LMS/NFS/S06246

Formerly Utilized Sites Remedial Action Program

Niagara Falls Storage Site Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches

October 2010

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Department of Energy
Office of Legacy Management

November 3, 2010

Subject: Transmittal of Final FUSRAP Niagara Falls Storage Site Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches

Dear Stakeholders:

I am pleased to provide the final report of the *Review of Radiological Conditions at Six vicinity Properties and Two Drainage Ditches at the Niagara Falls Storage Site Vicinity Properties, New York.* The U.S. Department of Energy (DOE) compiled this report in response to stakeholder concerns about radiological conditions and protectiveness of the Central Drainage Ditch and other closed vicinity properties near the Niagara Falls Storage Site (NFSS).

This report provides a summary of available information about radiological conditions on the selected closed vicinity properties, from the initial decontamination through the assessment, post remedial action, and verification. The remediation work was conducted in the 1980s. DOE finds that the reviewed sites remain protective under the current land use and restrictions.

This report is not a decision document, nor does it fulfill any regulatory requirement. DOE solicited public comment and input after the report was released in draft form in March 2010. Stakeholders were asked to provide any additional information concerning the reviewed properties that might not be included in the DOE document collection. After extending the comment period twice, DOE closed the comment period on June 14, 2010, in order to finalize the report.

DOE received 20 communications from stakeholders concerning the former Lake Ontario Ordinance Works. The comments and DOE responses are presented in a response summary, which is Appendix H of the final report. DOE will respond to comments provided at any time about conditions on the closed vicinity properties. We will amend the report if we receive additional information that changes of conclusions.

We look forward to working with the U.S. Army Corps of Engineers Buffalo District and the citizens of Lewiston and Porter as the NFSS cleanup is completed and the site is transitioned back to DOE for long-term surveillance maintenance. DOE will remain available and keep our stakeholders informed of DOE's activities during this transition.

Please contact Bob Darr, our public affairs specialist at:

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Sincerely,

Christopher Clayton
Site Manager

cc:
File: NFV 000(A) (rc-grand junction)

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Formerly Utilized Sites Remedial Action Program
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Abbreviations

AEC	U.S. Atomic Energy Commission
ALARA	as low as reasonably achievable
BNI	Bechtel National, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeter
CWM	Chemical Waste Management
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ft	foot/feet
FUSRAP	Formerly Utilized Sites Remedial Action Program
IWCS	Interim Waste Containment Structure
KAPL	Knolls Atomic Power Lab
LOOW	Lake Ontario Ordnance Works
m	meter(s)
m^2	square meter
MAP	Management Action Plan
MED	Manhattan Engineer District
μR/h	microroentgen(s) per hour (radioactivity measurement)
mrem	millirem (dose measurement)
NFSS	Niagara Falls Storage Site
NRC	U.S. Nuclear Regulatory Commission
NYDOH	New York State Department of Health
NYSDEC	New York State Department of Environmental Conservation
ORAU	Oak Ridge Associated Universities
ORNL	Oak Ridge National Laboratory
pCi/g	picocurie(s) per gram (contamination measurement)
SPRU	Separations Process Research Unit
SFMP	Surplus Facilities Management Program
TEDE	total effective dose equivalent
TNT	trinitrotoluene
USACE	U.S. Army Corps of Engineers
VP	vicinity property

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Executive Summary

Stakeholder concerns about final conditions at certain Niagara Falls Storage Site (NFSS) Vicinity Properties (VP) prompted the U. S. Department of Energy (DOE) to respond to the community with a desktop review of remediation documentation and land use of all VPs for which DOE has completed remediation activities under the Formerly Utilized Sites Remedial Action Program (FUSRAP). A more detailed data review was conducted for selected VPs (VP-Q, VP-R, VP-S, VP-T, VP-W, and VP-X) and associated drainages. DOE has determined that its assessment, remediation, and verification processes were thorough, and that FUSRAP wastes from the VPs have been remediated in accordance with DOE guidelines for unrestricted use.

The NFSS proper and associated VPs occupy approximately 1,500 acres of the original 7,500 acre Lake Ontario Ordnance Works (LOOW), a former trinitrotoluene manufacturing facility built during the 1940s. In 1944, the LOOW was reassigned to the Manhattan Engineer District (MED) and began to be used as a storage location for radioactive residues and other radioactive material that resulted from the development of the atomic bomb. By 1948, 6,000 acres of the original 7,500 acres were sold by the federal government, leaving the remaining 1,500 acres in the control of the newly formed U.S. Atomic Energy Commission (AEC), the agency that succeeded the MED.

In 1974, DOE began FUSRAP to address contamination at sites formerly used for MED and early AEC operations that were not addressed by other programs. DOE completed remediation of 23 of the 26 designated VPs before Congress transferred cleanup responsibilities under FUSRAP to the U.S. Army Corps of Engineers (USACE). The USACE Buffalo, NY, District is responsible for remediating the remaining three VPs and the NFSS proper under FUSRAP.[1]

The documentation in the DOE records collection was found to adequately describe final radiological conditions at the completed VPs. All FUSRAP wastes at the completed sites were cleaned up to meet DOE guidelines for unrestricted use. However, it was determined that certain other radiological materials remain on some of the VPs. These include wastes from other types of activities and types of slag that have been used for railroad ballast, road base, and structural fill throughout the Niagara Falls area. Remediation of these materials will need to be investigated further by regulators, USACE, and DOE.

If previously undiscovered contamination is found that is eligible for remediation under FUSRAP, DOE will refer the property to USACE for investigation and remediation in accordance with the Memorandum of Understanding between the two federal agencies (DOE and USACE 1999).

Comments were received on the Public Review Copy from Stakeholders from March 2010 through August 2010. These comments are addressed in a Responsiveness Summary located in Appendix H of this report which also includes copies of the original comments received.

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[1] NFSS proper refers to the 191-acre parcel owned by DOE and containing the Interim Waste Containment Structure. The NFSS VPs are nearby properties that were found to contain MED/AEC radiological contamination and are owned by other entities.

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1.0 Introduction

The Niagara Falls Storage Site (NFSS) is a small parcel (191 acres) within a much larger defense site—the former Lake Ontario Ordnance Works (LOOW), which is located 10 miles north of Niagara Falls, NY (Figure 1−1). The LOOW was constructed in 1942 and encompassed approximately 7,500 acres. During World War II, the U.S. Army built and operated a trinitrotoluene (TNT) plant on approximately 2,500 acres of the site known as the “developed zone.” The remaining 5,000 acres were used as a “buffer zone” around the TNT plant. The plant manufactured bulk TNT for approximately nine months and was decommissioned in 1943 (USACE 2009).

In 1944, the Manhattan Engineer District (MED) started storing uranium ore processing residues on approximately 1,650 acres of the former developed zone of the LOOW. Between 1947 and about 1952, the U.S. Atomic Energy Commission (AEC) continued to import, store, and dispose of radioactive wastes on the LOOW and used the site for transshipment of processed uranium and other radioactive materials. AEC relocated most of the stored material to the NFSS proper in the 1950s.

The residues and waste came from multiple sources. Most of the radioactive material stored at LOOW was from uranium ore processing. This material, known as residues, consisted of finely crushed rock from which the uranium was removed, but still contained uranium decay products. Most of the residues contained only low levels of radioactivity and came from sources such as the Linde site in Tonawanda, NY. However, MED also stored residues left from processing ore from the Belgian Congo, some of which contained as much as 65 percent uranium (the “K-65” residues). These were actually owned by the mining company and MED acquired only the uranium portion of the ore, but the U.S. Government acquired title to these residues and placed them in the Interim Waste Containment Structure (IWCS) on NFSS proper.

Other sources of radioactive material included the Knolls Atomic Power Laboratory, the University of Rochester, and material used for the construction of road and railways (slag). The slag contains low levels of radioactivity and was brought onto the LOOW during construction of the TNT facility.

If the radioactive material encountered at LOOW did not come from MED or early AEC operations, or if it was managed under a different program, that waste may not be eligible for remediation under the Formerly Utilized Sites Remedial Action Program (FUSRAP). DOE generally left these materials in place.

In the 1950s, AEC consolidated the storage of radioactive materials and reduced the footprint of the operation. Excess property surrounding the operations areas was subdivided and sold to the public or transferred to U.S. Department of Defense (DOD) ownership. Of the original AEC acreage, only the 191-acre NFSS remains under DOE ownership.

The NFSS and the NFSS VPs were included in FUSRAP by DOE. In the 1980s DOE remediated 23 of the VPs and consolidated the wastes into the 10-acre IWCS located on the NFSS. The VPs were certified to meet DOE guidelines for unrestricted use by DOE in 1990.

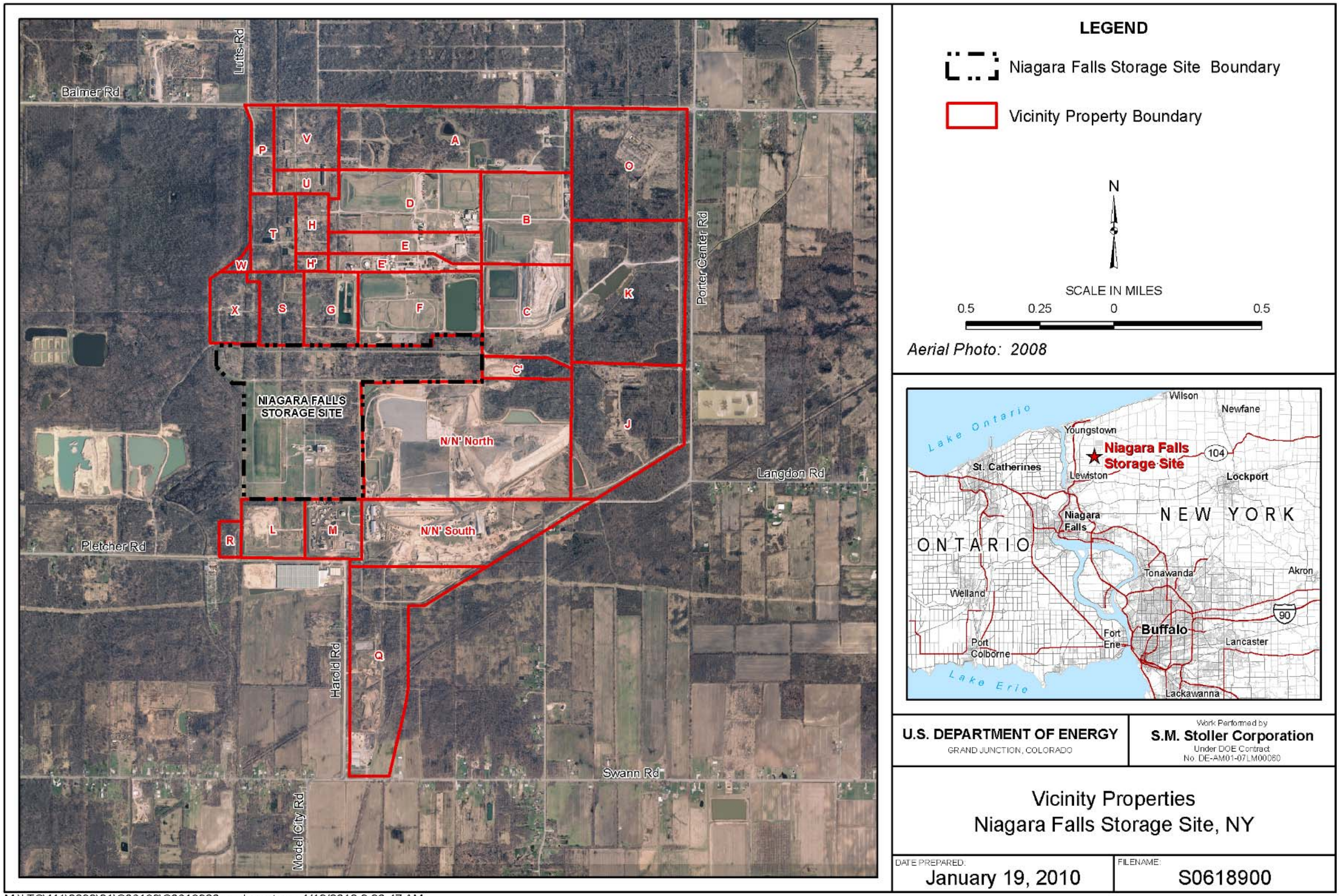

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Figure 1–1. NFSS Vicinity Map

Responsibility for cleanup of FUSRAP sites was transferred from DOE to the U.S. Army Corps of Engineers (USACE) in 1997. USACE is responsible for conducting remediation activities at the NFSS and the NFSS VPs for which remediation was not complete at the time of transfer from DOE. USACE is also responsible for remediation of other DOD-related contamination at the LOOW, including contamination that may be identified on completed FUSRAP VPs.

The VPs are currently either vacant or used for industrial, local government, or commercial purposes. The majority of completed VPs were found to have restricted access and are used for either hazardous materials or municipal landfills.

1.1 Objective

This desktop review included (1) current land use and final radiological conditions for all of the completed VPs and (2) a more detailed records review of six VPs (VP-Q, VP-R, VP-S, VP-T, VP-W, and VP-X) and associated drainages (Figure 1−2). These six areas were selected by DOE based on specific stakeholder inquiries, the accessibility of the properties, and proximity to former operations on the NFSS.

The objectives were as follows:

- Ensure that DOE records of FUSRAP activities at NFSS and NFSS VPs is complete;
- Review documentation of the assessment, remediation, and verification of the completed VPs to confirm that those properties meet cleanup standards; and
- Determine if new information indicates the need to refer a completed VP to USACE for assessment.

1.2 Review Scope

This review concentrated on site records located within DOE's Considered Sites Library as well as the USACE Buffalo District's holdings. While most of the summary reports and correspondence were located in these holdings, some field records and planning documents could not be located, and DOE will continue to the search for them.

DOE interviewed members of the team that conducted the original verification surveys, and coordinated with the New York State Department of Health (NYDOH), the New York State Department of Environmental Conservation (NYSDEC), and the U.S. Environmental Protection Agency (EPA) as well as USACE in gathering additional information.

The majority of completed VPs were found to have restricted access and currently are being used for either hazardous materials or municipal landfills.

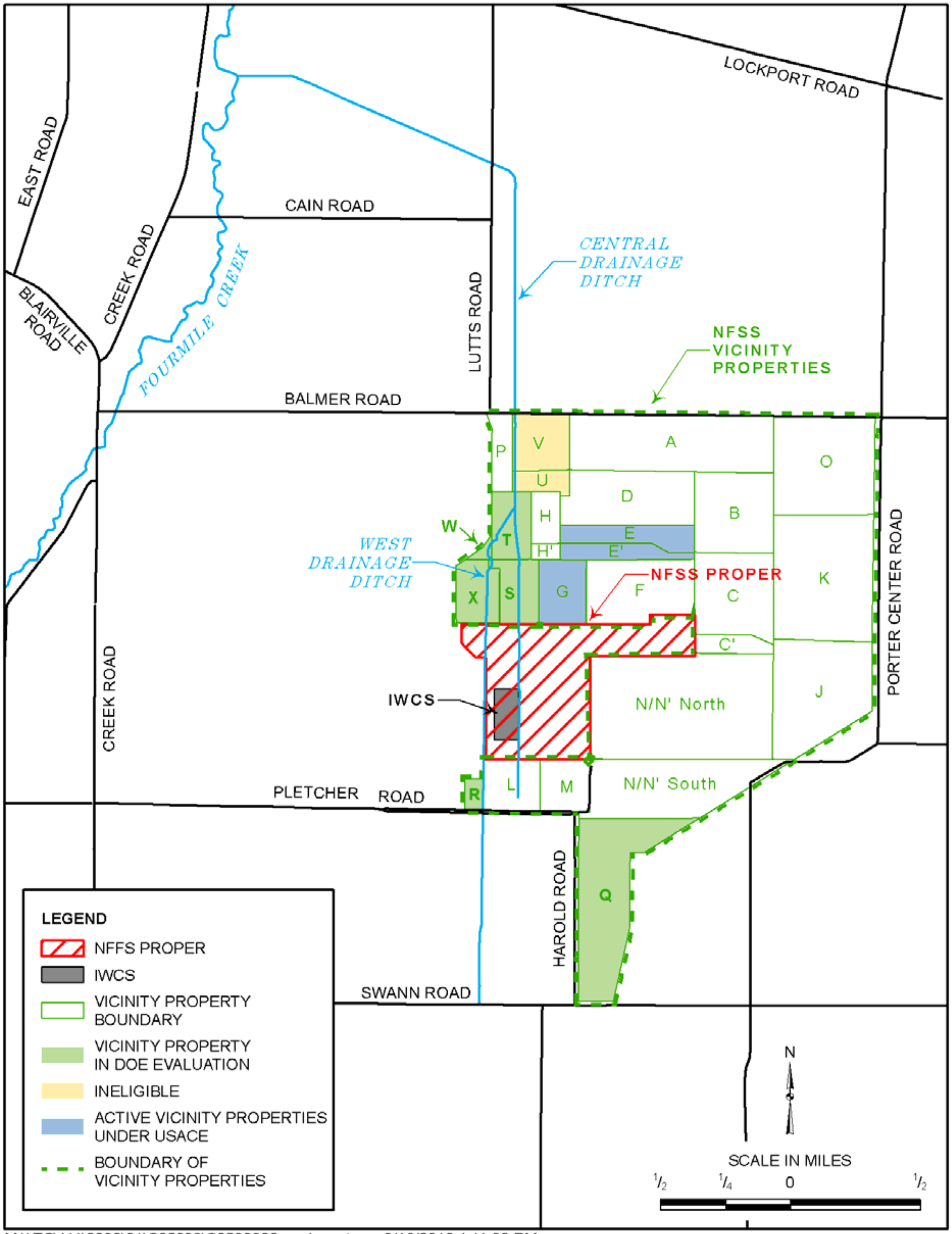

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Figure 1–2. NFSS Vicinity Properties Addressed by the Review

2.0 Roles on FUSRAP NFSS Vicinity Properties

The following sections outline the roles and responsibilities of DOE, USACE, state and federal agencies, and stakeholders involved with the NFSS and its VPs.

2.1 U.S. Department of Energy

FUSRAP was created in 1974. Cleanup of eligible FUSRAP sites was the responsibility of the AEC and its successor agency, DOE, until 1997. AEC/DOE was self-regulated under the Atomic Energy Act and established cleanup criteria and remediation processes for FUSRAP sites (see additional discussion in Section 4.2). Under FUSRAP, DOE was responsible for the cleanup of only radiological contamination. For remediation of the NFSS VPs, correspondence records indicate that NYSDEC, NYDOH, and EPA were kept informed and consulted during the decontamination, assessment, and remediation.

During review of the NFSS and surrounding areas, conducted in the 1970s and 1980s under the authority of DOE, properties adjacent to the NFSS that were known or suspected of having been used for storage of radioactive materials were designated as VPs for environmental response and were assigned letter designations (Figure 1−2). As of March 1997, DOE had completed remediation of all but three VPs and DOE retains responsibility for long-term surveillance of the completed VPs. The NFSS and the three partially remediated VPs (VP-E, VP-E′, and VP-G) are still active FUSRAP sites under the authority of USACE.

In addition to long-term surveillance and maintenance activities for the completed VPs, DOE is responsible for determining if new information or changed site conditions warrant the referral of a completed site to USACE for additional assessment and, if necessary, remediation, and for determining if a new site is eligible for remediation under FUSRAP.

DOE uses the following criteria to determine if a site should be referred to USACE for further assessment:

- A third-party characterization or survey reveals existing MED- or AEC-related contamination that was not previously identified;
- A review of historical records indicates the potential for existing MED/AEC contamination that was not previously identified; or
- An individual with credible institutional knowledge provides information that additional MED/AEC contamination might exist that was not identified in previous assessments.

2.2 U.S. Army Corps of Engineers

Congress transferred responsibility for assessing and remediating FUSRAP sites from DOE to USACE in 1997. In March 1999, DOE and USACE entered into a Memorandum of Understanding for the purpose of delineation, administration, and execution of responsibilities for FUSRAP (DOE and USACE 1999). It was agreed that USACE has the authority to administer and execute cleanup activities at eligible FUSRAP sites pursuant to the provisions of the Energy and Water Development Appropriations Act of 1998, the Energy and Water Development Appropriations Act of 1999, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the National Oil and Hazardous Substances

Pollution Contingency Plan. In addition, it was agreed that DOE does not have regulatory responsibility or control over the FUSRAP activities of USACE. Except as noted in the Memorandum of Understanding, USACE is responsible for all environmental response activities at a FUSRAP site until two years after remedial action is complete, at which time DOE assumes responsibility for long-term surveillance and maintenance of the site.

USACE is responsible for the cleanup of FUSRAP wastes from the NFSS and the three VPs that were still “active” when the program was transferred in 1997. Additionally, USACE is responsible for cleanup of DOD-related wastes from approximately 6,500 acres of the LOOW, which includes the NFSS and VPs. This cleanup is being conducted under the Defense Environmental Restoration Program for Formerly Used Defense Sites.

2.3 State and Federal Regulatory Agencies

NYSDEC provides input and oversight of the USACE Buffalo District’s ongoing FUSRAP cleanup, as well as regulatory oversight of the Modern Municipal Companies municipal waste landfill and Chemical Waste Management (CWM) hazardous waste landfill. These landfills occupy the majority of the VPs and access is restricted to the VPs that lie within their properties. NYSDEC has established guidelines for the cleanup of soils contaminated with radioactive materials (DSHM-RAD-05-01). NYSDEC policy states that the total effective dose equivalent (TEDE) to the maximally exposed individual of the general public from radioactive material remaining after site cleanup shall be as low as reasonably achievable (ALARA) and less than 10 millirem (mrem) above that received from background levels of radiation in any one year.

NYDOH maintains land use controls over portions of the NFSS and VPs. These were first imposed in 1972 after initial AEC activities indicated that dose rates from stored radioactive materials were potentially hazardous to the public. These controls, in the form of use restrictions, are still in effect for several of the completed VPs and prevent the properties from development or disturbance of the surface without an acceptable plan approved by the Commissioner of Health (Wallo 1980 and DOE 1980). Under these restrictions, the owner or future owner of a restricted property is responsible for performing the necessary due diligence in the case of sale of the property or a change in surface conditions or land use to ensure compliance with the restrictions.

EPA Region 2 provides regulatory oversight of the USACE operations and assists NYSDEC in its oversight of the municipal and hazardous waste landfill operations.

2.4 Stakeholders

USACE currently has a public outreach program for the LOOW and NFSS that is highlighted in the *Public Involvement Plan for the Former Lake Ontario Ordnance Works Site (Defense Environmental Restoration Program for Formerly Used Defense Sites) and Niagara Falls Storage Site (Formerly Utilized Sites Remedial Action Program)* for Lewiston and Porter, New York for 2009-2010 http://www.lrb.usace.army.mil/derpfuds/loow-nfss/loow-nfss-publicinvolvplan-2009-05.pdf (May 2009).

USACE has allowed DOE to present information to stakeholders at USACE public meetings. DOE has provided contact information to stakeholders and DOE will respond to stakeholder inquiries.

Stakeholders may contact DOE through Bob Darr, Public Affairs, at 720-377-9672 or bob.darr@lm.doe.gov.

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3.0 Site History

This section provides a chronological history of operations, investigations, and remedial actions performed on the VPs, including the properties that are the focus of this review.

3.1 Operations

The LOOW was initially established on 7,500 acres of land as a TNT facility and operated from 1942 until 1944, when the site was reassigned from the Army to MED. The majority of the activities were conducted on 1,500 acres of the site as the “Developed Area” (USACE 2009). The “Undeveloped Area” was approximately 6,000 acres that surrounded the active process areas and served as a buffer for the site.

Between 1944 and 1954, MED/AEC stored low-level wastes on the Developed Area. These wastes consisted primarily of residues from uranium processing operations, but also included contaminated rubble and scrap from decommissioning activities, other biological and miscellaneous wastes from the University of Rochester, and low-level fission-product wastes from contaminated-liquid evaporators at the Knolls Atomic Power Lab (KAPL).

From 1955 to 1975, more than 1,300 acres of the Developed Area were transferred or sold to private concerns, leaving the current interior 191 acres that the NFSS comprises. The surrounding acreage that had been sold or transferred became known as the NFSS Vicinity Properties (AEC 1973).

3.2 Cleanup Activities

3.2.1 Early Decontamination Activities

During October 1970 and June 1971, radiological surveys of the approximately 1,300 acres formerly held by AEC indicated that about 6.5 acres exceeded the AEC exposure criterion of 50 microroentgens per hour (μR/h). As a result of this survey, 15,000 to 20,000 cubic yards of contaminated soil and debris were removed and transported to the NFSS during 1972 (AEC 1973).

In 1971, EG&G conducted an aerial survey of the greater Niagara Falls area (EG&G 1978). This survey identified several areas of elevated gamma radiation. Most of these areas were later shown to contain a slag-type material similar to wollastonite ($CaSiO_3$); this material was referred to in various reports as pseuodwollastonite or cyclowollastonite. This material was reported to be of natural origin, probably the byproduct of a local metal processing or phosphorous extraction process.

In April 1972, following a review of AEC’s survey data, NYDOH placed land-use restrictions on all the excessed properties (Town of Lewiston 1980 and Wallo 1980).

In October 1978 DOE conducted another follow-up aerial survey using a helicopter for more sensitive readings (EG&G 1978). The survey did not indicate the presence of any significant gamma radiation off site except for in the drainage ditches. A mobile ground scanning was also performed to confirm the areas identified by the aerial survey (DOE NY.17-7 1979).

In 1979 and 1980, Battelle Columbus Laboratories conducted a comprehensive radiological characterization of the NFSS, including the West and Central Drainage Ditches, both on site and off site (Battelle Columbus Laboratories 1981). This survey identified contamination that exceeded DOE guidelines along the entire length of the West Drainage Ditch and the upstream portion of the Central Drainage Ditch. This initiated a resurvey of the off-site areas to determine whether any residual contamination existed in other areas. DOE began a systematic review of the VPs, as summarized in Section 3.2.2.

3.2.2 Vicinity Property FUSRAP Activities

The following is a chronology of the FUSRAP-related activities undertaken by DOE for the NFSS VPs:

- **1981:** Bechtel of Oak Ridge, Tennessee, replaced National Lead Company as the manager of the NFSS.
- **1982:** A Background and Resurvey Recommendations investigation was performed on the AEC portion of the LOOW (VPs) (Aerospace Corp 1982).
- **1981–1985:** Oak Ridge Associated Universities (ORAU) and Oak Ridge National Laboratory (ORNL) performed comprehensive radiological surveys of the individual vicinity properties that made up the 1,300 acres that were formerly part of the AEC-owned portion of the LOOW and lie outside the boundaries of the NFSS proper (ORAU 1983a through 1983e and ORAU 1984a through 1984s). Gamma exposure rates on 21 of the 26 properties exceeded DOE guidelines. (See Appendixes A through G for results associated with the six NFSS VPs and associated drainages addressed in this report.)
- **1983–1986:** Bechtel National, Inc., (BNI) performed remedial/post-remedial actions for DOE Oak Ridge Operations Office on the individual VPs based on the comprehensive radiological assessments by ORAU and ORNL.
- **1983–1984:** Supplemental Residual Contamination Guidelines were developed, as part of the remedial/post-remedial action being performed on the Central Drainage Ditch (BNI 1986).
- **1983–1989:** ORAU, under contract to DOE for FUSRAP, performed independent verification surveys and sampling on each of the VPs. Three of the properties could not be surveyed due to an inability to access the ground surface because of existing wet areas or ponds and paved areas. These VPs (VP-E, and VP-E′ and G) continue to be classified as active VPs to be evaluated and remediated in the future by USACE.

The radiological surveys conducted by DOE between 1979 and 1985 indicated that the majority of contamination was located on the NFSS proper and associated drainages. Remedial activities were completed in 1986 by DOE which removed approximately 50,000 cubic yards of low-level radiologically contaminated soil. The contaminated soil and the uranium residues are stored in the IWCS that is located on the NFSS. USACE is actively performing a Remedial Investigation/Feasibility Study under CERCLA on the NFSS. The remaining VPs are completed and are in a records-only status as the Niagara Falls Vicinity Properties, New York Site with the exception of three VPs that will remain open until assessment/remediation can be performed by USACE.

4.0 DOE Vicinity Property Cleanup Process

4.1 Definition of FUSRAP Waste

For wastes to be eligible for cleanup under FUSRAP, the following requirements must be satisfied:

- The wastes must have been generated by MED/AEC activity, which occurred from approximately the 1940s to the early 1960s (requires historical and process knowledge).
- The wastes have radioactive contaminants.
- The wastes must not be addressed under another program (e.g., CERCLA, U.S. Nuclear Regulatory Commission [NRC] license).

FUSRAP wastes primarily consist of low levels of uranium or thorium, along with their associated decay products. Wastes include ores and residues or similar materials derived from processing the ores (similar in character to uranium mill residues), as well as radioactive scrap and other process wastes.

DOE was not authorized to remediate waste under FUSRAP that resulted from non-FUSRAP eligible activities. Indicators that waste is not eligible under FUSRAP include the following:

- The waste was brought to or used at the site before or after the 1940s to 1960s time frame.
- The waste was not related to MED/AEC activity (e.g., activities conducted by DOD).
- The waste has characteristics unlike known FUSRAP wastes for a given site (based on site-specific knowledge of MED/AEC activities).

Based on these criteria, wastes described in Section 4.2 that would not be eligible for remediation under FUSRAP wastes are the pseudowollastonite and metal separation slag. Other materials to be evaluated for eligibility under FUSRAP are related to the University of Rochester and Knolls Atomic Power Lab/ Separations Process Research Unit (KAPL/SPRU). Based on process knowledge, when other radiological materials were encountered during assessment, remediation, and verification, DOE contractors generally left them in place and documented their occurrence.

4.2 Other Radiological Materials

Other radiological materials were identified during the FUSRAP cleanup activities described in Section 3.2.2 and are described in the following:

- **Knolls Atomic Power Lab/Separations Process Research Unit (KAPL/SPRU) wastes:** These wastes consist of semisolid neutralized radioactive waste, fission products from evaporator bottoms of a fuel reprocessing pilot plant. This was a federal research and development project to extract plutonium and uranium from canisters in support of the development of the PUREX process. The federal research was conducted on a laboratory scale and never production plant size (Aerospace Corp 1982). KAPL/SPRU is currently being addressed at the Schenectady, NY facility under a separate program by the DOE Office of Environmental Management. If KAPL wastes exceeding current guidelines are determined to exist on the NFSS or any of the completed VPs, USACE and DOE will coordinate to determine the necessary path forward.

