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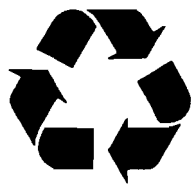
GAMMA WALKOVER SURVEY OF THE SEAWAY LANDFILL

TONAWANDA, NEW YORK

NOVEMBER 1998

prepared by
U.S. Army Corps of Engineers, Buffalo District Office, Formerly Utilized Sites Remedial Action Program

with technical assistance from
Science Applications International Corporation ESC-FUSRAP



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LIST OF ACRONYMS

AEC	Atomic Energy Commission
BFI	Browning-Ferris Industries
BRA	Baseline Risk Assessment
CORS	Continuously Operating Reference Station
CPM	counts per minute
DOE	U.S. Department of Energy
FS	Feasibility Study
FUSRAP	Formerly Utilized Sites Remedial Action Program
GPS	Global Positioning System
MED	Manhattan Engineer District
NaI	sodium iodide
RI	Remedial Investigation
SAIC	Science Applications International Corporation
SEC	Safety and Ecology Corporation
USACE	United States Army Corps of Engineers

EXECUTIVE SUMMARY

This report presents the results of an August 1998 gamma walkover survey of the Seaway property located in Tonawanda, New York. A Global Positioning System (GPS) was used in conjunction with radiation detection instrumentation to identify the location of radioactive contamination in surface (the top several inches of) soil. The purpose of this survey was to confirm the location of surface contamination in Areas A, B, and C of the Seaway Landfill and to determine if surface migration of contaminants was occurring.

The data set from the walkover survey includes radiation detector responses in counts per minute (CPM) and coordinate location information for each data point with accuracy to within 3 feet. The coordinate data was used to map CPM results which illustrates the relative concentrations of surface contamination in the study area. Results show that widespread uniform areas of surface contamination are present in Seaway Area A, a small isolated area of surface contamination is present in Area B, and isolated areas of surface contamination are present in Area C. No indication of migration of radioactivity from Seaway Areas A, B, and C was evident from the data collected during the walkover survey.

1. INTRODUCTION

From 1942 to 1946, portions of the Linde site (currently Praxair) and several buildings located at Linde in the Tonawanda, New York area were used for separation of uranium ores. These processing activities, conducted under a Manhattan Engineer District (MED) contract, resulted in elevated levels of radionuclides (specifically, radionuclides in the uranium, thorium and actinium decay series and, in particular, Ra-226, Th-230, and U-238) in portions of the property and buildings. Subsequent disposal and relocation of processing wastes from the Linde property resulted in elevated levels of radionuclides at three nearby properties in the Township of Tonawanda: the Ashland 1 property, the Seaway property, and the Ashland 2 property. The Linde, Ashland 1, Ashland 2, and Seaway properties are together referred to as the Tonawanda Site.

The Tonawanda Site properties are being remediated under the Formerly Utilized Sites Remedial Action Program (FUSRAP), which was established to identify and clean up, or otherwise control, sites where residual contamination remains from activities conducted under contract to MED or the U.S. Atomic Energy Commission (AEC). From its inception in the 1970s until October 1997, the responsibility for administration of FUSRAP was with the U.S. Department of Energy (DOE). In October 1997, the responsibility for FUSRAP including the Tonawanda Site was transferred to the United States Army Corps of Engineers (USACE).

During their tenure, DOE conducted surveys and investigations of the Tonawanda Site, and in 1993, issued a Remedial Investigation (RI) report (BNI 1993) describing the nature and extent of contamination on the Tonawanda Site properties. DOE also assessed the risks to human health and environment posed by the presence of contamination on the Tonawanda Site properties. The findings of the risk assessment are described in the Baseline Risk Assessment (BRA) for the Tonawanda Site (DOE 1993a). In November 1993, DOE issued a Feasibility Study (FS) for the Tonawanda Site, identifying and evaluating alternative means for remediating the Tonawanda Site properties (DOE 1993b).

