US Army Corps
of Engineers
Buffalo District

Proposed Plan
for the

Tonawanda Landfill Vicinity Property Site
Tonawanda, New York

Authorized under the
Formerly Utilized Sites Remedial Action Program
(FUSRAP)

Prepared by:
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UNITED STATES ARMY CORPS OF ENGINEERS
PROPOSED PLAN FOR THE TONAWANDA LANDFILL VICINITY PROPERTY
TONAWANDA, NEW YORK

This Proposed Plan was prepared for the Tonawanda Landfill Vicinity Property by the United States Army Corps of Engineers (USACE), under its authority to conduct the Formerly Utilized Sites Remedial Action Program (FUSRAP). On October 13, 1997, the Energy and Water Development Appropriations Act, 1998 was signed into law as Public Law 105-62. Pursuant to this law, FUSRAP was transferred from the Department of Energy (DOE) to the USACE. As a result of this transfer the responsibility for this project was transferred to USACE. The Energy and Water Development Appropriations Act for Fiscal Year 2000, Public Law 106-60, provides authority to USACE to conduct restoration work on FUSRAP Sites subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code (USC) 9601 et seq., as amended. Therefore, USACE is conducting this project in accordance with CERCLA.

USACE conducted a Remedial Investigation (RI) and a Baseline Risk Assessment (BRA) of the Tonawanda Landfill Vicinity Property in 2001. This effort was in addition to previous investigation by the DOE and Oakridge National Laboratory (ORNL) in the early 1990's. This Proposed Plan explains USACE's position that a CERCLA response action is not warranted for any media (soil, groundwater, and surface water) in the vicinity of the Town of Tonawanda Landfill that contain low concentrations of radionuclides similar to Manhattan Engineer District (MED) materials found at the Linde Site. The results of the BRA indicate that no further action is required, as the MED-like materials at the Tonawanda Landfill Vicinity Property do not pose a cancer risk above the threshold presented in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) found at 40 C.F.R Part 300. The NCP provides the guidelines and procedures needed to respond to releases of hazardous substances under CERCLA.

USACE invites members of the public to review the Proposed Plan and the supporting documents which further describe the conditions at the Tonawanda Landfill Vicinity Property and form the basis for this Proposed Plan. These documents may be found in the administrative record files for the Tonawanda Landfill Vicinity Property at the following locations:

USACE FUSRAP Public Information Center
1776 Niagara St.
Buffalo, NY 14207-3199
(716) 879-4197
1-800-833-6390 (press "4" at the recorded message)

Tonawanda Public Library
333 Main St.
Tonawanda, NY 14150

Members of the public who wish to comment on this Proposed Plan may submit their comments in writing to USACE at the following address:

U.S. Army Corps of Engineers, Buffalo District
FUSRAP Public Information Center
1776 Niagara St.
Buffalo, NY 14207-3199

Please refer to this Proposed Plan of the Tonawanda Landfill Vicinity Property, in any comments. All comments will be reviewed and considered by USACE prior to making a final decision concerning the Tonawanda Landfill Vicinity Property. Comments should be submitted no later then 30 days after the date of this Proposed Plan.

After the close of the public comment period, USACE will review all public comments, as well as the information contained in the administrative record file for this site, and any new information developed or received during the course of this public comment period, in light of the requirements of CERCLA and the NCP. An authorized official of USACE will then make a final selection of the remedial action to be conducted at this site. This decision will be documented in a Record of Decision, which will be issued to the public, along with a response to all comments submitted regarding this Proposed Plan.

If there are any questions regarding the comment process, or the Proposed Plan, please direct them to the address noted above, or telephone (716) 879-4396 or (800) 833-6390.

/S/

[redacted]
Brigadier General
Division Commander

__5 February_, 2007

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ACRONYMS AND ABBREVIATIONS

AEC	Atomic Energy Commission
ALARA	As low as reasonably achievable
Am-241	Americium-241
ANL	Argonne National Laboratory
ARAR	Applicable or relevant and appropriate requirement
BNI	Bechtel National Incorporated
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm	Centimeter
COPCs	Constituents of potential concern
cy	Cubic yards
DOE	Department of Energy
ECWA	Erie County Water Authority
ERA	Ecological risk assessment
FUSRAP	Formerly Utilized Sites Remedial Action Program
HHA	Human Health Assessment
HTRW	Hazardous, Toxic, and Radiological Waste
I-290	Interstate 290
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MED	Manhattan Engineer District
mrem/yr	millirem per year
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NMPC	Niagara Mohawk Power Corporation
NRC	Nuclear Regulatory Commission
NYCRR	New York State Code of Rules and Regulations
ORNL	Oak Ridge National Laboratory
OU	Operable Unit
pCi/g	Picocuries per gram
PP	Proposed Plan
Ra-226	Radium-226
RAGS	Risk Assessment Guidance for Superfund
RESRAD	RESidual RADioactivity Computer Code
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SMCLs	Secondary Maximum Contaminant Levels
SOR	Sum of ratios
TDS	Total dissolved solids
Th-230	Thorium-230
Th-232	Thorium-232
TTL	Town of Tonawanda Landfill

ACRONYMS AND ABBREVIATIONS (cont'd)

U-234	Uranium-234
U-235	Uranium-235
U-238	Uranium-238
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

UNITED STATES ARMY CORPS OF ENGINEERS
PROPOSED PLAN FOR THE TONAWANDA LANDFILL VICINITY PROPERTY
TONAWANDA, NEW YORK

1.0 INTRODUCTION:

This Proposed Plan (PP) for the Tonawanda Landfill Vicinity Property was prepared by the United States Army Corps of Engineers (USACE) under its authority to conduct the Formerly Utilized Sites Remedial Action Program (FUSRAP). The FUSRAP program was initiated by the Atomic Energy Commission (AEC) in 1974 to identify, assess and clean up sites with residual radioactive contamination resulting from the early years of the Nation's atomic energy and weapons program. Management of FUSRAP was transferred from the Department of Energy (DOE) to USACE in October 1997.

The USACE is issuing this PP as part of its public participation responsibilities under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code (USC) 9601 et seq., as amended and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 CFR § 300.430(f) (2). This plan explains why USACE has determined that a CERCLA response action is not warranted for the specific radionuclides found in the various media in the vicinity of the Town of Tonawanda Landfill even though the radionuclides are similar to the Manhattan Engineer District (MED) materials found at the Linde FUSRAP Site.

The primary document associated with this PP is the Remedial Investigation (RI) Report (USACE 2005). The RI report describes the nature and extent of the MED-like contaminants that are present at the Tonawanda Landfill Vicinity Property. The RI report also contains the Radiological Baseline Risk Assessment (BRA), which assesses cancer risks to public health and the environment posed by MED-like material at the site. The results of the BRA indicate that the cancer risks to human health for the current and reasonable future site uses are at or below the CERCLA acceptable risk limit.

The RI report and other documents associated with the Tonawanda Landfill Vicinity property are contained in the administrative record file at the Public Information Center at the Buffalo District USACE office and the Tonawanda Public Library Tonawanda, New York. The USACE encourages the public to review the applicable documents related to the Tonawanda Landfill Vicinity Property to gain a more comprehensive understanding of the site. The final remedy for the Tonawanda Landfill Vicinity Property will be documented in a Record of Decision (ROD) only after consideration of all comments received and any new information presented. The USACE may modify this PP based on new information or public and/or regulatory comments.

