convey the potential risk associated with FUSRAP related material buried in the Landfill Operable Unit.

First, so everyone is aware a millirem is a measurement of radiation dose to humans. The first green bars on this graph represent background sources that I was -- the first four green bars represent background radiation sources that I was exposed to like radon and cosmic radiation. In addition to background sources I also received a chest X-ray which was 10 millirems and one dental X-ray which was 1.5 millirems.

If we were to add up all the green bars we would get my overall annual radiation dose for the year which was 321.5 which is less than the national average which was 620 millirem.

Based on the data we collected for our updated risk assessment, under current conditions a youth spending time regularly on the landfill for a year would receive an additional dose of 1.8 millirem to his or her

overall annual dose which is shown on this blue bar right here. This is slightly more than the dose I received when I had my dental X-ray.

If no action were taken to prevent erosion of soil over the areas that are contaminated with FUSRAP related material, 600 years into the future a youth spending time regularly on the landfill for a year would receive an additional dose of 38 millirem which is this blue bar right here. Which almost equates to the cosmic radiation.

This potential future exposure exceeds federal regulations which is why we are addressing the site.

We updated the human health risk assessment based upon public input to include the risk of people spending some time on the landfill. Soil, surface water, ground water are the media that a person on the site could potentially come into contact with that were evaluated.

For the current use of the Landfill OU,

the risks to human health from potential exposures to FUSRAP related material are within the acceptable limits established by the USEPA.

Surface water, which is found in the northern drainage ditch within the FUSRAP investigation area is temporary in nature and is not a source of drinking water, potential drinking water, nor an ecological habitat. Incidental ingestion of surface water is within regulatory risk limits. Surface water is not a media of concern.

As you can see, surface water has been removed from this slide. I'd like to talk next about groundwater. The groundwater is currently not a drinking water source and it is not likely that it would be in the future due to the availability of fresh drinking water from offsite sources like the Niagara River. The groundwater at the site is not considered a media of concern.

As you can see groundwater has been removed from the slide. Next I would like to

talk about soil. FUSRAP related constituents are primarily buried under more than 2 feet of soil. If the soil covering the FUSRAP related material is not maintained and allowed to naturally erode, over time the FUSRAP related material will slowly become exposed after approximately 600 years. At that time it will produce an unacceptable risk to the people who spent time directly on the landfill surface. As you recall on the bar graph that was shown earlier, this was 38 millirem per year. This additional exposure would be to a youth that spends two hours a day every day on a landfill for a year.

This is a closer look at the investigative area. The light purple circles show the test point locations completed within the Landfill Operable Unit. The detailed information on these borings is available in the reports in administrative record file. Soil samples were collected from each test point location and the white circles indicate sample results were below the cleanup goals. As you can see, we

performed test borings along the fence line of the property. Those results are all below the cleanup goals. The purple circles indicate sample results that are above the cleanup goals and if no action is taken there is the potential that someone could receive an unallowable exposure in 600 years because of erosion of the top two feet of soil.

This slide shows the nine CERCLA criteria that are used to move from the alternatives in the feasibility study to a selected remedy.

First both threshold criteria must be met by any remedial alternative for it to be considered a viable remedy. Then the five balancing criteria are used to weigh major tradeoffs among the alternatives and represent the primary criteria upon which detailed analysis were based.

Remaining two CERCLA criteria referred to as modifying criteria are typically evaluated following the public commentary on a proposed plan and will be addressed during preparation of the record of decision.

Next I'd like to turn the presentation over to [redacted] our project engineer who will discuss feasibility study and the alternatives.

[redacted] Thank you, [redacted] This first slide that I'm going to go over covers the remedial alternatives that were developed and evaluated during the feasibility study and considered during the proposed plan.

No action alternative, is required under the CERCLA process provide a baseline to evaluate the other alternatives against. As you can see it has been screened out as it was not protective of human health in the environment.

I'm going to go over these next couple of remedial alternatives in more detail over the next slides. They consist of single layer capping, the Corps' preferred alternative of the targeted shallow removal and the deep excavation.

Over the next couple of slides we'll have visual representations of all the

alternatives. It will all consist of a cross section from point 1 to point 2.