- **Metal separation slag:** Prior assessment surveys identified numerous pieces of slag-like rock in the base material beneath an asphalt parking lot north of a two-story structure on VP-P. These pieces of slag-like material were determined to contain elevated radionuclide concentrations as high as 940 picocuries per gram (pCi/g) of the Th-232 decay series and as high as 190 pCi/g of the U-238 series. Both of these naturally occurring decay series appeared to be in secular equilibrium (that is, generally found in concentrations that indicate the material was not processed to remove a particular radionuclide). The slag-like material was therefore considered to be non FUSRAP eligible and was not removed as part of the remediation of this property. (Berger 2009).
- **Pseudowollastonite slag:** Pseudowollastonite slag was commonly used mostly as construction material for road base and railroad grades in Niagara County during the time of LOOW construction. Pseudowollastonite slag was identified at numerous locations, both on the NFSS VPs (for example, VP-H) and at other locations in the Lewiston and Niagara Falls area. The slag was described as typically very hard and exhibiting a glass-like blue/green/gray coloring. The pieces were typically 1 to 2 inches in size and had generally flat sides with distinct edges. The individual pieces did not appear to be weathered or worn, suggesting that the slag was mechanically fractured into these small pieces. This type of slag contains equal activities of uranium and radium, in the range of approximately 5 to 50 pCi/g. It is not regarded as a FUSRAP waste originating from AEC/MED operations, but instead as part of the construction materials brought in by contractors constructing the LOOW in the early 1940s. ORNL attributed it to early elemental phosphorus operations by Niagara Falls electrochemical plants (Berger 2009).
- **University of Rochester:** Radiation safety research was performed by the University during the MED era on VP-G, an active FUSRAP site not addressed under this project. Burial of contaminated carcasses and waste from laboratory animals occurred on VP-G. Ignitors for nuclear Model 1 (strontium 90) and Model 3 gaps (cesium-137) were sent to LOOW for storage or burial. One gap reading 11 μR/h on contact was removed from the University of Rochester burial area (Aerospace Corp 1982). VP-G remains active due to areas that could not be adequately surveyed during the comprehensive assessments (surface structures or ponds) and therefore was not remediated. Future RI work will need to be performed prior to determining whether the site can be closed or will require remediation. If during the RI work any of the University of Rochester waste is determined to be FUSRAP related, then DOE will evaluate a path forward with USACE.

4.3 FUSRAP Cleanup Guidelines

Under FUSRAP, DOE cleanups did not fall under the authority of any separate regulatory agency. There were no formal cleanup criteria established by statute. FUSRAP guidelines for residual radioactive materials (DOE 1987) were developed for the protection of public health and the environment based on radiation protection dose standards consistent with recommendations of the International Commission on Radiological Protection; guidelines established for other remedial programs (e.g., Title 40 *Code of Federal Regulations* Part 192); and guidelines established in DOE Orders (Orders 5480.1A & B, superseded by Order 5400.5). Guidelines for radiation protection and for residual radioactive contamination that are currently in DOE Order 5400.5, "Radiation Protection of the Public and the Environment," are identical to and supersede the FUSRAP Guidelines (DOE 1987) and are generally referred to in this document as the "DOE guidelines."

DOE guidelines include a basic dose limit for the general public for exposure to radiation from DOE activities (including remedial actions) of 100 mrem/yr above normal background. This basic dose limit, which is based on International Commission on Radiological Protection recommendations, was used to establish generic soil guidelines that apply to "worst-case plausible-use" scenarios (DOE Order 5400.5). The basic dose limit can also be used to calculate site-specific soils cleanup levels for radionuclides that do not have numerical limits or for site-specific exposure scenarios. (Numerical limits have also been developed for surface contamination of structures. Those are not discussed here because, with the exception of an old warehouse located on Property B, the remedial action at NFSS involved removal of contaminated soil, therefore, the soil guidelines are most relevant to the data review summarized in this report).

The generic soil guidelines are based on average radionuclide concentrations over an area of 100 square meters (m^2). The generic guidelines for radium-226, radium-228, thorium-230, and thorium-232 are 5 pCi/g above background averaged over 100 m^2 in the first (surface) 15-centimeter- (cm-) thick soil layer and 15 pCi/g above background averaged over 100 m^2 within any subsequent 15-cm-thick soil layer below the surface layer (Table 4−1).

Table 4–1. Standards for Remediation of FUSRAP Residual Radioactive Contamination at the NFSS VPs

Type of Occurrence	Standard
Contamination in Soil	FUSRAP/SFMP Guidelines[a] DOE Order 5400.5[b] Derived limits for total uranium and cesium-137[c]
Surface Activity (structural surfaces)	FUSRAP/SFMP Guidelines[a] DOE Order 5400.5[b]
Gamma Exposure Rate (interior areas only)	FUSRAP/SFMP Guidelines[a] DOE Order 5400.5[b]
Radon Decay-Product Concentration (interior areas only)	FUSRAP/SFMP Guidelines[a] DOE Order 5400.5[b]
Total Effective Dose Equivalent	FUSRAP/SFMP Guidelines[a]

[a] DOE (U.S. Department of Energy), 1987. *Guidelines for Residual Radioactive Material at Formerly Utilized Sites Remedial Action Program (FUSRAP) and Remote Surplus Facilities Management Program Sites.*
[b] DOE Order 5400.5, *Radiation Protection of the Public and the Environment.*
[c] DOE (U.S. Department of Energy), 1988. *Derivation of a Uranium and Cesium-137 Residual Radioactive Material Guidelines for the Niagara Falls Storage Site,* Argonne National Laboratory, Chicago, IL, August.

DOE guidelines also establish criteria for evaluating "hot spots" based on the areal extent and maximum concentration of contamination, and a mixture rule for occurrences where more than one radionuclide is present.

During the assessment and cleanup process discussed in Sections 4.4 through 4.6, assessment and verification data were compared not only to DOE guidelines but also to background or baseline measurements collected throughout the Lewiston area. Background measurements used during verification activities for radium-226 and thorium-232 ranged up to 1.2 pCi/g. Background surface exposure rates (at 1 meter [m] above ground surface) ranged from 7 to 9 μR/h (Table 4−2).

Table 4–2. Background Radionuclide Concentrations at the NFSS VPs

Radionuclide	Background[a]
Radium-226	<0.9 to 1.22 pCi/g
Thorium-232	0.32 to 1.18 pCi/g
Uranium-235	<0.14 to 0.46 pCi/g
Uranium-238	< 2.20 to 6.26 pCi/g
Cesium-137	<0.02 to 1.05 pCi/g
Dose Rate at 1 m	6.7 to 8.6 μR/h

[a] DOE ** to DOE

Key: m = meter(s); pCi/g = picocurie(s) per gram; μR/h = microroentgens per hour

DOE conducted remediation activities to result in contamination levels that were "as low as reasonably achievable" (DOE Order 5400.5). This concept refers to an approach to radiation protection to control or manage (1) exposures (both individual and collective, to the workforce and the general public) and (2) releases of radioactive material to the environment as low as social, technical, economic, practical, and public policy considerations permit. The objective of the DOE guidelines is to attain dose levels as far below the applicable limits as is reasonably achievable.

4.4 Assessment Process

For each of the properties included as a VP, a comprehensive radiological survey was conducted by ORAU or ORNL. The technical approaches as well as the results of these surveys are summarized in separate reports for each property (ORAU 1983a through 1983e and ORAU 1984a through 1984s). The surveys employed a systematic approach to characterizing radiological contamination at each site as follows:

- Brush and weeds were cleared as necessary to provide access for gridding and surveying.
- A grid system was established for each property. Grids ranged in size from 10 m to 80 m, depending on the known history of the site and whether contamination was likely to be present. Previous survey data (for example, the Battelle Columbus Laboratories survey), if available, were also used to make this determination.
- Gamma exposure rates were measured at the surface and 1 m above the surface for each grid interval.
- Beta-gamma rates were measured 1 cm above the surface at each grid interval.
- Surface soil samples were collected at grid intervals, and from within each gridded area in a systematic, non biased, uniform sampling procedure.
- Additional, biased samples were collected from those areas of known contamination and at locations where more detail was required.
- Walkover surface scans were conducted over accessible areas of each property.
- Where walkover scans detected elevated surface radiation, beta-gamma dose rates and exposure rates at 1 m above the surface were measured. Surface soil samples were collected,

and surface exposure rates were re-measured to determine the effectiveness of sampling on source removal.

- Analysis of soil samples included Th-232, U-238, Th-230, Cs-137, and Ra-226.
- Ground penetrating radar surveys were performed at selected properties where known burial areas existed.
- Boreholes were drilled and logged at selected locations. Borehole locations were placed at locations of known previous burials, at selected locations of surface contamination, and at locations of surface targets identified by ground penetrating radar. Samples were collected from the borings included grab water samples and soils. Downhole gamma logging was performed on the borings prior to completion. Additional locations were also distributed throughout the accessible portions of the properties to provide more representative data.

The survey reports compared sample results to cleanup guidelines and identified areas where radionuclide concentrations exceeded the guidelines. Volumes of material requiring remediation were estimated. The survey reports included maps showing the sampling grids, borehole locations, other sampling locations, and areas where radionuclide concentrations in soil exceeded criteria. Results of all grid sampling were also included (analytical results, gamma, and beta-gamma) in the summary reports. However, the field documentation supporting the summary reports were not included (walkover survey data).[2]

4.5 Remediation Process

Based on the radiological survey results, engineering drawings were prepared to guide remediation activities. These delineated the identified areas exceeding the remediation guidelines. Remediation activities consisted of the following:

- Contaminated areas were resurveyed and marked for excavation.
- Contaminated soils were removed from marked areas to the depth specified.
- After excavation, a gamma scan of the excavated area was performed to ensure that no significant areas of contamination remained. Additional contamination was removed, if necessary, until average concentrations met DOE guidelines.
- A 10 foot (ft) grid was established in the excavated areas, and soil samples were collected from alternate grid intersections (every 20 ft) for confirmatory analysis.
- Gamma count rates were obtained for each grid intersection point.
- Excavated areas were backfilled with clean fill material.

Two post-remedial-action reports were prepared: one for remediation activities conducted in 1983 and 1984 (BNI 1986) and one for remediation activities conducted in 1985 and 1986 (BNI 1989). These reports summarized the remediation activities and the post-remediation status for each property. Maps were included showing the extent of excavations and the locations of post-remediation samples. Laboratory data for post-remediation sampling was also provided in these reports.

[2] DOE may have found the gamma walkover survey data in ORAU records. Confirmation and acquisition of the data for the DOE FUSRAP collection is pending.

4.6 Verification Process

Following the post-remedial-action sampling, ORAU performed an independent verification of the cleanup work for the VPs. The verification process included the following:

- A review of characterization reports, engineering drawings, and post-remedial-action reports.
- Laboratory analysis of selected samples (sample splits) collected by the remediation contractor to confirm the accuracy of the post-remedial-action sampling results.
- A survey of the excavated areas, including visual inspections, gamma scans, direct measurements, and surface and subsurface sampling, on representative portions of the excavated areas.

Results of the verification work were compared with background exposure rates and soil concentrations for the Lewiston area. Results of verification sampling were included in the two verification reports (ORAU 1989 and ORAU 1990).

Statements of certification were prepared that addressed all of the completed sites and were signed by the director of DOE Oak Ridge Operations Office. The statements indicated that the properties were determined to be in compliance with DOE decontamination criteria and standards (DOE Order 5400.5 and FUSRAP Guidelines). Letters of certification were sent to property owners. After remediation of all VPs was completed (except those that were transferred to USACE), DOE-HQ published a *Federal Register* notice of certification for the NFSS VPs site and made the certification docket available for public review (DOE 1992).

5.0 Results of DOE Investigations

Table 5−1 summarizes information from the comprehensive radiological assessments, the post-remedial-action reports, and the verification reports for all of the VPs that were certified as "completed" at the time the remainder of the project was transferred to USACE.

Current land use was evaluated by representatives of DOE Office of Legacy Management on two occasions, in September and December 2009. Aerial photos were reviewed to determine current site land use. The following sections describe conditions observed during the 2009 site visits and from the review of 2008 aerial photography. A 1951 aerial photograph of these sites is also provided for comparison with the 2008 aerial photographs. On-site photographs could not be obtained from VP-S, VP-T, and VP-W, because the areas were fenced and secured by the owner, CWM.

Specific information for the six VPs and the associated drainages is provided in the following sections.

5.1 Vicinity Property Q

VP-Q covers approximately 89 acres (36 hectares). It is the southernmost VP, bounded on the west by Harold Road and on the south by Swan Road. The northern boundary is a fence dividing Town of Lewiston property and that owned by the operator of a municipal landfill. South Patrol Road forms the northeast boundary and the eastern boundary is not delineated by a feature. Three structures were located on the property during the MED/AEC operations; these structures have since been demolished or destroyed by fire.

A former railroad grade can be observed in aerial photographs (2008 and 1951) running from southwest to northeast and also north and south across the property. The central portion of the property is accessible to the public.

5.1.1 Current Land Use

Current land use can be described as a mixture of municipal landfill (north), a small-arms firing range (central), composting/materials-storage-area (central), and Town of Lewiston maintenance shops on the southernmost tip (Figure 5−1).

5.1.2 Review Findings

Assessment data tables, a survey grid, and the remedial action survey information is located in Appendix A. Table 5−1 summarizes the pre-remediation assessment, remediation action, post-remedial action, and verification results.

Surface scans during verification identified three regions of elevated radioactivity. The area near former warehouse location was cleaned up to background levels. Areas adjacent to railroad tracks had cinder and ash-like materials that were cleaned up to near-background levels. Elevated gamma levels near a dirt access road were associated with ash-like material. This area was cleaned up, and remediation resulted in reduced exposure rates (14–24 μR/h); samples met DOE guidelines. A large remediated area had gamma scans within range of background. Soil was removed from two small areas of contamination, and subsequent sampling was within the baseline range.

Table 5–1. Summary of Radiological Conditions at the NFSS Vicinity Properties

VP-ID	Ownership/ Access	Pre-remediation Assessment Status	Remediation Performed	Post-remedial Action Status	Verification Status	Current Land Use/Site Conditions
A	CWM/ Perimeter Fence and security	80 m grid samples <5 pCi/g; numerous areas isolated; contamination identified on walkover scans; mainly small rock chips, crushed rock; likely would meet 100 m^2 guideline	4 areas decontaminated; backfilled	All samples < 5 pCi/g	Remediated areas at background; isolated elevated areas identified, removed, and rescanned.	Hazardous waste landfill operations
B	CWM/ Perimeter Fence and security	40 m grid samples <5 pCi/g; 100 m^2 guideline exceeded in areas around warehouse; warehouse exceeds surface criteria for buildings; incomplete scan of warehouse interior due to stored waste containers	7 areas decontaminated; backfilled	4 samples exceed 5 pCi/g; met average of 4.1 pCi/g (excluding background)	Cleanup to remove polychlorinated biphenyls (PCBs) will address residual radiological contamination	Hazardous waste landfill operations
C	CWM/ Perimeter Fence and security	40 m and 20 m grid samples all <5 pCi/g; no areas of surface contamination identified in walkover survey	Remediation not required	Not applicable	Not applicable	Hazardous waste landfill operations
C′	CWM/ Perimeter Fence and security	Samples collected sitewide on 20 m grid; one area subdivided into 10 m grid; elevated naturally occurring and MED/AEC materials identified ; hot spots identified on south-central portion of property	4 areas decontaminated; not backfilled because below water	2 samples exceed 5 pCi/g (excluding background); meet average of 1.9 pCi/g (including background)	Additional cleanup performed based on elevated readings; following cleanup, 2 locations exceeded 15 pCi/g but met hot spot criteria for 1 m^2 and DOE criteria for 100 m^2	Hazardous waste landfill operations
D	CWM/ Perimeter Fence and security	All 40 m grid samples <5 pCi/g; walkover surveys identified small pieces of elevated materials; rock samples with elevated uranium and thorium; numerous areas with small isolated pieces of contaminated materials (not dispersed in soil)	8 areas decontaminated	1 sample exceeds 5 pCi/g; average 1.3 pCi/g above background	Residual pieces of material removed; no elevated readings following removal	Hazardous waste landfill operations
F	CWM/ Perimeter Fence and security	40 m and 20 m grid samples all <5 pCi/g; small isolated areas of elevated concentration identified by walkover scan, and sampling removed most of this; many isolated areas of contamination located adjacent to main roads, suggesting minor spills	1 area decontaminated and backfilled	Sample meets 5 pCi/g	1 elevated area removed; remaining soil <5 pCi/g	Hazardous waste landfill operations

Table 5−1 (continued). Summary of Radiological Conditions at the NFSS Vicinity Properties

VP-ID	Ownership/ Access	Pre-remediation Assessment Status	Remediation Performed	Post-remedial Action Status	Verification Status	Current Land Use/Site Conditions
H	CWM/ Perimeter Fence and security	<3% of 20 m grid locations exceeded 5 pCi/g; met 100 m^2 guideline; areas of slag material used in the Niagara Falls area	Remediation not required	Not applicable	Not applicable	Currently undeveloped by CWM
H′	CWM/ Perimeter Fence and security	Large area of property (6,000 m^2 in eastern portion); down to 50 cm in depth	1 large area decontaminated and backfilled	5 samples exceed 15 pCi/g; average for 100 m^2 meets 15 pCi/g	Small chips removed at elevated areas; black cinder-like material removed; only remaining elevated areas were naturally occurring slag	Currently undeveloped by CWM; USACE has identified elevated Ra-226 in recent survey under former staging area –DOE currently evaluating data
J	Modern Affiliated Companies/ Perimeter Fence and security	All 80 m grid samples at background levels; no elevated surface readings	Remediation not required	Not applicable	Not applicable	Undeveloped
K	Modern Affiliated Companies/ Perimeter Fence and security	All 80 m grid samples at background levels; no elevated surface readings	Remediation not required	Not applicable	Not applicable	Undeveloped
L	Modern Affiliated Companies/ Perimeter Fence and security	Isolated areas of surface soil exceeding guidelines along streets on east and south sides of property based on walkover sampling; few 20 m grid samples exceeded 5 pCi/g	2 areas decontaminated and backfilled	2 samples exceed 5 pCi/g; average concentration = 1.7 pCi/g above background	4 individual samples above 5 pCi/g; areas meet 5 pCi/g when averaged over 100m^2	Undeveloped
M	Modern Affiliated Companies/ Perimeter Fence and security	All 20 m grid samples < 5 pCi/g; elevated areas noted in walkover survey, most not removed by sampling; soil exceeds criteria at two areas along Campbell Street and few other isolated areas	3 areas decontaminated and backfilled	5 samples exceed 5 pCi/g; average per 100 m^2 is 5.6 pCi/g excluding background	Slightly elevated measurements; 6 samples exceed 5 pCi/g over background; average over 100 m^2 meets guidelines	Municipal landfill operations

Table 5−1 (continued). Summary of Radiological Conditions at the NFSS Vicinity Properties

VP-ID	Ownership/ Access	Pre-remediation Assessment Status	Remediation Performed	Post-remedial Action Status	Verification Status	Current Land Use/Site Conditions
N/N′ North	Modern Affiliated Companies/ Perimeter Fence and security	**N′ North**: 10 m grid; walkover survey identified several general and numerous isolated elevated areas; 13% of grid samples exceeded 5 pCi/g; small white chips with highly elevated Ra-226 and U-238 **N North**: 80 m grid; walkover survey identified 2 general and several isolated elevated areas; highest Ra-226 levels were ballast; yellowcake identified	Property decontaminated per agreement with Modern Landfill	1 location exceeded 15 pCi/g, but 100 m^2 average was 6.6 pCi/g; 1 location with 44 pCi/g U-238 met hot spot criteria	Small isolated elevated levels removed; further remediation done in other areas; surveys show 100 m^2 guideline met; gamma rates slightly higher than other VPs due to railroad ballast with naturally occurring uranium	Municipal landfill operations
N/N′ South	Modern Affiliated Companies/ Perimeter Fence and security	80 m grid; 10 m grid in incinerator and Track Street areas; 80 m grid samples all <5 pCi/g; elevated concentrations in incinerator and Track Street areas; 2 areas where 100 m^2 average exceeds 5 pCi/g	11 areas decontaminated and backfilled	Average on property 1.3 pCi/g above background; 2 samples >15 pCi/g, but these areas meet 15 pCi/g criteria averaged over 100 m^2	2 isolated elevated areas reduced by surface sampling to background levels; verification samples met baseline levels or cleanup criteria	Municipal landfill operations
O	Southport Rail Transfer LLC./ Fence only	All 20 m grid samples at background levels; no elevated surface measurements; natural slag-like materials present; indoor measurements determined radioactive contaminants not present	Remediation not required	Not applicable	Not applicable	Currently undeveloped
P	CWM/ Perimeter Fence and security	All 20 m grid samples <5 pCi/g; several elevated locations identified in walkover survey (all but 1 in paved parking lot); paving material assumed to be natural slag	1 area decontaminated and backfilled	Sample meets 5 pCi/g	No elevated measurements; 1 sample at baseline levels	Currently undeveloped by CWM
Q	North Modern Affiliated Companies/ Fenced South Town of Lewiston/ Accessible	Elevated contaminants identified in samples from 20 m grid samples and samples from elevated walkover areas; 2 general areas exceeded the 100 m^2 guideline for Ra-226; other isolated areas of contamination could be eliminated by removing small amounts of material	20 areas decontaminated and backfilled	2 samples exceed 15 pCi/g; average over 100 m^2 meets 15 pCi/g	4 regions and 2 small areas with elevated measurements; additional cleanup and small removals performed; subsequent sampling met 5 pCi/g	North: Municipal Landfill Middle: Small-arms firing range South: Town of Lewiston Maintenance Building

Table 5−1 (continued). Summary of Radiological Conditions at the NFSS Vicinity Properties

VP-ID	Ownership/ Access	Pre-remediation Assessment Status	Remediation Performed	Post-remedial Action Status	Verification Status	Current Land Use/Site Conditions
R	Niagara Mohawk National Grid/ Accessible	Several 20 m grid samples exceeded 5 pCi/g; general area of contamination identified along Pletcher Road.; 2 other isolated areas identified	3 areas decontaminated and backfilled	1 location >5 pCi/g but <15 pCi/g; average excluding background was 1.1 pCi/g	1 elevated area required further remediation; subsequent sampling met 15 pCi/g guideline before backfilling; other locations <5 pCi/g	Undeveloped. West Drainage borders the east side of the property between R and L. South of EU9(USACE 2009)
S	CWM/ Perimeter Fence and security	All 40 m grid locations <5 pCi/g; several samples from 5 m grid in vicinity of concrete pad >5 pCi/g and exceeded 100 m^2 guideline, but attributed to natural slag; other area with elevated Ra-226 is site-related but meets 100 m^2 guideline	1 area decontaminated and backfilled	All samples <5 pCi/g excluding background	No elevated readings	Currently undeveloped by CWM
T	CWM/ Perimeter Fence and security	Numerous elevated areas identified in 20 m grid survey and sampling; 3 types of material identified—only 1 of MED/AEC origin (rock-like material and sediment dredged from West Ditch)	37 small areas decontaminated and backfilled	6 locations > 5 pCi/g above background; all < 15 pCi/g; average 1.5 pCi/g above background	Elevated concentrations by Central Drainage Ditch and haul road and additional remediation performed; small areas > 15 pCi/g; hot spot and average guidelines met	Currently undeveloped by CWM
U & V	Somerset Group/	Samples from the 20 m grid and biased samples based on walkover survey exceeded 5 pCi/g; many of these were determined to be natural slag-like material with comparable Ra-226 and U-238 levels and not from MED/AEC activities; rock-like material with Ra-226 elevated above U-238 was likely MED/AEC	8 areas decontaminated and backfilled	All samples <5 pCi/g above background	Additional small areas remediated based on elevated levels; additional sampling met guidelines; scans at baseline levels	Currently undeveloped. All future federal liability on these properties has been resolved and is now ineligible from investigation under FUSRAP.
W	CWM/ Perimeter Fence and security	Samples from 40 m grid survey all at baseline; elevated areas identified from walkover survey near West Drainage Ditch; Ra-226 concentrations up to 102 pCi/g	2 areas decontaminated and backfilled	All samples <5 pCi/g	No elevated readings; samples <5 pCi/g above background	Currently undeveloped by CWM

Table 5−1 (continued). Summary of Radiological Conditions at the NFSS Vicinity Properties

VP-ID	Ownership/ Access	Pre-remediation Assessment Status	Remediation Performed	Post-remedial Action Status	Verification Status	Current Land Use/Site Conditions
X	Town of Lewiston/ Accessible	40 m grid samples <5 pCi/g; 2 general areas exceeding criterion along with biased samples based on walkover survey; small areas meet 100 m^2 guideline	14 areas decontaminated and backfilled	All samples <5 pCi/g	Elevated gamma scans identified ash material for removal; additional scans not elevated; verification samples <5 pCi/g; some naturally occurring material may remain at site (rock and slag used for fill in the area)	Abandoned structures / fall hazards Evidence of trespassing
Pletcher Road	Accessible	No specific assessment report	26 areas decontaminated and backfilled	Average overall was 4.2 pCi/g above background; 3 samples exceeded 15 pCi/g but averages in those areas over 100 m^2 were < 15 pCi/g	Gamma scans identified several small elevated areas; further remediation performed; 2 locations exceeded 15 pCi/g but met hot spot criteria	Active roadway for access to municipal landfill, residences, greenhouse industry and KOA campground
West Drainage Ditch	Accessible	Composite sample (each bank plus midpoint) collected every 30 m to its confluence with Central Drainage Ditch; highest concentration = 75 pCi/g	Ditch was decontaminated but not backfilled	7 individual samples exceed 5 pCi/g but meet 100 m^2 guideline; average overall for ditch is 0.5 pCi/g above background	Several areas elevated along lower banks but areas were small and not remediated; verification samples met 5 pCi/g criterion	Overgrown and undeveloped. USACE EU9 identified some elevated levels which will be addressed during the FS
Central Drainage Ditch	Northern portion/ Accessible	Composite sample (each bank plus midpoint) collected every 30 m to its confluence with Fourmile Creek; concentrations up to 1,900 pCi/g	Portions of ditch were decontaminated but not backfilled; farthest downgradient portion not remediated and supplemental limits applied	Average remediated ditch concentration of 1.2 pCi/g above background; 7 areas exceed 5 pCi/g averaged over 100 m^2 but are less than 15 pCi/g	Verification samples indicated all but one met 5 pCi/g for excavated portion of ditch; ditch met 100 m^2 guideline	Overgrown and undeveloped to the North of the NFSS VPs and CWM and WETS Military facility

References:
Comprehensive Radiological Surveys, ORNL 1983–1986.
Post Remedial Action Reports for 1983–1984, BNI 1986
Post Remedial Action Reports for 1985–1986, BNI 1989
Verification of 1983–1984 Remedial Actions, ORAU 1989
Verification of 1985–1986 Remedial Actions, ORAU 1990
USACE Management Action Plan, USACE 2009

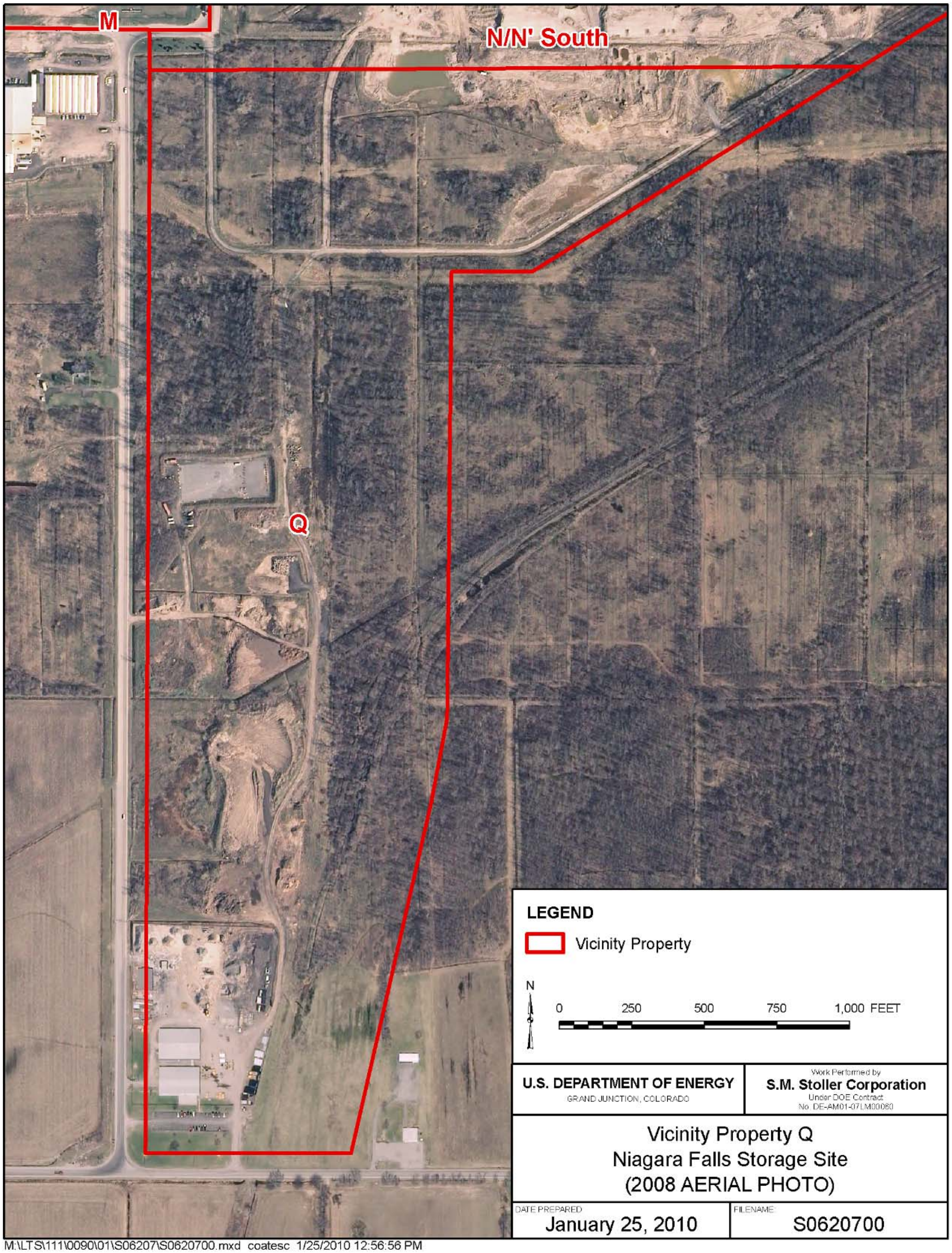

Figure 5–1. 2008 Aerial Photo of Vicinity Property Q

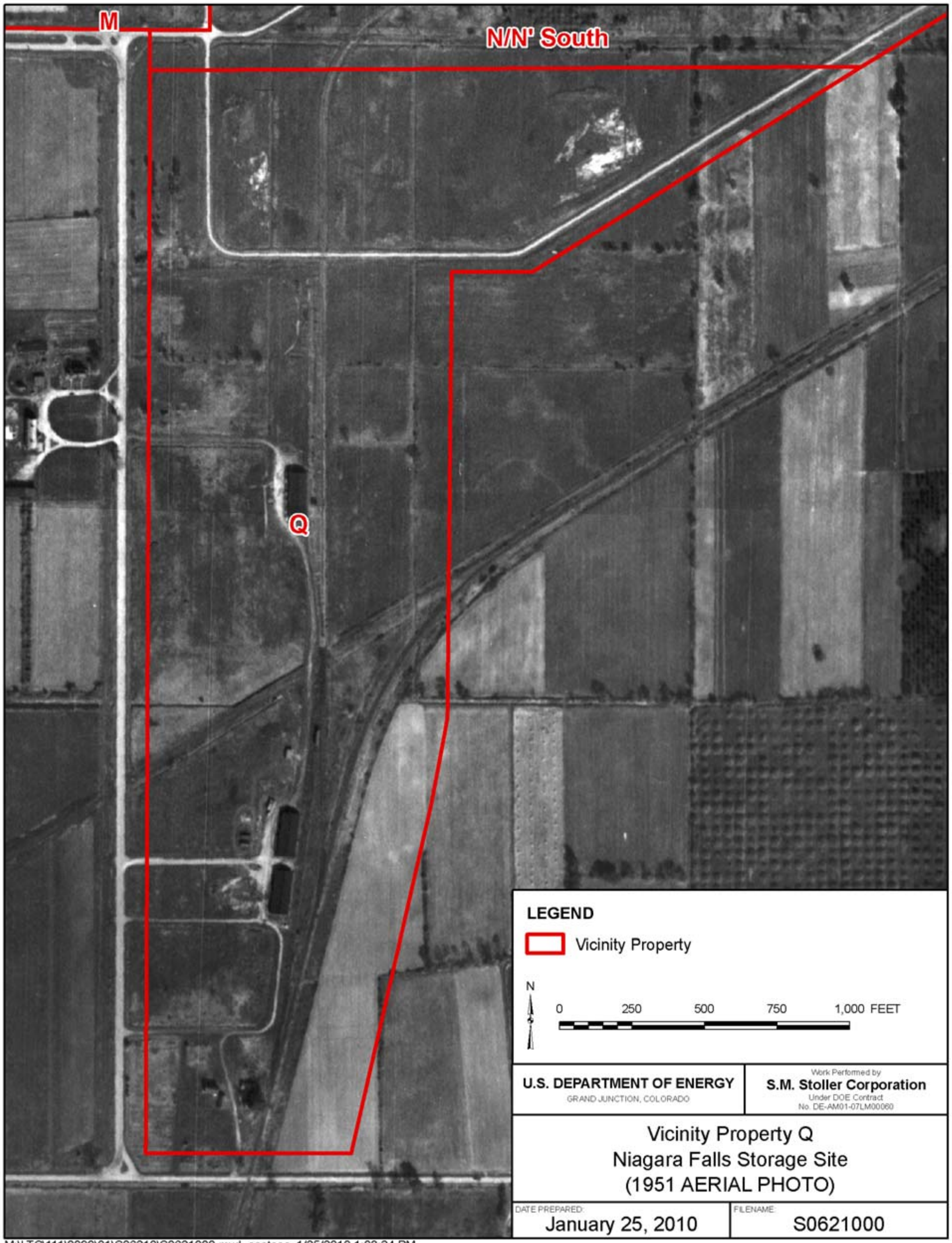

Figure 5–2. 1951 Aerial Photo of Vicinity Property Q

Figure 5–3. VP-Q: Fenceline Separating Modern Landfill and Small-Arms Range (East from Harold Road)

Figure 5–4. VP-Q: Entrance to Small-Arms Firing Range (Central to the Property, East of Harold Road, and North of Town of Lewiston Maintenance Shops)

Figure 5–5. VP-Q: View Northeast up Harold Road (Town of Lewiston Shops)

5.2 Vicinity Property R

VP-R is rectangular and measures approximately 190 m × 120 m (623 ft × 394 ft). The site borders Pletcher Road, which forms the southern boundary of the property. The West Drainage Ditch is located along the eastern boundary between VP-R and VP-L. The property is south of the EU9 currently being investigated by USACE in its RIR/BRA. Power transmission lines cross the property in a north-south direction, and a paved road provides access to the power lines. There are no structures located on the property and it is accessible to the general public as evidenced by dumping along the access road.