Although the Tonawanda Landfill Vicinity Property was designated for evaluation pursuant to FUSRAP by DOE, subsequent investigations have found no evidence of federal government responsibility for any of the radioactive material on the site and no statements in this

document should be construed as the federal government accepting responsibility for any such material. However, because the Tonawanda Landfill Vicinity Property has been evaluated pursuant to the Corps' FUSRAP authority and because that evaluation supports a "no action" remedy, the Corps will use the information it has obtained to issue this report and make a final determination.

2.0 SITE BACKGROUND:

2.1 Site Location:

The Tonawanda Landfill Vicinity Property is located approximately 1.5 miles north of the Linde (Praxair) FUSRAP site in the Town of Tonawanda, New York (Figure 1). It is compromised of two main parcels – the Town of Tonawanda Landfill (Landfill) and the Mudflats area (Figure 2). Both of these properties are owned by the Town of Tonawanda and current zoning of the area is commercial/industrial, except for the bordering residential area to the north of the Town of Tonawanda Landfill Vicinity Property.

2.2 Site History:

The landfill was operated as a municipal landfill by the Town of Tonawanda from the mid-1930's through October 1989. In the early 1900's a quarry was located in the western portion of the Landfill property. In the 1920's, the quarry was reportedly abandoned at a depth of 60 feet when water was encountered. Wastes disposed in the Landfill included ash generated by the incinerators (formerly located just west of the Mudflats), construction/demolition debris and yard refuse (leaves, branches, etc.) collected from Town residents. On occasion, the Landfill accepted municipal solid waste and wastewater sludge (formerly incinerated at the incinerators), but only when the incinerators were temporarily inoperable.

The incinerators, operated by the Town of Tonawanda between the 1940's and the early 1980's, were used to burn municipal solid waste and sludge generated at the Town of Tonawanda's Waste Water Treatment Plant. The incinerators were located in the western edge of the Mudflats area (see Figure 2) until they were demolished in 2002. Other than the incinerators, the Mudflats have always been vacant.

Although neither the Landfill nor Mudflats were known to be directly involved with MED activities, the Landfill and Mudflats were designated a FUSRAP Vicinity Property by the DOE (DOE 1992) due to the potential for MED material from the Linde Site having been placed in the Landfill.

2.3 Site Status:

The Town of Tonawanda is in the process of closing the Landfill in accordance with the current Title 6 of the New York Code of Rules and Regulations (6 NYCRR) Part 360 and Part

380 (Malcolm Pirnie 1999). This action is being undertaken by the Town of Tonawanda, with regulatory oversight from the New York State Department of Environmental Conservation (NYSDEC). Cover material is being placed in areas of the Landfill (primarily at the eastern end) in preparation for capping and closure. A revised Closure Investigation Plan was prepared for the Town of Tonawanda by Malcolm Pirnie Inc., and submitted to NYSDEC in March 2002. This latest revision addressed NYSDEC comments on the earlier report (Malcolm Pirnie 1999), but did not substantively change the closure plan or the parameters from the earlier report that are utilized in the USACE 2005 RI report.

The Town of Tonawanda's plans for the Mudflats area include demolition of the former incinerator, and industrial development of the area. The demolition of the former incinerator was completed by the Town of Tonawanda in 2002. Portions of the Mudflats area are being used as debris collection locations for the Town of Tonawanda Department of Public Works. Street sweepings, mulch, tree limbs etc., are stored on portions of the site. Part of the closure plan for the Town of Tonawanda Landfill calls for the Mudflats being used as the borrow source for much of the final cover material in the Town of Tonawanda Landfill.

2.4 Previous Investigations:

Prior to the Corps' RI study, several other investigations were performed at the Tonawanda Landfill Vicinity Property. A summary is provided below and more detailed information can be found in the Remedial Investigation Report, Tonawanda Landfill Vicinity Property (USACE 2005).

In 1990, the DOE, while working on the Linde FUSRAP Site Investigation detected MED-like material at the Town of Tonawanda Landfill and the Mudflats. Subsequent soil samples collected from the areas inside the Town of Tonawanda Landfill and Mudflats detected elevated levels of uranium-238 (U-238) and radium-226 (Ra-226). Both of these isotopes are consistent with material expected to be in ore processing byproducts generated at the Linde Site (ORNL 1990).

A limited radiological investigation was conducted by the DOE in September, 1991 which included gamma walkover surveys and biased and systematic soil sampling. Laboratory results indicated some soil samples exhibited characteristics similar to MED product formerly produced at the Linde Site. As a result of these investigations, the impacted area of the Town of Tonawanda Landfill and the Mudflats were designated as a Vicinity Property of the Linde FUSRAP site (DOE 1992).

The DOE conducted additional soil sampling activities at the Landfill and Mudflats in 1994 to determine the vertical extent of the radiological contamination at the site. Sample results indicated that radiological contamination was essentially limited to the upper 1.5 feet of soil.

Using data from the DOE's investigations conducted in 1991 and 1994, the USACE completed a screening-level radiological human health assessment (HHA) for the Town of

Tonawanda Landfill and Mudflats in February, 1999. The 1999 Radiological Risk Assessment was not a full baseline risk assessment (BRA). The 2005 BRA (discussed in Section 4 of this PP) supersedes this earlier risk evaluation, by incorporating new and old data and including ecological risk as well as additional receptors.

2.5 USACE Remedial Investigation in 2001

To supplement the available information from prior investigations, USACE conducted a RI of the Tonawanda Landfill Vicinity Property in 2001. The purpose of the 2001 investigation was to further delineate the extent of MED-like contamination present at the Tonawanda Landfill Vicinity Property. A gamma walkover survey was conducted of the Landfill and the Mudflats and was used to target areas to sample later in the investigation. The sampling portion of the investigation included the collection of over 500 soil samples from borings at varying depths in the Town of Tonawanda Landfill and Mudflats operable units (OU) and background samples in non-impacted areas. Surface water and sediment samples were collected and analyzed. Water samples were also collected from existing Town of Tonawanda monitoring wells

3.0 SITE CHARACTERIZATION:

3.1 Site Description:

The Town of Tonawanda Landfill parcel is approximately 55 acres and is located at the northern end of East Park Drive, and is bounded by residential developments to the north and northwest, a railroad line to the east and an easement by Niagara Mohawk Power Corporation (NMPC) to the south. The Mudflats portion is located south of the NMPC easement that borders the Landfill. The Mudflats is approximately 115 acres in size and is bordered by the NMPC to the north, a railroad line to the east, an access road to the west, and to the south by Interstate 290 (I-290).

A 48-inch diameter Erie County Water Authority (ECWA) water line traverses the NMPC easement. The ECWA also has a second easement to install another water line parallel to the existing 48-inch diameter water line. An abandoned 36-inch diameter sanitary sewer line, as well as a 42-inch diameter sewer line transects the Mudflats, as do a 24-inch diameter water line and several other abandoned sewer lines (Figure 2).