As detailed in the 1993 RI and FS, waste residues produced during uranium processing at Linde from 1944 to 1946 were deposited at Ashland 1 (formerly the Haist property). Records indicate that approximately 8,000 tons of these residues, principally low-grade uranium ore tailings, were spread over two-thirds of the Ashland 1 property. During construction of a bermed area for two petroleum tanks and a drainage ditch on the Ashland 1 property in 1974, radioactively contaminated residues from Ashland 1 were transported to Seaway and Ashland 2 for disposal. Disposal at Seaway took place in four (4) areas referred to as Areas A, B, C, and D as illustrated in Attachment A. The scope of the walkover survey and this report is limited to Seaway Areas A, B, and C.

The Seaway site comprises about 93 acres referred to as the Seaway Industrial Park and was used as a landfill for the past 50 to 60 years (BNI 1993). The property is owned by the Sands Mobile Park Corporation but was operated as a landfill by Browning-Ferris Industries (BFI) (USACE 1998). Refuse was received at the landfill until 1993 and the landfill was closed in 1995 (Erk 1998).

Site surveys conducted in 1976, 1981 and 1986 reported that active operation of the landfill altered the physical conditions of the property and that the locations of the radioactive contamination varied from time to time (BNI 1993). Based on comparisons of topographic maps of the landfill in 1976 and 1986, it was estimated that Areas B and C had been covered with up to 40 feet of fill material and refuse. It was also estimated that approximately 40 percent of Area A had been covered with a similar but thinner layer of material (0 to 10 feet thick) (BNI 1993).

Remedial investigations at Seaway were conducted from January 1988 through April 1988, October 1988 through March 1989, and from November 1990 through May 1991. Because landfill material covered Areas B and C to a depth up to 40 feet, soil samples for those areas could not be collected (BNI 1993). Attachment B shows the approximate location of MED wastes encountered during the remedial investigation. The 1993 FS identifies soils in Area A of Seaway as accessible for remediation, and identifies contaminated soils in Areas B and C of Seaway as access-restricted (i.e., buried under several feet of landfill material).

2. PURPOSE AND SCOPE

Due to reconfiguration of the property by landfill waste management operations, it was necessary to identify the current location of surface contamination in areas A, B, and C of the Seaway property (Area D was not included in the scope of this investigation). This information will be used to determine if historical data accurately describe current conditions or if site conditions have been significantly altered since the last characterization activities. In order to locate surface contamination at Seaway, Science Applications International Corporation (SAIC), in conjunction with Safety and Ecology Corporation (SEC), was tasked by the USACE to perform a radiological walkover survey.

The survey was performed to:

1) Identify the general magnitude (relative activity) and lateral extent of surface contaminants in areas previously identified as containing elevated radionuclide concentrations (areas A, B, and C of the Seaway property), and

2) Identify the general magnitude (relative activity) and lateral extent of surface contaminants adjacent to areas A, B, and C where migration of materials may have occurred.

3. METHOD AND INSTRUMENTATION

Radiation measurements were collected using a 2-inch by 2-inch sodium iodide (NaI) gamma scintillation detector (Ludlum Model 44-10) and a rate meter/scaler (Ludlum Model 2221) with an RS-232 connection. A Trimble Pro XRS GPS unit was used to collect position and time information which was merged with radiation measurement. The trimble unit consists of an

antenna for collecting the GPS signal, a receiver where GPS and radiation measurement data are merged, and a TDC-1 data logger.

A reference grid system encompassing areas A, B, and C was established with a GPS unit using the NAD-27 positioning system and U.S. State Plane 1927, New York West 3103 survey coordinates. The grid was oriented to the Seaway property line using 55 degrees True North as "Site North," with a resulting grid system that paralleled site property lines.

The grid started by establishing a site monument using GPS at a utility pole on the north property fence. Pin flags were then placed at 100-foot intervals from the monument along the north property fence. The intervals were measured using the GPS navigational system. From each 100-foot marker, additional pin flags were set at twenty-foot intervals from the North property line moving southward over the desired survey areas. These rows of pin flags were placed using the GPS navigational system to determine both distance from the north property fence and orientation along 55 degrees True North resulting in a 20-feet by 100-feet grid system that paralleled the North property line over the desired survey areas.