5.2.1 Current Land Use

VP-R is currently owned by Mohawk Power Grid. The land is vegetated and undeveloped with the exception of the access road and power lines. The West Drainage Ditch bounds the eastern boundary of the site where it is adjacent to VP-L. Farther east from the drainage are industrial greenhouses, and residences and a KOA campground are to the south and east.

5.2.2 Review Findings

Assessment data tables and survey grid as well as the remedial action survey information is located in Appendix B. Table 5−1 summarizes the pre-remediation assessment, remediation action, post-remedial action, and verification results.

Gamma exposure rates in and near the remediated area were slightly elevated (12–14 μR/h), but soils samples were generally within baseline levels. All samples met DOE guidelines.

Further remediation was performed at areas of isolated elevated gamma exposure rates (29−34 μR/h). Follow-up samples were less than 15 pCi/g, and exposure rates were 13–14 μR/h before the area was backfilled.

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Figure 5–6. 2008 Aerial Photo of Vicinity Property R

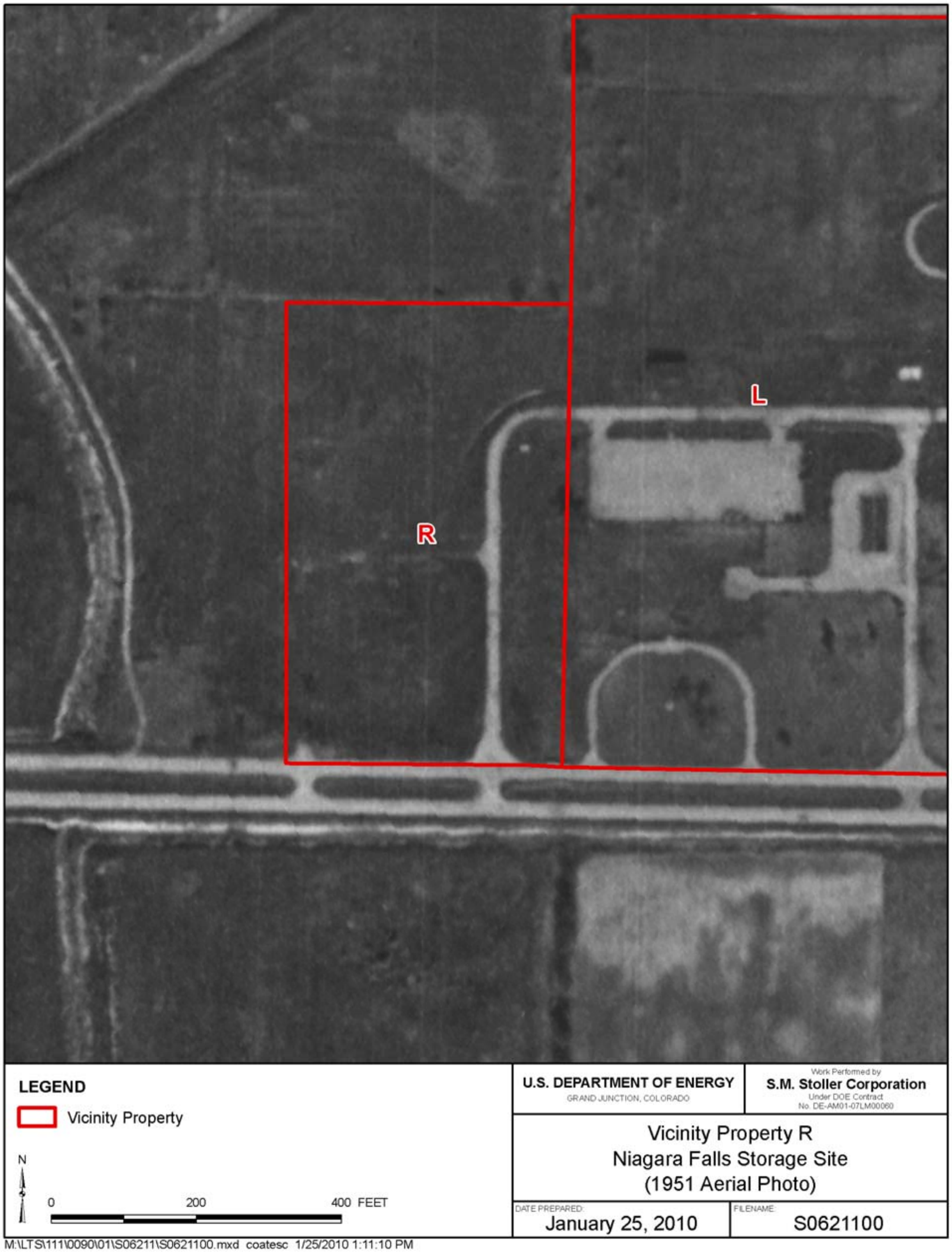

Figure 5–7. 1951 Aerial Photo of Vicinity Property R

Figure 5–8. VP-R: View of Access Road that Parallels the West Drainage Ditch (December 2009)

Figure 5–9. VP-R: View North of West Drainage Ditch that Flows Through the VP

5.3 Vicinity Property S

VP-S is bounded by M Street on the north and by Campbell Street on the east. NFSS is located directly south of the property. The Town of Lewiston owns the section of VP-X immediately bordering VP-S on the west. There are no structures associated with the property; however, there is a concrete pad adjacent to M Street. The Central Drainage Ditch passes through VP-S in a north-south direction. The property is fenced and monitored by security.

5.3.1 Current Land Use

VP-S is currently owned by Chemical Waste Management as part of their hazardous waste landfill operations. The property is well vegetated and undeveloped. Figure 5−10 and Figure 5−11 show the property in 2008 and 1951.

5.3.2 Review Findings

Assessment data tables and survey grid as well as the remedial action survey information are in Appendix C. Table 5−1 summarizes the pre-remediation assessment, remediation action, post-remedial action, and verification results.

Gamma exposure rates were 10–14 μR/h in the small area that was remediated. It was determined that the cleanup met DOE Order 5400.5 and FUSRAP Guidelines for Unrestricted Use.

5.4 Vicinity Property T

VP-T measures 420 m × 235 m (1,378 ft × 771 ft). The property is bounded by I Street on the north, M Street on the south, Wesson Road on the east, and Lutts Road on the west. Sections of the West and Central Drainage Ditches pass through the property. Out-of-service railroad tracks are also located on the western side of VP-T. All the structures on this property were constructed for the Mathieson rocket fuel operations during the 1950s but the majority of the buildings were demolished as of the 1960s aerial photography (Aerospace Corp 1982). Concrete pads and foundations remain at various locations on the property, indicating additional structures were present at one time. VP-T is located just northeast of VP-X.

5.4.1 Current Land Use

Currently VP-T is undeveloped. It is inaccessible to the public due to a perimeter fence and security provided as part of the Chemical Waste Management operations.

The property is well vegetated and undeveloped. Figure 5−10 and Figure 5−11 show the property in 2008 and 1951.

5.4.2 Review Findings

Gamma scans identified regions of elevated contact radiation along the banks of the Central Drainage Ditch and the haul road areas adjacent to the Central Drainage Ditch. There areas were remediated further by BNI and follow-up direct monitoring and sampling confirmed that efforts were effective in reducing residual activity to acceptable levels. Final gamma exposure rates at 1 m above the surface ranged from 7 to 17 μR/h. Results of the verification sampling (Table 11 in Verification section of Appendix D) identified small areas of residual Ra-226 activity in excess of the 15 pCi/g guideline levels for subsurface soil at grid coordinates N2516,E76; N2814,E273; N2475,E495; N2720,E365; N2795,E435; N2905,E355; N2905,E395; and N2910,E430. Maximum Ra-226 level in samples from these locations was 103 pCi/g. Direct

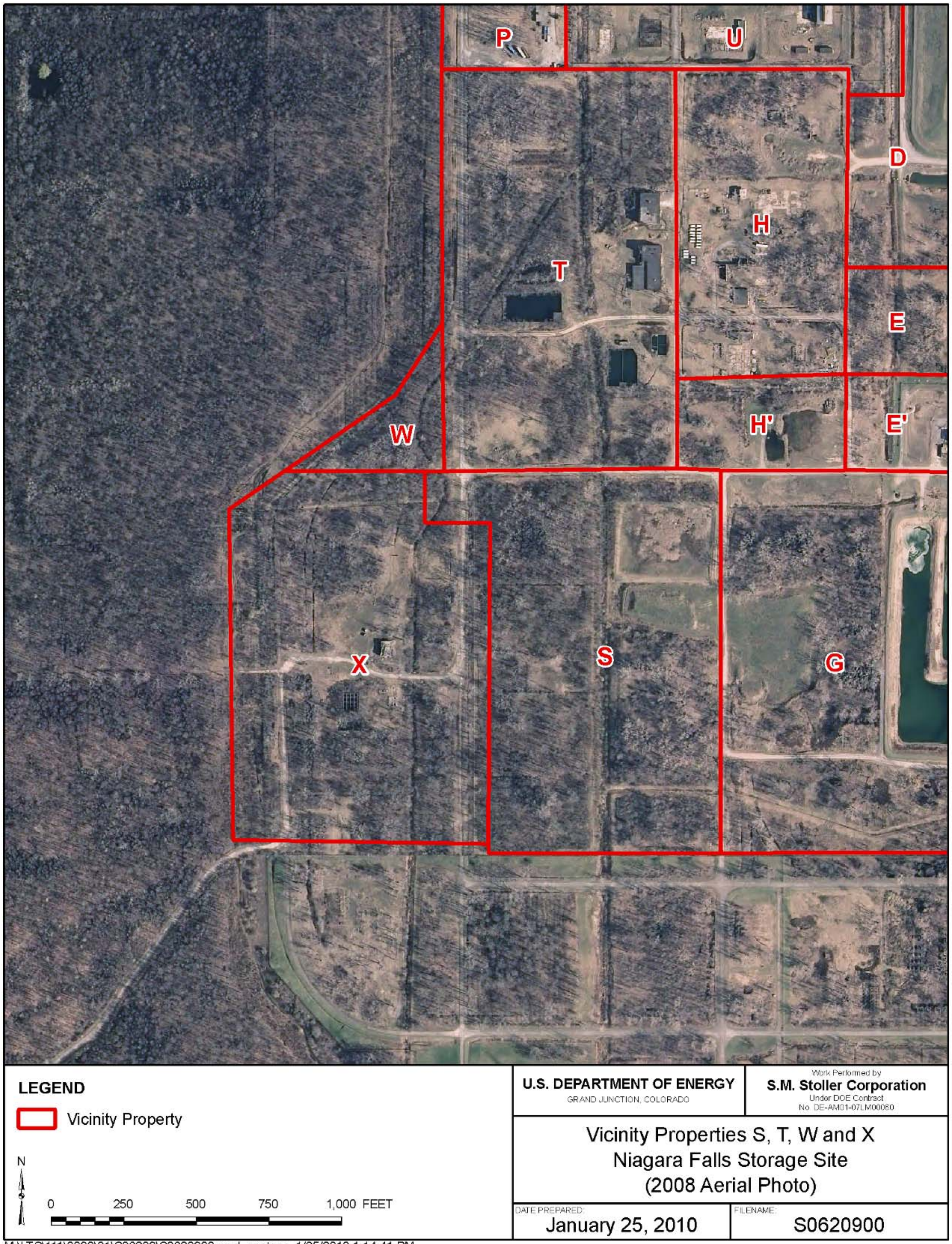

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Figure 5–10. 2008 Aerial Photo of Vicinity Properties S, T, W, and X

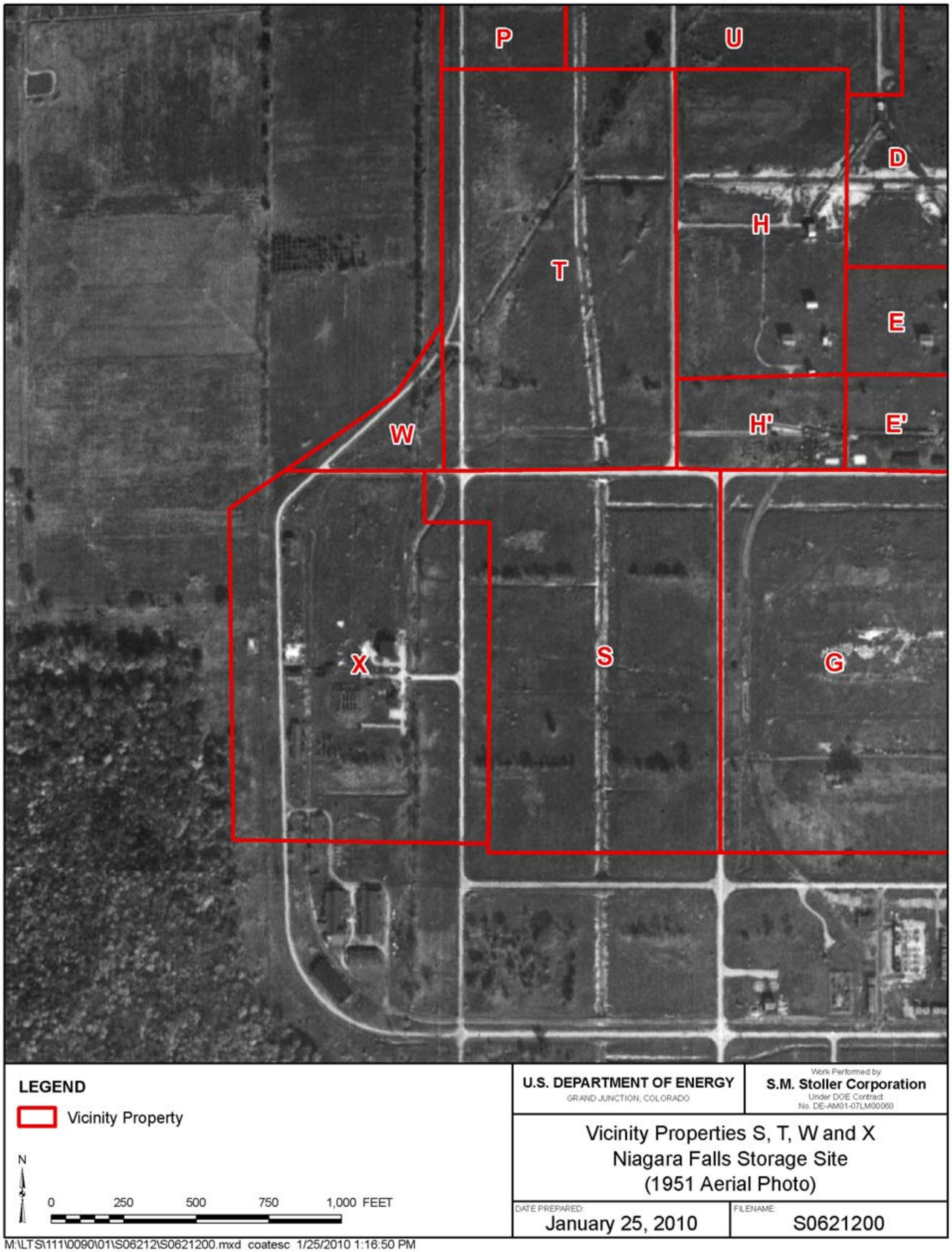

Figure 5–11. 1951 Aerial Photo of Vicinity Properties S, T, W, and X

monitoring and additional samples from contiguous 100 m^2 areas at these locations demonstrated that the residual contamination was confined to small (<1 m^2) isolated areas and that satisfied the Hot-Spot criterion and average guideline numerical standard.

Assessment data tables and survey grid as well as the remedial action survey information are in Appendix D. Table 5−1 summarizes the pre-remediation assessment, remedial action, post-remedial action, and verification results.

5.5 Vicinity Property W

VP-W is the smallest of the NFSS VPs. It is triangle-shaped, and its southern boundary is VP-X along M Street. A chain-link security fence forms the boundary along the northwest perimeter. There are no structures on VP-W. The West Drainage Ditch passes through the eastern section of the property.

5.5.1 Current Land Use

The property is currently well vegetated and undeveloped. The property is owned by CWM and therefore is inaccessible.

5.5.2 Review Findings

Assessment data tables and survey grid as well as the remedial action survey information are in Appendix E. Table 5−1 summarizes the pre-remediation assessment, remedial action, post-remedial action, and verification results.

Gamma scans identified elevated contamination along the banks of the Central Drainage Ditch and haul-road areas adjacent to the Central Drainage Ditch within the boundary of VP-W. These areas were remediated further during the Post Remedial Action and Verification surveys. Final gamma exposure rates were 7 to 17 μR/h. Verification sampling identified small areas exceeding the 15 pCi/g guideline (maximum 103 pCi/g Ra-226). Additional exposure rate measurements and sampling over a 100 m^2 area indicated contamination was limited to less that 1 m^2. The area met the hot-spot criterion (150 pCi/g) and the 100 m^2 guideline prior to backfilling.

5.6 Vicinity Property X

VP-X is roughly rectangular and measures approximately 223 m × 404 m (732 ft × 1,325 ft). M Street forms the northern property boundary. The NFSS forms the south boundary of VP-X. West Patrol Road and Lutts Road cross the property in a north-south direction along the western and eastern perimeters, respectively. Located near the center of VP-X are abandoned facilities that were part of the former wastewater treatment plant for the LOOW. Operation of the sewage plant ceased in the mid-1970s, and all that remains are the concrete structures of the plant. A chain-link fence separates the property from the NFSS but the site is still accessible by the public from the west. Railroad loading platforms straddle the border between VP-X and the NFSS Proper. The vicinity shops are located on the NFSS proper.

5.6.1 Current Land Use

The property is currently derelict and in disrepair but a four-wheeler access road allows the area to be monitored for trespassing. VP-X is currently owned by the Town of Lewiston, which is planning to construct a fence surrounding the property to deter trespassing and to prevent injury from animals or humans falling into the open tanks or foundations.

5.6.2 Review Findings

Assessment data tables and survey grid as well as the remedial action survey information is located in Appendix F. Table 5−1 summarizes the pre-remediation assessment, remedial action, post-remedial action, and verification results.

Two regions of elevated gamma exposure rates were identified (17–40 μR/h). At one area, these measurements were associated with materials that had approximately equal concentrations of Ra-226 and U-238, indicating naturally occurring rock and slag. This was commonly used as fill and paving base in the Niagara Falls area and is considered non-FUSRAP eligible materials and, therefore, this area was not remediated. At the other location, elevated gamma levels were associated with a black ash, possibly from incineration activities. Gamma exposure rates were as high as 130 μR/h. This material was cleaned up to 20 μR/h. Gamma scans over a large remediated area on the south property boundary were 7 to 12 μR/h in the vicinity of the rail loading platforms. Verification samples met DOE guidelines.

Figure 5–12. VP-X: View Northeast from IMHOFF Tank to Remains of Pump House

Figure 5–13. VP-X: IMHOFF Tank

Figure 5–14. VP-X: View West from IMHOFF Tank at Access from the Holding Ponds Off-site

Figure 5–15. VP-X: West Drainage Ditch within VP-X (West of the Sewage Treatment Plant)

5.7 Drainages

The West Drainage Ditch is one of the two major drainage ditches that flow on and off of the NFSS proper. The West and Central Drainage Ditches are shown in Figure 5−16. The West Drainage Ditch became radioactively contaminated as a result of surface erosion over the years. It begins at a point to the south of NFSS and flows northward for approximately 1,372 m (4,501 ft) where it intersects with the Central Drainage Ditch just north of the NFSS boundary in the vicinity of VP-X, VP-W, and VP-S.

The Central Drainage Ditch, which is the largest of the drainage ditches, originates on VP-L on the NFSS. It flows approximately 5.63 kilometers (3.5 miles) to its confluence with Fourmile Creek north and west of the NFSS and the VPs.

5.7.1 Current Land Use

The ditches continue to drain the NFSS and VPs and are heavily vegetated. No change in land use is anticipated.

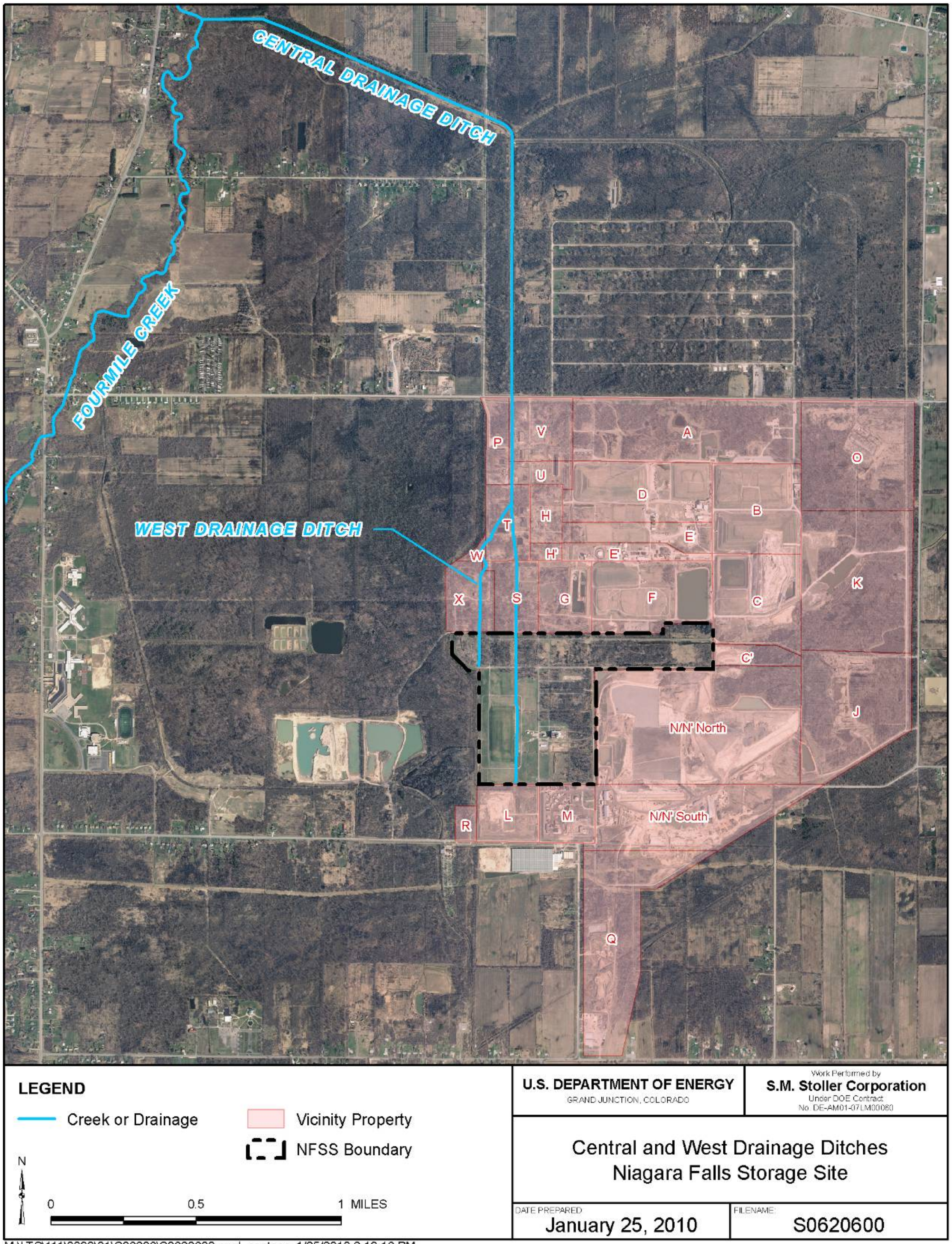

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Figure 5–16. Central and West Drainage Ditches (Niagara Falls Storage Site)

5.7.2 Review Findings

Assessment data tables and survey grid as well as the remedial action survey information is located in Appendix G. Table 5−1 summarizes the pre-remediation assessment, remediation action, post-remedial action, and verification results.

Contact exposure rates in the West Drainage Ditch were 17–42 µR/h. These areas were located mainly along the lower banks and were < 1 m^2, isolated occurrences, therefore it was determined that no further remediation was necessary. Verification soil samples were collected at 200 ft intervals along the ditch between DOE property and its intersection with the Central Drainage Ditch and were found to meet the DOE guidelines (Oct 1989; 1983 and 1984 Verification Survey). No further remediation was performed.

Contact and general exposure rates in the remediated portion of the Central Drainage Ditch were 7–16 µR/h. All but one sample location met DOE guidelines. The location that was above guidelines was isolated and was therefore averaged over 100 m^2 according to DOE guidelines. (Note that the initial characterization of the Central Drainage Ditch did not identify elevated gamma readings based on surface scans of the unexcavated portion of the ditch.)

Exposure rates in the unexcavated portion were only slightly above DOE guidelines and, based on sampling and risk analysis, it was determined that supplemental standards be applied to this portion of the ditch in accordance with the FUSRAP Guidelines. Subsequent sample results from USACE during their annual environmental surveillance program indicated no levels above background in the sediment or the surface water exiting the Central Drainage Ditch (USACE 2008).

5.7.2.1 USACE RI/BRA Findings

During the 2001 site-wide gamma walkover survey of the NFSS property, gamma radiation in surface soil above background was detected on the western border of the NFSS property adjacent to the National Grid property within EU9 north of the VP-R. The Corps continued the gamma walkover survey from the NFSS fenceline westerly into the west ditch on National Grid property. A strip of ground, including the ditch, approximately 60 ft × 820 ft was surveyed. Several isolated spots in this area displayed elevated radioactivity two to three times the natural background level of approximately 9,000 to 13,000 counts per minute (USACE 2008).

Figure 5–17. Central Drainage Ditch South from Balmer Road (September 2009)

Figure 5–18. Central Drainage Ditch View North Toward IWCS (September 2009)

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6.0 Conclusions

DOE has determined that the records collection was found to adequately describe final radiological conditions at the completed VPs. All FUSRAP wastes at the completed sites were cleaned up to meet DOE guidelines for unrestricted use.

In the future, if previously undiscovered contamination is found that is eligible for remediation under FUSRAP, DOE will refer the property to USACE for investigation and remediation in accordance with the Memorandum of Understanding between the two federal agencies (DOE and USACE 1999).

6.1 Stakeholder/Outstanding Issues

The review of the documentation from the completed VPs included consideration of outstanding issues associated with NFSS and the VPs as understood from stakeholder meetings. The stakeholder issues centered on responsibilities for the removal of certain residual radioactive materials remaining on the completed NFSS VPs. The following were determined to be included in that category:

- KAPL/SPRU: A portion of these materials were temporarily stored at the waste water treatment plant (VP-X); however, no evidence of contamination from these materials was found during the assessment, remediation or verification of this completed property. DOE will review available information to determine an appropriate response.
- Metal separation slag: This material was commonly used in the surrounding Niagara Falls area for road base and construction. Path forward will need to be addressed internally with regulators.
- Pseudowollastonite slag: This material was commonly used in the surrounding Niagara Falls area for road base and construction.
- University of Rochester: On open VP-G; USACE will address this material when they remediate this property.

A review of the origin and content of the above mentioned materials which were not removed during the assessment, remediation, and verification of the completed VPs determined that the materials did not meet FUSRAP criteria for remediation.

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Appendix A

NFSS Vicinity Property Q

Assessment Data

Excerpt from Comprehensive Radiological Survey
Off-Site Property Q
Niagara Falls Storage Site

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BECHTEL - OAK RIDGE
LIBRARY

COMPREHENSIVE RADIOLOGICAL SURVEY

OFF-SITE PROPERTY Q
NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

Prepared for

U.S. Department of Energy
as part of the
Formerly Utilized Sites -- Remedial Action Program

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Oak Ridge, Tennessee 37830

FINAL REPORT

July 1983

This report is based on work performed under contract number DE-AC05-76OR00033 with the Department of Energy.