3.2 Site Geology:

The Tonawanda Landfill Vicinity Property is located within the Erie-Ontario Lowland Physiographic Unit of New York. The Erie-Ontario Lowland has significant relief characterized by two major escarpments – the Niagara and the Onondaga. The Tonawanda Landfill Vicinity Property is located between these two escarpments. Additional information concerning the site geology can be found in the Tonawanda Landfill Vicinity Property RI (USACE 2005).

3.3 Hydrogeology:

Based on the Remedial Investigation for the Tonawanda Landfill Vicinity Property (USACE, 2005), groundwater in the Tonawanda area may occur in three distinct hydrogeological systems: a perched system, a shallow semi confined system, and a contact-zone aquifer at the contact between the basal unconsolidated unit and the weathered bedrock. A detailed description of each hydrogeologic unit can be found in the Tonawanda Landfill Vicinity Property RI (USACE 2005). Groundwater is not used by the local community because they are supplied public water from the Niagara River. Previous investigations of ground water have also shown exceedances of Secondary Maximum Contaminant Levels (SMCLs) for total dissolved solids (TDS), sulfates and chloride. Secondary Maximum Contaminant Levels were developed by the USEPA to address cosmetic and aesthetic effects in drinking water (such as taste, odor, staining, color, etc.). The USEPA SMCLs for chloride are 250 mg/L, sulfate 250 mg/L, and for (TDS) 500 mg/L. Historic groundwater documentation for the Tonawanda area show results ranging from 2,000 – 6000 mg/L for TDS; sulfate from 1,000 – 1,500 mg/L; and chloride from 1,500 – 2000 mg/L (BNI 1993).

The naturally occurring concentrations of TDS, sulfate, and chloride in the groundwater in the Tonawanda area would preclude its use without treatment. The USEPA notes at its web site (http://www.epa.gov/safewater/consumer/2ndstandards.html) (USEPA 2005) that "Non-conventional treatments like distillation, reverse osmosis, and electrodialysis are effective for removal of chloride, nitrates, TDS, and other inorganic substances. However, these are fairly expensive technologies and may be impractical for smaller systems."

Use of the groundwater as drinking water is not probable due to the cost associated with treating the SMCLs exeedances and the ample supply of drinking water from the Niagara River. Therefore, USACE concludes that there is no current or future completed drinking water exposure pathway at the Tonawanda Landfill Vicinity Property.

3.4 Surface Water Hydrology:

The surface water hydrology at the Tonawanda Landfill Vicinity Property is controlled by the man-made features that characterize the site. At the Town of Tonawanda Landfill portion of the site, water runoff flows from the top of the landfill and is collected in intermittent swales along the northwestern, northeastern and eastern edges of the landfill. The southern border of the landfill runs into a wet area around the NMPC easement. The Mudflats area of the Tonawanda Landfill Vicinity Property is poorly drained and as a consequence surface water typically ponds on the surface of this area. Exposure to surface water is considered not to be a viable pathway because of the shallowness, seasonal, highly turbid nature of what little surface water is present at the Town of Tonawanda Landfill Vicinity Property. Additionally, any surface water present has no recreational value is unlikely to be used for recreational or other purposes (USACE, 2005). Additional information concerning the surface water hydrology can be found in the Tonawanda Landfill Vicinity Property RI (USACE 2005).

3.5 Constituents of Potential Concern:

Portions of the Tonawanda Landfill Vicinity Property are contaminated with radionuclides from the U-238, U-235, and the Th-232 decay chains, including Ra-226 and Th-230 that may have originated from uranium ore processing that occurred at the Linde Site.

3.6 Impacted Soils and Groundwater:

The nature and extent of MED-like material detected in surface and subsurface soils, sediment, surface water, and ground water are briefly described in this section. Additional information to the nature and extent of MED-like material can be found in the RI Report Tonawanda Landfill Vicinity Property (USACE 2005). For simplicity's sake the Town of Tonawanda Landfill and the Mudflats were broken out into separate and distinct units noted as the Town of Tonawanda Landfill operable unit (OU) and the Mudflats OU (Figure 3). Areas where MED-like material was found in previous investigations were designated as Areas A and B in the Town of Tonawanda Landfill, and Area C in the Mudflats Area.

3.6.1 Impacted Soils:

USACE investigated the soils on site in order to supplement investigations that were done previously. During the investigation, radiological activity above the background screening levels established in the USACE (2001) Sampling and Analysis Plan was found in Areas A and B of the Town of Tonawanda Landfill OU. In Area A the radiological activity above screening levels was found in a section that was less than a 2,500 m^2 in size. In Area B it was found in non-contiguous locations and did not impact any large area. The soil results of the constituents of potential concern (COPC) at the Landfill OU ranged from 0.26 – 20.1 pCi/g for Ra-226, Th-230 0.49 – 76 pCi/g, Th-232 0.4 – 4.01 pCi/g, U-234 – 0.43 – 349 pCi/g, U-235 -0.02 – 19.3 pCi/g, and for U-238 0.35 – 357 pCi/g. A summary of results is located in Table 1.

The Mudflats OU was also investigated. The investigation did not find radiological activity above background screening levels in areas where it had been located previously during investigation conducted by ORNL (USACE 2005). The soil results of the COPC at the Mudflats OU during the USACE 2001 RI ranged from 0.07 – 22.6 pCi/g for Ra-226, Th-230 0.34 – 31.5 pCi/g, Th-232 0.16 – 1.29 pCi/g, U-234 – 0.36 – 29 pCi/g, U-235 -0.01 – 1.72 pCi/g, and for U-238 0.39 – 27.9 pCi/g. A summary of results is located in Table 2. The reason that previously identified areas containing elevated radiological activity are no longer present may be that various construction activities took place in Area C subsequent to the ORNL investigation causing the previous identified soils to be either blended or buried (USACE 2005).

3.6.2 Impacted Ground Water:

A total of 14 wells were sampled at the Tonawanda Landfill Vicinity Property. For screening purposes, groundwater sample results were compared to groundwater standards found in the Uranium and Thorium Mill Tailings Act, 40 CFR 192. A summary of the results is located

in Table 3 which shows the range of groundwater results for the Tonawanda Landfill Vicinity Property. Of the groundwater samples collected during the 2001 Remedial Investigation, one sample, L-3, collected from within the Landfill (Figure 3) exceeded the groundwater standards for total uranium and combined U-234 and U-238. However, as stated previously, groundwater is not used as a water source by the local community due to the high dissolved solids, sulfates, chloride levels and the availability of drinking water from the Niagara River. Also, it is anticipated that the potential for migration of MED-like materials from site soils to groundwater will be reduced, once the Town of Tonawanda completes capping and closure of the Landfill.

4.0 SUMMARY OF SITE RISKS:

The Baseline Risk Assessment (BRA) portion of the RI (USACE 2005) provides a quantitative estimate of potential cancer risks to human health and the environment from MED-like constituents. The BRA is comprised of two key elements: a Human Health Assessment (HHA) and a screening Ecological Risk Assessment (ERA). The BRA does not include an evaluation of non-MED-like related radiological constituents and chemicals that have been identified as being present in the Tonawanda Landfill Vicinity Property.

This Baseline Risk Assessment is different from the screening-level Radiological Human Health Assessment performed by USACE (1999) in that the BRA is a full baseline risk assessment performed in accordance with CERCLA guidelines i.e., *Risk Assessment Guidance for Superfund (RAGS)* (USEPA 1989). The BRA incorporates data generated during the RI and considers additional receptors.