The general procedure for collecting the radiation measurements involved walking the GPS unit over the subject property while holding the NaI detector as close to the ground surface as possible. Position, time, and radiation measurements were merged resulting in a data point measurement approximately every two seconds. Each data point measurement consisting of date, time, survey coordinates (northing, easting, and altitude), and detector response in counts per minute (CPM).

The gamma walkover survey was conducted along lines running parallel to the north property fence at twenty-foot intervals. Slight variations in the survey pattern exist for Area A due to heavy overgrowth, terrain configuration, and obstacles imposed by landfill materials and equipment. Additional surveys were performed where contamination had previously been suspected but not confirmed (Area B), and to delineate the boundaries of isolated areas of elevated activity (Areas B and C).

4. QUALITY ASSURANCE AND CONTROL OF DATA

All SEC instruments were calibrated in accordance with SEC Standard Operating Procedures prior to use at the Seaway site. Each instrument was precision-tested through a Chi-square calculation and a response range was established in accordance with ANSI N323-1978. Each instrument was performance checked twice daily against the response range at the same predetermined location.

Additionally, the field responses of the selected instruments were compared to other calibrated instruments from the same manufacturer in use at the SEC Ashland 2 project. This comparison found good agreement between detector responses (within ±10%).

The selected GPS equipment received daily physical integrity and functional checks. The NAD-27 positioning system and US State Plane 1927, New York West 3103 survey coordinates system were selected from the available GPS options. Navigation/location checks were then performed for four survey monuments that had been previously established by a land surveyor at the Ashland 2 site. Navigation/location checks were also performed at the GPS monument established at a utility pole on the north property fence of the Seaway site. Results of the navigation/location checks at both reference points were verified to indicate agreement with previously established coordinates in all three dimensions (northing, easting, and altitude) to within ± 2 feet.

4.1 CONTROL OF DATA

All data generated during the Seaway gamma walkover survey were recorded by the GPS unit. All files generated during the survey were downloaded to a computer at the site and kept in a separate folder designated for Seaway use only. The raw positional survey data were differentially corrected via the Internet from data provided by the National Geodetic Survey. The data used for the differential corrections were collected from the Continuously Operating Reference Station (CORS) located in Youngstown, New York.

Corrected files were then sent to the SEC office in Knoxville, TN, for final preparation before mapping. Final preparation included exporting individual data files into a Microsoft Excel spreadsheet and then aggregating the individual data files into one data set. The entire data set was then overlain onto an existing site drawing and aerial photographs (electronic files showing relevant and distinguishable site features) by SAIC and color coded to illustrate the locations of relatively elevated radionuclide concentrations.

5. FINDINGS AND RESULTS

Maps of gamma walkover survey results are presented in Attachments C and D. Walkover survey data are provided in electronic format in Attachment E (MS Excel spreadsheets). When the CPM result exceed 20,000 CPM (including background) an area was assumed to be contaminated. This criterion is based upon a data evaluation by Bechtel National Incorporated (BNI) which demonstrated that areas with activity levels less than 20,000 gross CPM were found to exceed the site-specific radionuclide cleanup guideline 0% of the time (BNI 1997). The 44-10 detector was selected to match this BNI correlation study.

Background ranged from 8,000 to 12,000 CPM for rock covered drainage swales and from 8,000 to 11,000 CPM for clay/gravel road beds and ground surfaces. This determination was made as a result of a scan of each surface media at locations on the Seaway property away from the suspect areas. The background survey was performed using the same equipment and methodology as in Areas A, B, and C.

5.1 AREA A

Initial estimates from previous reports for the Seaway property placed Area A on or under a plateau and its associated northern slope between capped areas on the north side of the landfill. This area is bounded on the south by the central/main cap access road, and on the southeast by an abandoned portion of the central access road that separates Areas A and B. The north side begins with a gentle slope that becomes steeper as it approaches the northern site access road. The east/northeast portion of the plateau blends into the slope of the main landfill cap. The west side of the plateau slopes sharply downward to where it meets a smaller landfill cap.