*Industrial Safety and Applied Health Physics Division, Oak Ridge National Laboratory

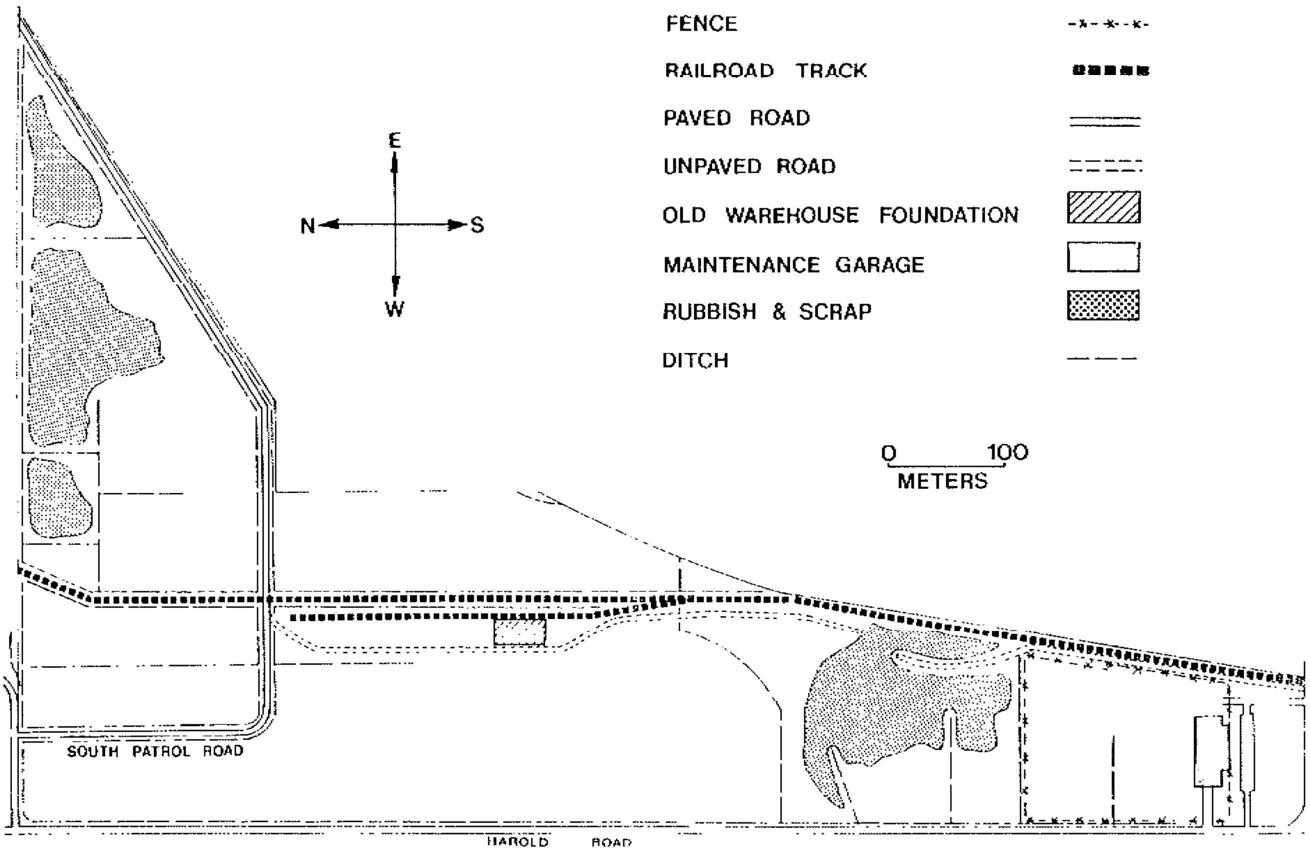

FIGURE 2. Plan View of Niagara Falls Storage Site Off-Site Property Q, Indicating Prominent Surface Features.

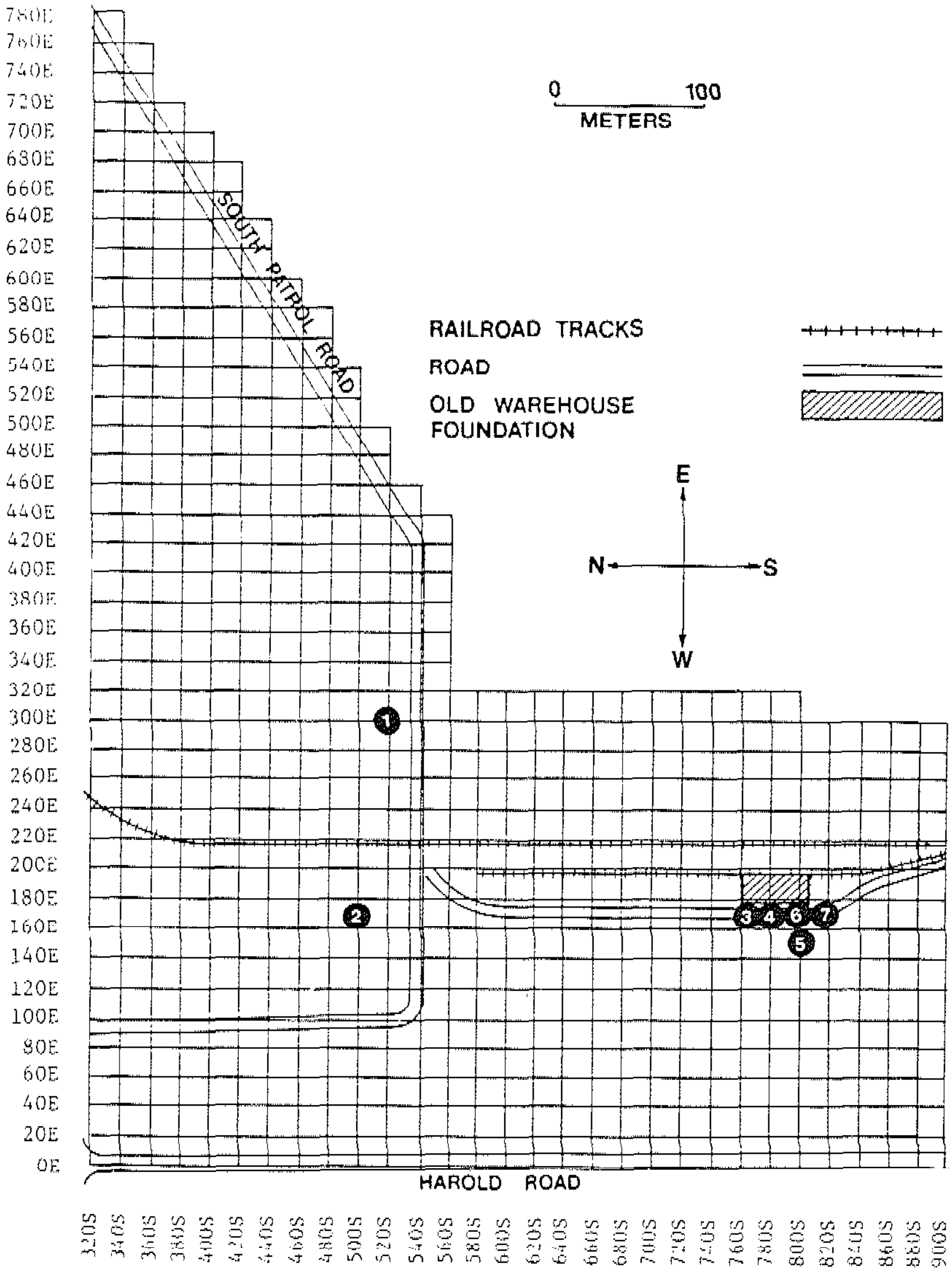

FIGURE 3. Map of the Northern Portion of Property Q Indicating the Grid System and Areas of Elevated Direct Radiation Levels.

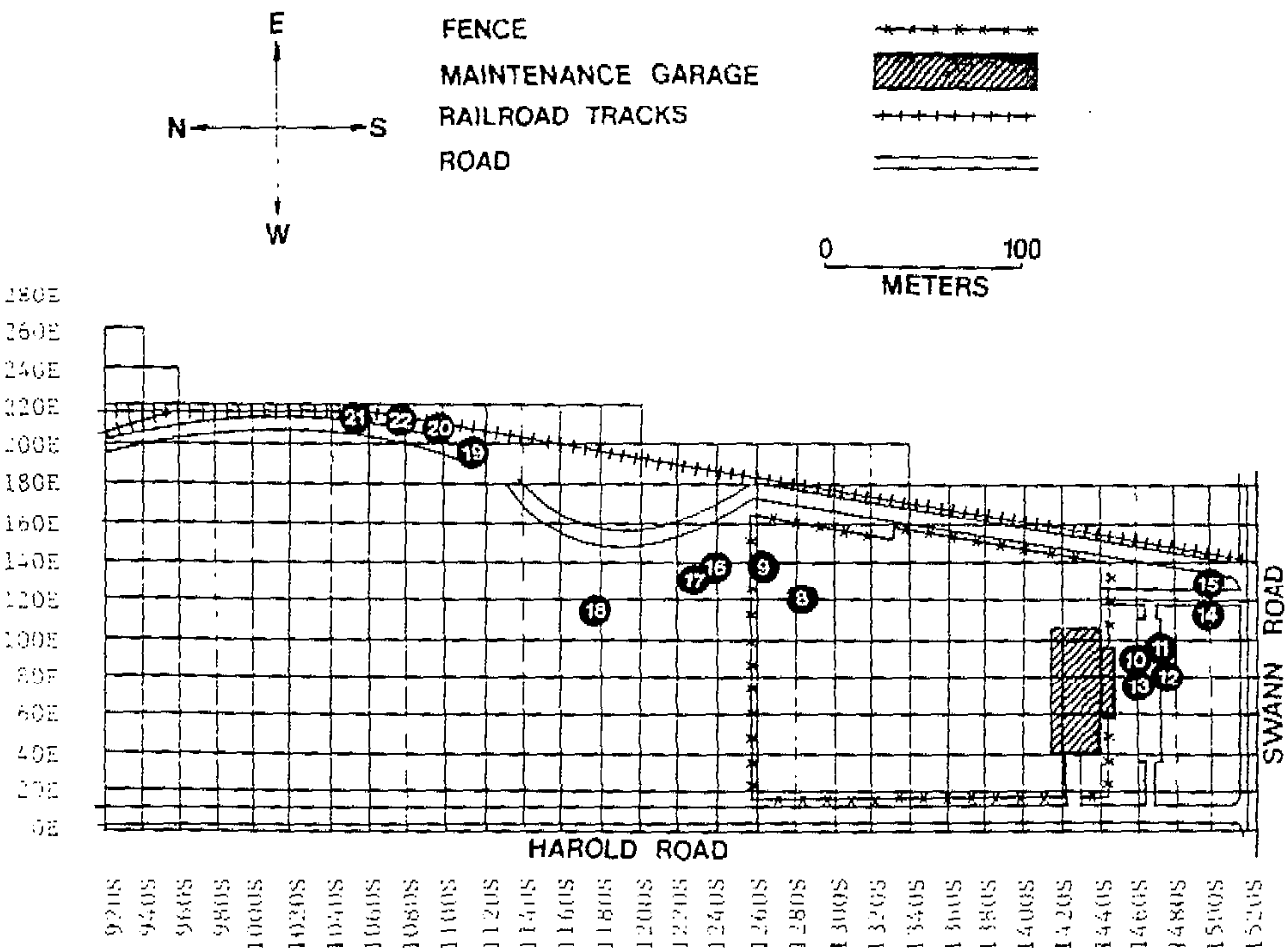

FIGURE 4. Map of the Southern Portion of Property Q Indicating the Grid System and Areas of Elevated Direct Radiation Levels.

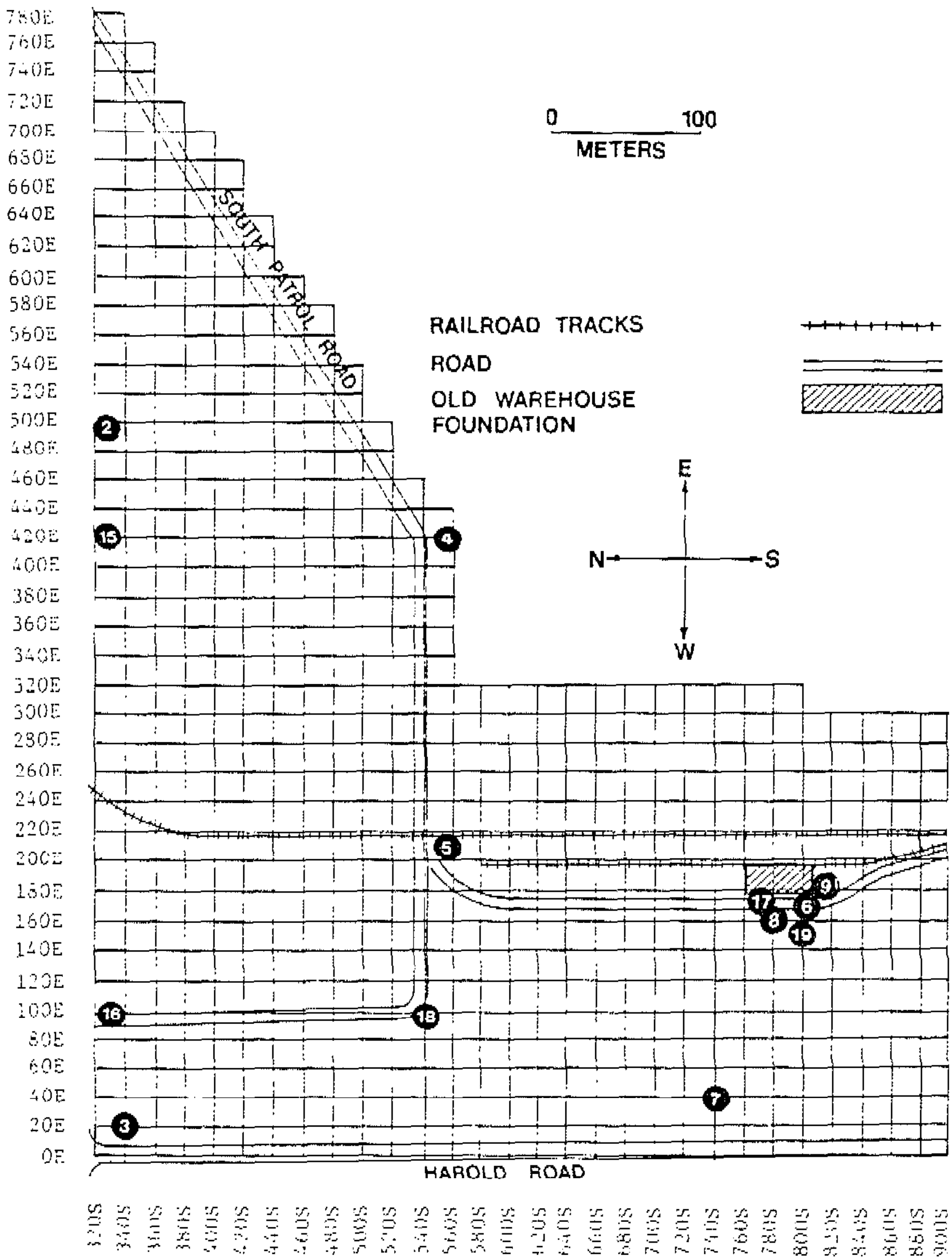

FIGURE 3. Borehole Locations on the Northern Portion of Property Q.

17

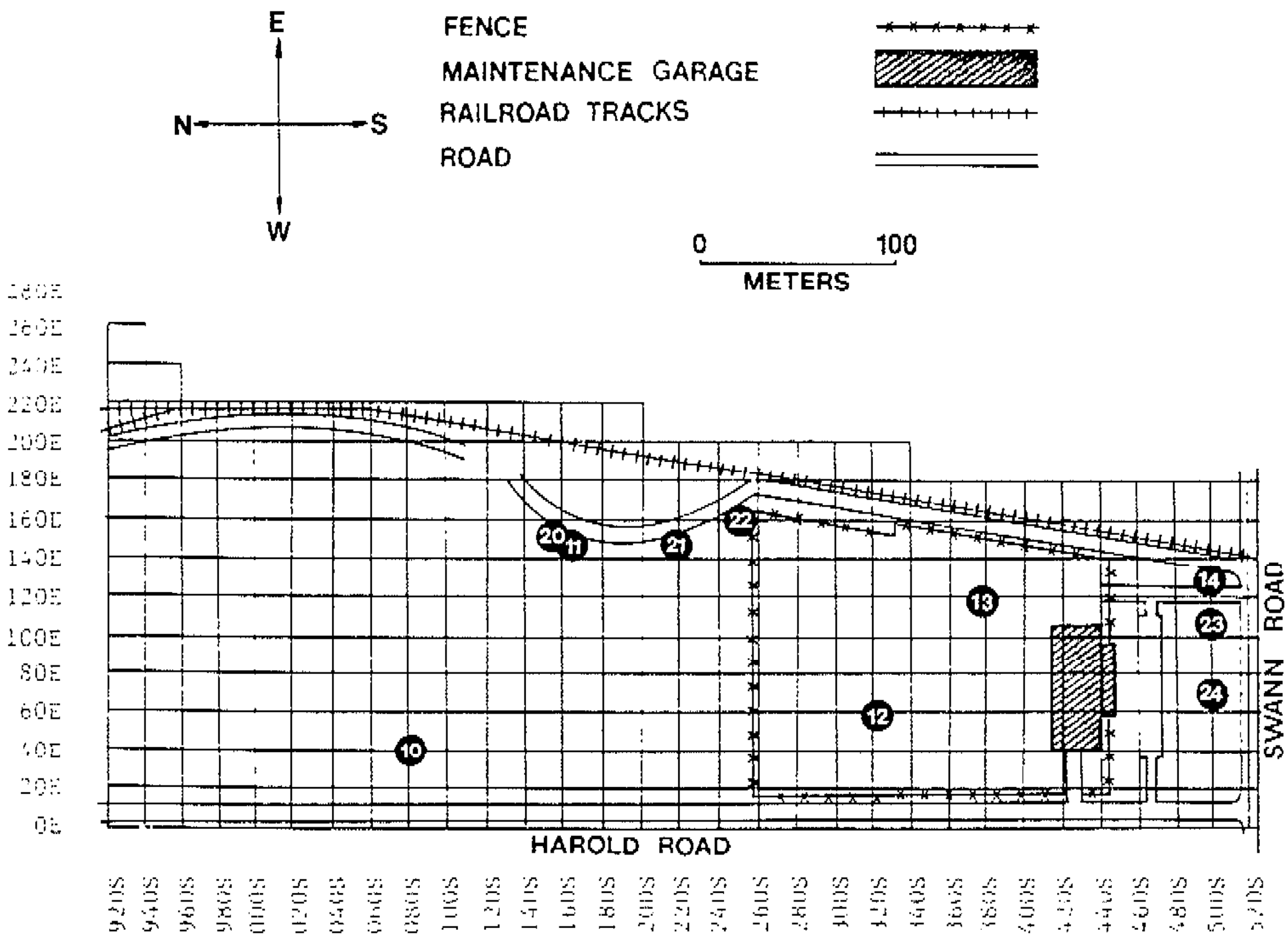

FIGURE 6. Borehole Locations on the Southern Portion of Property Q.

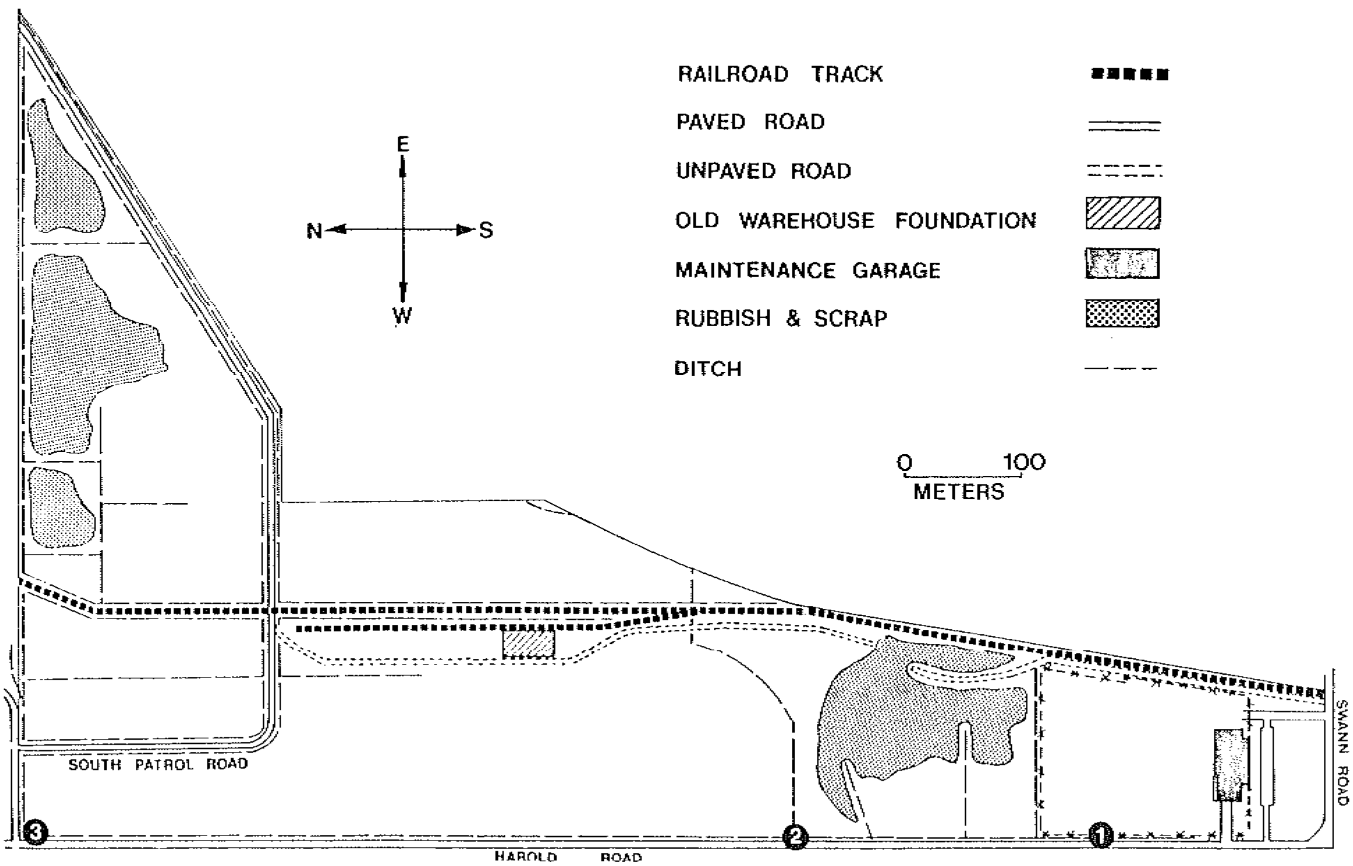

FIGURE 7. Locations of Surface Water Samples Collected on Property Q.

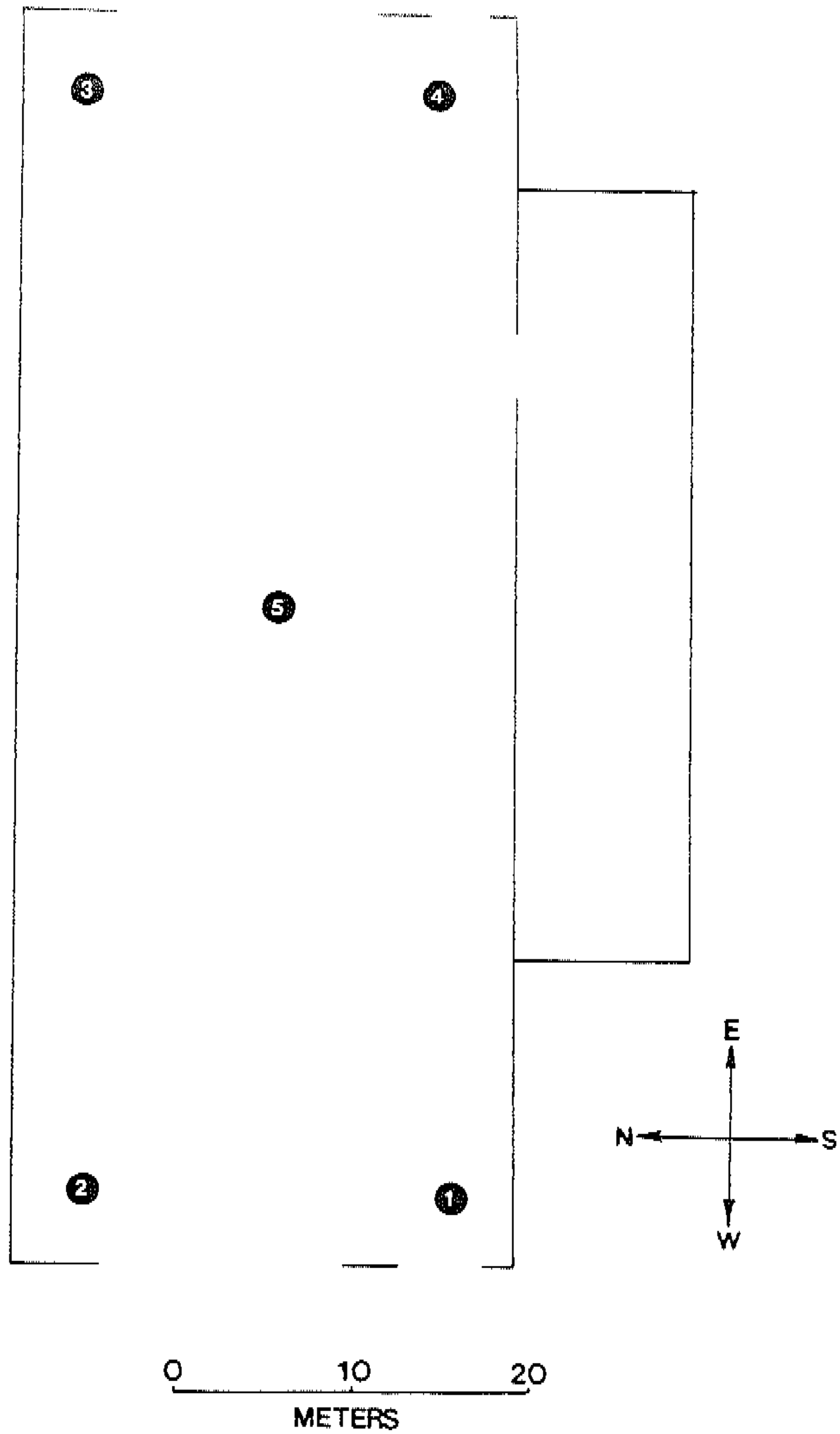

FIGURE 8. Locations of Direct Radiation Measurements in the Maintenance Building on Property Q.

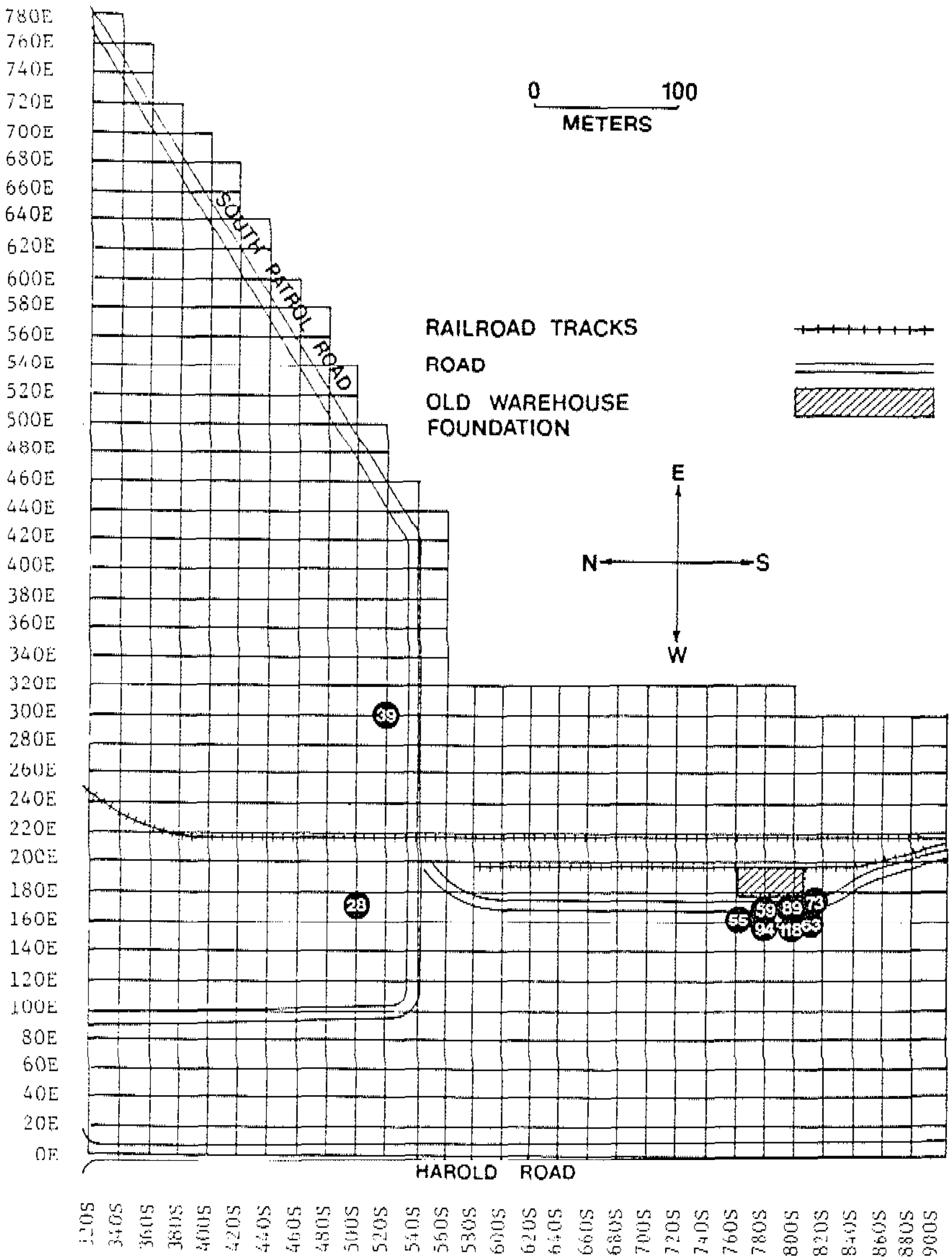

FIGURE 10. Locations and Levels (μR/h) of Elevated Contact Radiation on the Northern Portion of Property Q.