Sorry, I skipped a slide there. Alternative 2 is a single layer capping of FUSRAP related material. As you can see, we have the fence line and the drainage ditch represented on this cross section. The blue shaded area represents the saturated fill zone with the top of the blue area representing the ground water level into the landfill. You have the gray shaded area here which is fill. Purple rectangles represent samples that were taken that were above our cleanup goals with the white rectangles representing samples that were below our cleanup levels.

Alternative 2 consists of a clay layer over the FUSRAP related material within the landfill. The clay would be approximately 2 feet thick and covered by a soil vegetative layer.

Alternative 2 eliminates potential future exposure by preventing exposure to the material within the landfill.

Land-use controls and long-term monitoring and maintenance would be required under this alternative over the thousand year time frame and it would be reviewed every five years to ensure that protectiveness of being maintained.

This alternative would take approximately 18 months to implement from the award of the contract.

Alternative 3 is targeted shallow removal and off-site disposal of FUSRAP related material. As you can see we again have saturated fill and ground water level, the fill within the landfill. We've added this time the orange shaded area which represents material that would be excavated out of the landfill. The dark purple rectangles are samples above our cleanup goals that would be removed and the light purple rectangles represent samples above the cleanup goals that would however remain in the landfill.

All soils above cleanup levels within the top 5 feet below ground surface of the

landfill would be removed and disposed of off-site. This equates to approximately 1500 cubic yards of material that would be removed from the landfill which is the equivalent of about 115 truck loads of material. Any groundwater encountered during the remedial action would be managed, treated and disposed of.

Now, you may be wondering why we selected 5 feet for the depth of excavation. This is because this is the depth that eliminates all potential exposure from the landfill due to natural erosion over the thousand year time frame that was considered.

After excavation is complete, clean backfill would be placed within the excavated areas. Land-use controls and long-term site inspections would -- like those Alternative 2 would be required along with reviews every five years to ensure that protectiveness is being maintained.

Implementability of this alternative would be approximately 17 months after the award of

contract.

Alternative 4 is deep excavation and off-site disposal of FUSRAP related materials within the landfill. Again, we have the saturated zone, groundwater level to go within the landfill. The dark purple rectangles are samples above our cleanup goals that would be removed. White is again samples below the cleanup goals. The orange shaded area again is material that would be removed from the landfill. However, this green shaded area is unimpacted soils that would be stockpiled within the landfill.

The stockpiled material and the excavated material are both approximately ten times the volume that would be removed from Alternative 3. This alternative eliminates all potential future exposure by removing the FUSRAP contaminated soils above the cleanup goals within the landfill. So therefore, no land-use controls or long-term monitoring would be required with this alternative.

Because the excavation is greater than 5

feet deep, the sides of the excavation would need to be sloped to ensure safety for the workers. This would increase the amount of material stockpiled within the landfill. Again, water encountered during the excavation would need to be managed, treated and disposed of.

Stockpiled material could potentially be used as backfill within the excavation or it will be left for disposition, future disposition by the site owner. This decision would be left for the site owner based on discussions with the New York State Department of Environmental Conservation. The excavation regardless will be backfilled with clean soils and reseeded.

This alternative would take approximately 28 months after the award of contract. While it is a viable alternative, there are increased challenges and risks posed with this alternative due to the depth of the excavation and imposes no greater protectiveness than Alternative 3.

This table is very similar to the table on page 4 of the handout you received earlier and shows a comparison of the alternatives based upon the balancing criteria. The alternatives are rated from high to low with high being the best. Based upon the comparison, the preferred alternative in the feasibility study, Alternative 3 is the best overall choice. It is protective of human health and the environment, meets all applicable federal regulations and is highly implementable.

Again, alternative 3 is the preferred alternative of the Corps. Some key features of this alternative is that all soils in the top 5 feet below ground surface above cleanup goals will be removed from the landfill. Clean backfill will then be placed within the excavation. The federal government will implement and maintain land-use controls on the site as necessary. Annual site inspections and reviews will be conducted to ensure protectiveness. The total cost for this alternative is approximately $12.2

million dollars.