Widespread areas of elevated activity (>20,000 CPM) were detected over ground surfaces in Area A (see Attachment C and D). Count rates ranged from <13,000 gross CPM to >100,000 CPM. The extent of areas of elevated activity exceeding 20,000 CPM roughly correlated with the remediation areas outlined by historical data.

The areas of elevated activity were bounded on the north by the site access road, consisting of a gravel/clay media. Readings exceeding 20,000 CPM were noted to be within a few feet of the north access road. A small portion (approximately 60 feet) of the south side of the road in the vicinity of the Rattlesnake Creek was not clearly defined, with clay/gravel road media fading into a portion of the landfill materials. The north side of the road was not clearly defined, with clay/gravel road media roughly spread up to the north property fence in the vicinity of the northwestern branch of the Rattlesnake Creek. Additionally, BFI roll-off containers located along the north property fence presented survey obstacles. No readings exceeding 20,000 CPM were noted on the road surface or on the north side of the access road near the property fence.

Elevated activity in Area A was bounded on the south by the central/main cap access road. BFI roll-off containers on the north side of the central access road presented survey obstacles. Elevated areas of activity (>20,000 CPM) ranged at distances of 30 to 150 feet from the central access road.

The western boundary of Area A is formed by a small landfill cap running north to south. The majority of elevated readings (>20,000 CPM) ranged at distances of 50 to 150 feet from the cap. One area of elevated activity was noted within approximately 15 feet of the western cap's juncture with the north access road.

The east side of Area A is bounded by the combination of an abandoned portion of the central access road separating Areas A and B, and the west end of the main landfill cap near its juncture with the north access road. Elevated readings were noted in and adjacent to the abandoned access road during its steep descent toward the north access road. These elevated readings continued to the east, stopping short of the main cap at distances ranging from approximately 30 to 100 feet.

5.2 AREA B

Area B was estimated to be on or under a steep slope to the southeast of the abandoned portion of the central access road. This slope was further bounded by a portion of the central/main cap access road that is still in use.

Only one isolated pocket of elevated activity (>24,000 CPM) was found at the southeast edge of Area B. The location was essentially a point source with the peak reading in an area less than six inches in diameter, and tapering off rapidly to <18,000 CPM within approximately two feet of the peak reading. The isolated area was located at the top of the slope covering Area B and approximately 50 feet north of the central/main cap access road. The point was marked using a pin flag for future reference.

5.3 AREA C

Area C was estimated to be on or under a small plateau and its associated southern slope between capped areas in the south-central area of the landfill. It was further assessed that a portion of the eastern edge of Area C may have been capped over.

Gamma radiation rates in the location of Area C ranged from <13,000 CPM to approximately 30,000 CPM. Isolated pockets of elevated activity were identified during the initial pass over Area C. A more intensive survey was performed on two general areas found to contain these isolated pockets.

The first general area was adjacent to the main cap with the more intensive survey revealing an area of approximately 40 × 60 feet containing a few dozen isolated areas of elevated activity (>20,000 CPM). The isolated pockets ranged in size from a few inches to approximately two feet in diameter and were located on a small plateau within about 100 feet of the cap line. The majority of elevated points were less than six inches in diameter. A large portion of this general area showed elevated readings that were less than the 20,000 CPM criteria. Some of the isolated pockets of elevated activity were marked using pin flags with the gross CPM written on the marker flag for future reference.

The second general area receiving a more intensive survey effort was located to the west of the first area on a narrow portion of the same plateau. The survey revealed only a few isolated pockets of elevated activity (>20,000 CPM) covering approximately 10-feet by 15-feet. The isolated pockets ranged in size from a few inches to approximately one foot in diameter. A small portion of this general area showed elevated readings that were less than the 20,000 CPM criterion. Some of the pockets were marked using pin flags with the gross CPM written on the marker flag for future reference.

The eastern side of Area C displayed an area of elevated activity immediately adjacent to the main cap line, but was less than the 20,000 CPM criterion. This area stretched along the cap line for approximately 20 feet and was approximately even with the small plateau upon which

readings >20,000 CPM were found. The radiation levels tapered off to background levels between the area of elevated activity on the plateau and the area of slight elevation at the cap line.