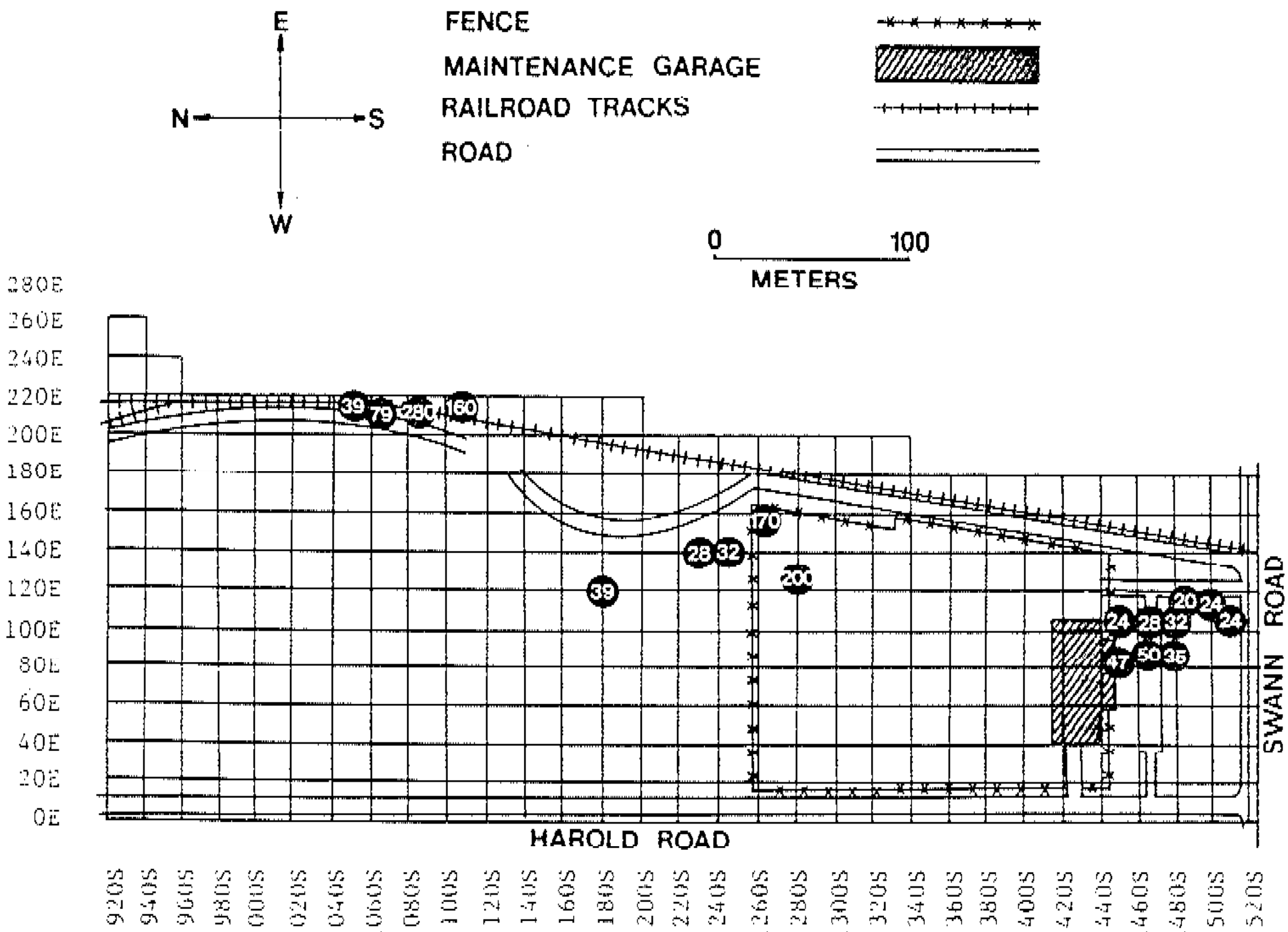

FIGURE 11. Locations and Levels (μR/h) of Elevated Contact Radiation on the Southern Portion of Property Q.

23

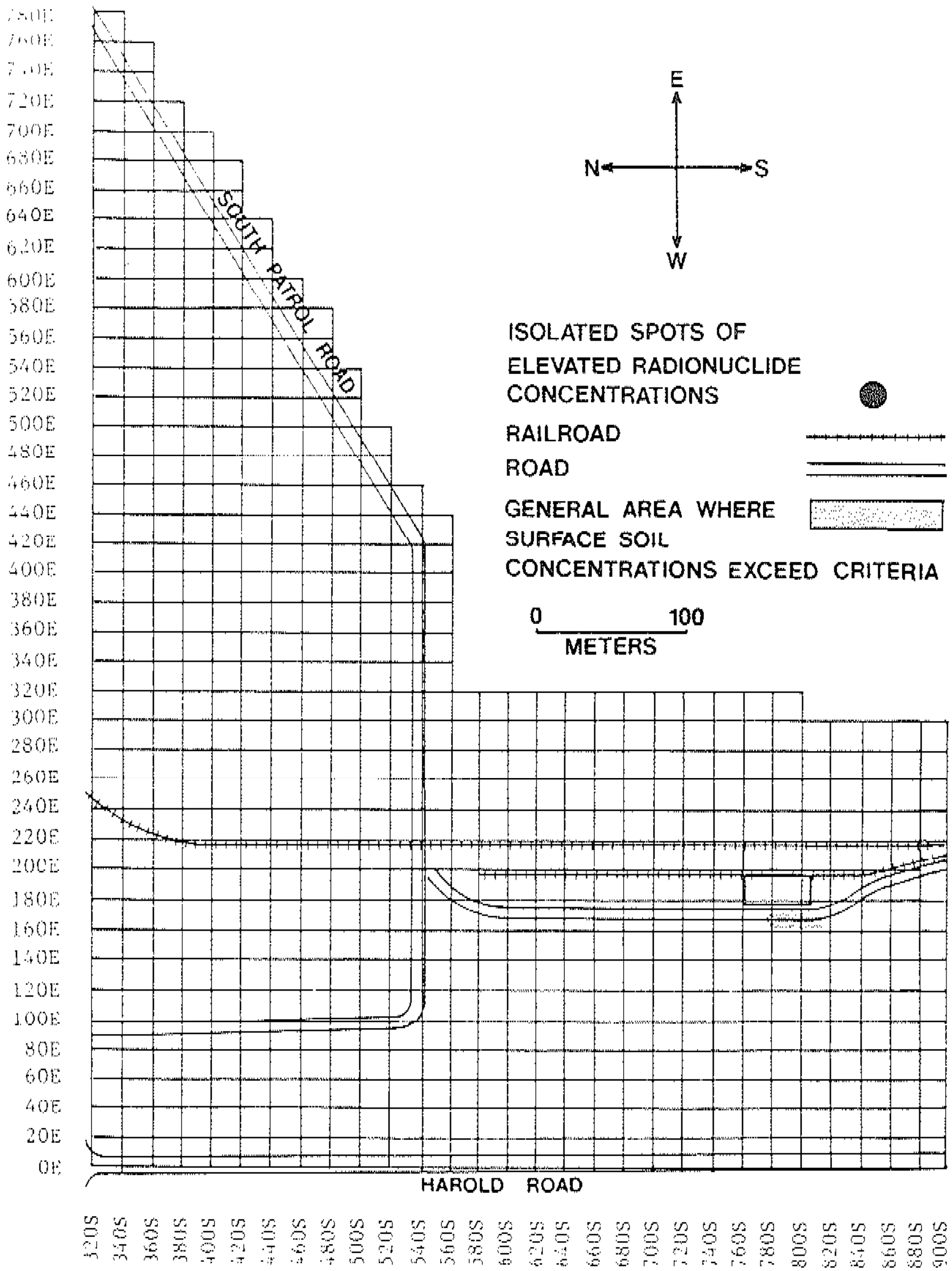

FIGURE 12. Map of NFSS Off-Site Property Q (Northern Portion) Indicating the Area Where Radionuclide Concentrations in Soil Exceed Criteria.

24

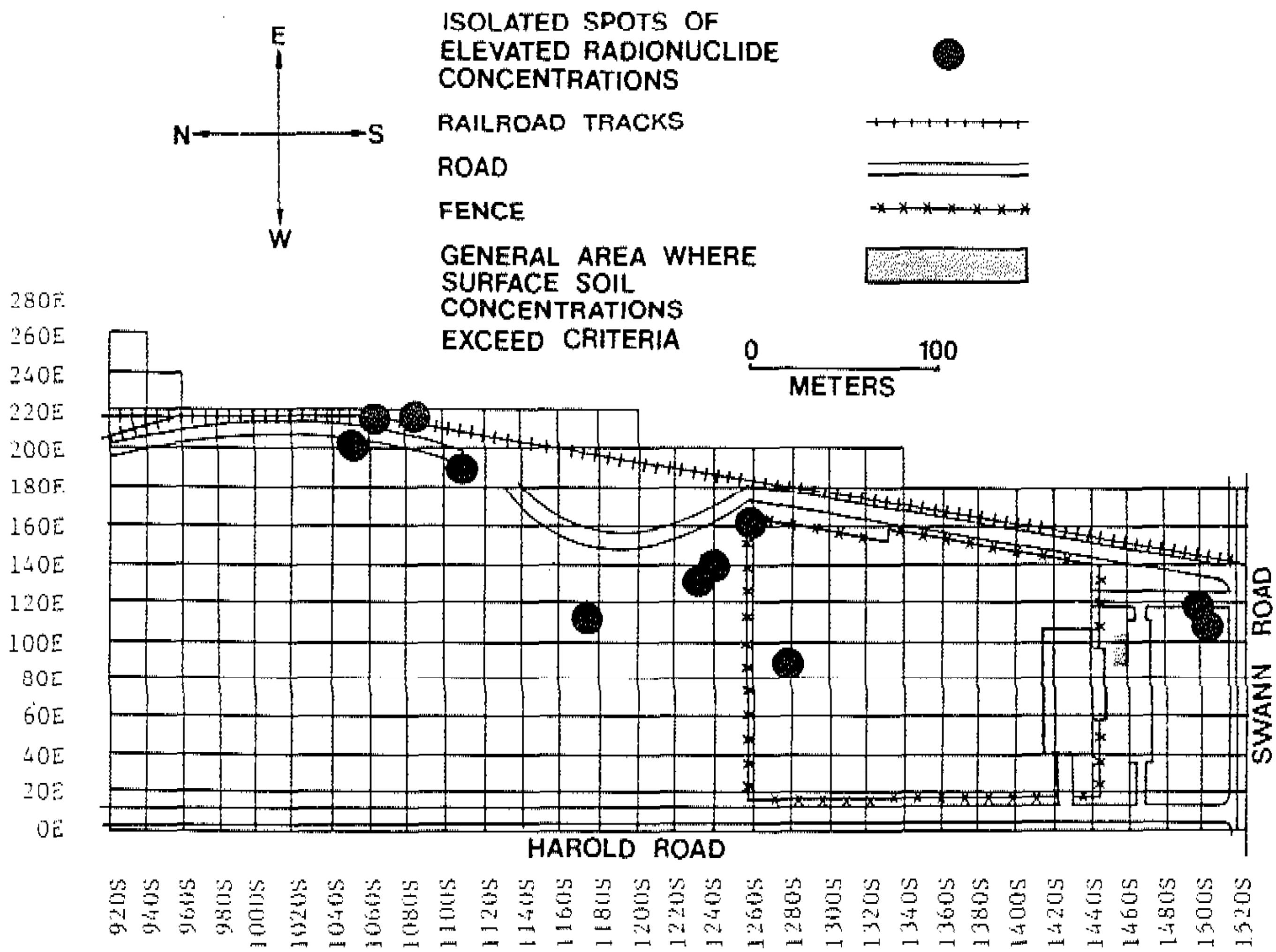

FIGURE 13. Map of NFSS Off-Site Property Q (Southern Portion) Indicating the Area Where Radionuclide Concentrations in Soil Exceed Criteria.

TABLE 2

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
320S, 0E	10	10	28
320S, 20E	11	11	31
320S, 40E	10	10	20
320S, 60E	10	10	29
320S, 80E	11	11	32
320S,100E	9.8	8.7	48
320S,120E	11	11	42
320S,140E	12	12	52
320S,160E	13	13	42
320S,180E	12	15	54
320S,200E	14	16	57
320S,220E	13	15	45
320S,240E	13	15	31
320S,260E	13	13	45
320S,280E	14	15	55
320S,300E	13	15	66
320S,320E	13	12	38
320S,340E	11	11	35
320S,360E	11	10	17
320S,380E	11	10	28
320S,400E	11	11	43
320S,420E	11	11	34
320S,440E	11	11	35
320S,460E	11	11	37
320S,480E	11	11	22
320S,500E	11	11	58
320S,520E	11	11	31
320S,540E	12	12	37
320S,560E	12	12	51
320S,580E	12	12	31
320S,600E	11	11	45
320S,620E	11	11	42
320S,640E	11	12	31
320S,660E	11	11	37
320S,680E	11	12	35
320S,700E	11	12	43
320S,720E	11	11	26
320S,740E	11	11	37
320S,760E	11	11	31
320S,780E	10	11	29

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
340S, 0E	12	12	34
340S, 20E	11	12	48
340S, 40E	11	12	35
340S, 60E	12	12	49
340S, 80E	11	12	49
340S,100E	11	11	42
340S,120E	11	11	32
340S,140E	12	12	28
340S,160E	12	12	25
340S,180E	11	12	35
340S,200E	11	12	43
340S,220E	12	12	46
340S,240E	13	13	43
340S,260E	12	12	48
340S,280E	12	12	28
340S,300E	12	12	37
340S,320E	12	12	38
340S,340E	12	12	45
340S,360E	11	11	26
340S,380E	11	12	25
340S,400E	11	12	25
340S,420E	12	12	25
340S,440E	12	12	38
340S,460E	12	12	49
340S,480E	11	11	34
340S,500E	9.8	9.8	18
340S,520E	10	10	20
340S,540E	11	11	34
340S,560E	11	12	42
340S,580E	11	12	34
340S,600E	11	12	29
340S,620E	11	11	37
340S,640E	12	12	35
340S,660E	11	11	38
340S,680E	12	12	40
340S,700E	11	11	35
340S,720E	11	11	23
340S,740E	11	11	29
340S,760E	10	10	31
340S,780E	10	10	38

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
360S, 0E	12	12	46
360S, 20E	12	12	35
360S, 40E	12	13	32
360S, 60E	12	12	22
360S, 80E	12	12	28
360S,100E	11	11	29
360S,120E	11	12	35
360S,140E	11	11	34
360S,160E	12	12	22
360S,180E	11	11	28
360S,200E	11	11	42
360S,220E	12	12	22
360S,240E	12	12	29
360S,260E	12	13	20
360S,280E	12	12	46
360S,300E	12	13	43
360S,320E	11	11	31
360S,340E	11	11	48
360S,360E	11	11	42
360S,380E	12	12	34
360S,400E	11	12	31
360S,420E	11	12	60
360S,440E	12	12	40
360S,460E	12	12	23
360S,480E	12	12	49
360S,500E	11	11	42
360S,520E	12	12	23
360S,540E	11	12	55
360S,560E	11	12	38
360S,580E	11	11	35
360S,600E	11	12	38
360S,620E	11	11	34
360S,640E	11	11	31
360S,660E	12	12	28
360S,680E	11	11	42
360S,700E	11	12	35
360S,720E	11	12	46
360S,740E	11	11	46
380S, 0E	10	10	35
380S, 20E	11	11	37

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
380S, 40E	11	12	35
380S, 60E	11	12	34
380S, 80E	11	11	40
380S,100E	11	11	38
380S,120E	12	12	30
380S,140E	11	11	29
380S,160E	12	12	54
380S,180E	11	11	35
380S,200E	12	12	40
380S,220E	13	16	57
380S,240E	12	12	35
380S,260E	12	13	37
380S,280E	11	12	58
380S,300E	12	11	29
380S,320E	12	11	34
380S,340E	11	11	26
380S,360E	10	10	35
380S,380E	11	11	29
380S,400E	11	11	38
380S,420E	11	12	17
380S,440E	11	12	37
380S,460E	12	12	31
380S,480E	12	12	32
380S,500E	12	12	34
380S,520E	12	12	54
380S,540E	11	12	32
380S,560E	11	12	40
380S,580E	11	12	28
380S,600E	12	12	38
380S,620E	12	11	23
380S,640E	11	11	35
380S,660E	11	11	37
380S,680E	11	11	46
380S,700E	8.7	8.7	45
400S, 0E	10	8.7	28
400S, 20E	11	11	37
400S, 40E	11	12	31
400S, 60E	12	12	46
400S, 80E	11	12	28
400S,100E	12	12	46

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY
MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
400S,120E	12	12	49
400S,140E	11	11	46
400S,160E	12	12	37
400S,180E	12	12	42
400S,200E	11	12	57
400S,220E	12	12	42
400S,240E	11	11	29
400S,260E	12	12	32
400S,280E	12	12	32
400S,300E	12	12	35
400S,320E	12	12	38
400S,340E	11	11	40
400S,360E	12	12	34
400S,380E	12	12	38
400S,400E	12	12	34
400S,420E	12	12	42
400S,440E	11	12	29
400S,460E	11	12	29
400S,480E	12	11	46
400S,500E	12	12	38
400S,520E	12	12	28
400S,540E	11	12	32
400S,560E	11	11	37
400S,580E	11	11	29
400S,600E	12	12	40
400S,620E	10	10	37
400S,640E	11	11	29
400S,660E	11	12	35
400S,680E	11	11	37
420S, 0E	9.8	9.8	29
420S, 20E	11	11	45
420S, 40E	11	11	46
420S, 60E	11	11	23
420S, 80E	11	10	43
420S,100E	12	12	51
420S,120E	11	11	46
420S,140E	12	12	43
420S,160E	12	12	54
420S,180E	12	12	37
420S,200E	12	12	35

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
420S,220E	12	12	40
420S,240E	11	11	34
420S,260E	11	12	43
420S,280E	12	12	22
420S,300E	11	11	34
420S,320E	11	12	43
420S,340E	12	12	38
420S,360E	11	12	35
420S,380E	11	12	45
420S,400E	11	12	38
420S,420E	12	12	45
420S,440E	12	12	48
420S,460E	12	12	31
420S,480E	11	11	34
420S,500E	11	11	51
420S,520E	11	12	43
420S,540E	12	12	43
420S,560E	11	11	32
420S,580E	11	11	31
420S,600E	11	11	29
420S,620E	11	11	32
420S,640E	11	11	25
440S, 0E	9.5	8.7	28
440S, 20E	11	12	46
440S, 40E	11	12	35
440S, 60E	11	11	46
440S, 80E	11	11	38
440S,100E	11	11	41
440S,120E	11	11	35
440S,140E	12	12	34
440S,160E	12	12	42
440S,180E	12	12	34
440S,200E	12	12	37
440S,220E	12	12	45
440S,240E	12	12	45
440S,260E	11	11	42
440S,280E	11	11	43
440S,300E	11	11	46
440S,320E	12	12	37
440S,340E	11	12	38

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY
MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
440S,360E	11	12	45
440S,380E	11	11	40
440S,400E	12	12	45
440S,420E	12	12	32
440S,440E	11	11	34
440S,460E	11	11	45
440S,480E	11	11	29
440S,500E	11	11	43
440S,520E	11	11	28
440S,540E	11	12	32
440S,560E	12	12	25
440S,580E	11	11	34
440S,600E	9.8	8.0	37
440S,620E	11	11	46
460S, 0E	10	9.8	35
460S, 20E	11	12	43
460S, 40E	11	11	49
460S, 60E	11	11	32
460S, 80E	11	11	42
460S,100E	11	11	58
460S,120E	11	11	34
460S,140E	12	12	51
460S,160E	12	12	31
460S,180E	11	11	31
460S,200E	11	12	31
460S,220E	12	12	40
460S,240E	11	11	37
460S,260E	12	12	25
460S,280E	11	11	34
460S,300E	10	11	34
460S,320E	11	12	35
460S,340E	12	12	35
460S,360E	11	12	17
460S,380E	11	12	31
460S,400E	11	12	29
460S,420E	11	12	31
460S,440E	11	12	31
460S,460E	11	11	38
460S,480E	12	12	40
460S,500E	11	11	42

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
460S,520E	11	11	38
460S,540E	10	11	40
460S,560E	11	11	32
480S, 0E	10	8.7	45
480S, 20E	11	11	35
480S, 40E	11	12	37
480S, 60E	11	11	42
480S, 80E	12	12	29
480S,100E	11	11	23
480S,120E	12	11	48
480S,140E	11	11	31
480S,160E	12	12	40
480S,180E	12	12	38
480S,200E	12	12	38
480S,220E	13	13	31
480S,240E	11	12	17
480S,260E	11	11	52
480S,280E	11	11	37
480S,300E	11	11	45
480S,320E	11	12	31
480S,340E	11	11	35
480S,360E	12	12	28
480S,380E	11	11	55
480S,400E	11	12	38
480S,420E	11	11	45
480S,440E	11	11	43
480S,460E	11	11	29
480S,480E	10	10	20
480S,500E	11	11	43
480S,520E	11	11	26
500S, 0E	9.8	9.8	23
500S, 20E	11	11	45
500S, 40E	11	11	18
500S, 60E	11	11	38
500S, 80E	12	12	32
500S,100E	11	11	40
500S,120E	11	11	35
500S,140E	12	12	34
500S,160E	11	12	26

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
500S,180E	11	12	38
500S,200E	11	11	45
500S,220E	12	12	46
500S,240E	12	11	18
500S,260E	10	11	38
500S,280E	11	11	32
500S,300E	11	11	48
500S,320E	12	12	32
500S,340E	11	11	26
500S,360E	12	12	46
500S,380E	12	12	23
500S,400E	12	12	34
500S,420E	11	11	34
500S,440E	11	11	34
500S,460E	11	11	25
500S,480E	11	11	42
520S, 0E	8.7	8.4	23
520S, 20E	11	11	49
520S, 40E	11	11	46
520S, 60E	11	11	28
520S, 80E	11	11	31
520S,100E	11	11	43
520S,120E	11	12	51
520S,140E	11	11	40
520S,160E	11	13	45
520S,180E	11	11	35
520S,200E	12	13	42
520S,220E	13	13	48
520S,240E	11	12	45
520S,260E	11	11	35
520S,280E	11	12	46
520S,300E	22	22	40
520S,320E	12	12	37
520S,340E	11	12	28
520S,360E	12	12	49
520S,380E	11	12	45
520S,400E	11	11	28
520S,420E	11	10	25
520S,440E	11	11	45
520S,460E	11	12	49

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
540S, 0E	9.5	8.4	32
540S, 20E	11	12	34
540S, 40E	11	11	37
540S, 60E	11	11	38
540S, 80E	10	10	31
540S,100E	11	11	38
540S,120E	11	11	38
540S,140E	11	11	26
540S,160E	11	12	32
540S,180E	11	12	49
540S,200E	12	11	35
540S,220E	12	12	42
540S,240E	11	11	45
540S,260E	11	11	34
540S,280E	11	11	45
540S,300E	11	12	30
540S,320E	12	12	35
540S,340E	11	11	26
540S,360E	11	11	34
540S,380E	11	12	26
540S,400E	11	11	23
540S,420E	11	11	32
540S,440E	10	9.8	25
540S,460E	10	11	42
560S, 0E	9.8	9.5	32
560S, 20E	11	11	32
560S, 40E	11	12	48
560S, 60E	10	10	25
560S, 80E	11	10	37
560S,100E	11	11	29
560S,120E	10	11	32
560S,140E	11	11	49
560S,160E	11	12	46
560S,180E	11	11	37
560S,200E	10	10	29
560S,220E	12	14	42
560S,240E	11	11	34
560S,260E	11	11	45
560S,280E	11	11	42

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY
MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
560S,300E	11	12	35
560S,320E	11	11	49
560S,340E	11	11	52
560S,360E	12	12	46
560S,380E	11	11	35
560S,400E	11	11	45
560S,420E	11	11	26
580S, 0E	9.8	8.7	25
580S, 20E	11	11	49
580S, 40E	10	11	34
580S, 60E	12	12	22
580S, 80E	11	12	40
580S,100E	11	11	28
580S,120E	11	11	31
580S,140E	11	11	37
580S,160E	11	12	48
580S,180E	11	11	45
580S,200E	11	11	32
580S,220E	14	13	34
580S,240E	11	12	40
580S,260E	11	11	43
580S,280E	11	12	40
580S,300E	11	12	26
580S,320E	11	11	34
600S, 0E	8.0	8.7	31
600S, 20E	10	11	28
600S, 40E	11	11	38
600S, 60E	10	11	32
600S, 80E	11	11	38
600S,100E	11	11	28
600S,120E	12	11	32
600S,140E	11	11	42
600S,160E	11	12	37
600S,180E	11	11	34
600S,200E	12	11	45
600S,220E	13	12	54
600S,240S	11	12	32
600S,260S	11	11	37
600S,280S	11	12	34

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY
MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
600S,300S	11	12	40
600S,320S	11	11	55
620S, 0E	9.8	8.7	31
620S, 20E	11	11	25
620S, 40E	11	11	22
620S, 60E	11	11	29
620S, 80E	11	11	32
620S,100E	11	11	26
620S,120E	11	11	35
620S,140E	12	12	28
620S,180E	12	12	38
620S,200E	12	12	31
620S,220E	14	13	45
620S,240E	11	11	51
620S,260E	11	11	34
620S,280E	11	11	43
620S,300E	12	12	49
620S,320E	12	12	42
640S, 0E	10	10	52
640S, 20E	10	11	28
640S, 40E	11	11	31
640S, 60E	11	11	37
640S, 80E	11	11	48
640S,100E	11	11	29
640S,120E	11	12	34
640S,140E	11	11	37
640S,160E	12	11	28
640S,180E	11	11	34
640S,200E	12	12	32
640S,220E	12	12	37
640S,240E	11	11	31
640S,260E	11	11	42
640S,280E	11	11	38
640S,300E	12	12	48
640S,320E	12	12	40
660S, 0E	10	11	42
660S, 20E	10	10	46
660S, 40E	11	11	31

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
660S, 60E	10	11	34
660S, 80E	11	11	38
660S,100E	11	11	29
660S,120E	11	11	35
660S,140E	11	11	31
660S,160E	11	12	49
660S,180E	11	12	40
660S,200E	12	12	32
660S,220E	11	11	26
660S,240E	11	11	29
660S,260E	11	11	34
660S,280E	11	11	38
660S,300E	11	11	31
660S,320E	11	11	35
680S, 0E	10	10	32
680S, 20E	11	11	29
680S, 40E	11	11	35
680S, 60E	11	11	37
680S, 80E	11	11	35
680S,100E	11	11	40
680S,120E	11	11	40
680S,140E	10	11	32
680S,160E	11	11	37
680S,180E	11	11	34
680S,200E	11	11	37
680S,220E	12	12	32
680S,240E	12	12	37
680S,260E	11	12	31
680S,280E	11	11	35
680S,300E	11	11	43
680S,320E	11	11	29
700S, 0E	8.7	8.7	22
700S, 20E	11	11	28
700S, 40E	11	10	25
700S, 60E	11	11	35
700S, 80E	11	11	32
700S,100E	11	11	38
700S,120E	11	11	32
700S,140E	11	11	40

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
700S,160E	11	11	34
700S,180E	11	11	31
700S,200E	12	12	43
700S,220E	13	13	52
700S,240E	12	12	42
700S,260E	12	12	35
700S,280E	11	11	29
700S,300E	11	11	32
700S,320E	11	11	28
720S, 0E	9.9	10	40
720S, 20E	8.4	9.8	38
720S, 40E	10	11	32
720S, 60E	11	11	46
720S, 80E	11	11	37
720S,100E	11	11	42
720S,120E	11	11	31
720S,140E	10	11	32
720S,160E	11	11	29
720S,180E	12	11	42
720S,200E	12	12	31
720S,220E	12	12	32
720S,240E	11	11	31
720S,260E	11	11	40
720S,280E	11	11	37
720S,300E	11	11	32
720S,320E	11	11	28
740S, 0E	8.0	8.4	42
740S, 20E	11	11	29
740S, 40E	11	11	32
740S, 60E	12	12	38
740S, 80E	13	13	49
740S,100E	13	13	42
740S,120E	13	15	43
740S,140E	11	12	35
740S,160E	11	11	31
740S,180E	11	11	35
740S,200E	11	11	37
740S,220E	12	12	48
740S,240E	12	12	40

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
740S,260E	11	11	34
740S,280E	11	11	31
740S,300E	11	11	28
740S,320E	11	11	35
760S, 0E	10	11	31
760S, 20E	11	11	34
760S, 40E	11	11	34
760S, 60E	11	11	34
760S, 80E	11	11	31
760S,100E	11	11	32
760S,120E	11	11	28
760S,140E	11	11	31
760S,160E	11	11	35
760S,180E	11	11	40
760S,200E	12	12	46
760S,220E	12	13	42
760S,240E	10	10	43
760S,260E	11	11	37
760S,280E	11	11	35
760S,300E	10	10	28
760S,320E	11	11	31
780S, 0E	10	11	28
780S, 20E	12	11	23
780S, 40E	11	11	23
780S, 60E	10	12	42
780S, 80E	11	11	54
780S,100E	11	11	37
780S,120E	11	12	35
780S,140E	11	12	35
780S,160E	11	11	28
780S,180E	11	12	26
780S,200E	13	17	46
780S,220E	12	13	32
780S,240E	11	11	46
780S,260E	11	11	45
780S,280E	11	12	35
780S,300E,	12	11	37

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
800S, 0E	9.8	9.8	32
800S, 20E	11	11	26
800S, 40E	11	11	34
800S, 60E	11	12	35
800S, 80E	11	11	35
800S,100E	11	11	31
800S,120E	11	12	28
800S,140E	11	11	34
800S,160E	11	11	31
800S,180E	12	11	32
800S,200E	14	15	63
800S,220E	14	15	55
800S,240E	11	12	42
800S,260E	11	11	34
800S,280E	10	11	32
800S,300E	11	12	46
820S, 0E	10	11	32
820S, 20E	11	11	40
820S, 40E	11	11	35
820S, 60E	11	11	45
820S, 80E	11	11	35
820S,100E	11	11	38
820S,120E	11	11	34
820S,140E	11	12	46
820S,160E	11	10	35
820S,180E	11	11	23
820S,200E	14	16	51
820S,220E	13	14	60
820S,240E	11	11	34
820S,260E	11	12	54
820S,280E	11	12	54
820S,300E	11	11	40
840S, 0E	9.8	10	26
840S, 20E	11	11	29
840S, 40E	11	11	26
840S, 60E	11	11	34
840S, 80E	11	11	26
840S,100E	11	11	32
840S,120E	11	11	28

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY
MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
840S,140E	11	12	57
840S,160E	11	11	40
840S,180E	11	11	42
840S,200E	15	16	51
840S,220E	13	13	65
840S,240E	11	11	35
840S,260E	10	11	45
840S,280E	11	11	42
840S,300E	11	11	34
860S, 0E	10	11	26
860S, 20E	11	11	43
860S, 40E	11	11	48
860S, 60E	11	11	38
860S, 80E	11	11	37
860S,100E	11	11	28
860S,120E	11	11	34
860S,140E	11	12	32
860S,160E	11	12	15
860S,180E	11	11	42
860S,200E	11	10	18
860S,220E	13	13	38
860S,240E	11	12	51
860S,260E	11	11	56
860S,280E	11	11	38
860S,300E	11	11	26
880S, 0E	9.9	11	40
880S, 20E	11	11	43
880S, 40E	11	11	48
880S, 60E	11	11	38
880S, 80E	11	11	37
880S,100E	11	11	28
880S,120E	11	11	34
880S,140E	11	12	32
880S,160E	11	12	15
880S,180E	12	12	42
880S,200E	11	11	18
880S,220E	13	13	38
880S,240E	11	12	51
880S,260E	11	11	57