Some advantages of Alternative 3 is that it's protective of human health and the environment along with workers and the community during the remedial action. Again, it complies with all applicable and federal regulations and is implementable with 17 months after contract award. It doesn't pose the risk of deep excavation and it is cost effective in addressing future risks.

The public comment period for the proposed plan started on September 14 of this year and will continue through November 14. After considering the comments received, the Corps of Engineers will select a final remedy for the FUSRAP related material within the Landfill Operable Unit. This preferred remedy, this final remedy will be documented in the record of decision which is slated for release currently in 2017.

The start of remedial action is based upon completion of sites currently within the program undergoing cleanup and the

availability of funds within the national program.

[redacted] now come back up to start the comment period.

[redacted]: Thank you, [redacted] We'll now prepare to open the meeting for formal comments to be entered into the public record.

When you came in you received a sign in card with a box on it that indicates you wish to speak. [redacted] has just collected those. We'll begin with elected officials and then we'll call up those people who indicated on the sign in card that they wanted to make a comment and then time permitting we'll open the floor to others who wish to make a comment. And in general, we are here until people make their comments so if you want to speak we're going to hear you.

I just want to reiterate the operating principals we have on the screen. One person speaking at a time. Please use the microphone that we have in the center of the room so that we can accurately record your comment and

please state your name and affiliation before providing your comment. To allow everyone that wishes the opportunity to speak, please limit your comments to five minutes. We have a timekeeper and we'll just be monitoring that.

With that I would like to call to the microphone Mayor [redacted].

[redacted]: Thank you, colonel. Mayor [redacted], with the City of Tonawanda. Take a little walk down memory lane, it was the early 1990s I was still in high school, many people in this room were a lot younger and less gray than we are and that's when the federal government first became aware of the radioactive contamination at the Tonawanda Landfill. It's been 25 years worth of haggling over there not being any documentation of the disposal of Uranium, Radium and Thorium at the landfill. 25 years worth of contamination being labeled MED like when we all knew where it came from. 25 years ago it would've cost a hell of a lot less to

cleanup than it will in today's world but let's talk about the now and the future. Thank you to the Army Corps for finally coming to the realization that this material came from Linde, was a byproduct of the atomic bomb and some how was illegally dumped there.

The Army Corps has presented us with three quality options moving forward, each has their pros and cons. While I would love to stand up here tonight and demand a full clean up of all contaminating material, I'm also a realist. At a cost of $55.4 million to accomplish out of the yearly national FUSRAP budget of approximately $100 million it will take many decades for the deep excavation option never to come to fruition. Most of us sitting here today will be long gone before we see that project come to fruition.

This would also further delay the closure and capping of the Tonawanda Landfill which in itself poses daily quality of life issues for many of our residents that live near and adjacent to the landfill. This is why I fully

support the Army Corps' shallow excavation option. This would allow for proper closure of the landfill and bring a piece of mind our residents deserve sooner rather than later. And as a side note, with the shallow excavation, any efforts by the Army Corps should be worked in unison with the town and the DEC to make sure that their efforts aren't hampering the town's efforts to be able to properly cap and close the landfill.

I thank Senator [redacted] for coming out here at the beginning of the year to shed light on this and I call on him to appropriate the federal funding to fast track this project.

Again, I also thank the Army Corps for getting it right and for having this meeting this evening. Thank you.

[redacted] Thank you for your comments, Mayor. I would like to now call to the microphone [redacted].

[redacted], I'm president of Citizens United for Justice. I'm

very glad that after meeting with Senator [redacted] that he was able to push to get this here tonight. For all of the work we've done over the past ten years, it's phenomenal how fast people move when higher up government officials get involved.

The one thing I want to make sure that everybody understands, this is not over until it's fully capped, fully taken care of and the residents are taken care of. The first thing I want to say is radiation does not go away. It will continue to build in each person's body, it's cumulative, it doesn't wash away, time doesn't take it away. This plus the compromised immune systems due to the Tonawanda Coke Corporation's criminal past elevates health risks for those of us living in the area. This needs to be considered versus a person that hasn't lived here. And I understand you went through all this radiation, you don't have a compromised immune system, I do. I have Hashimoto's disease, my immune system is severely compromised.

Radiation is being carried away in the groundwater to Two Mile Creek finding its way to the Niagara River. Over time it's going to accumulate there and ruin one of our best natural resources and potentially hurting people further down that river.