It was noted that readings over the cap surfaces throughout the Seaway site were occasionally above background in the 13,000 to 15,000 CPM range over wide spread areas. The clay displaying elevated readings at the cap line was similar in appearance to the clay used for capping the landfill. It is possible that naturally occurring radioactive material in the native clay may be a major contributor to the elevated activity at the site detected near the cap line.

No areas of elevated activity were detected immediately up slope or down slope from the small plateau in Area C.

6. CONCLUSIONS

Widespread uniform areas of surface and near-surface contaminants are present in Area A roughly corresponding with the magnitude and lateral extent identified in previous estimates. No indication of the migration of radioactive materials from Area A to adjacent areas was evident.

One small isolated area of surface and near-surface contaminants was identified in Area B. No indication of the migration of radioactive materials from Area B to adjacent areas was evident. Due to reconfiguration of the property by landfill waste management processes and based on the gamma walkover survey results, it is assumed that nearly all of the radioactive materials from Area B are below surface.

Isolated areas of surface contamination are present in Area C. No indication of the migration of radioactive materials from Area C to adjacent areas was evident. Due to reconfiguration of the property by landfill waste management processes and based on the gamma walkover survey results, it is assumed that the vast majority of the radioactive materials from Area C are also below surface.

7. REFERENCES

BNI (Bechtel National, Incorporated) 1993. *Remedial Investigation for the Tonawanda Site.* DOE/OR21949-300, Oak Ridge, TN.

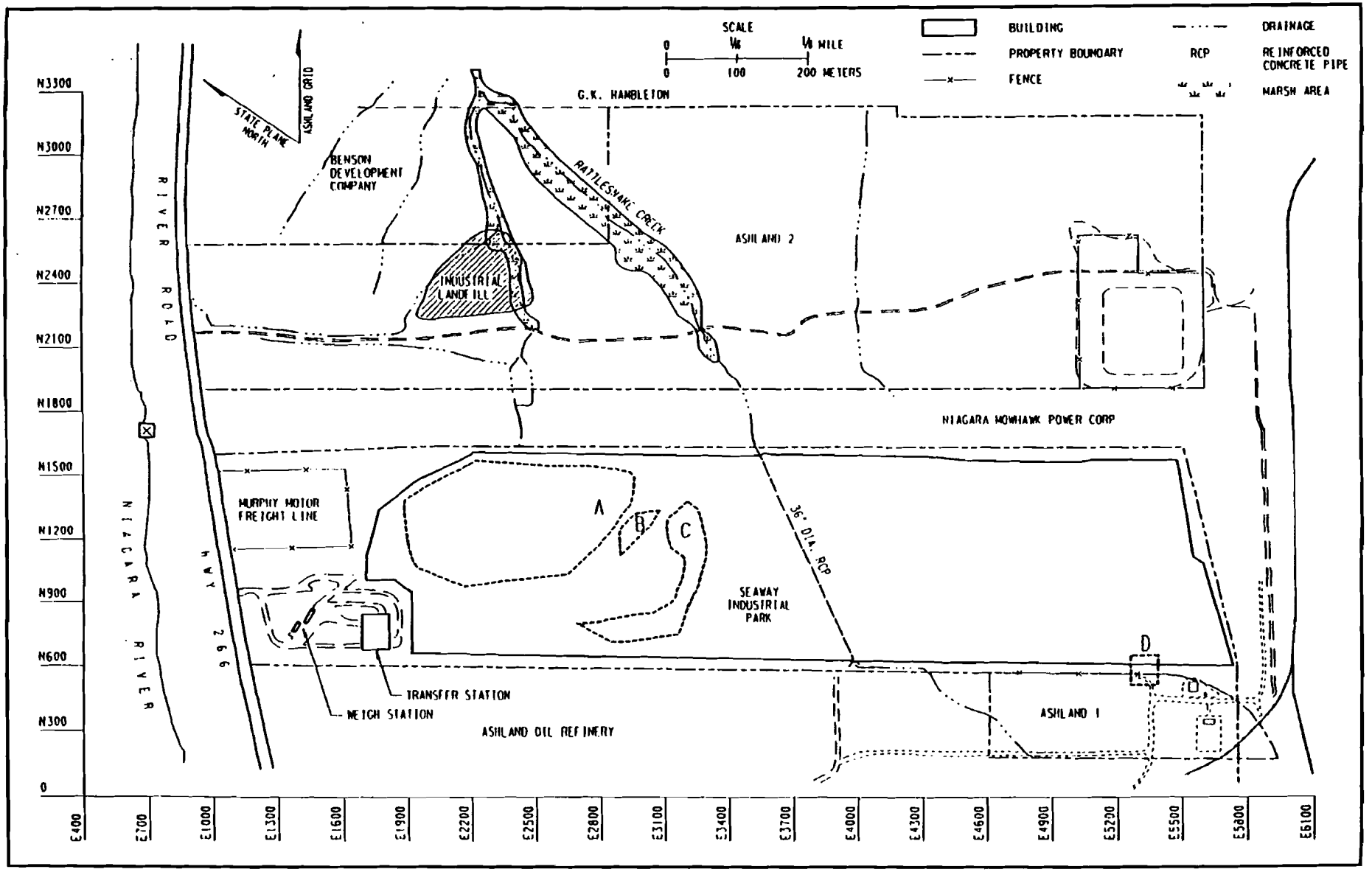
BNI 1997. *Correlation of Radiological Gamma Scan Readings with Discrete Soil Samples for the Ashland 2 Site.* Technical Memorandum 132-30N-G01-003, Oak Ridge, TN.