4.1 Human Health Assessment:

The BRA identifies the primary sources/release mechanisms, environmental transport media, principal exposure point concentrations, principal exposure routes, and likely receptors for the COPC's at the Tonawanda Landfill Vicinity Property. The potential cancer risks and ecological impacts due to radiological contamination have been characterized. The Town of Tonawanda Landfill Vicinity Property was divided into five soil exposure units (EU's) as presented in Figure 4. The exposure units were created so as to maximize exposure to areas of contamination identified in the RI (USACE 2005). Receptors for the BRA were chosen based on the current land use, as well as the reasonable future land use of the property. Exposure scenarios examined for the landfill EU's (EU's 1 and 2) include baseline conditions (recreational use-current), a worker who constructs the landfill cap for closure (construction worker), and a recreational user who utilizes the Landfill following closure (recreational user – future). The post-closure exposure scenarios assume that the Landfill is closed in accordance with the closure plans submitted by Malcolm Pirnie, the Town of Tonawanda's contractor, without removal of radioactive material. The post closure scenario assumes that a 3 foot cover would be in place, thus precluding future exposures to the wastes as long as the cover is maintained. However, under a worst-case future scenario, the cover might be allowed to degrade over time, thereby again exposing the contaminants. Therefore, the future recreational user could be subject to the same risks as the current recreational user. Exposure scenarios for the Mudflats EU's (EU's 3, 4

and 5) include a recreational user, a construction worker, and an industrial worker, as the Mudflats area may be developed for commercial or industrial use in the future. Residential future use is believed to be unlikely; however, residential scenarios (adult and child) were developed for the Mudflats.

Although a residential neighborhood is adjacent to the Landfill, no residential scenarios are considered within the Landfill itself. In accordance with USEPA guidance, *Presumptive Remedy for CERCLA Municipal Landfill Sites* (USEPA 1993), institutional controls may be assumed to preclude residential use of municipal landfills. However, the BRA did consider the presence of the residents neighboring the Landfill. The exposure scenario assumed that since the backyard of some residents directly abutted the Landfill that extensive recreational direct exposure could occur to wastes in the Landfill. A range of recreational exposures to the Landfill was considered, from 2 hours per day for 6 months a year for 6 years (juvenile), to 15 minutes per weekday plus 23 minutes per weekend day for 30 years (adult). These exposure parameters were chosen consistent with USEPA guidance for reasonable maximum outdoor exposure time for residential and recreational users, respectively (USEPA 1997). The breathing rate for the recreational user is assumed to be moderately heavy, for outdoor activities. These exposure parameter values are adequate to protect people who live adjacent to the landfill and could have direct exposure to the landfill wastes. However, since their residences are not placed directly on top of the waste, continuous direct exposure to the wastes (i.e., 16 or 24 hours/day) cannot be assumed.

In accordance with RAGS, both the reasonable maximum exposure (RME) and central tendency exposures were evaluated. According to the conceptual site model, the following exposure pathways were evaluated for the receptors described above:

- Inhalation of suspended particulates
- Direct incidental ingestion of soils
- Direct gamma radiation from soils
- Ingestion of contaminated plants (residential only)

This BRA satisfies the CERCLA requirement for a detailed analysis of the no-action alternative.

The HHA was performed using data generated for the 2005 USACE RI report and historical data (USACE 2005). The RESidual RADioactivity (RESRAD) computer code version 6.2.1 (ANL 2001) was used to calculate the cancer risks for this HHA. RESRAD calculated the total excess cancer risk (the risk of persons developing cancer as a result of exposure to site contaminants) from MED-like constituents to a range of receptors or site users representing the current and reasonable future site uses of the Town of Tonawanda Landfill and Mudflats area, over the next 1,000 years. Table 4 summarizes the radiological risks from RME to the MED-like material for the Town of Tonawanda Landfill and the Mudflats area as depicted in Figure 4. The results of the HHA indicate that excess cancer risks are within the range of acceptable cancer risks is 1 in 1 million (1,000,000) to 1 in ten thousand (10,000) excess cancer risks, averaged over a lifetime, to the population users, as indicated in Table 4. As noted in Table 4, the excess

cancer risk from the RME to the recreational user in EU 1 is 1.3 in 10,000 excess cancer risks. This risk of 1.3 in 10,000 excess cancer risks would still be considered within the acceptable risk range due to the fact that the upper boundary of risk range is not a discrete line at 1 in 10,000 excess cancer risks. A specific risk estimate around $1x10^{-4}$ may be considered acceptable (EPA 1991).

Radiologically contaminated soils may have impacted water in the Town of Tonawanda Landfill. Concentrations of total uranium and combined U-234 and U-238 in water leachate exceeded 40 CFR 192 Groundwater Standards at one location indicated on Figure 3. During the HHA it was determined that a potential ground water pathway as a potential mechanism for exposure was incomplete. Groundwater is not considered a contaminant source of concern in the BRA due to the high dissolved solids, sulfates, chloride levels and it is not of drinking water quality. Additionally residential water in the area is supplied through public water from the Niagara River, a cheap reliable source of potable water. Capping of the landfill, as indicated in section 2.2 of this report will also reduce the potential of migration of MED-like material into the groundwater. Exposure to surface water is considered not to be a viable pathway because of the shallowness, seasonal, highly turbid nature of what little surface water is present at the Town of Tonawanda Landfill Vicinity Property. Additionally, any surface water present has no recreational value is unlikely to be used for recreational or other purposes (USACE, 2005).

4.2 Ecological Risk Assessment:

The ecological risk assessment identified limited areas that may pose a threat to terrestrial receptors. These areas are located within exposure unit 1. Any potential for ecological risks will be eliminated when the landfill is capped. The terrestrial and wetland areas at the site are of poor quality and are not currently managed for ecological purposes, nor are there any plans to manage these areas for ecological purposes in the future. These current and future land uses will allow for minimal habitat for ecological receptors and thus minimal exposure to ecological receptors. Further information concerning the ecological risk assessment can be found in the Remedial Investigation Report, Tonawanda Landfill Vicinity Property (USACE 2005).

5. CONCLUSIONS:

The USACE has concluded that the radiological risks, for all media, of MED-like material present at the Tonawanda Landfill Vicinity Property, for the current and reasonable future site uses are within the CERCLA risk limit. Therefore, even if this site fell under FUSRAP authority, which it does not as explained above, USACE has determined that no further action is required at the Tonawanda Landfill Vicinity Property under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

6. COMMUNITY ROLE IN THE SELECTION PROCESS:

Public input is encouraged by USACE and no final decision will be made on the Tonawanda Landfill Vicinity Property until all comments are considered. USACE invites members of the public to review the Proposed Plan and the supporting documents which further describe the conditions at the Tonawanda Landfill Vicinity Property and the basis for this Proposed Plan. These documents may be found in the administrative record files for the Tonawanda Landfill Vicinity Property at the following locations:

USACE FUSRAP Public Information Center
1776 Niagara St.
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Members of the public who wish to comment on this Proposed Plan may submit their comments in writing to USACE at the following address:

U.S. Army Corps of Engineers, Buffalo District
FUSRAP Public Information Center
1776 Niagara St.
Buffalo, NY 14207-3199

Please refer to this Proposed Plan or the Tonawanda Landfill Vicinity Property, in any comments. All comments will be reviewed and considered by USACE prior to making a final decision concerning the Tonawanda Landfill Vicinity Property. Comments should be submitted no later then 30 days after the date of this Proposed Plan.