This does not just impact the generation living on the hill now, most of us that are living there now have willed our homes to our children. You are affecting not just this generation, my son's generation, my grandkid's great grandkids.

If number 4 is done the potential for an environmentally friendly and community nature trails which is what this site was used for for years, the potential is there. Wildlife is already there, we already have deer, fox, turkey, multiple birds, pheasants. It could be used for educational purposes for the future for our children to show the right way how to handle an environmental mess.

The potential for that site for future education is phenomenal. The failure to do

this the right way doesn't make up for the sins of our fathers. Doing number 4 is a step in the right direction to pay for the sins of our fathers and what they did do.

I would also ask that in light of how long this took to come and the amount of material that has to be absorbed, that you consider extending the comment period to the end of December to give people a chance to learn, to question and to absorb everything you're telling us. Granted you guys have all the knowledge, give us the chance to catch up. We've got a lot of catching up to do based on the new information you've given us and I want to thank you for that, that's phenomenal. Thanks again.

[redacted] Ma'am, thank you for your comment. I would like to now call [redacted] to the microphone.

[redacted] I moved to the City of Tonawanda in the early '60s, by the mid '60s Stamp and Spot Brother were building the Youngmann. They in turn excavated and made

the Tonawanda Flats in order to make the roadbed from Delaware to Niagara Falls Boulevard. In that process they had to scrape some of your stuff. We got the only nuclear highway in the United States that I know of. On what he's saying, 2 foot of clay, we live on clay hill and we are lower than what the so called dump is. Are you going to get together with the town and grade away from our property or going to elevate it and drain towards us as we have now. That's what we're looking for.

Secondary looking for evidently you're all for bid, that takes time. 2010 you took the samplings and it's five years, that takes time. Everything takes time. In the meantime how can I tell you how many people pass away in the area. I haven't got the numbers but there are plenty. Thank you.

[redacted] Thank you for your comment, [redacted]. You asked a question kind of about the coordination with other agencies regarding the capping of the landfill. I'd like to point out that one of the purposes of

the public comment period is to allow also the state agencies to review our analysis and that is really the starting point for meaningful collaboration on how to do that in a synchronized way and of course as we move forward, we'll address your comment in greater detail.

This time I would like to call [redacted] to the microphone.

[redacted] spoke with me and I spoke with her.

[redacted]: Okay, thank you. I do not have any additional cards. Would anyone like to move to the microphone to make a comment?

[redacted], Town of Tonawanda citizen. Just a couple of questions. One gentlemen [redacted] spoke about the risks of number 4 but he didn't say what the risks were outside of that they're deeper and the people working on it. What I'm worried about what are the risks environmentally and what's in number 4 that you said 3 would evolve avoiding those risks,

what risks are we avoiding?

[redacted] I can address that a little bit. We mentioned the risks are primarily due to the depth of the excavation and the amount of material that would be removed and managed as part of the deep excavation. So the safety risks due to the depth, the type of material and the landfill that's not cohesive so extra care needs to be taken to manage the side slopes while were doing the excavation for worker protection. Because of the depth excavation and the large volume or the high water table at the site, there will be a large volume of water infiltrating from the rest of the landfill into the excavation that would need to be managed, treated and disposed of.

Also, managing not only the FUSRAP material but the material that is above the FUSRAP material, the other landfill that would need to be managed, stockpiled while we're doing the excavation. And any kind of associated -- potential hazards associated with that fill as it's managed while we're

removing the FUSRAP material.

[redacted] With the deeper excavation and the risks that are happening with that, if 3 is taken, what about the groundwater and what is -- obviously everything flows towards rivers heading to Niagara River and to surrounding area, without -- you know, how does that balance between 3 and 4 as far as radiation which I'm sure has been for many years leaching into that area and the stoppage of that.

[redacted]: Alternative 3 would remove part of that source. The contaminated soil would be potential source to leaching and to the groundwater. Alternative 3 would remove part of that source and then following the town's final closure of the landfill that would reduce any potential future infiltration or leaching from the soils. Alternative 4 would remove all of the soil source for potential future leaching in the groundwater.