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY
MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
880S,280E	11	11	38
880S,300E	11	11	26
900S, 0E	11	11	38
900S, 20E	11	11	32
900S, 40E	11	11	45
900S, 60E	11	11	22
900S, 80E	11	11	42
900S,100E	11	11	37
900S,120E	11	11	28
900S,140E	11	12	32
900S,160E	11	11	28
900S,180E	11	12	31
900S,200E	11	11	45
900S,220E	13	13	60
900S,240E	11	11	48
900S,260E	11	11	29
900S,280E	11	11	60
900S,300E	11	11	34
920S, 0E	11	11	42
920S, 20E	11	11	21
920S, 40E	10	10	23
920S, 60E	11	11	34
920S, 80E	11	11	40
920S,100E	11	12	46
920S,120E	11	11	28
920S,140E	11	11	35
920S,160E	11	11	34
920S,180E	11	11	25
920S,200E	11	11	43
920S,220E	14	14	34
920S,240E	11	11	38
920S,260E	10	11	49
920S,280E	10	11	42
940S, 0E	10	11	29
940S, 20E	11	11	43
940S, 40E	11	11	51
940S, 60E	11	11	35
940S, 80E	11	11	18

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
940S,100E	12	12	37
940S,120E	11	11	32
940S,140E	11	11	46
940S,160E	11	12	29
940S,180E	11	12	38
940S,200E	11	12	35
940S,220E	13	15	60
940S,240E	11	11	37
940S,260E	12	12	45
960S, 0E	9.8	8.7	20
960S, 20E	11	11	48
960S, 40E	11	11	45
960S, 60E	11	11	49
960S, 80E	11	12	48
960S,100E	11	11	35
960S,120E	11	11	29
960S,140E	11	11	29
960S,160E	11	11	28
960S,180E	11	12	29
960S,200E	11	11	31
960S,220E	14	17	75
960S,240E	11	11	45
960S,260E	11	12	28
980S, 0E	8.7	8.4	20
980S, 20E	11	12	40
980S, 40E	11	12	35
980S, 60E	11	12	42
980S, 80E	11	12	23
980S,100E	11	11	37
980S,120E	11	11	49
980S,140E	11	11	48
980S,160E	11	12	38
980S,180E	12	12	62
980S,200E	12	13	40
980S,220E	12	13	46
1000S, 0E	8.7	8.0	28
1000S, 20E	11	11	38
1000S, 40E	11	11	43

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY
MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
1000S, 60E	11	11	49
1000S, 80E	11	11	37
1000S,100E	11	11	34
1000S,120E	11	11	34
1000S,140E	11	11	52
1000S,160E	11	11	22
1000S,180E	12	13	46
1000S,200E	11	11	37
1020S, 0E	8.7	8.0	37
1020S, 20E	11	12	34
1020S, 40E	11	11	48
1020S, 60E	12	12	54
1020S, 80E	11	11	23
1020S,100E	11	11	38
1020S,120E	11	11	35
1020S,140E	11	12	15
1020S,160E	12	12	51
1020S,180E	11	11	37
1020S,200E	11	12	34
1040S, 0E	9.8	8.0	38
1040S, 20E	11	11	35
1040S, 40E	10	11	31
1040S, 60E	11	11	29
1040S, 80E	11	12	32
1040S,100E	11	11	37
1040S,120E	11	11	38
1040S,140E	12	12	32
1040S,160E	12	11	31
1040S,180E	11	11	49
1040S,200E	11	12	31
1060S, 0E	9.9	8.7	31
1060S, 20E	10	11	52
1060S, 40E	11	11	20
1060S, 60E	11	12	42
1060S, 80E	10	10	32
1060S,100E	10	9.9	37
1060S,120E	11	12	38
1060S,140E	11	11	32

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
1060S,160E	11	12	54
1060S,180E	12	13	46
1060S,200E	12	11	42
1080S, 0E	9.5	9.5	43
1080S, 20E	11	11	52
1080S, 40E	11	11	42
1080S, 60E	12	11	51
1080S, 80E	12	12	35
1080S,100E	11	11	23
1080S,120E	11	12	46
1080S,140E	12	11	37
1080S,160E	12	12	43
1080S,180E	12	12	55
1080S,200E	11	11	38
1100S, 0E	9.8	8.4	37
1100S, 20E	10	10	48
1100S, 40E	11	11	40
1100S, 60E	10	11	54
1100S, 80E	10	11	48
1100S,100E	11	11	54
1100S,120E	11	11	68
1100S,140E	11	11	40
1100S,160E	11	12	48
1100S,180E	11	12	38
1100S,200E	12	12	52
1120S, 0E	8.1	8.0	28
1120S, 20E	11	12	32
1120S, 40E	11	11	45
1120S, 60E	11	11	37
1120S, 80E	11	11	37
1120S,100E	11	11	32
1120S,120E	11	11	38
1120S,140E	11	11	38
1120S,160E	10	11	38
1120S,180E	11	11	54
1120S,200E	12	13	42

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
1140S, 0E	8.4	8.4	31
1140S, 20E	11	11	34
1140S, 40E	11	11	23
1140S, 60E	11	11	37
1140S, 80E	10	11	38
1140S,100E	11	11	31
1140S,120E	10	11	23
1140S,140E	11	11	46
1140S,160E	9.8	9.8	37
1140S,180E	10	11	40
1160S, 0E	9.8	8.0	23
1160S, 20E	11	11	35
1160S, 40E	11	11	29
1160S, 60E	11	11	43
1160S, 80E	11	11	42
1160S,100E	11	11	38
1160S,120E	10	11	48
1160S,140E	10	10	40
1160S,160E	10	10	31
1160S,180E	11	11	32
1180S, 0E	9.5	8.1	25
1180S, 20E	10	11	37
1180S, 40E	11	11	31
1180S, 60E	11	11	34
1180S, 80E	11	11	42
1180S,100E	11	11	35
1180S,120E	11	11	34
1180S,140E	12	12	43
1180S,160E	10	10	26
1200S, 0E	9.8	8.1	26
1200S, 20E	12	12	45
1200S, 40E	11	11	37
1200S, 60E	10	11	31
1200S, 80E	11	11	34
1200S,100E	9.9	9.9	46
1200S,120E	11	11	32
1200S,140E	11	11	35
1200S,160E	9.5	9.8	34

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY
MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
1220S, 0E	9.5	9.5	38
1220S, 20E	9.8	9.5	37
1220S, 40E	9.8	9.8	29
1220S, 60E	11	11	46
1220S, 80E	10	11	37
1220S,100E	10	10	32
1220S,120E	11	11	48
1220S,140E	10	10	28
1220S,160E	8.4	7.0	38
1240S, 0E	9.9	8.4	25
1240S, 20E	9.8	10	35
1240S, 40E	11	11	29
1240S, 60E	10	10	28
1240S, 80E	10	11	49
1240S,100E	10	10	31
1240S,120E	10	10	40
1240S,140E	11	11	34
1240S,160E	10	10	46
1260S, 0E	10	9.9	25
1260S, 20E	11	10	69
1260S, 40E	11	11	35
1260S, 60E	11	11	28
1260S, 80E	6.4	6.7	28
1260S,100E	9.8	9.5	20
1260S,120E	10	11	55
1260S,140E	11	12	69
1260S,160E	10	11	48
1260S,180E	10	10	38
1280S, 0E	8.7	8.4	29
1280S, 20E	10	10	31
1280S, 40E	11	10	37
1280S, 60E	6.4	4.7	34
1280S, 80E	5.7	5.4	29
1280S,100E	--[a]	--	--
1280S,120E	11	11	40
1280S,140E	11	12	43
1280S,160E	11	11	51
1280S,180E	12	12	57

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
1300S, 0E	9.5	8.1	35
1300S, 20E	11	11	63
1300S, 40E	11	10	40
1300S, 60E	8.0	9.8	37
1300S, 80E	5.4	5.7	28
1300S,100E	--[a]	--	--
1300S,120E	--[a]	--	--
1300S,140E	--[a]	--	--
1300S,160E	12	14	49
1300S,180E	12	13	58
1320S, 0E	9.8	10	17
1320S, 20E	11	11	52
1320S, 40E	10	11	68
1320S, 60E	10	10	52
1320S, 80E	6.0	5.4	37
1320S,100E	--[a]	--	--
1320S,120E	--[a]	--	--
1320S,140E	--[a]	--	--
1320S,160E	12	13	54
1320S,180E	12	13	62
1340S, 0E	9.8	9.8	32
1340S, 20E	10	11	38
1340S, 40E	10	10	35
1340S, 60E	9.9	10	29
1340S, 80E	6.0	6.0	26
1340S,100E	--[a]	--	--
1340S,120E	--[a]	--	--
1340S,140E	--[a]	--	--
1340S,160E	11	10	58
1340S,180E	11	13	69
1360S, 0E	8.0	8.0	22
1360S, 20E	10	11	46
1360S, 40E	11	11	40
1360S, 60E	10	11	34
1360S, 80E	10	11	37
1360S,100E	10	11	45
1360S,120E	11	11	49

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
1360S,140E	10	9.9	34
1360S,160E	11	11	40
1360S,180E	12	12	34
1380S, 0E	9.8	9.8	26
1380S, 20E	11	11	42
1380S, 40E	10	11	63
1380S, 60E	10	10	42
1380S, 80E	10	11	37
1380S,100E	12	12	66
1380S,120E	10	11	31
1380S,140E	9.8	10	42
1380S,160E	12	11	62
1380S,180E	12	13	75
1400S, 0E	9.8	8.0	28
1400S, 20E	11	11	72
1400S, 40E	9.8	9.8	31
1400S, 60E	10	11	57
1400S, 80E	11	12	58
1400S,100E	9.8	10	45
1400S,120E	6.7	7.4	38
1400S,140E	6.7	6.7	31
1400S,160E	12	11	65
1400S,180E	11	11	48
1420S, 0E	8.7	8.0	22
1420S, 20E	8.0	10	48
1420S, 40E	8.4	11	45
1420S, 60E	--[b]	--	--
1420S, 80E	--[b]	--	--
1420S,100E	7.4	8.0	42
1420S,120E	7.4	8.0	42
1420S,140E	6.0	6.7	38
1420S,160E	12	13	69
1420S,180E	11	12	57
1440S, 0E	8.7	8.4	31
1440S, 20E	10	11	49
1440S, 40E	11	11	51
1440S, 60E	10	12	63

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY
MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
1440S, 80E	--[b]	--	--
1440S,100E	9.8	9.5	37
1440S,120E	6.7	6.0	25
1440S,140E	6.7	6.7	43
1440S,160E	11	12	34
1440S,180E	11	11	48
1460S, 0E	8.0	8.7	32
1460S, 20E	10	11	52
1460S, 40E	6.7	6.7	26
1460S, 60E	7.4	7.4	55
1460S, 80E	6.7	7.4	55
1460S,100E	13	14	37
1460S,120E	6.7	7.0	29
1460S,140E	8.7	9.8	42
1460S,160E	12	10	45
1460S,180E	11	11	46
1480S, 0E	8.0	8.0	34
1480S, 20E	11	11	42
1480S, 40E	11	11	52
1480S, 60E	11	11	52
1480S, 80E	12	12	55
1480S,100E	12	12	35
1480E,120E	7.4	7.7	40
1480E,140E	11	11	60
1480S,160E	11	10	46
1480S,180E	11	10	45
1500S, 0E	8.0	8.4	23
1500S, 20E	10	10	38
1500S, 40E	11	10	62
1500S, 60E	11	11	42
1500S, 80E	12	11	52
1500S,100E	12	12	32
1500S,120E	9.5	8.7	25
1500S,140E	8.4	8.0	32
1500S,160E	11	10	55
1500S,180E	10	10	35

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED AT GRID LINE INTERSECTIONS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at the Surface (μrad/h)
1520S, 0E	8.4	8.4	34
1520S, 20E	7.4	7.0	28
1520S, 40E	7.4	7.0	25
1520S, 60E	8.7	7.7	31
1520S, 80E	8.0	7.4	26
1520S,100E	8.7	8.4	49
1520S,120E	8.0	7.4	42
1520S,140E	7.4	7.0	31
1520S,160E	11	10	37
1520S,180E	10	10	40

[a] Measurements not taken due to presence of gravel piles.
[b] Measurements not taken due to presence of the Maintenance Building.

TABLE 3

DIRECT RADIATION LEVELS AT SELECTED LOCATIONS IDENTIFIED BY THE WALKOVER SURFACE SCAN

Location[a]	Grid Point	Exposure Rate (μR/h) at Contact		Surface Dose Rate (μrad/h)	Soil Sample[b]
		Before Sampling	After Sampling		
1	514S,300E	39	30	195	B1
2	500S,176E	28	30	131	B2
3	771S,170E	55	98	150	B3
4	782S,169E	79	200	282	B4
5	796S,170E	130	430	490	B5
6	799S,173E	94	200	564	B6
7	809S,172E	67	120	244	B7
8	1280S,126E	200	410	618	B8
9	1260S,158E	170	55	808	B9
10	1460S, 91E	55	120	207	B10
11	1471S, 97E	35	59	149	B11
12	1458S, 91E	45	94	167	B12
13	1455S,105E	26	53	130	B13
14	1506S,111E	24	43	89	B14
15	1488S,118E	22	41	112	B15
16	1239S,138E	32	41	147	B16
17	1233S,137E	28	37	140	B17
18	1175S,114E	39	28	182	B18
19	1107S,216E	160	280	571	B19
20	1087S,217E	280	43	1056	B20
21	1054S,209E	39	35	234	B21
22	1062S,216E	79	120	288	B22

[a] Refer to Figures 3 and 4.
[b] Soil concentrations are presented in Table 5.

TABLE 4

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES FROM GRID LINE INTERSECTIONS

Sample No.	Location	Radionuclide Concentrations (pCi/g)[a] Ra-226	U-235	U-238	Cs-137
1	323S, 20E	0.98 ± 0.24[b]	<0.27	<3.45	0.16 ± 0.12
2	323S, 60E	1.03 ± 0.24	<0.24	<3.78	0.75 ± 0.14
3	323S,100E	0.72 ± 0.28	<0.29	<3.15	0.29 ± 0.16
4	320S,140E	1.10 ± 0.26	<0.24	<6.42	1.41 ± 0.20
5	320S,180E	0.83 + 0.22	<0.24	<4.30	0.35 ± 0.10
6	320S,220E	2.30 ± 0.42	<0.24	<7.65	0.96 ± 0.22
7	320S,260E	0.43 ± 0.24	<0.25	6.16 ± 11.12	0.39 ± 0.12
8	320S,300E	1.17 ± 0.26	<0.24	<4.34	0.49 ± 0.12
9	320S,340E	<0.17	<0.29	<4.55	0.46 ± 0.15
10	320S,380E	0.59 ± 0.20	<0.24	<4.56	0.59 ± 0.12
11	320S,420E	0.50 ± 0.36	<0.23	<5.42	0.55 ± 0.14
12	320S,460E	0.58 ± 0.22	<0.24	<3.55	0.31 ± 0.10
13	320S,500E	0.57 ± 0.22	<0.23	<2.56	0.60 ± 0.12
14	320S,540E	0.61 ± 0.18	<0.24	7.04 ± 10.24	0.64 ± 0.12
15	320S,580E	0.43 ± 0.78	<0.25	4.90 ± 8.80	0.64 ± 0.12
16	320S,620E	0.37 ± 0.16	<0.24	<3.67	0.64 ± 0.12
17	320S,660E	0.54 ± 0.22	<0.24	<3.91	0.42 ± 0.10
18	320S,700E	0.51 ± 0.26	<0.24	<5.47	0.84 ± 0.10
19	320S,740E	0.54 ± 0.22	<0.20	<3.21	0.46 ± 0.12
20	320S,780E	0.54 ± 0.26	<0.24	<4.04	0.68 ± 0.14
21	340S, 40E	0.43 ± 0.22	<0.26	<4.64	0.50 ± 0.14
22	340S, 80E	0.44 ± 0.20	<0.24	<4.10	0.64 ± 0.16
23	340S,120E	0.67 ± 0.32	<0.23	<4.13	0.54 ± 0.16
24	340S,160E	0.53 + 0.20	0.61 + 0.60	<3.47	0.46 + 0.14
25	340S,200E	0.39 ± 0.20	<0.22	<3.69	0.55 ± 0.14
26	340S,240E	0.51 ± 0.18	<0.24	<4.40	0.31 ± 0.14
27	340S,280E	0.60 ± 0.22	<0.25	<3.28	<0.03
28	340S,320E	0.52 ± 0.27	<0.24	<4.19	<0.04
29	340S,360E	0.89 ± 0.32	<0.32	<4.30	0.26 ± 0.10
30	340S,400E	0.41 ± 0.20	<0.24	<5.75	0.12 ± 0.12
31	340S,440E	0.54 ± 0.20	<0.23	<3.38	0.30 ± 0.08
32	340S,480E	0.59 ± 0.28	<0.24	<2.75	0.09 ± 0.10
33	340S,520E	0.75 ± 0.22	<0.21	<3.83	0.08 ± 0.10
34	340S,560E	0.67 ± 0.24	<0.24	<4.17	0.11 ± 0.10
35	340S,600E	0.47 ± 0.32	<0.25	<3.81	0.68 ± 0.14
36	340S,640E	0.51 ± 0.30	<0.25	<5.11	0.17 ± 0.10
37	340S,680E	0.76 ± 0.22	<0.24	<4.07	<0.03
38	340S,720E	0.48 ± 0.26	<0.24	<4.30	0.16 ± 0.12

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM GRID LINE INTERSECTIONS

Sample No.	Location	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137
39	340S,760E	0.53 ± 0.20	<0.23	<3.95	0.25 ± 0.10
40	360S, 20E	0.51 ± 0.22	<0.24	<4.43	0.28 ± 0.10
41	360S, 60E	0.49 ± 0.26	<0.26	<3.56	0.30 ± 0.12
42	360S,100E	0.68 ± 0.24	<0.24	<4.52	<0.04
43	360S,140E	0.40 ± 0.18	<0.24	<3.49	0.42 ± 0.14
44	360S,180E	0.36 ± 0.20	<0.24	<3.11	0.47 ± 0.12
45	360S,220E	0.51 ± 0.20	<0.25	<3.87	0.62 + 0.16
46	360S,260E	0.33 ± 0.16	<0.24	<4.23	0.05 ± 0.08
47	360S,300E	0.75 ± 0.24	<0.24	<4.36	<0.05
48	360S,340E	0.60 ± 0.20	<0.27	<5.18	<0.04
49	360S,380E	0.37 ± 0.22	<0.20	<3.42	<0.03
50	360S,420E	0.59 ± 0.20	<0.24	<4.67	<0.04
51	360S,460E	0.65 ± 0.20	<0.26	<3.76	<0.04
52	360S,500E	0.69 ± 0.24	<0.24	<3.91	0.06 ± 0.06
53	360S,540E	0.71 ± 0.26	<0.28	<3.18	0.14 ± 0.12
54	360S,580E	0.41 ± 0.18	<0.24	<3.30	0.11 ± 0.08
55	360S,620E	<0.13	<0.22	<3.30	0.60 ± 0.12
56	360S,660E	0.33 ± 0.26	<0.23	<3.94	0.92 ± 0.14
57	360S,700E	0.53 ± 0.22	<0.24	<3.51	<0.03
58	360S,740E	0.52 ± 0.24	<0.24	<3.51	0.19 ± 0.10
59	380S, 40E	0.71 ± 0.30	<0.33	<5.07	0.72 ± 0.16
60	380S, 80E	0.43 ± 0.20	<0.24	<4.20	0.63 ± 0.12
61	380S,120E	0.36 ± 0.24	<0.32	<5.14	1.04 ± 0.26
62	380S,160E	0.87 ± 0.26	0.33 ± 0.67	<4.52	1.22 ± 0.22
63	380S,200E	0.50 ± 0.28	<0.22	<3.90	0.54 ± 0.16
64	380S,240E	0.45 ± 0.20	<0.24	<4.66	0.38 ± 0.14
65	380S,280E	0.58 ± 0.24	<0.27	<4.80	<0.05
66	380S,320E	0.37 ± 0.30	<0.24	<4.18	0.10 ± 0.10
67	380S,360E	0.63 ± 0.32	<0.24	<4.89	0.20 ± 0.16
68	380S,380E	0.51 ± 0.24	<0.24	<4.40	<0.04
69	380S,400E	0.70 ± 0.24	<0.24	<4.61	<0.04
70	380S,440E	0.43 ± 0.22	<0.24	<3.18	0.06 ± 0.08
71	380S,480E	0.51 ± 0.20	<0.25	<3.86	0.35 ± 0.10
72	380S,520E	0.53 ± 0.22	<0.27	<3.01	<0.04
73	380S,560E	0.73 ± 0.24	<0.28	<3.49	0.18 + 0.12
74	380S,600E	0.59 ± 0.20	<0.25	<3.59	0.24 + 0.10
75	380S,640E	0.62 ± 0.22	<0.24	<5.27	0.37 ± 0.14
76	380S,680E	0.72 ± 0.20	<0.24	<4.04	0.18 ± 0.12

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM GRID LINE INTERSECTIONS

Sample No.	Location	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137
77	400S, 20E	0.66 ± 0.24	0.29 ± 0.61	<4.50	0.55 ± 0.14
78	400S, 60E	1.24 ± 0.32	<0.30	<5.15	0.53 ± 0.70
79	400S,100E	0.63 ± 0.24	<0.24	<3.77	0.76 ± 0.12
80	400S,140E	0.41 ± 0.18	0.32 ± 0.46	<4.48	0.70 ± 0.14
81	400S,180E	0.45 ± 0.24	<0.24	<6.03	0.78 ± 0.20
82	400S,220E	0.39 ± 0.22	<0.26	<4.71	0.40 ± 0.14
83	400S,260E	0.48 ± 0.24	<0.24	<4.66	0.50 ± 0.16
84	400S,300E	0.60 ± 0.22	<0.24	<4.48	0.15 ± 0.14
85	400S,340E	0.49 ± 0.26	<0.24	<4.81	0.41 ± 0.12
86	400S,380E	0.45 ± 0.20	<0.24	<4.00	<0.06
87	400S,420E	0.40 ± 0.16	<0.24	<4.67	0.14 ± 0.10
88	400S,460E	0.70 ± 0.16	<0.21	<3.86	0.04 ± 0.10
89	400S,500E	0.55 ± 0.10	<0.24	<4.06	<0.03
90	400S,540E	0.38 ± 0.24	<0.24	<3.79	0.24 ± 0.14
91	400S,580E	0.74 ± 0.18	<0.24	<4.10	0.14 ± 0.06
92	400S,620E	0.54 ± 0.16	<0.15	<3.32	0.32 ± 0.10
93	400S,660E	0.49 ± 0.18	<0.24	<3.59	0.49 ± 0.12
94	420S, 40E	0.52 ± 0.22	<0.24	<4.16	0.41 ± 0.12
95	420S, 80E	0.48 ± 0.22	<0.23	<4.77	0.53 ± 0.12
96	420S,120E	0.58 ± 0.20	<0.24	<4.30	0.35 ± 0.12
97	420S,160E	0.61 ± 0.30	<0.24	<5.28	2.00 ± 0.26
98	420S,200E	0.65 ± 0.24	<0.23	<4.16	0.21 ± 0.12
99	420S,240E	0.45 ± 0.20	<0.24	5.76 ± 12.76	0.49 ± 0.12
100	420S,280E	0.56 ± 0.22	<0.25	<4.80	0.71 ± 0.16
101	420S,320E	0.52 ± 0.18	<0.24	<4.61	0.71 ± 0.12
102	420S,360E	0.49 ± 0.18	<0.24	<4.61	0.43 ± 0.12
103	420S,400E	0.33 ± 0.18	<0.24	<3.33	0.04 ± 0.06
104	420S,440E	0.44 ± 0.18	<0.22	<4.14	0.07 ± 0.10
105	420S,480E	0.64 ± 0.26	0.54 ± 0.63	<5.16	0.10 ± 0.06
106	420S,520E	0.70 ± 0.20	<0.23	<3.09	<0.03
107	420S,560E	0.60 ± 0.20	<0.24	<4.34	<0.05
108	420S,600E	0.58 ± 0.24	<0.25	<4.65	0.35 ± 0.12
109	420S,640E	0.52 ± 0.20	<0.24	<3.85	0.71 ± 0.14
110	440S, 20E	0.48 ± 0.28	<0.24	5.75 ± 11.72	0.34 ± 0.12
111	440S, 60E	0.65 ± 0.20	<0.24	<4.37	0.39 ± 0.10
112	440S,100E	0.54 ± 0.20	<0.25	<4.97	0.40 ± 0.12
113	440S,140E	0.72 ± 0.22	<0.24	<4.74	0.40 ± 0.12
114	440S,180E	0.57 ± 0.22	<0.27	<5.01	0.80 ± 0.18

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM GRID LINE INTERSECTIONS

Sample No.	Location	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137
115	440S,220E	0.59 ± 0.24	<0.24	<3.92	0.08 ± 0.08
116	440S,260E	0.58 ± 0.20	<0.24	<5.33	0.64 ± 0.12
117	440S,300E	0.41 ± 0.24	<0.24	<3.70	0.48 ± 0.16
118	440S,340E	0.48 ± 0.30	<0.27	<5.15	0.91 ± 0.18
119	440S,380E	0.42 ± 0.20	<0.24	<3.67	0.46 ± 0.12
120	440S,420E	0.49 ± 0.20	<0.24	<3.85	0.16 ± 0.08
121	440S,460E	0.52 ± 0.18	<0.24	<3.46	0.21 ± 0.10
122	440S,500E	0.50 ± 0.20	<0.23	4.82 ± 10.84	0.09 ± 0.10
123	440S,540E	0.66 ± 0.20	<0.24	<4.41	0.06 ± 0.08
124	440S,580E	0.58 ± 0.24	<0.22	<3.27	0.12 ± 0.08
125	440S,620E	0.46 ± 0.28	<0.24	<5.07	0.49 ± 0.06
126	460S, 40E	0.51 ± 0.20	<0.24	<3.03	0.59 ± 0.20
127	460S, 80E	0.34 ± 0.26	0.77 ± 0.50	6.68 ± 6.44	0.60 ± 0.14
128	460S,120E	0.42 ± 0.24	<0.24	<4.59	0.48 ± 0.12
129	460S,160E	0.53 ± 0.32	<0.24	<4.95	1.75 ± 0.20
130	460S,200E	0.67 ± 0.28	<0.24	<3.54	0.62 ± 0.16
131	460S,240E	0.37 ± 0.24	<0.24	<2.89	0.48 ± 0.14
132	460S,280E	0.74 ± 0.20	<0.24	<3.23	0.66 ± 0.14
133	460S,320E	0.31 ± 0.20	<0.24	<4.44	0.45 ± 0.12
134	460S,360E	0.57 ± 0.20	<0.24	<3.77	0.70 ± 0.14
135	460S,400E	0.55 ± 0.24	<0.24	<4.86	<0.04
136	460S,440E	0.57 ± 0.20	<0.24	<4.78	0.42 ± 0.12
137	460S,480E	0.64 ± 0.20	<0.24	<3.94	<0.03
138	460S,520E	0.65 ± 0.20	<0.24	10.8 ± 9.62	0.09 ± 0.10
139	460S,560E	0.67 ± 0.20	<0.24	<4.73	0.79 ± 0.14
140	480S, 20E	0.50 ± 0.22	<0.24	6.34 ± 13.34	0.48 ± 0.12
141	480S, 60E	0.45 ± 0.28	<0.25	<1.50	0.62 ± 0.14
142	480S,100E	0.30 ± 0.18	<0.24	<4.84	0.87 ± 0.18
143	480S,140E	0.55 ± 0.26	<0.24	<4.57	0.32 ± 0.12
144	480S,180E	0.21 ± 0.20	<0.29	<4.49	0.54 ± 0.14
145	480S,220E	0.77 ± 0.22	<0.24	<4.54	0.26 ± 0.10
146	480S,260E	0.44 ± 0.16	<0.24	<4.56	0.85 ± 0.16
147	480S,300E	0.60 ± 0.18	0.37 ± 0.46	<4.28	1.06 ± 0.18
148	480S,340E	0.56 ± 0.30	<0.24	<4.82	1.05 ± 0.18
149	480S,380E	0.31 ± 0.24	<0.24	<6.62	0.94 ± 0.16
150	480S,420E	0.51 ± 0.22	<0.24	<4.89	0.09 ± 0.08
151	480S,460E	0.60 ± 0.20	<0.24	<4.06	<0.04
152	480S,500E	0.43 ± 0.22	<0.24	<4.25	0.21 ± 0.08

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM GRID LINE INTERSECTIONS

Sample No.	Location	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137
153	480S,540E	0.59 ± 0.18	<0.24	<4.06	0.16 ± 0.10
154	500S, 40E	0.47 ± 0.18	0.31 ± 0.44	<3.67	0.54 ± 0.16
155	500S, 80E	0.44 ± 0.22	<0.24	<3.71	0.54 ± 0.14
156	500S,120E	0.32 ± 0.24	<0.24	<6.22	0.98 ± 0.18
157	500S,160E	0.65 ± 0.34	<0.32	<4.52	0.48 ± 0.18
158	500S,200E	0.05 ± 0.20	<0.24	<3.42	0.55 ± 0.14
159	500S,240E	0.68 ± 0.20	<0.24	<4.09	0.53 ± 0.14
160	500S,280E	0.58 ± 0.22	0.26 ± 0.66	<3.10	0.53 ± 0.14
161	500S,320E	0.68 ± 0.24	<0.24	<4.22	0.69 ± 0.14
162	500S,360E	0.46 ± 0.26	0.68 ± 0.54	<5.13	0.88 ± 0.16
163	500S,400E	0.40 ± 0.34	<0.24	<3.59	1.45 ± 0.20
164	500S,440E	0.44 ± 0.18	<0.25	<5.15	0.32 ± 0.16
165	500S,480E	0.61 ± 0.20	<0.34	<4.68	<0.04
166	500S,520E	0.50 ± 0.22	0.79 ± 0.52	<4.08	0.50 ± 0.14
167	520S, 20E	0.49 ± 0.18	<0.24	<5.63	0.58 ± 0.12
168	520S, 60E	0.45 ± 0.18	<0.24	<4.57	0.53 ± 0.12
169	520S,100E	1.04 ± 0.26	<0.25	<4.46	0.78 ± 0.16
170	520S,140E	0.49 ± 0.18	<0.24	<4.47	0.59 ± 0.14
171	520S,180E	0.45 ± 0.26	<0.24	<5.63	0.74 ± 0.16
172	520S,220E	<0.13	<0.24	<3.76	0.08 ± 0.10
173	520S,260E	0.51 ± 0.27	<0.23	<3.45	0.45 ± 0.12
174	520S,300E	0.42 ± 0.24	<0.24	<2.59	0.41 ± 0.10
175	520S,340E	0.47 ± 0.20	<0.24	<4.14	0.31 ± 0.12
176	520S,380E	0.65 ± 0.22	<0.24	<5.04	0.73 ± 0.14
177	520S,420E	0.43 ± 0.20	<0.24	<3.78	0.26 ± 0.14
178	520S,460E	0.63 ± 0.22	<0.24	<4.93	0.81 ± 0.14
179	540S, 40E	0.40 ± 0.18	<0.24	<2.80	0.40 ± 0.12
180	540S, 80E	0.60 ± 0.22	<0.24	<4.71	0.77 ± 0.14
181	540S,120E	0.62 ± 0.30	<0.24	5.77 ± 9.74	0.43 ± 0.16
182	540S,140E	0.37 ± 0.16	<0.24	<3.64	0.46 ± 0.12
183	540S,160E	0.59 ± 0.22	<0.24	<4.50	1.08 ± 0.20
184	540S,180E	0.51 ± 0.24	<0.24	<2.57	0.25 ± 0.10
185	540S,200E	0.77 ± 0.22	<0.24	4.88 ± 9.14	0.48 ± 0.10
186	540S,220E	0.47 ± 0.16	<0.24	<3.58	<0.03
187	540S,240E	0.46 ± 0.20	<0.24	<3.49	0.43 ± 0.12
188	540S,260E	0.46 ± 0.20	<0.22	<3.35	0.54 ± 0.14
189	540S,280E	0.44 ± 0.20	<0.24	<3.92	0.13 ± 0.10
190	540S,320E	0.64 ± 0.18	<0.24	3.95 ± 16.18	0.50 ± 0.12
191	540S,360E	0.66 ± 0.20	<0.24	<5.40	0.45 ± 0.12