7.0 REFERENCES

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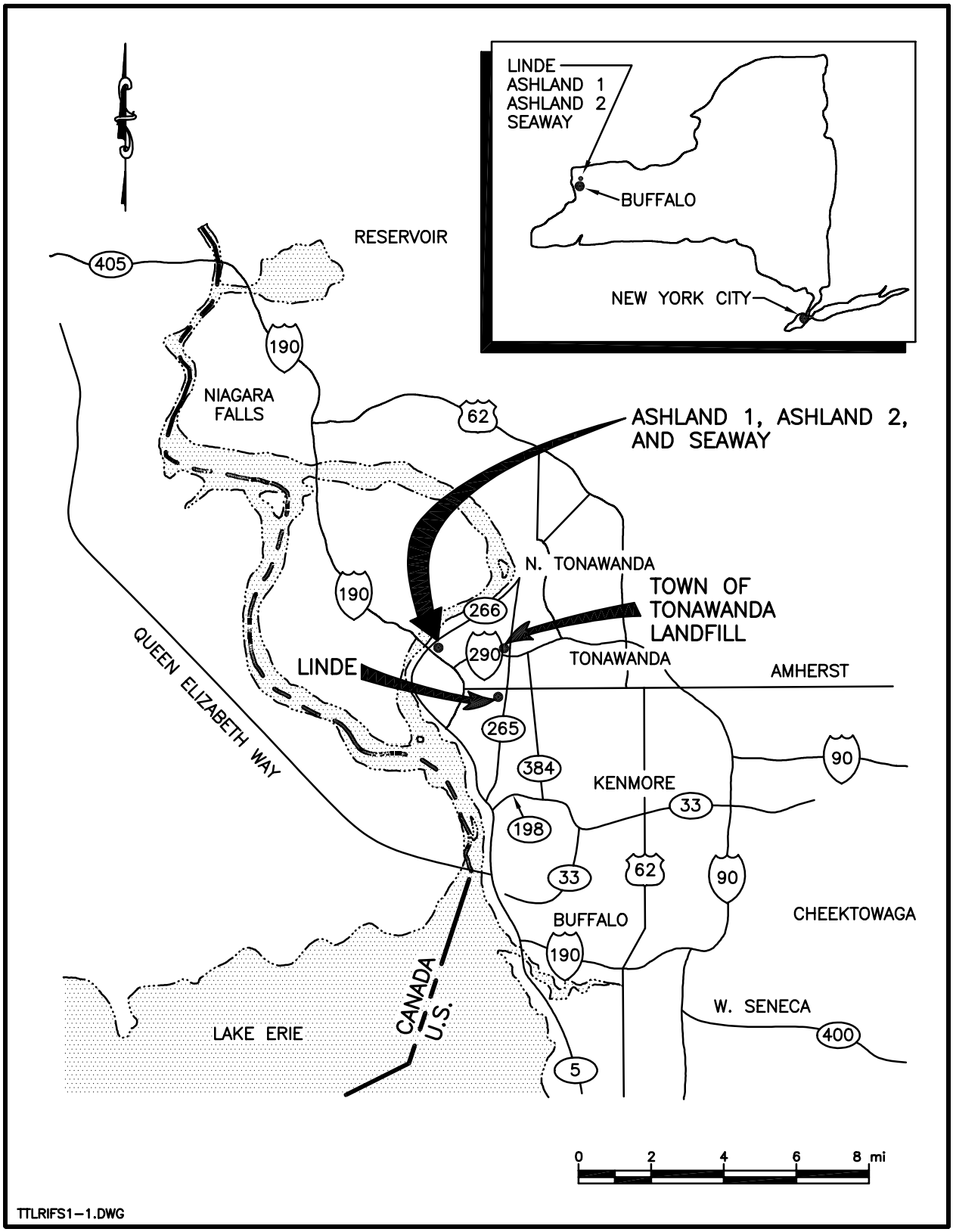
FIGURES