Our sampling that we've done at the landfill has found uranium in the groundwater.

However, groundwater is not the drinking water source, it has other natural components that make it not a useful or viable drinking water source.

Also, monitored Two Mile Creek and did not find elevated levels of uranium in Two Mile Creek so that's why based on that, our conclusion was in the risk assessment that groundwater was not a media of concern. By addressing the soil we're addressing the potential future risk due to potential future exposure to FUSRAP material.

[redacted] Thank you.

[redacted] You're welcome.

[redacted]: Anyone else who would like to make a formal comment?

UNIDENTIFIED CITIZEN: I have a question.

[redacted] Yes, ma'am.

UNIDENTIFIED CITIZEN: Who's going to make the final decision on which one of these to use, who makes the final decision?

[redacted]: So ma'am, as we discussed earlier, the proposed plan which is up for

public comment now. We receive those public comments, respond to those and develop what's called a record of decision. My commanding officer, Brigadier General Kaiser from the Great Lakes and Ohio River Division signs off on that final plan and that informs the public of what we intend to do.

UNIDENTIFIED CITIZEN: So people have no input into it, the people that live here?

[redacted]: And that is why we are here tonight. We are here to hear your input and to inform how we prepare this record of decision.

Okay. I'll leave it one more chance out there for anyone who would like to make a comment. Again, we're all going to be available after the session for one-on-one dialogue and questions.

So this concludes the formal comment portion of the meeting, please feel free to view the displays and talk with our staff in the open house area and remember that there are other ways to give us your comments. One,

you may write them down and leave them with us here tonight. You may mail your comments to us at the address on the slide. You may also email them to the address listed on the slide.

Please ensure that your comments are mailed or emailed by November 14 which is the current conclusion of the comment period. Your comments and all responses to them will become part of the official administrative record which can be viewed at the Corps office in Buffalo.

I thank you for coming tonight. We do appreciate you taking the time this evening to attend and your desire to give us feedback. We value your input during this decision making process.

Responses to your comments will be provided in the responsiveness summary that is part of the record of decision, that's the document I just spoke about. The administrative record for the Tonawanda Landfill Vicinity Property is available on our website and we can assist you with accessing

that and the record contains major reports and supporting documentation used for our decision making for the vicinity property. An example of that, the bore log data that [redacted] spoke about during his presentation.

If you'd like any additional information please use one of these methods to contact us so we can be responsive to you. I thank you again. The team will be available at the posters and please drive safely on your way home. Thank you.

[redacted]: So no question and answer situation? Can we all ask questions so you can guys can answer them for us or is that not part of this?

[redacted]: This was for you to give public --

[redacted]: It's a comment thing where you can go up there but can we just raise our hand and ask questions where you guys can answer them for us?

[redacted]: Everyone would kind of like to have like open Q and A before we move to

individual posters, sure, that's fine.

[redacted]: I mean I've got multiple questions but one of them is like beyond the fence line, was there any drilling done and testing done beyond the fence line?

[redacted], former resident of the City of Tonawanda. Beyond the fence line, was any testing done beyond the fence line?

[redacted]: The Corps of Engineers did not do any testing beyond the fence line. We sampled right up to the fence. Based on our information, our data, we did not see potential for material moving past the fence line. However, the New York State Department of Environment Conservation did do investigations of several of the residential properties on the other side.

[redacted]: Could you go to page 17, put that up on the screen. See this saturated fill. Saturated fill goes right up to the fence line, what happens to it after that? There's no doubt that testing needs to be done beyond the fence line and that if there's

saturated fill going right up to the fence line it doesn't just stop because there's a fence above the ground.

[redacted]: And that's where the New York State Department of Environmental Conservation did do some investigations beyond the fence line and did not find evidence of FUSRAP related material there.

[redacted]: In the future, stuff that's left deeper than 5 feet is going to be in a saturated fill zone where it could actually make its way past that fence line in the future, is that correct?

[redacted]: Actually the ground water flow direction in this area is actually away from the fence line towards the south.

[redacted]: Well, eventually it can go to the creek in the river or somewhere that it shouldn't be if it's left there.