Erk, Yavuz 1998. Telephone conversation between A. Davis (SAIC) and Yavuk Erk (Environmental Engineer II, NYSDEC, Region 9), March 13.

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

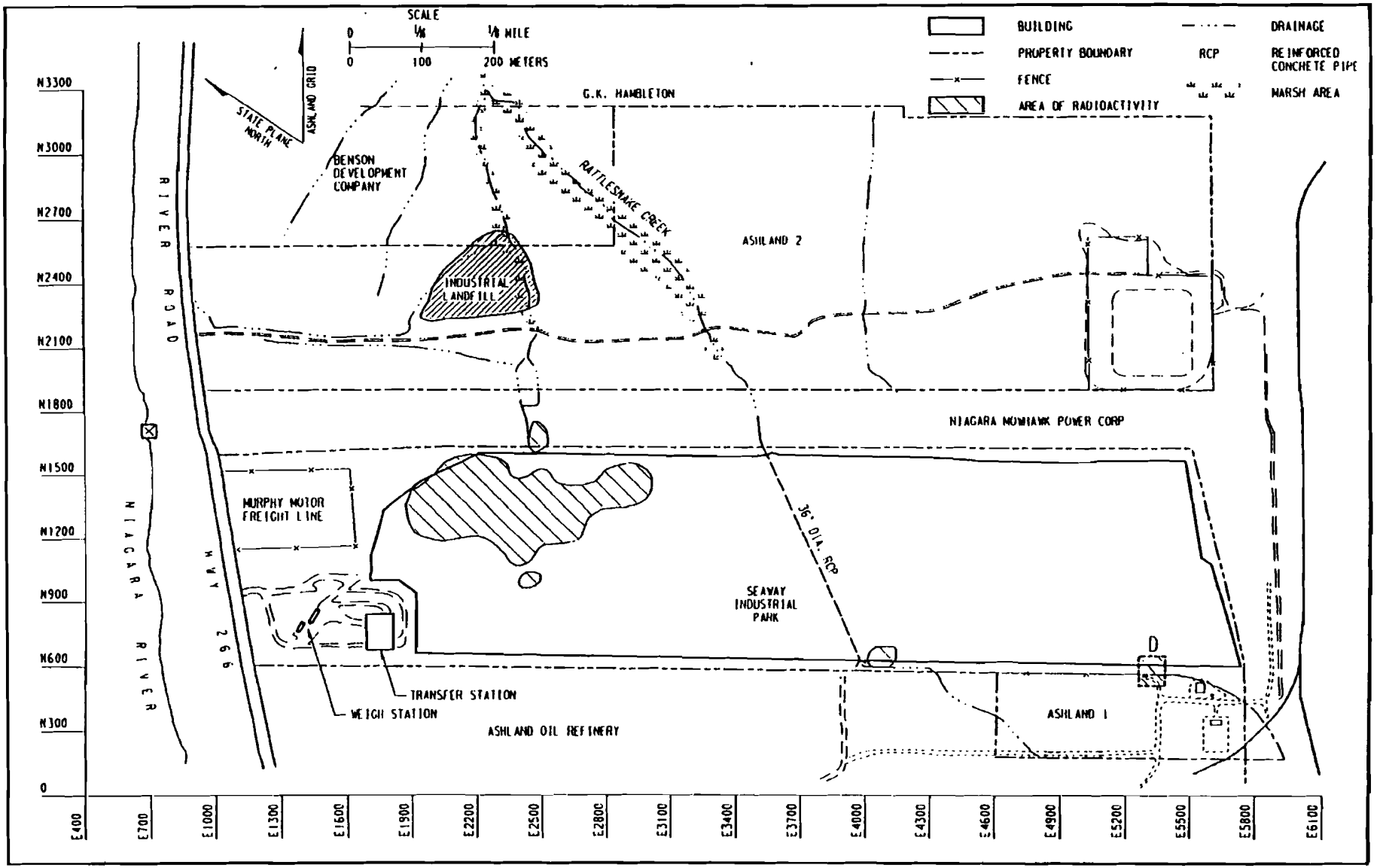
DOE (U.S. Department of Energy) 1993a. *Baseline Risk Assessment for the Tonawanda Site.* DOE/OR-21950-003, Oak Ridge, TN, August.