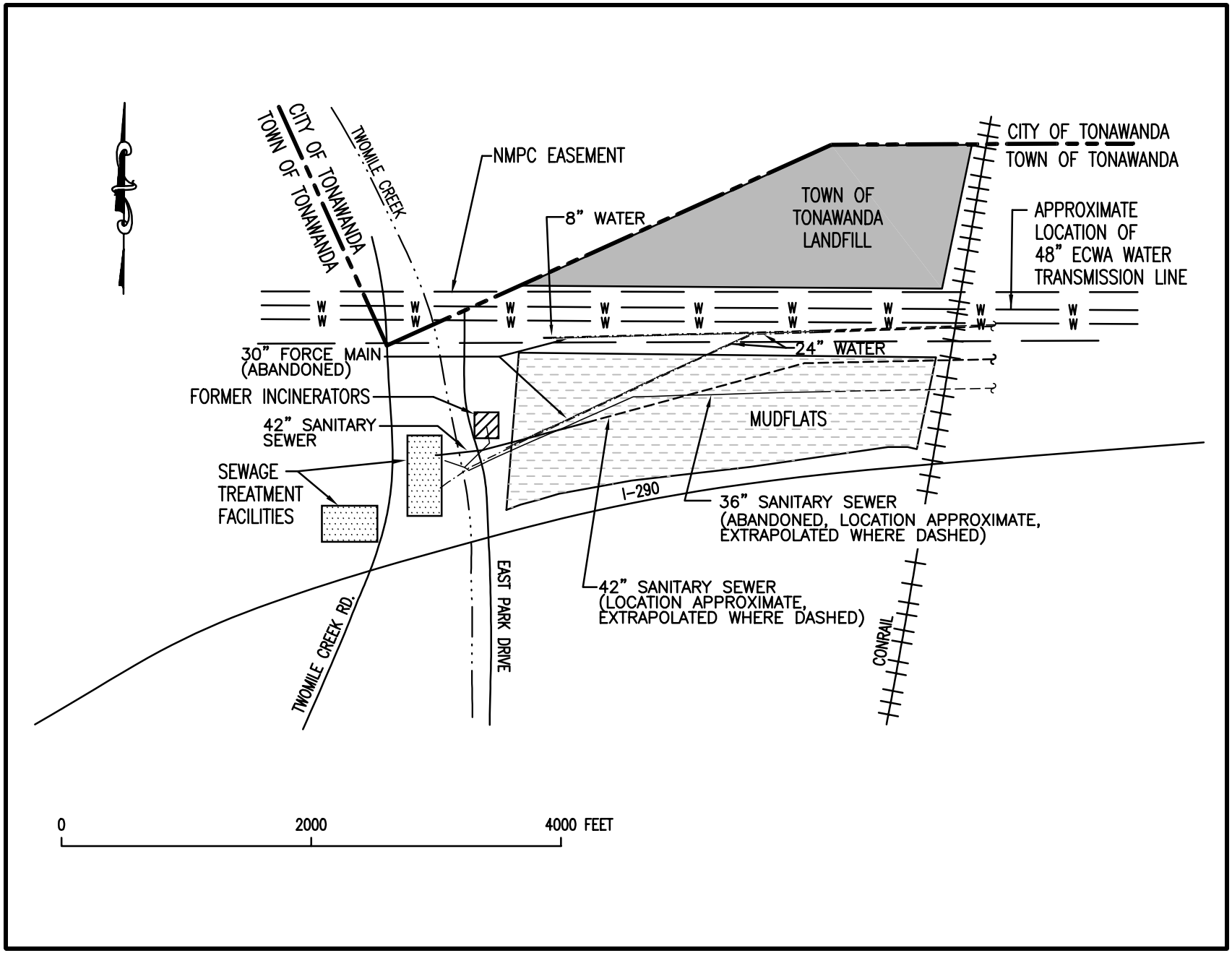
FIGURE 1



Tonawanda_04.10_0001_a

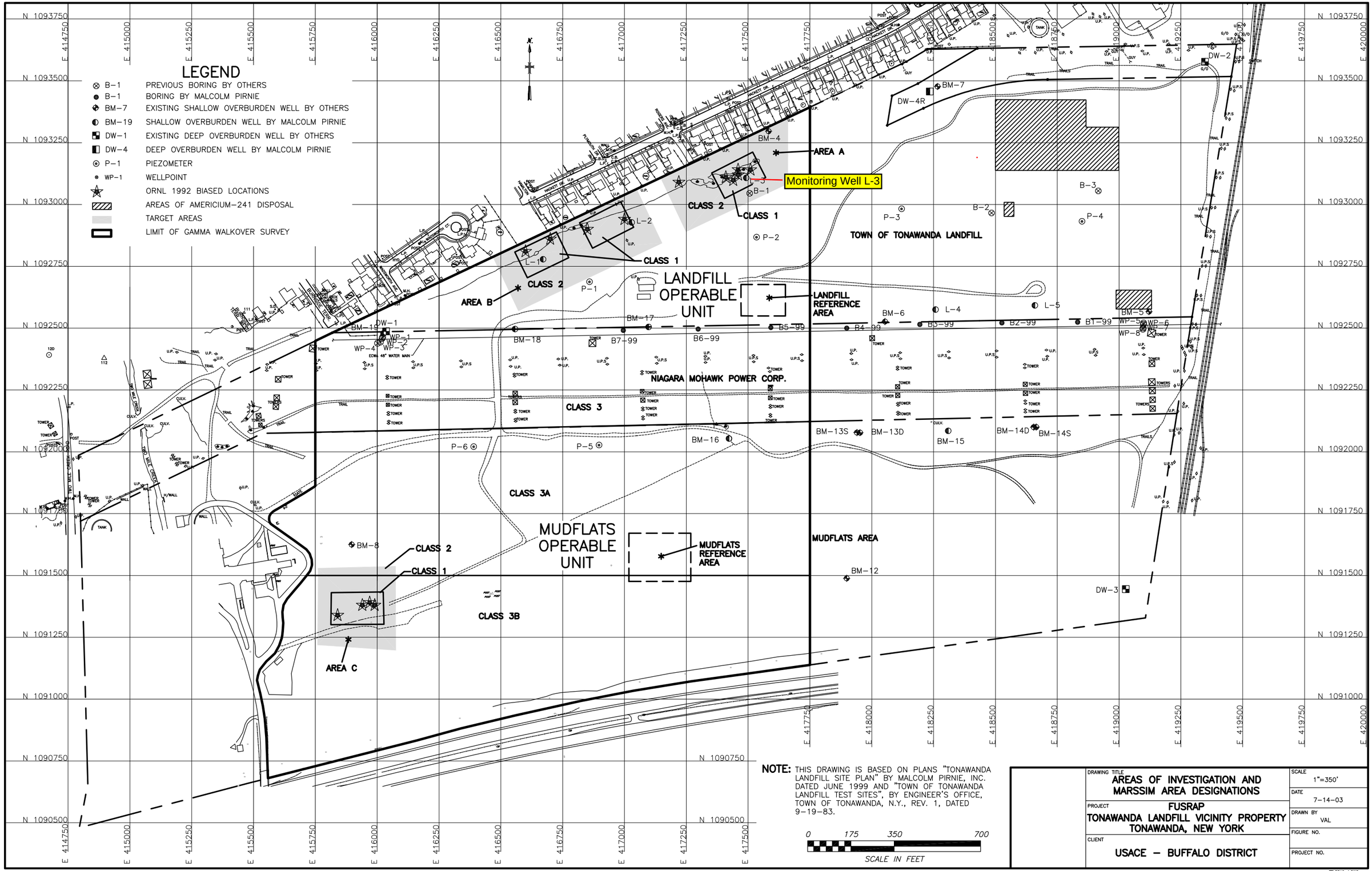
REGIONAL LOCATION OF THE TOWN OF TONAWANDA, NEW YORK AND THE ASHLAND 1, ASHLAND 2, SEAWAY AND LINDE SITES AND TONAWANDA LANDFILL VICINITY PROPERTY

FIGURE 2



TONAWANDA LANDFILL VICINITY PROPERTY APPROXIMATE LOCATIONS

FIGURE 3



NOTE: THIS DRAWING IS BASED ON PLANS "TONAWANDA LANDFILL SITE PLAN" BY MALCOLM PIRNIE, INC. DATED JUNE 1999 AND "TOWN OF TONAWANDA LANDFILL TEST SITES", BY ENGINEER'S OFFICE, TOWN OF TONAWANDA, N.Y., REV. 1, DATED 9-19-83.