[redacted] The landfill and the testing we've done and the groundwater again is in the direction to the south has not found uranium levels towards the Two Mile Creek or the

sampling we did in Two Mile Creek did not find elevated uranium levels in the creek.

[redacted]: What exactly is that material made up of? Is it construction material, is it eye beams, is it walls, is it concrete floors, is it dirt, what is it?

[redacted]: The FUSRAP related material it's contaminated soil. So it's basically dirt, soil that has some of the FUSRAP constituents within it. Primary uranium, radium, thorium are the radioactive materials.

[redacted]: So if you took all of it out of there, you never had to monitor it ever again, no money would ever have to be spent but if you leave it down in there you're going to have to keep an eye on it for eternity?

[redacted]: Correct. If we remove the material, alternative 4 would not require any future site inspections or monitoring. Alternative 3 does require site inspections basically to ensure that the deeper FUSRAP material is not being disturbed.

[redacted]: When the town closes the

landfill, aren't they going to be piling up a bunch of dirt and bunch of clay on top of that like 30 feet of it?

[redacted]: Don't have the details to share on the town's final closure plan and what their final closure will entail.

[redacted]: Well, nearby it's like 30 feet above the ground level so I'm sure that's what they're going to do. Isn't that going to make it harder to monitor what's in the ground there?

[redacted]: Well, monitoring that for the FUSRAP material is basically to ensure that there isn't a deep excavation undergoing that would expose deeper the FUSRAP material below.

[redacted] That's all I got.

[redacted] Thank you. And again, we have the information around the posters. If you want to talk one-on-one with any of the team members or any of the particular posters you want to look at.

[redacted]: Just real quick, you and I discussed no matter whether you do 3 or 4, we

discussed screening, 8 foot screening to be put up to protect the neighborhood from any of the soil, dirt, whatever coming into the neighborhood. We put up with this stuff for so many years now, a lot of us are fed up with it. Is there any plan in place to put a screening up to protect the Riverview neighborhood, the school, playground, everything that's there, 17 months, 28 months, it doesn't matter how long it's going to take. The neighborhood still needs to be protected from whatever is being excavated out of there. What is the Army Corps' plan to protect the neighborhood as the stuff is being done, what measures are going to be put in place?

[redacted] Well, the detailed plans would be developed as part of the remediation work plans. Once we have selected the final remedy and once we have awarded the contract to do the work, we work with the contractor to develop the work plans necessary to conduct the work safely. And obviously one of the things we are very careful about on your

FUSRAP sites is ensuring that we are not releasing any FUSRAP material from the site inadvertently.

So we would look at various methods to ensure contamination control, dust control as we conduct the remediation. And that consideration would look at methods to protect, you know particularly for this site where we do have residential area right next to it we would have to look at what specific methods would best help control and prevent any contamination.

[redacted]: Let's face it, you're not just digging into FUSRAP you're digging into an old landfill that nobody knows for sure what's in there. So far the residents haven't been protected from that from this point forward, the residents that live up on Riverview need to be protected.

[redacted]: Agree. And I think actually our team leader from our environment health section may have a point to make here as well.

[redacted]: Yes, ma'am. One thing I'd

like to point is that when we do an excavation, when we do remedial clean up we'll have multiple rings of air monitoring that will go on on that site. We'll have breathing air monitors for our workers and we'll have further air monitors that are sequenced so that we understand where the wind directions are going so that we have an idea if anything is released. Your point about the other chemical issue that is out there, we'll have other monitoring in place that help protect so it's not moving off-site. And if we were to experience something like that we would have a procedure in place to ensure that everybody is notified if there was an issue. Thank you.

[redacted]: I got another question. So it's $10 million to do step 3, $55 million to do step 4. How much money is it going to cost to monitor that stuff from now to eternity? And if the Seaway Landfill is still open at that spot where that material is over there, why not just get this out and put it over there because you're going to leave that stuff

over there? So it's like two things.

[redacted]: Okay. Sorry, could you repeat.

[redacted]: From here to eternity how much is that going to cost to monitor the step 3 thing?

[redacted]: The construction cost for step 3 is about $10 million. The present worth cost for the monitoring is a little over $2 million. So that's the cost in today's dollars that would take to do the monitoring over a thousand year time period. Which for alternative 3 is basically site inspections to ensure that there is not any future disturbance of the FUSRAP material left in the Tonawanda Landfill.