DOE 1993b. *Feasibility Study for the Tonawanda Site.* DOE/OR-21950-234, Oak Ridge, TN, August.



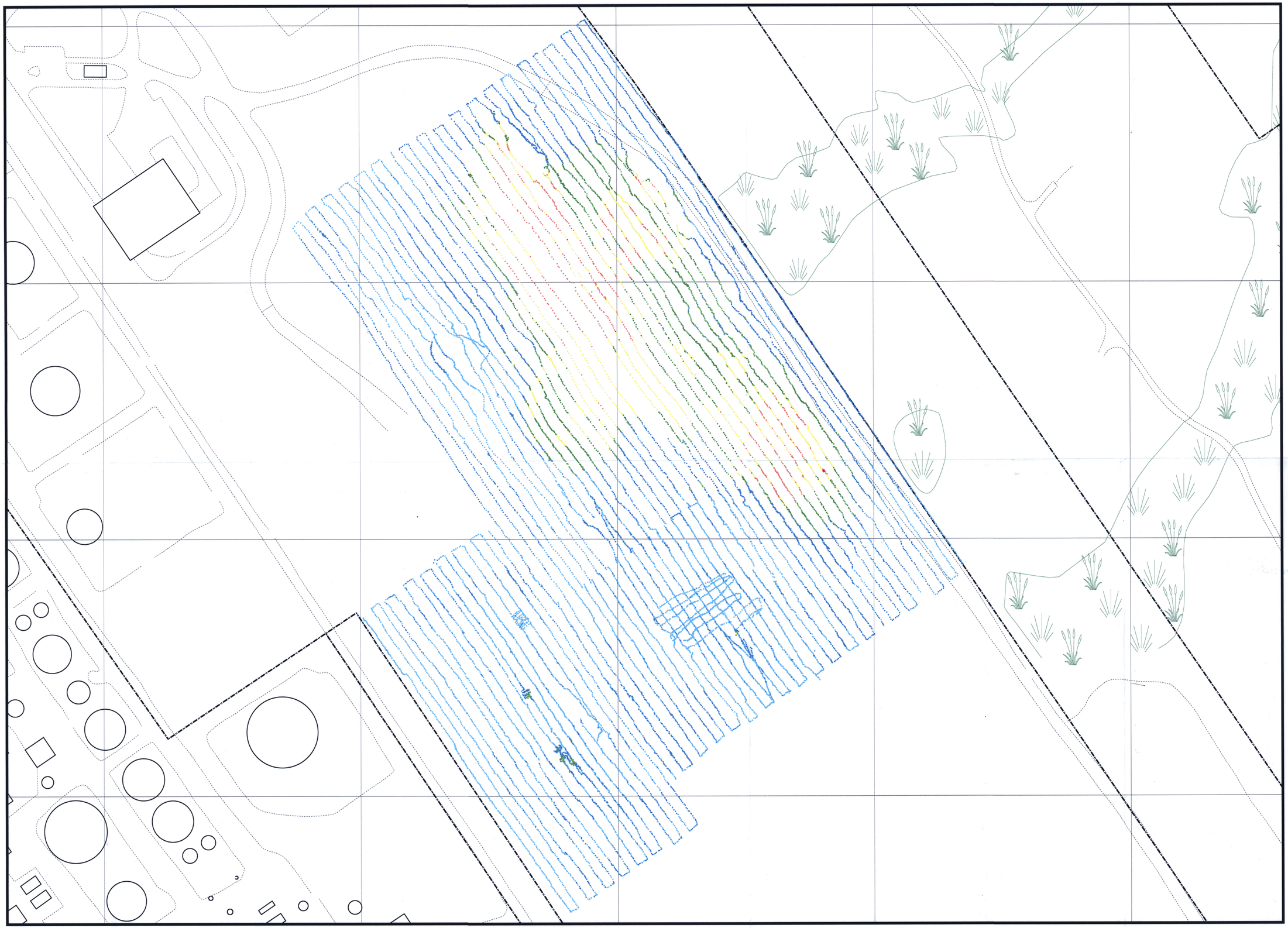
FUS NY Seaway 11/98

Attachment A. Approximate Historical Location of MED Wastes Deposited in Seaway Areas A, B, C, and D.



FUS NY Seaway 11/98

Attachment B. Approximate Location of MED Wastes Encountered During Remedial Investigation.



Legend:

Gamma Walkover Data
- 0-12000
- 12001 - 16000
- 16001 - 20000
- 20001 - 30000
- 30001 - 50000
- 50001 - 100000
- 100001 - 103867

Approximate Property Boundary

Building/Tank

Road (secondary)

Grid Based on New York State Plane

Wetlands

Wetlands

70 0 70 140 210 Feet

NY. STATE PLANE NAD 27 (FEET)

SAIC
Science Applications International Corporation

ASHLAND SITE
TONAWANDA, NEW YORK

ATTACHMENT C

RESULTS FROM THE 1998 SEAWAY GAMMA WALKOVER SURVEY