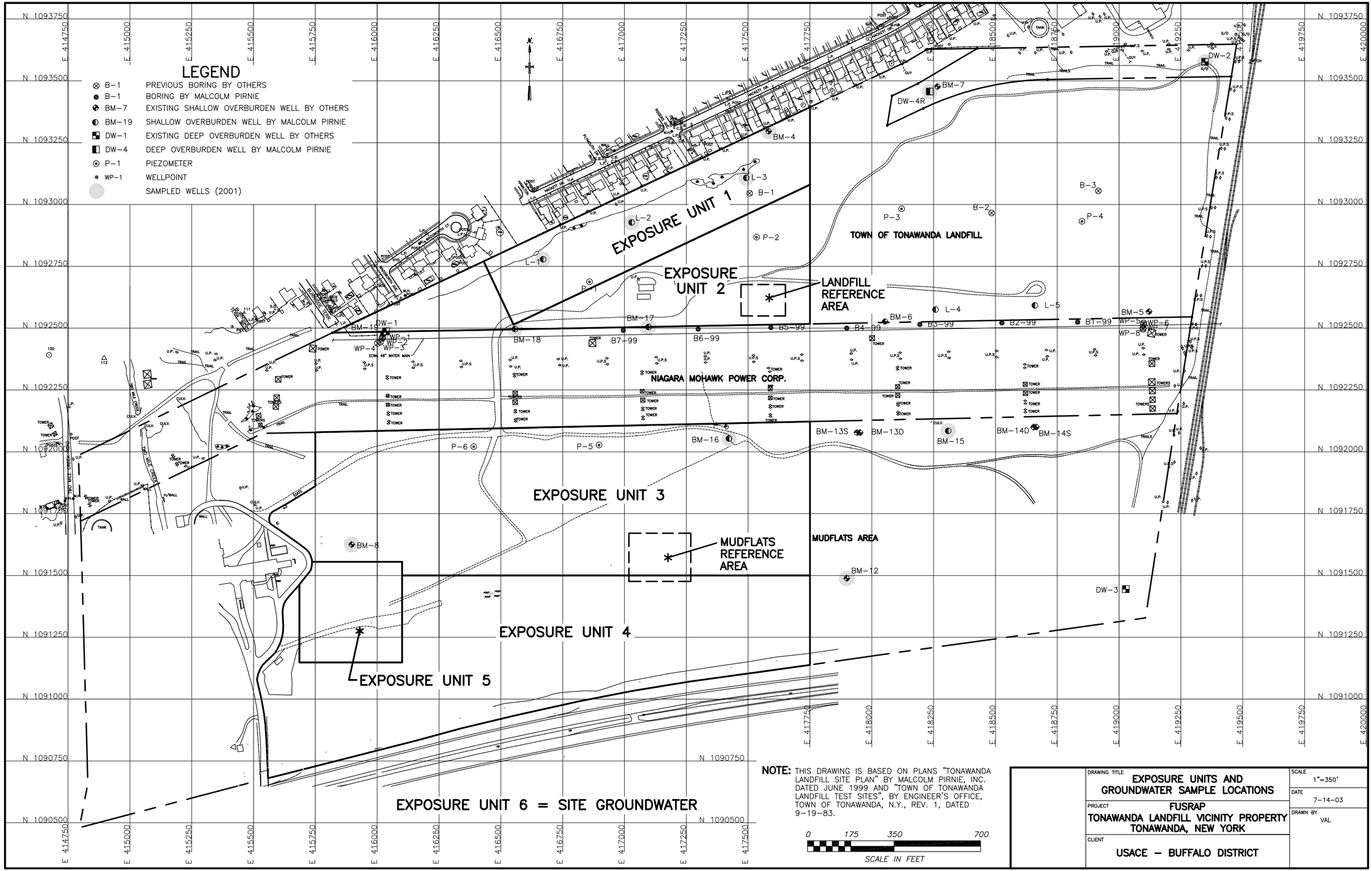
0 175 350 700

SCALE IN FEET

DRAWING TITLE AREAS OF INVESTIGATION AND MARSSIM AREA DESIGNATIONS	SCALE 1"=350'
PROJECT FUSRAP TONAWANDA LANDFILL VICINITY PROPERTY TONAWANDA, NEW YORK	DATE 7-14-03
	DRAWN BY VAL
	FIGURE NO.
CLIENT USACE – BUFFALO DISTRICT	PROJECT NO.

TTLBRA6-1.DWG

FUGURE 4


LEGEND
B-1 PREVIOUS BORING BY OTHERS
B-1 BORING BY MALCOLM PIRNIE
BM-7 EXISTING SHALLOW OVERBURDEN WELL BY OTHERS
BM-19 SHALLOW OVERBURDEN WELL BY MALCOLM PIRNIE
DW-1 EXISTING DEEP OVERBURDEN WELL BY OTHERS
DW-4 DEEP OVERBURDEN WELL BY MALCOLM PIRNIE
P-1 PIEZOMETER
WP-1 WELLPOINT
SAMPLED WELLS (2001)
EXPOSURE UNIT 1
EXPOSURE UNIT 2
EXPOSURE UNIT 3
EXPOSURE UNIT 4
EXPOSURE UNIT 5
EXPOSURE UNIT 6 = SITE GROUNDWATER
LANDFILL REFERENCE AREA
MUDFLATS REFERENCE AREA
MUDFLATS AREA
TOWN OF TONAWANDA LANDFILL
NIAGARA MOHAWK POWER CORP.
NOTE: THIS DRAWING IS BASED ON PLANS "TONAWANDA LANDFILL SITE PLAN" BY MALCOLM PIRNIE, INC. DATED JUNE 1999 AND "TOWN OF TONAWANDA LANDFILL TEST SITES", BY ENGINEER'S OFFICE, TOWN OF TONAWANDA, N.Y., REV. 1, DATED 9-19-83.
0 175 350 700
SCALE IN FEET
DRAWING TITLE
EXPOSURE UNITS AND GROUNDWATER SAMPLE LOCATIONS
PROJECT
FUSRAP
TONAWANDA LANDFILL VICINITY PROPERTY
TONAWANDA, NEW YORK
CLIENT
USACE – BUFFALO DISTRICT
SCALE
1"=350'
DATE
7-14-03
DRAWN BY
VAL

TABLES

Table 1

Results Summary for Tonawanda Landfill – Landfill OU
Soil Results[1]

Nuclide	Detections/ Results[2]	Maximum Concentration (pCi/g)	Minimum Concentration (pCi/g)	Mean Concentration (pCi/g)	Standard Deviation (pCi/g)	UCL95 Concentration[3] (pCi/g)
Ra-226	217/217	20.1	0.26	1.69	2.28	1.94
Th-230	217/217	76	0.49	2	5.75	2.65
Th-232	217/217	4.01	0.4	1.09	0.69	1.17
U-234	214/214	349	0.43	6.92	29.95	10.3
U-235	170/217	19.3	-0.02	0.4	1.82	0.61
U-238	214/214	357	0.35	6.96	30.34	10.39

Notes:
(1) Includes sediment samples.
(2) Duplicate sample results were compared to the primary sample results and the greater valve for each isotope was used in calculations.
(3) The Upper Confidence Limit (UCL) is the upper bound of a confidence interval around any calculated statistic. The UCL95 values were calculated according to the risk calculations found in Section 6.0 of the Remedial Investigation Report (USACE, 2005).

pCi/g – picocuries per gram
Ra – Radium
Th – Thorium
U – Uranium

Table 2

Results Summary for Tonawanda Landfill - Landfill OU
Soil Results [1]

Nuclide	Detections/ Results [2]	Maximum Concentration (pCi/g)	Minimum Concentration (pCi/g)	Mean Concentration (pCi/g)	Standard Deviation (pCi/g)	UCL95 Concentration [3] (pCi/g)
Ra-226	217/217	20.1	0.26	1.69	2.28	1.94
Ra-228	211/217	4.3	0.22	1.02	0.81	1.12
Th-228	217/217	3.97	0.37	1.17	0.73	1.25
Th-230	217/217	76	0.49	2	5.75	2.65
Th-232	217/217	4.01	0.4	1.09	0.69	1.17
U-234	214/214	349	0.43	6.92	29.95	10.3
U-235	170/217	19.3	-0.02	0.4	1.82	0.61
U-238	214/214	357	0.35	6.96	30.34	10.39
Am-241	8/217	1.72	-5.7	-0.09	0.46	-0.04
Pa-231	25/217	5.4	-1.9	0.13	0.99	0.25

Notes:
(1) Includes sediment samples.
(2) Duplicate sample results were compared to the primary sample results and the greater value for each isotope was used in the calculations.
(3) The Upper Confidence Limit (UCL) is the upper bound of a confidence interval around any calculated statistic. The UCL95 values were calculated according to the risk calculations found in Section 6.0 of the Remedial Investigation Report (USACE, 2005).
pCi/g - picocuries per gram
Ra - Radium
Th - Thorium
U - Uranium
Am - Americium
Pa - Protactinium