The second part, the Seaway landfill, the record of decision for that is to cap the FUSRAP material in place. We do not have the authority under the record of decision to add additional material to the Seaway Landfill. So the Seaway Landfill once funding is available we'll be capping those areas of that

site.

[redacted]: Okay. Thanks again and our staff will be standing by posters so we can have some one-on-one discussions and additional Q and A. Thank you very much.

From: [redacted] behalf of Fusrap, LRB
To: [redacted]
[redacted] FW: Public Comment: Tonawanda Landfill (UNCLASSIFIED)
Date: Monday, October 19, 2015 9:32:23 AM

Classification: UNCLASSIFIED
Caveats: NONE

-----Original Message-----
From: [redacted]]
Sent: Saturday, October 17, 2015 3:38 PM
To: Fusrap, LRB
Cc: [redacted]
Subject: [EXTERNAL] Public Comment: Tonawanda Landfill

Dear USACE Buffalo District,

I was in attendance last Thursday evening at the meeting regarding the Tonawanda Landfill-FUSRAP presentation. I would like to thank you for your time and commitment to this urgent matter. A few thoughts came to mind following the meeting that I ask you add to the public comment record.

What concerns me most is the amount of time it has taken to get to this point. For more than a decade my family and I, as well as other residents, have been unable to enjoy our homes and yards resulting from noisy construction equipment, dust, odors, and rodents due to the constant activity in the landfill. It was reported that a final ROD will not be issued until sometime in 2017, that no work will actually begin before 2020, and that it will take 17 months to complete once a contract is awarded. Then, subsequently the Town of Tonawanda will have to complete their final capping and grading/seeding. This is absolutely unacceptable. The residents effected by this contaminated landfill have waited for closure far too long already, and the thought of this dragging out for another five or more years is unfathomable. Behind my house at 331 Wadsworth Court, there is an enormous hill of dirt. Mixed in with this dirt hill is broken concrete, glass and plastic waste that is an absolute eyesore. My wife and I have considered selling our home relocating, although we anticipate this may be impossible considering our decreased property value and proximity. Our home was recently accessed $10,000 less than previously valued.

All considered I agree that Alternative Three is the best solution, although I don't agree with the time table presented. I understand there are funding issues and logistics involved, but this matter should be an USACE urgent priority.

The landfill needs to be closed without unnecessary delay. Every day that passes is another day of personal frustration and potential exposure to toxins. Please expedite the Tonawanda Landfill closure so my family and the effected residents can truly enjoy the homes and property we love and have so diligently worked for.

Thank you,

[redacted]

[redacted]

Classification: UNCLASSIFIED
Caveats: NONE

From: [redacted]
[redacted]
[redacted]
Subject: FW: Tonawanda Landfill Vicinity Property
Date: Monday, November 09, 2015 4:42:57 PM

-----Original Message-----
From: [redacted]
Sent: Monday, November 02, 2015 8:27 PM
To: Fusrap, LRB <fusrap@usace.army mil>
Subject: [EXTERNAL] Tonawanda Landfill Vicinity Property

If all you read is the first line then my choice is Alternative 4. Hopefully you will read further.
The Manhattan Project saved billions of dollars and millions of lives yet the ongoing cost for this is being borne by the health and lives of the citizens of Tonawanda.
Alternative 3 is a band aide approach which would be wholly unacceptable if this were a private situation. 1000 years of monitoring. How bizarre! If the problem has not been solved in the 65 years since the end of WW II , 1000 years of monitoring can't be a serious proposal.
In the end all decisions are personal. Ask yourself if you, your children and grandchildren would voluntarily choose to live with Alternative 3. Put another way do you want to live with the shame of a decision you know is not a real solution to the problem for the sake of a few (in the overall scheme of government spending) dollars.
In short, make the correct recommendation and let the politicians figure out where to get the money.
Lauren D Rachlin
Sent from my iPhone

[redacted]
Partner
Barclay Damon, LLP
The Avant Building
200 Delaware Avenue
Suite 1200
Buffalo, NY 14202
[redacted]