REVISION	DRAWN BY:	CHECKED BY:	DATE
0	M. NORRIS	D. KING	11/02/98

Referenced Files

Swaybase.dwg
08Combo
3-2BC1
3-2D2

SHT 1 of 1
PLATE #

G:\98017\PROJECTS\SITEBASE+WALKOVER.APR
ARCVIEW PROJECT NAME

Legend:

Gamma Walkover Data
- 0-12000
- 12001 - 16000
- 16001 - 20000
- 20001 - 30000
- 30001 - 50000
- 50001 - 100000
- 100001 - 103867

Approximate Property Boundary

70 0 70 140 210 Feet

NY. STATE PLANE NAD 27 (FEET)

SAIC
Science Applications International Corporation

ASHLAND SITE
TONAWANDA, NEW YORK

ATTACHMENT D

RESULTS FROM THE
1998 SEAWAY GAMMA
WALKOVER SURVEY

OVERLAIN ON 1995
AERIAL PHOTOGRAPHS

REVISION	DRAWN BY:	CHECKED BY:	DATE
0	M. NORRIS	D. KING	11/02/98

Referenced Files

Swaybase.dwg
08Combo
3-2BC1
3-2D2

SHT 1 of 1
PLATE #

G:\98017\PROJECTS\SITEBASE+WALKOVER.APR
ARCVIEW PROJECT NAME