Table 3
Groundwater Sampling Results
Tonawanda Landfill Vicinity Property - September 2001

UNFILTERED SAMPLES (Total)

Analytes	Ra-226	Ra-228	Ra-226 + Ra-228	U-234	U-235	U-238	U-234 + U-238	U Total	Gross Alpha	Gross Alpha (2)	Th-230	Th-232
Standard (1)	NA	NA	**5**	NA	NA	NA	**30**	**44**	NA	**15**	NA	NA
Units	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	µg/L	pCi/L	pCi/L	pCi/L	pCi/L
WELL												
BM-4	1.5	3.2	4.7	14.4	0.4	12.3	26.7	30.1	26.8	-0.3	0.3	0.3
BM-4 (DUP)	1.7	1.2	2.9	13.6	0.5	11.6	25.2	35.6	26.0	0.3	0.3	0.3
BM-8	0.2	1.9	2.1	2.5	0.2	2.0	4.5	9.4	5.6	0.9	0.1	0.1
BM-12	1.2	0.7	1.9	4.3	0.3	3.1	7.4	5.7	10.3	2.6	0.1	0.2
BM-15	0.6	0.6	1.2	7.4	0.4	6.0	13.4	14.8	17.1	3.3	0.1	0.2
BM-16	0.4	1.0	1.5	13.2	0.6	9.9	23.1	27.0	25.4	1.7	0.0	0.0
BM-17	1.5	2.5	4.0	9.2	0.7	8.0	17.2	22.5	16.6	-1.3	0.3	0.1
BM-18	2.2	1.5	3.8	12.2	0.6	10.0	22.2	30.7	28.2	5.5	0.4	0.2
BM-19	0.7	1.3	2.0	12.1	0.7	10.6	22.7	34.8	21.1	-2.3	0.1	0.0
L-1	0.3	0.3	0.6	1.8	0.1	1.4	3.2	3.6	-0.5	-3.8	0.3	0.2
L-2	0.7	1.6	2.3	1.1	0.1	1.6	2.7	4.5	0.6	-2.2	1.1	1.1
L-3	0.9	0.7	1.6	58.2	2.5	58.3	116.5	175.0	114.0	-5.0	3.0	0.3
L-3 (DUP)	0.8	2.3	3.1	59.0	4.0	57.7	116.7	164.0	111.0	-9.7	4.3	0.7
DW-1	1.7	1.5	3.1	0.3	0.0	0.2	0.5	0.5	-3.3	-3.8	0.0	0.0
DW-2	0.6	2.1	2.7	0.2	0.0	0.1	0.3	0.3	0.9	0.5	0.2	0.1
DW-4R	0.5	0.9	1.4	0.2	0.0	0.1	0.3	1.1	9.1	8.7	0.4	0.3

FILTERED SAMPLES (Dissolved)

Analytes	Ra-226	Ra-228	Ra-226+ Ra-228	U-234	U-235	U-238	U-234 + U-238	U Total	Gross Alpha	Gross Alpha (2)	Th-230	Th-232
Standard (1)	NA	NA	**5**	NA	NA	NA	**30**	**44**	NA	**15**	NA	NA
Units	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	µg/L	pCi/L	pCi/L	pCi/L	pCi/L
WELL												
BM-4	0.7	1.4	2.0	12.2	0.8	11.6	23.8	32.1	23.9	-0.7	0.1	0.0
BM-4 (DUP)	0.9	1.8	2.7	12.5	0.5	10.8	23.3	37.7	29.7	5.9	0.0	0.0
BM-8	0.6	-0.7	-0.1	3.9	0.2	2.4	6.3	7.5	6.9	0.4	0.2	0.0
BM-12	0.7	1.5	2.3	4.2	0.1	2.6	6.8	5.4	4.9	-2.0	0.1	0.0
BM-15	0.6	2.1	2.7	6.3	0.4	5.1	11.4	15.4	11.1	-0.7	0.1	0.0
BM-16	0.4	-0.1	0.4	13.3	0.9	9.6	22.9	27.0	19.7	-4.1	0.1	0.0
BM-17	1.0	0.3	1.3	9.3	0.6	7.9	17.2	24.0	13.6	-4.2	0.1	0.0
BM-18	0.9	0.3	1.2	10.4	0.7	8.9	19.3	31.0	16.7	-3.3	0.0	0.0
BM-19	0.4	0.0	0.4	13.0	0.6	10.4	23.4	31.6	26.5	2.5	0.1	0.0
L-1	0.5	0.3	0.8	1.8	0.1	2.0	3.8	2.9	-0.7	-4.6	0.1	0.1
L-2	0.5	0.1	0.6	0.5	0.0	0.6	1.1	1.6	-0.7	-1.8	0.1	0.1
L-3	0.5	0.7	1.1	46.8	3.4	46.9	93.7	133.0	60.3	-36.8	0.5	0.1
L-3 (DUP)	1.0	0.5	1.5	54.1	2.5	53.7	107.8	134.0	83.3	-27.0	0.7	0.1
DW-1	0.7	1.9	2.6	0.2	0.1	0.0	0.2	0.4	-1.0	-1.3	0.2	-0.1
DW-2	0.7	1.2	1.9	0.1	0.0	0.0	0.1	0.2	-0.1	-0.1	0.1	0.0
DW-4R	0.7	1.0	1.7	0.2	0.0	0.1	0.2	0.4	-0.1	-0.4	0.1	0.0

Notes:
(1) The standard is the groundwater standard of 40 CFR Part 192 Subpart A.
(2) Excluding radon and uranium. (Radon purged from sample as part of analytical method)
(DUP) - Duplicate Sample
Where results are reported by the laboratory as undetected, the detection limit is reported as a result in this table.
Where results are reported by the laboratory as less than a specific concentration, that specific concentration is reported as a result in this table.

Table 4

Reasonable Maximum Exposure Cancer Risk Summary
For
All Exposure Units

		Current	Future			Additional	
Exposure Unit		Recreational	Recreational	Construction Worker	Industrial Worker	Resident Adult	Resident Child
1	Surface	**1.3E-04**	<< 1.0E-06 [a]	9.1E-05	NA	NA	NA
	Subsurface	**NA**	NA	6.5E-05	NA	NA	NA
2	Surface	0.0E+00[b]	0.0E+00	0.0E+00	NA	NA	NA
	Subsurface	NA	NA	1.7E-07	NA	NA	NA
3	Surface	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Subsurface	NA	NA	1.8E-07	5.5E-07	1.0E-05	2.5E-06
4	Surface	1.1E-07	1.1E-07	1.1E-07	4.1E-07	4.0E-06	1.9E-06
	Subsurface	NA	NA	3.8E-07	1.2E-06	2.2E-05	5.3E-06
5	Surface	3.0E-07	3.0E-07	2.0E-07	6.0E-07	1.2E-05	2.9E-06
	Subsurface	NA	NA	1.3E-06	3.8E-06	7.9E-05	1.8E-05

Values reported in the Table reflect maximum risk between year 0 (current) and year 1000 (future)
NA = not calculated – scenario not included
a) << 1.0E-06 because 3 feet maintained landfill cap precludes exposure
b) Indicates that constituents of potential concern were not found in this Exposure Unit above background and therefore not carried forward in the Baseline Risk Assessment