The Exchange Tower, 130 King Street West, Suite 1800
Toronto, Ontario M5X 1E3
[redacted]

[redacted]

~BD~

[redacted]
[redacted]
[redacted]
Subject: FW: [EXTERNAL] Tonawanda Landfill Vicinity Property
Date: Monday, November 09, 2015 4:41:31 PM

-----Original Message-----
[redacted]
Sent: Sunday, November 01, 2015 8:20 AM
To: Fusrap, LRB <fusrap@usace.army mil>
Subject: [EXTERNAL] Tonawanda Landfill Vicinity Property

I am a new resident in the town of Tonawanda. I was interested to read that there is illegally dumped radioactive waste in the Tonawanda Landfill. I have nothing to add to the conversation about your action plan, but I am inquiring about the radiation. I would like to know more about the method used for identification of the 3 waste products (Radium, Thorium and Uranium) and if the amounts are quantified. Also, the detective work it took to conclude the origin of the waste.

Can you share your reports from the Health Physicist or Radiation Safety Officer?
Thank you.

[redacted]

[redacted]
[redacted]
[redacted]

Subject: FW: [EXTERNAL] City of Tonawanda, NY Landfill Vicinity Property
Date: Monday, November 09, 2015 4:40:52 PM

-----Original Message-----
[redacted]
Sent: Saturday, October 31, 2015 2:02 PM
To: Fusrap, LRB <fusrap@usace.army mil>
Subject: [EXTERNAL] City of Tonawanda, NY Landfill Vicinity Property

US Army Corps of Engineers,

My vote for
The only way to truly protect our future:

Alternative 4 of Analysis of Remedial Alternatives
Deep Excavation and Off-Site Disposal of FUSRAP - Related Material

[redacted]

[redacted]
[redacted]
[redacted]

Subject: FW: [EXTERNAL] tonawanda landfill comment
Date: Tuesday, December 08, 2015 11:19:22 AM

Comment received on the TLVP PP

[redacted]
Sent: Monday, December 07, 2015 8:26 PM
To: Fusrap, LRB <fusrap@usace.army mil>
Subject: [EXTERNAL] tonawanda landfill comment

We cannot leave any material of concern in the middle of our community.

[redacted]
[redacted]

Subject: FW: [EXTERNAL] Tonawanda Landfill Vicinity Property
Date: Monday, December 14, 2015 2:32:16 PM

-----Original Message-----
[redacted]
Sent: Friday, December 11, 2015 2:29 PM
To: Fusrap, LRB <fusrap@usace.army mil>
Subject: [EXTERNAL] Tonawanda Landfill Vicinity Property

To Whom it May Concern,

I am writing in regards to the Tonawanda Landfill Remedial Alternatives. I am in support of Deep Excavation and Off Site Disposal (Alternative #4).

I am a homeowner on Hackett Dr. and have a young child and I am concerned for both of our health living here. I purchased this home with the intent on staying in the neighborhood and raising her right here. Her school is Riverview Elementary School which is also affected by the landfill. Her grandparents live on the dead end side of Brookside Terrace and babysit her after school and during the summer. Purchasing a home on Hackett Dr. was perfect for us , with her school and grandparents so conveniently located and especially because it is a quiet, very nice and quaint little neighborhood. I know I am not the only parent who lives in this neighborhood and whose child attends this school and is also babysat here as well. These children are not given a break with all this contamination. We are very happy here and do not want to move but I will be honest, I was not aware of the landfill when purchasing our home.

I am concerned for my daughters future health as well as my own and the other many, many children that live in this neighborhood and attend Riverview Elementary. I truly hope that this situation FINALLY gets a resolution and I am hoping beyond hope that it is Alternative #4.

Thank you for considering my comments.

Sincerely,

[redacted]

[redacted]
[redacted]

Subject: FW: [EXTERNAL] tonawanda landfill
Date: Tuesday, December 15, 2015 10:11:47 AM

[redacted]
Sent: Monday, December 14, 2015 11:59 PM
To: Fusrap, LRB <fusrap@usace.army mil>
Subject: [EXTERNAL] tonawanda landfill

after reviewing 1943-2015 and wondering what 3015 will be like, the only logical alternative is #4. thank you for all your hard work. [redacted]