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM GRID LINE INTERSECTIONS

Sample No.	Location	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs 137
192	540S,400E	0.49 ± 0.18	<0.24	<3.28	0.21 ± 0.08
193	540S,440E	0.37 ± 0.18	<0.18	<3.40	0.60 ± 0.10
194	560S, 20E	0.59 ± 0.20	<0.24	<2.81	0.62 ± 0.12
195	560S, 60E	0.45 ± 0.18	<0.24	<3.76	0.11 + 0.08
196	560S,100E	0.63 ± 0.18	<0.24	<3.73	0.51 ± 0.12
197	560S,140E	0.52 ± 0.20	<0.24	<4.28	0.70 ± 0.14
198	560S,180E	0.56 ± 0.20	<0.24	<3.67	0.46 ± 0.18
199	560S,220E	0.43 ± 0.18	<0.24	<4.02	1.02 ± 0.16
200	560S,260E	0.13 ± 0.18	<0.24	<3.26	0.46 ± 0.14
201	560S,300E	0.66 ± 0.18	<0.24	<4.08	0.36 ± 0.14
202	560S,340E	0.43 ± 0.22	<0.24	5.78 ± 12.66	0.12 ± 0.10
203	560S,380E	0.53 ± 0.16	<0.24	<4.27	0.25 ± 0.08
204	560S,420E	0.55 ± 0.18	<0.21	<3.63	0.23 ± 0.08
205	580S, 40E	0.31 ± 0.16	<0.24	<3.60	0.84 ± 0.14
206	580S, 80E	0.54 ± 0.20	<0.24	<3.78	0.47 ± 0.12
207	580S,120E	0.50 ± 0.22	<0.21	<1.68	0.60 ± 0.12
208	580S,160E	0.53 + 0.26	<0.24	<5.74	3.74 ± 0.30
209	580S,200E	0.53 ± 0.20	<0.24	<3.02	1.79 + 0.22
210	580S,240E	0.60 ± 0.26	<0.24	<4.32	0.64 ± 0.14
211	580S,280E	0.60 ± 0.24	<0.24	<5.06	1.12 ± 0.18
212	580S,320E	0.65 ± 0.16	<0.24	<4.64	0.56 ± 0.14
213	600S, 20E	0.33 ± 0.18	<0.24	<4.11	0.54 ± 0.12
214	600S, 60E	0.34 ± 0.18	<0.24	<4.10	0.54 ± 0.14
215	600S,100E	0.38 ± 0.16	<0.24	<3.07	0.46 ± 0.14
216	600S,140E	0.62 ± 0.24	<0.24	7.81 ± 11.04	0.63 ± 0.14
217	600S,180E	0.54 ± 0.24	<0.24	<3.38	0.51 ± 0.14
218	600S,220E	0.41 ± 0.16	<0.21	<2.97	0.42 ± 0.10
219	600S,260E	0.40 ± 0.16	<0.24	<3.10	0.39 ± 0.12
220	600S,300E	0.41 ± 0.18	<0.24	5.55 ± 7.68	0.15 ± 0.08
221	620S, 40E	0.44 ± 0.20	<0.24	<4.10	0.36 ± 0.12
222	620S, 80E	0.48 + 0.14	<0.24	<3.07	0.20 ± 0.06
223	620S,120E	0.24 ± 0.16	<0.24	<4.25	0.19 + 0.05
224	620S,160E	0.47 ± 0.16	<0.24	<2.41	0.21 + 0.04
225	620S,200E	0.40 ± 0.18	<0.24	7.30 + 8.54	0.37 ± 0.10
226	620S,240E	0.46 ± 0.16	<0.24	<4.01	0.36 + 0.12
227	620S,280E	0.39 ± 0.22	<0.24	<2.38	0.47 ± 0.12
228	620S,320E	0.49 ± 0.22	<0.24	<3.87	0.42 + 0.12
229	640S, 20E	0.44 ± 0.20	<0.20	<2.65	0.54 ± 0.10
230	640S, 60E	0.29 ± 0.14	<0.24	<3.26	0.21 - 0.12

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM GRID LINE INTERSECTIONS

Sample No.	Location	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137
231	640S,100E	0.41 ± 0.72	<0.24	<3.24	0.44 ± 0.12
232	640S,140E	0.44 ± 0.18	<0.24	8.20 ± 7.32	0.77 ± 0.14
233	640S,180E	0.71 ± 0.24	<0.24	<3.02	0.25 ± 0.10
234	640S,220E	0.55 ± 0.16	<0.24	<2.52	0.45 ± 0.10
235	640S,260E	0.79 ± 0.20	<0.24	<3.48	0.47 ± 0.14
236	640S,300E	0.40 ± 0.18	<0.24	<4.22	0.33 ± 0.10
237	660S, 40E	0.40 ± 0.12	<0.24	<4.14	0.42 ± 0.12
238	660S, 80E	0.36 ± 0.14	<0.74	<2.77	0.50 ± 0.12
239	660S,120E	1.35 ± 0.22	<0.24	<4.13	0.51 ± 0.12
240	660S,160E	0.63 ± 0.16	<0.24	7.04 ± 6.12	0.47 ± 0.12
241	660S,200E	0.50 ± 0.16	<0.24	<3.16	0.22 ± 0.06
242	660S,240E	0.29 ± 0.22	<0.24	<3.61	0.46 ± 0.12
243	660S,280E	0.42 ± 0.22	<0.24	<3.04	0.43 ± 0.12
244	660S,320E	0.36 ± 0.16	<0.24	<3.35	0.59 ± 0.12
245	680S, 20E	0.45 ± 0.16	<0.24	<3.67	0.39 ± 0.12
246	680S, 60E	0.40 ± 0.14	<0.22	<3.19	0.56 ± 0.10
247	680S,100E	0.36 ± 0.16	<0.20	<3.34	0.45 ± 0.12
248	680S,140E	0.49 ± 0.16	<0.24	<3.61	<0.03
249	680S,180E	0.46 ± 0.12	0.42 ± 0.36	<3.29	0.18 ± 0.10
250	680S,220E	0.39 ± 0.18	<0.24	<3.90	0.33 ± 0.10
251	680S,260E	0.49 ± 0.16	<0.22	<2.96	0.46 ± 0.16
252	680S,300E	0.30 ± 0.20	<0.24	6.90 ± 8.84	0.47 ± 0.12
253	700S, 40E	0.15 ± 0.16	<0.24	<2.28	1.24 ± 0.16
254	700S, 80E	0.28 ± 0.14	<0.24	<3.04	0.16 ± 0.08
255	700S,120E	0.40 ± 0.20	<0.24	<3.08	0.45 ± 0.12
256	700S,160E	0.53 ± 0.22	<0.24	<3.40	0.78 ± 0.12
257	700S,200E	0.48 ± 0.16	<0.24	<4.18	0.23 ± 0.08
258	700S,240E	0.36 ± 0.16	<0.24	<1.87	0.63 ± 0.12
259	700S,280E	0.41 ± 0.18	<0.24	<5.05	0.22 ± 0.10
260	700S,320E	0.31 ± 0.16	<0.24	<3.92	0.80 ± 0.16
261	720S, 20E	0.18 ± 0.12	<0.14	<3.24	0.33 ± 0.10
262	720S, 60E	0.47 ± 0.16	<0.25	<3.81	0.67 ± 0.12
263	720S,100E	0.43 ± 0.20	<0.24	14.8 ± 13.28	0.41 ± 0.12
264	720S,140E	0.30 ± 0.16	<0.24	<2.79	0.49 ± 0.10
265	720S,180E	0.72 ± 0.22	<0.74	<3.67	0.70 ± 0.14
266	720S,220E	0.55 ± 0.20	<0.24	<4.17	0.15 ± 0.12
267	720S,260E	0.44 ± 0.16	<0.24	<4.49	0.56 ± 0.14
268	720S,300E	0.49 ± 0.18	<0.24	<1.69	0.47 ± 0.12
269	740S, 40E	0.43 ± 0.20	<0.22	<3.37	0.24 ± 0.10
270	740S, 80E	0.35 ± 0.18	<0.24	<2.97	0.47 ± 0.14
271	740S,120E	0.44 ± 0.20	0.18 ± 0.50	<4.42	0.24 ± 0.10
272	740S,160E	0.43 ± 0.16	<0.24	<2.64	0.16 ± 0.08
273	740S,200E	0.37 ± 0.28	<0.24	<4.06	0.37 ± 0.12

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM GRID LINE INTERSECTIONS

		Radionuclide Concentrations (pCi/g)			
Sample No.	Location	Ra-226	U-235	U-238	Cs-137
274	740S,240E	0.38 ± 0.18	<0.24	<3.61	0.62 ± 0.12
275	740S,280E	0.48 ± 0.16	<0.24	<4.55	0.46 ± 0.10
276	740S,320E	0.24 ± 0.22	<0.21	5.29 ± 6.14	0.39 ± 0.12
277	760S, 20E	0.37 ± 0.16	<0.24	<2.46	0.23 ± 0.08
278	760S, 60E	0.66 ± 0.16	<0.24	<3.59	0.43 ± 0.10
279	760S,100E	0.39 ± 0.15	<0.24	<4.05	0.51 ± 0.12
280	760S,140E	0.55 ± 0.08	<0.17	1.95 ± 4.64	0.09 ± 0.04
281	760S,160E	0.52 ± 0.14	<0.24	<4.66	1.15 ± 0.09
282	760S,180E	0.97 ± 0.18	<0.24	<3.07	0.50 ± 0.12
283	760S,220E	0.73 ± 0.28	<0.24	5.14 ± 8.46	0.61 ± 0.14
284	760S,260E	0.48 ± 0.22	<0.24	4.96 ± 8.96	0.43 ± 0.12
285	760S,300E	0.55 ± 0.22	<0.24	<3.81	0.39 ± 0.12
286	780S, 40E	0.48 ± 0.18	<0.24	<3.72	0.39 ± 0.10
287	780S, 80E	0.43 ± 0.24	<0.22	<2.55	0.10 ± 0.08
288	780S,120E	0.41 ± 0.18	<0.22	<3.45	0.26 ± 0.08
289	780S,160E	0.71 ± 0.22	<0.24	<2.71	0.19 ± 0.14
290	780S,200E	1.09 ± 0.22	<0.24	<4.73	0.27 ± 0.08
291	780S,240E	0.50 ± 0.16	<0.24	<2.97	0.15 ± 0.10
292	780S,260E	0.55 ± 0.18	<0.24	<3.19	0.11 ± 0.10
293	800S, 20E	0.45 ± 0.16	<0.24	<3.21	0.43 ± 0.10
294	800S, 60E	0.42 ± 0.18	0.27 ± 0.59	<3.86	0.38 ± 0.10
295	800S,100E	0.55 ± 0.18	<0.24	<3.99	0.65 ± 0.14
296	800S,140E	0.34 ± 0.18	0.39 ± 0.44	<3.16	0.31 ± 0.08
297	800S,180E	0.48 ± 0.20	0.42 ± 0.50	<4.19	0.48 ± 0.12
298	800S,220E	0.54 ± 0.18	<0.24	<3.93	0.77 ± 0.14
299	800S,260E	0.62 ± 0.16	<0.24	<3.77	<0.04
300	800S,300E	0.45 ± 0.20	<0.24	<3.95	0.19 ± 0.10
301	820S, 40E	0.43 ± 0.20	<0.24	<3.43	0.10 ± 0.10
302	820S, 80E	0.49 ± 0.20	<0.24	<4.10	0.11 ± 0.08
303	820S,120E	0.42 ± 0.16	<0.24	<3.77	0.26 ± 0.10
304	820S,160E	0.52 ± 0.28	<0.24	<3.37	0.23 ± 0.10
305	820S,200E	0.68 ± 0.24	<0.24	<4.41	0.97 ± 0.14
306	820S,240E	0.59 ± 0.16	<0.24	<3.91	0.35 ± 0.10
307	820S,280E	0.60 ± 0.20	<0.24	<3.63	0.33 ± 0.12
308	840S, 20E	0.40 ± 0.16	<0.24	5.09 ± 7.44	0.31 ± 0.10
309	840S, 60E	<0.12	<0.24	<3.74	0.21 ± 0.14
310	840S,100E	0.48 ± 0.15	<0.24	<3.11	0.30 ± 0.14
311	840S,140E	0.38 ± 0.20	<0.24	<4.26	0.63 ± 0.12
312	840S,180E	0.58 ± 0.18	<0.24	4.09 ± 8.36	0.28 ± 0.10

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM GRID LINE INTERSECTIONS

		Radionuclide Concentrations (pCi/g)			
Sample No.	Location	Ra-226	U-235	U-238	Cs-137
313	840S,220E	0.76 ± 0.20	<0.24	<3.50	0.57 ± 0.10
314	840S,260E	0.45 ± 0.16	<0.24	<4.17	0.34 ± 0.12
315	840S,300E	0.31 ± 0.16	<0.24	<3.44	0.71 ± 0.14
316	860S, 40E	0.43 ± 0.22	<0.24	<3.20	0.27 ± 0.12
317	860S, 80E	0.52 ± 0.18	0.46 ± 0.71	<4.84	0.33 ± 0.10
318	860S,120E	0.40 ± 0.22	<0.24	6.34 ± 6.38	0.30 ± 0.12
319	860S,160E	0.53 ± 0.20	<0.24	<3.71	0.37 ± 0.10
320	860S,200E	0.41 ± 0.20	<0.24	<3.79	0.36 ± 0.10
321	860S,240E	0.50 ± 0.20	<0.24	<4.00	0.05 ± 0.08
322	860S,280E	8.27 ± 0.62	<0.24	<6.41	0.36 ± 0.26
323	880S, 20E	0.40 ± 0.20	<0.24	5.57 ± 12.24	0.76 ± 0.10
324	880S, 60E	0.37 ± 0.22	<0.23	<2.82	0.35 ± 0.12
325	880S,100E	0.81 ± 0.28	<0.24	<5.42	0.15 ± 0.12
326	880S,140E	0.50 ± 0.24	<0.24	<3.84	0.37 ± 0.14
327	880S,180E	0.44 ± 0.20	0.43 ± 0.50	<3.67	0.42 ± 0.12
328	880S,220E	0.62 ± 0.20	<0.24	<3.68	0.56 ± 0.14
329	880S,260E	0.39 ± 0.16	<0.24	<3.41	0.33 ± 0.10
330	880S,300E	0.81 ± 0.24	<0.21	<3.30	0.23 ± 0.12
331	900S, 40E	0.50 ± 0.20	<0.24	<4.91	0.39 ± 0.12
332	900S, 80E	0.34 ± 0.22	<0.24	<4.14	0.40 ± 0.14
333	900S,120E	0.68 ± 0.22	<0.24	<4.75	0.15 ± 0.10
334	900S,160E	0.64 ± 0.20	<0.22	<4.33	0.15 ± 0.10
335	900S,200E	0.38 ± 0.16	<0.24	<3.90	0.29 ± 0.08
336	900S,240E	0.56 ± 0.20	<0.24	<5.47	0.17 ± 0.12
337	900S,280E	0.52 ± 0.20	<0.24	<3.98	0.09 ± 0.10
338	920S, 20E	0.58 ± 0.20	<0.24	<3.58	0.24 ± 0.16
339	920S, 60E	0.43 ± 0.18	<0.24	<3.80	0.27 ± 0.08
340	920S,100E	0.39 ± 0.28	<0.24	7.55 ± 7.84	0.48 ± 0.12
341	920S,140E	0.56 ± 0.18	<0.24	<3.64	0.19 ± 0.10
342	920S,180E	0.39 ± 0.26	<0.24	<3.74	0.53 ± 0.12
343	920S,220E	0.44 ± 0.16	<0.24	<3.88	0.08 ± 0.06
344	920S,260E	0.42 ± 0.20	<0.24	<3.73	0.37 ± 0.12
345	940S, 40E	0.43 ± 0.18	0.45 ± 0.56	<3.75	<0.07
346	940S, 80E	0.38 ± 0.20	<0.24	6.75 ± 8.76	0.37 ± 0.12
347	940S,120E	0.52 ± 0.22	<0.24	<3.25	0.41 ± 0.12
348	940S,160E	0.56 ± 0.18	<0.24	<2.95	0.27 ± 0.08
349	940S,200E	0.58 ± 0.22	0.36 ± 0.66	<3.65	0.28 ± 0.10
350	940S,240E	0.45 ± 0.22	<0.24	<3.42	0.12 ± 0.10
351	960S, 20E	0.71 ± 0.26	<0.24	<4.47	0.33 ± 0.12

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM GRID LINE INTERSECTIONS

Sample No.	Location	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137
352	960S, 60E	0.48 ± 0.24	<0.24	<4.56	0.34 ± 0.12
353	960S,100E	0.50 ± 0.18	<0.24	<1.96	0.29 ± 0.16
354	960S,140E	0.40 ± 0.20	<0.24	<3.30	0.20 ± 0.12
355	960S,180E	0.70 ± 0.22	<0.24	<3.91	0.57 ± 0.14
356	960S,220E	0.53 ± 0.18	<0.24	<4.26	0.56 ± 0.12
357	960S,260E	0.43 ± 0.22	<0.24	<3.13	0.76 ± 0.14
358	980S, 40E	0.50 ± 0.24	<0.24	<4.60	0.23 ± 0.12
359	980S, 80E	0.61 ± 0.20	<0.24	<4.50	0.35 ± 0.18
360	980S,120E	0.34 ± 0.26	<0.24	<4.11	0.39 ± 0.10
361	980S,160E	0.49 ± 0.18	<0.24	<3.05	0.37 ± 0.12
362	980S,200E	1.46 ± 0.24	<0.24	<2.74	0.42 ± 0.16
363	1000S, 20E	0.53 ± 0.24	<0.24	<3.73	0.20 ± 0.14
364	1000S, 60E	0.52 ± 0.18	<0.24	<3.91	0.45 ± 0.12
365	1000S,100E	0.43 ± 0.18	<0.24	<3.70	0.23 ± 0.12
366	1000S,140E	0.59 ± 0.20	<0.24	<3.91	0.29 ± 0.10
367	1000S,180E	1.63 ± 0.28	<0.24	<2.67	0.54 ± 0.12
368	1020S, 40E	0.36 ± 0.28	<0.22	<2.96	0.29 ± 0.10
369	1020S, 80E	0.51 ± 0.16	0.41 ± 0.50	<4.49	0.36 ± 0.12
370	1020S,120E	0.58 ± 0.22	<0.24	<3.41	0.55 ± 0.16
371	1020S,160E	0.61 ± 0.22	<0.24	<5.16	0.70 ± 0.16
372	1020S,200E	0.69 ± 0.22	<0.24	<2.66	1.57 ± 0.18
373	1040S, 20E	0.57 ± 0.20	<0.24	<5.20	0.52 ± 0.12
374	1040S, 60E	0.33 ± 0.20	<0.24	<3.61	0.61 ± 0.20
375	1040S,100E	0.61 ± 0.16	<0.24	<4.66	0.56 ± 0.12
376	1040S,140E	0.54 ± 0.20	<0.24	<5.20	0.57 ± 0.14
377	1040S,180E	0.50 ± 0.20	<0.24	8.99 ± 10.36	0.68 ± 0.14
378	1060S, 40E	0.68 ± 0.22	<0.24	<5.48	0.57 ± 0.12
379	1060S, 80E	0.52 ± 0.20	<0.24	<2.98	0.20 ± 0.10
380	1060S,120E	0.38 ± 0.14	<0.24	<3.24	0.43 ± 0.10
381	1060S,160E	0.61 ± 0.20	<0.24	<3.07	0.34 ± 0.12
382	1060S,200E	1.32 ± 0.26	<0.24	<3.90	0.33 ± 0.10
383	1080S, 20E	0.53 ± 0.24	<0.24	<3.16	0.63 ± 0.12
384	1080S, 60E	0.58 ± 0.22	<0.24	<3.66	0.49 ± 0.14
385	1080S,100E	0.54 ± 0.20	0.51 ± 0.20	<4.42	0.39 ± 0.12
386	1080S,140E	0.46 ± 0.22	<0.24	<4.02	0.64 ± 0.14
387	1080S,180E	0.74 ± 0.24	<0.24	<4.51	0.76 ± 0.16
388	1100S, 40E	0.47 ± 0.18	<0.21	<2.57	[illegible] ± 0.10
389	1100S, 80E	0.36 ± 0.16	<0.24	<4.26	[illegible] ± 0.12
390	1100S,120E	0.71 ± 0.22	<0.24	<3.89	[illegible] ± 0.14

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES FROM GRID LINE INTERSECTIONS

Sample No.	Location	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137
391	1100S,160E	0.56 ± 0.20	<0.24	<5.17	0.06 ± 0.12
392	1120S, 20E	0.70 ± 0.30	<0.24	<3.79	0.94 ± 0.16
393	1120S, 60E	0.53 ± 0.22	<0.24	<4.05	0.56 ± 0.14
394	1120S,100E	0.43 ± 0.20	<0.24	<5.24	0.53 ± 0.12
395	1120S,140E	0.58 ± 0.22	<0.24	<3.87	0.39 ± 0.12
396	1120S,180E	0.78 ± 0.12	<0.24	<4.97	0.78 ± 0.14
397	1140S, 40E	0.65 ± 0.20	<0.24	<3.82	0.47 ± 0.12
398	1140S, 80E	0.37 ± 0.20	<0.24	<4.33	0.89 ± 0.14
399	1140S,120E	0.61 ± 0.22	<0.24	<2.82	0.12 ± 0.10
400	1140S,160E	0.94 ± 0.20	0.44 ± 0.42	<4.71	<0.05
401	1160S, 20E	0.55 ± 0.20	<0.24	<3.95	0.52 ± 0.12
402	1160S, 60E	0.54 ± 0.24	<0.21	<3.49	0.36 ± 0.12
403	1160S,100E	0.39 ± 0.20	<0.24	<3.17	0.58 ± 0.12
404	1160S,140E	0.55 ± 0.24	<0.24	<2.25	0.11 ± 0.10
405	1160S,180E	0.54 ± 0.18	<0.24	<3.08	0.14 ± 0.08
406	1180S, 40E	0.58 ± 0.26	<0.24	<4.52	0.30 ± 0.12
407	1180S, 80E	0.69 ± 0.24	<0.24	<4.77	0.31 ± 0.10
408	1180S,120E	0.41 ± 0.24	<0.22	4.54 ± 8.64	0.33 ± 0.10
409	1180S,160E	0.42 ± 0.20	<0.24	<3.59	0.19 ± 0.12
410	1200S, 20E	0.74 ± 0.22	<0.24	<3.59	0.86 ± 0.14
411	1200S, 60E	0.51 ± 0.20	<0.24	<3.41	0.13 ± 0.08
412	1200S,100E	0.64 ± 0.22	<0.24	<2.86	0.27 ± 0.10
413	1200S,140E	0.61 ± 0.20	<0.24	<3.64	0.16 ± 0.08
414	1200S,180E	0.47 ± 0.18	<0.24	<4.04	0.10 ± 0.10
415	1220S, 40E	0.45 ± 0.20	<0.24	<3.89	0.21 ± 0.08
416	1220S, 80E	0.64 ± 0.24	<0.24	<3.01	0.13 ± 0.12
417	1220S,120E	1.14 ± 0.22	<0.24	<3.19	0.08 ± 0.08
418	1220S,160E	0.46 ± 0.14	<0.24	<2.16	0.09 ± 0.08
419	1240S, 20E	0.44 ± 0.16	<0.24	<2.98	0.20 ± 0.10
420	1240S, 60E	0.62 ± 0.18	<0.24	<3.13	0.14 ± 0.10
421	1240S,100E	0.59 ± 0.26	<0.24	<2.79	0.15 ± 0.12
422	1240S,140E	0.53 ± 0.20	<0.22	<3.73	0.10 ± 0.08
423	1240S,180E	0.58 ± 0.22	<0.23	2.20 ± 8.42	0.16 ± 0.16
424	1260S, 20E	0.69 ± 0.26	0.42 ± 0.58	6.44 ± 8.62	0.39 ± 0.12
425	1260S, 40E	0.43 ± 0.24	<0.24	<3.27	0.45 ± 0.16
426	1260S, 60E	0.71 ± 0.24	<0.24	<4.84	0.12 ± 0.10
None	1260S, 80E	---c	---	---	---
None	1260S,100E	---c	---	---	---
427	1260S,120E	0.38 ± 0.20	<0.24	<5.11	0.63 ± 0.14
428	1260S,140E	0.36 ± 0.18	<0.24	<4.99	0.59 ± 0.14
429	1260S,160E	0.47 ± 0.20	<0.24	<3.53	0.32 ± 0.14

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM GRID LINE INTERSECTIONS

Sample No.	Location	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137
430	1260S,180E	1.51 ± 0.38	<0.32	<5.05	0.16 ± 0.10
431	1280S, 20E	0.65 ± 0.20	<0.24	<4.34	0.17 ± 0.08
432	1280S, 40E	0.53 ± 0.18	<0.24	<4.70	0.19 ± 0.12
433	1280S, 60E	0.43 ± 0.20	<0.24	8.42 ± 10.07	<0.03
None	1280S, 80E	---c	---	---	---
None	1280S,100E	---c		---	---
434	1280S,120E	0.44 ± 0.16	<0.24	<3.15	0.13 ± 0.08
435	1280S,140E	0.76 ± 0.24	<0.24	<3.43	0.65 ± 0.14
436	1280S,160E	0.67 ± 0.22	<0.24	<4.68	0.60 ± 0.14
437	1300S, 20E	0.40 ± 0.22	<0.24	<5.07	0.64 ± 0.14
438	1300S, 40E	0.51 ± 0.22	<0.24	<2.66	0.67 ± 0.16
439	1300S, 60E	0.67 ± 0.22	<0.24	<3.71	0.04 ± 0.10
None	1300S, 80E	---c	---		---
None	1300S,100E	---c	---	---	---
440	1300S,120E	1.91 ± 0.40	<0.24	<4.88	<0.05
None	1300S,140E	---c	---	---	---
441	1300S,160E	1.76 ± 0.34	<0.24	<6.71	0.09 ± 0.12
442	1320S, 20E	0.46 ± 0.20	<0.24	<2.84	0.48 ± 0.16
443	1320S, 40E	0.69 ± 0.22	<0.24	<5.23	0.42 ± 0.12
444	1320S, 60E	0.60 ± 0.20	<0.24	<4.64	0.31 ± 0.10
None	1320S, 80E	---c	---	---	---
None	1320S,120E	---c	---	---	---
445	1320S,140E	1.94 ± 0.36	<0.24	<5.45	<0.04
446	1320S,160E	0.60 ± 0.26	<0.24	<1.51	0.92 ± 0.16
447	1340S, 20E	0.59 ± 0.26	<0.24	<4.38	0.63 ± 0.14
448	1340S, 40E	0.42 ± 0.22	<0.24	<4.07	0.34 ± 0.12
449	1340S, 58E	0.38 ± 0.18	<0.24	<3.45	0.03 ± 0.08
None	1340S, 80E	---c	---	---	---
None	1340S,100E	---c	---	---	---
450	1340S,120E	1.73 ± 0.32	<0.24	<3.88	<0.03
451	1340S,140E	0.62 ± 0.22	<0.24	<3.71	0.16 ± 0.08
452	1340S,160E	0.48 ± 0.20	<0.24	<3.59	0.05 ± 0.06
453	1360S, 20E	0.58 ± 0.20	<0.24	<3.05	0.12 ± 0.08
454	1360S, 40E	0.62 ± 0.22	<0.24	<3.71	0.16 ± 0.08
455	1360S, 60E	0.42 ± 0.18	<0.24	<2.77	0.46 ± 0.12
456	1360S, 80E	0.66 ± 0.16	<0.24	<3.62	0.12 ± 0.06
457	1360S,100E	0.80 ± 0.26	<0.24	<2.82	0.22 ± 0.10
458	1360S,120E	1.54 ± 0.30	<0.24	<4.14	0.11 ± 0.10
459	1360S,140E	0.55 ± 0.20	<0.23	<4.40	0.38 ± 0.10
460	1360S,160E	0.40 ± 0.16	<0.24	<3.59	<0.04
461	1380S, 20E	0.47 ± 0.20	<0.24	<4.92	0.14 ± 0.12
462	1380S, 40E	0.50 ± 0.22	<0.24	<4.23	0.17 ± 0.08

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES FROM GRID LINE INTERSECTIONS

Sample No.	Location	Radionuclide Concentrations (pCi/g) Ra 226	U-235	U-238	Cs-137
463	1380S, 60E	0.51 ± 0.22	<0.24	<3.65	0.62 ± 0.12
464	1380S, 80E	0.53 ± 0.18	<0.24	<2.52	0.33 ± 0.10
465	1380S,100E	0.75 ± 0.20	0.36 ± 0.48	<4.38	0.21 ± 0.17
466	1380S,120E	0.28 ± 0.10	<0.24	<1.11	0.02 ± 0.06
467	1380S,140E	1.06 ± 0.20	<0.24	<4.64	0.32 ± 0.14
468	1380S,160E	0.42 ± 0.18	0.43 ± 0.60	<3.29	0.26 ± 0.10
469	1400S, 20E	0.56 ± 0.14	<0.24	<4.20	0.20 ± 0.10
470	1400S, 40E	0.48 ± 0.18	<0.22	<4.81	0.12 ± 0.08
471	1400S, 60E	0.47 ± 0.22	<0.24	<3.30	0.12 ± 0.08
472	1405S, 80E	0.58 ± 0.18	<0.24	<3.38	0.11 ± 0.08
473	1399S,100E	0.47 ± 0.18	<0.24	<4.06	0.07 ± 0.08
None	1400S,120E	---d	---	---	---
None	1400S,140E	---d	---	---	---
None	1400S,160E	---d	---	---	---
474	1420S, 20E	0.51 ± 0.20	0.34 ± 0.54	<3.50	0.21 ± 0.10
475	1420S, 40E	0.67 ± 0.16	<0.24	<3.69	0.25 ± 0.10
None	1420S, 60E	---e	---	---	---
None	1420S, 80E	---e	---	---	---
None	1420S,100E	---e	---	---	---
None	1420S,120E	---d	---	---	---
476	1420S,150E	0.56 ± 0.16	<0.24	<2.37	0.10 ± 0.05
477	1420S,160E	1.16 ± 0.36	0.57 ± 0.87	<4.95	0.89 ± 0.18
478	1440S, 20E	1.76 ± 0.28	<0.24	<4.78	0.37 ± 0.10
479	1440S, 40E	0.49 ± 0.32	<0.24	<5.11	0.48 ± 0.14
480	1440S, 60E	0.57 ± 0.22	<0.24	<4.68	0.45 ± 0.12
None	1440S, 80E	---e	---	---	---
481	1440S,100E	0.59 ± 0.20	<0.24	<3.44	0.34 ± 0.10
482	1440S,120E	0.72 ± 0.20	<0.24	<3.60	0.34 ± 0.10
483	1440S,140E	0.19 ± 0.12	<0.13	2.56 ± 7.20	<0.01
None	1440S,160E	---d	---	---	---
484	1460S, 20E	0.53 ± 0.18	<0.24	<4.21	0.44 ± 0.17
485	1460S, 40E	0.39 ± 0.16	<0.24	<2.61	0.17 ± 0.06
None	1460S, 60E	---d	---	---	---
None	1460S, 80E	---d	---	---	---
486	1460S,100E	0.82 ± 0.28	<0.24	<3.58	0.39 ± 0.12
487	1460S,120E	0.65 ± 0.20	<0.24	<3.40	0.25 ± 0.08
488	1460S,140E	0.40 ± 0.20	<0.24	<2.54	0.06 ± 0.06
489	1460S,160E	0.52 ± 0.22	<0.24	<4.05	0.62 ± 0.14
490	1480S, 20E	0.82 ± 0.28	<0.24	<4.93	0.20 ± 0.12
491	1480S, 40E	0.54 ± 0.20	<0.24	<3.74	0.15 ± 0.05
492	1480S, 60E	0.59 ± 0.26	<0.24	<4.83	0.71 ± 0.14
493	1480S, 80E	0.60 ± 0.20	<0.24	<3.42	0.48 ± 0.12
494	1480S,100E	1.05 ± 0.22	<0.24	<4.14	0.27 ± 0.08
495	1480S,120E	0.64 ± 0.20	<0.24	<3.81	0.47 ± 0.16

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM GRID LINE INTERSECTIONS

Sample No.	Location	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137
496	1480S,140E	0.34 ± 0.16	<0.24	<2.94	0.33 ± 0.08
497	1500S, 20E	0.62 ± 0.24	<0.27	<2.61	0.06 ± 0.12
498	1500S, 40E	0.38 ± 0.16	<0.24	<3.71	0.09 ± 0.06
499	1500S, 60E	0.83 ± 0.28	<0.24	<5.06	0.15 ± 0.12
500	1500S, 80E	0.59 ± 0.18	<0.24	<3.22	0.16 ± 0.08
501	1500S,100E	0.54 ± 0.28	<0.24	<4.47	0.42 ± 0.16
502	1500S,120E	0.62 ± 0.30	<0.24	<4.03	0.25 ± 0.14

[a] Refer to Table 2 for direct radiation levels.
[b] Errors are 2σ based on counting statistics.
[c] No soil sample taken due to sand and gravel piles.
[d] No sample taken due to paved surface.
[e] No sample taken due to presence of maintenance building.

TABLE 5

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM SELECTED LOCATIONS IDENTIFIED BY THE WALKOVER SCAN

Sample No.[a]	Location	Radionuclide Concentrations (pCi/g)[b]			
		Ra-226	U-235	U-238	Cs-137
B1	514S,300E	0.70 ± 0.24[c]	<0.31	<3.07	0.70 ± 0.16
B2	500S,176E	<0.15	<0.31	<6.99	1.31 ± 0.22
B3	771S,170E	51.9 ± 1.3	<0.31	1.78 ± 0.39	0.88 ± 0.32
B4	782S,169E	1.44 ± 0.26	0.64 ± 0.52	2.03 ± 0.45	0.34 ± 0.12
B5	796S,170E	11.9 ± 0.6	1.86 ± 1.28	36.6 ± 0.6	0.27 ± 0.16
B6	799S,173E	3.07 ± 0.38	<0.31	<5.67	1.11 ± 0.18
B7	809S,172E	13.4 ± 0.7	2.06 + 1.24	22.1 ± 0.6	0.53 ± 0.18
B8	1280S,126E	106 ± 2	<0.31	1.09 ± 0.33	1.73 ± 0.42
B9	1260S,158E	92.6 ± 2.3	<0.31	1.56 ± 0.52	1.32 ± 0.56
B10[d]	1460S, 91E	31.9 ± 1.2	1.86 ± 2.06	18.3 ± 0.4	0.75 ± 0.32
B11	1471S, 97E	0.35 ± 0.20	<0.31	<3.85	0.23 ± 0.10
B12	1458S, 91E	8.12 ± 0.64	<0.31	11.2 ± 0.4	<0.09
B13	1455S,105E	2.81 ± 0.40	<0.31	<5.77	0.25 ± 0.18
B14	1506S,111E	7.79 ± 0.20	0.97 + 1.18	<7.22	0.40 ± 0.20
B15	1488S,118E	2.79 ± 0.42	<0.31	<5.65	0.56 ± 0.20
B16	1239S,138E	4.68 ± 0.44	0.49 ± 0.74	<5.86	0.27 ± 0.12
B17[e]	1233S,137E	5.56 ± 0.58	<0.31	8.99 ± 0.53	<0.08
B18	1175S,114E	2.65 ± 0.34	<0.31	<4.18	0.14 ± 0.10
B19	1107S,216E	3.37 ± 4.74	<0.31	0.50 ± 0.55	7.11 ± 1.04
B20	1087S,217E	1020 ± 8	<0.31	2.85 ± 0.45	<1.22
B21	1054S,209E	41.6 ± 1.5	<0.31	1.39 ± 0.33	1.18 + 0.22
B22	1062S,216E	209 ± 4	<0.31	1.34 ± 0.48	<0.53

[a] Refer to Figures 3 and 4.
[b] Refer to Table 3 for direct radiation levels.
[c] Errors are 2σ based on counting statistics.
[d] Sample also contained 13.0 ± 1.54 pCi/g Th-232.
[e] Sample also contained 8.71 ± 1.32 pCi/g Th-232.

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Excavated Area

Excerpt from Post-Remedial Action Report for the Niagara Falls Storage Site Vicinity Properties 1983 and 1984

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DOE/OR/20722-84

Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-ACO5-810R20722

POST-REMEDIAL ACTION REPORT FOR THE NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES - 1983 AND 1984

Lewiston, New York

December 1986

Bechtel National, Inc.

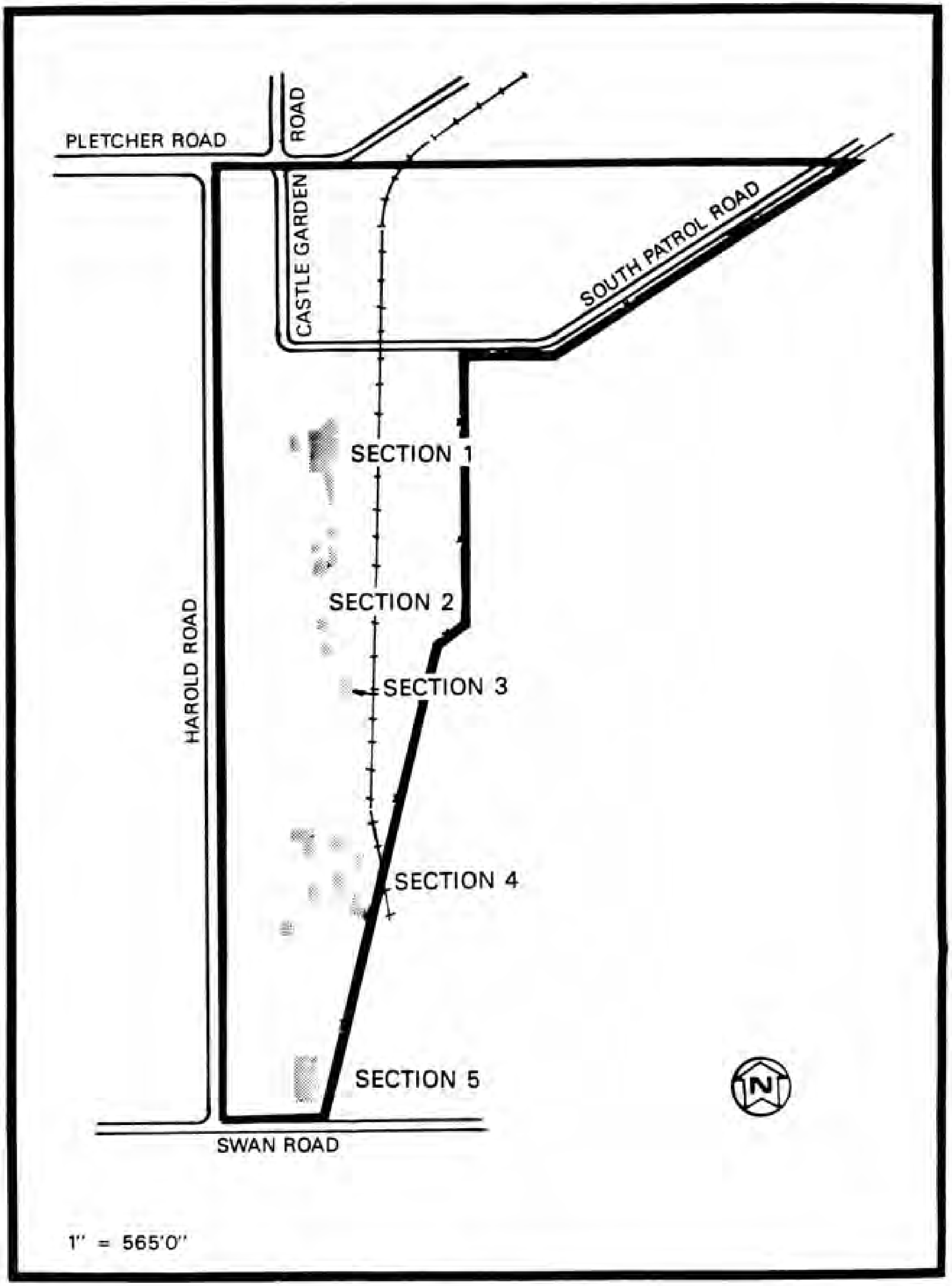

FIGURE 17 EXCAVATED AREAS ON PROPERTY Q

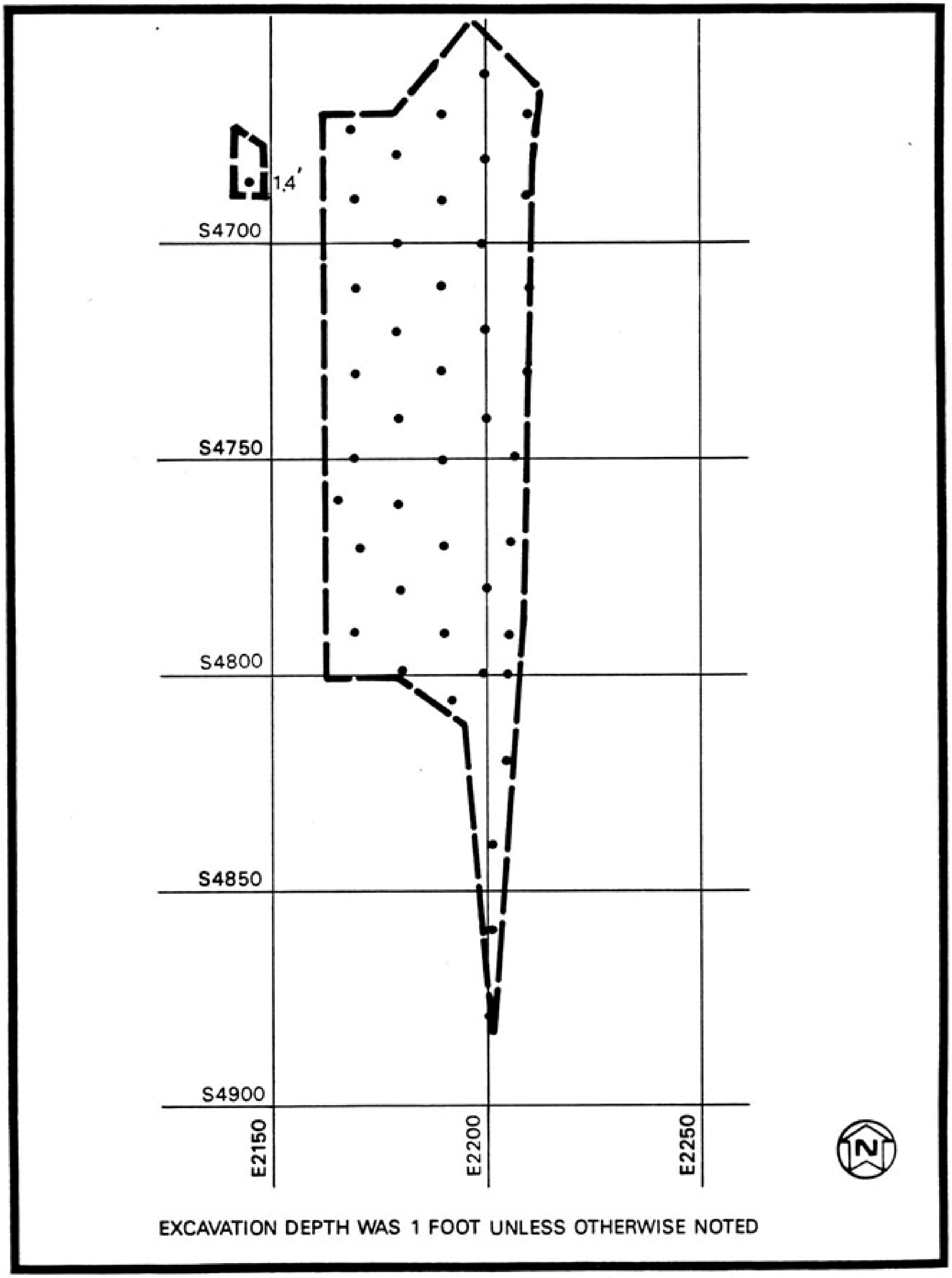

FIGURE 18 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY Q - SECTION 1

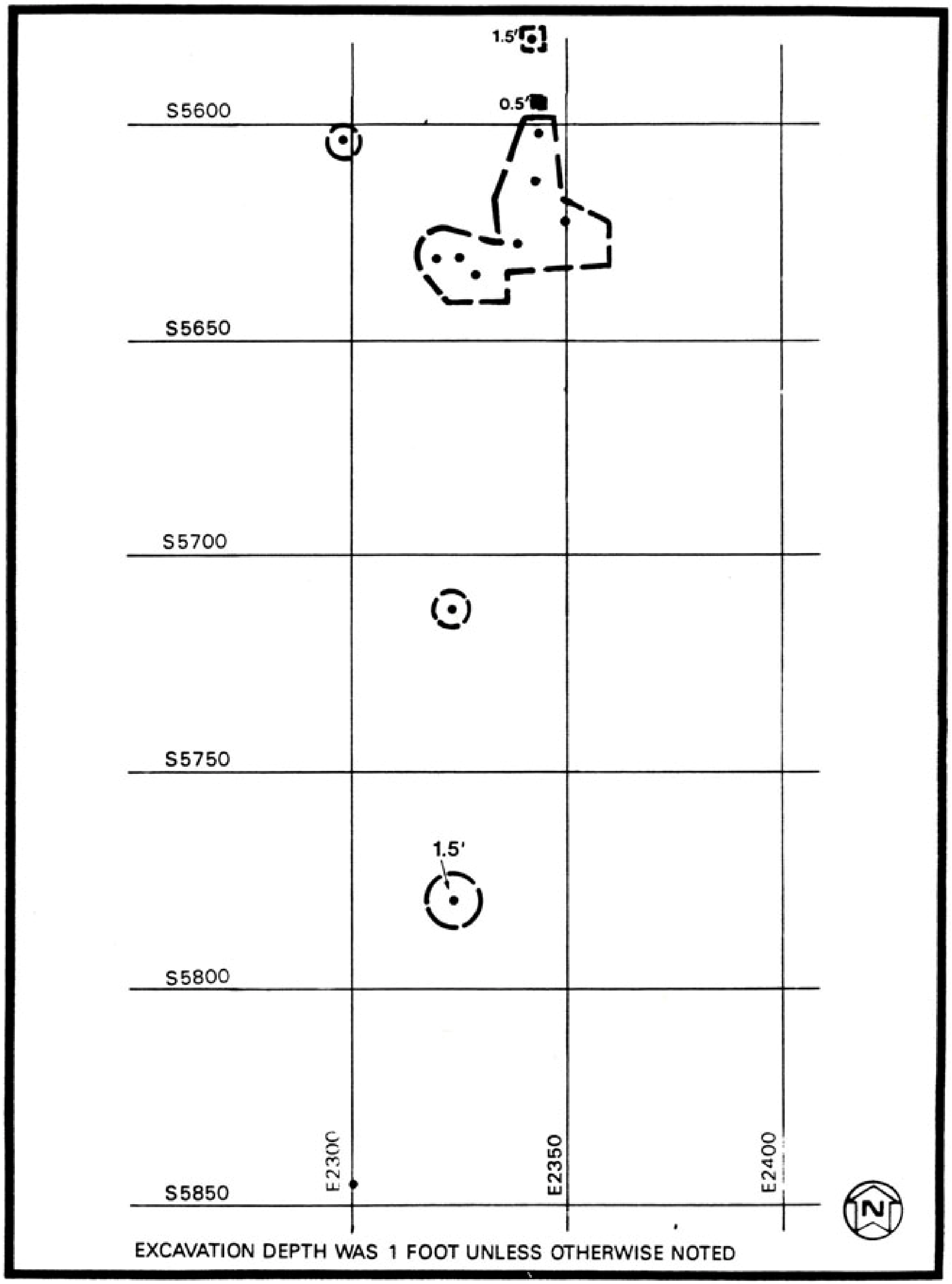

FIGURE 19 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY Q - SECTION 2

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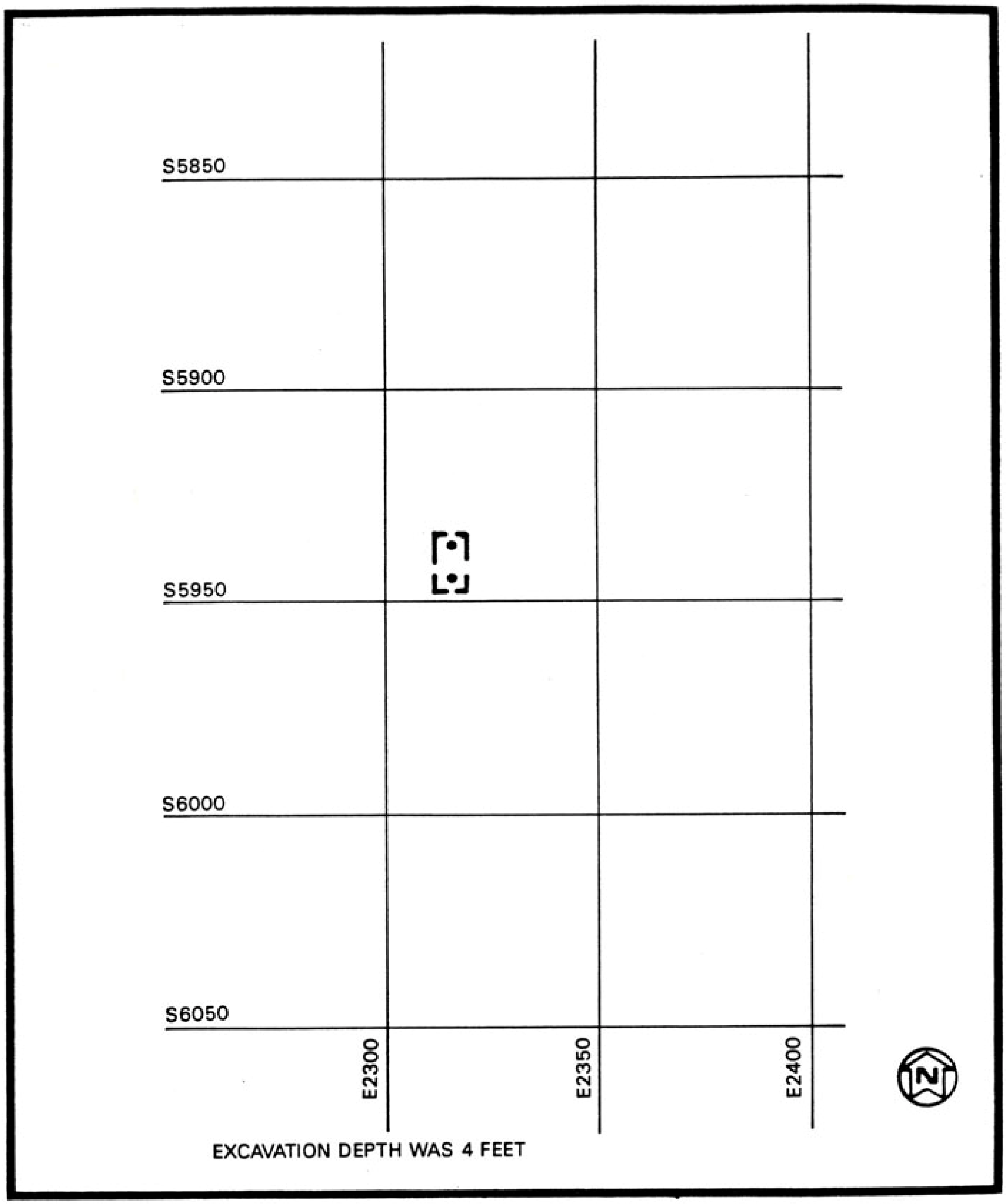

FIGURE 20 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY Q - SECTION 3

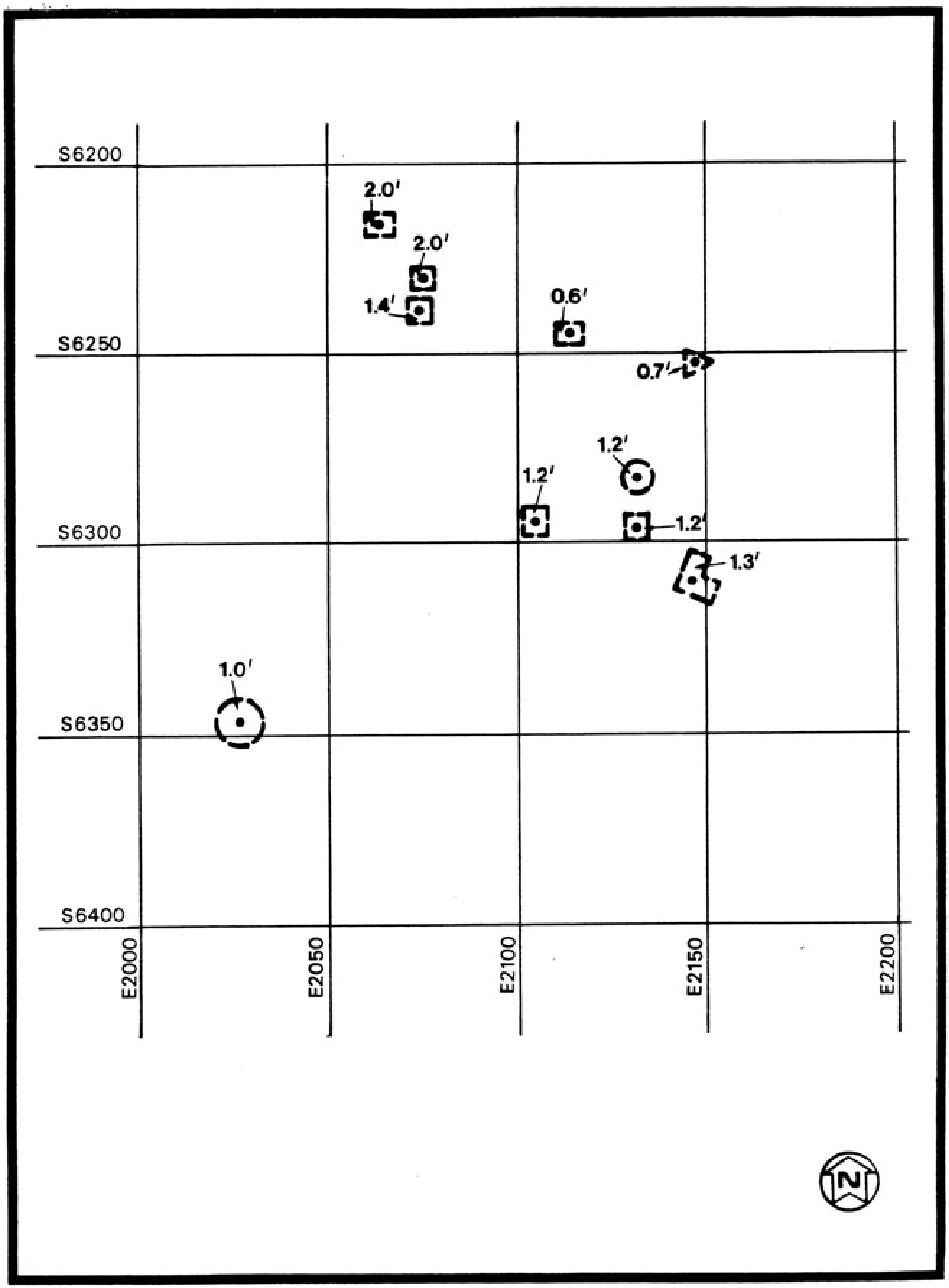

FIGURE 21 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY Q - SECTION 4

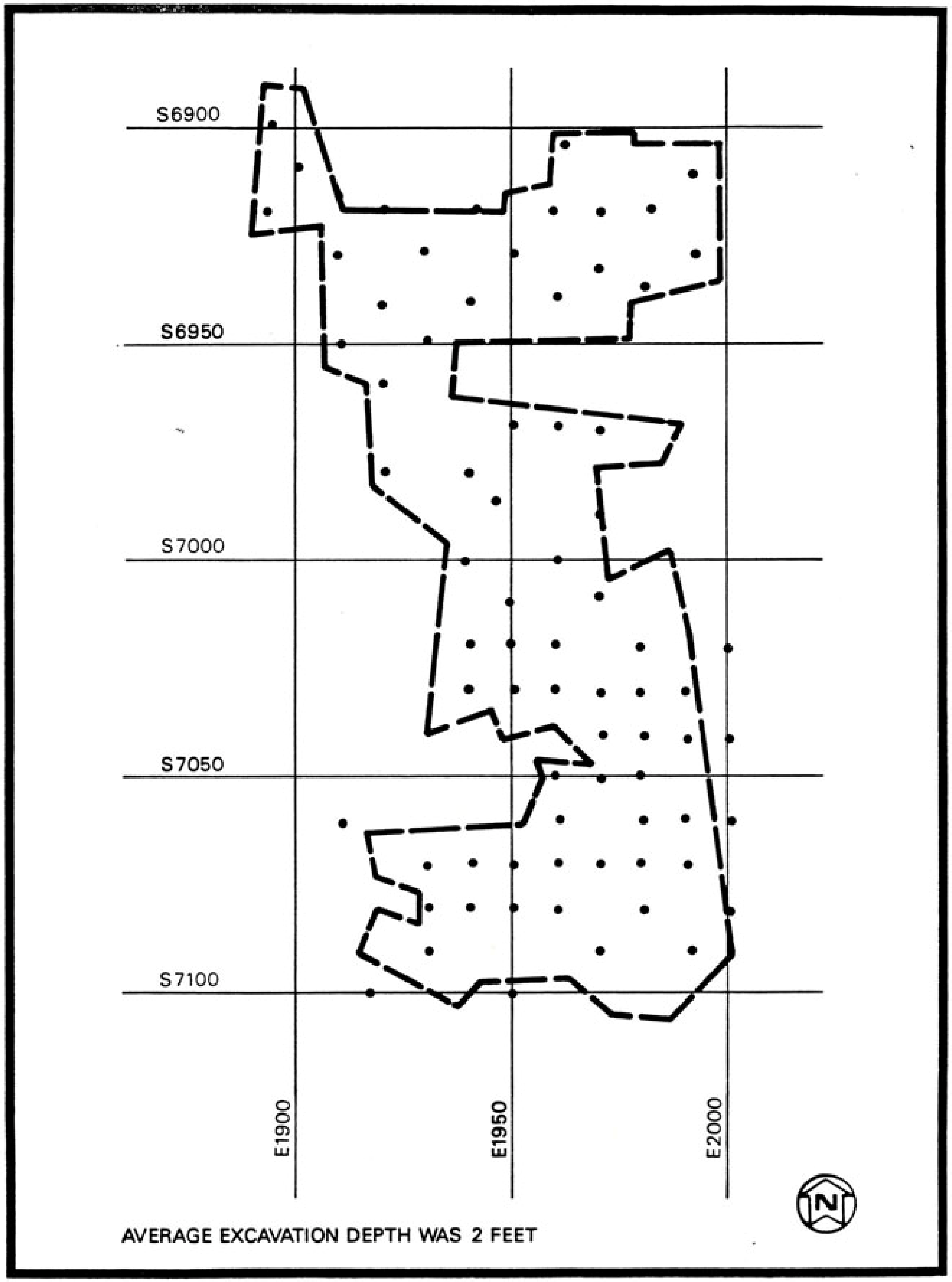

FIGURE 22 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY Q - SECTION 5

TABLE 7

POST-REMEDIAL ACTION SAMPLING RESULTS

FOR PROPERTY Q

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E1890	S6900	A	1.2 ± 0.1	1.3 ± 0.2
E1890	56920	0.9 ± 1.3	1.5 ± 0.1	1.0 ± 0.2
E1900	S6910	A	1.3 ± 0.1	1.1 ± 0.2
E1910	S6930	A	0.9 ± 0.1	0.4±0.2
E1910	S6950	A	0.8 ± 0.1	0.7 ± 0.3
E1910	57060	A	1.4 ± 0.1	1.2±0.2
E1918	S7100	A	12.4 ± 0.6	7.1 ± 0.8
E1920	S6920	A	0.9 ± 0.1	0.7 ± 0.2
E1920	56940	A	1.0 ± 0.1	1.3 ± 0.2
E1920	S6960	A	1.1 ± 0.1	0.6 ± 0.2
E1920	S6980	A	0.9 ± 0.1	1.1 ± 0.2
E1930	56920	A	0.9 ± 0.1	1.2 ± 0.2
E1930	S6930	3.6 ± 0.1	0.7 ± 0.1	A
E1930	S6950	A	1.1 ± 0.1	1.6 ± 0.2
E1930	57070	A	1.3 ± 0.2	A
E1930	S7080	A	1.3 ± 0.1	1.7 ± 0.2
E1930	S7090	A	1.0 ± 0.1	1.2 ± 0.2
E1940	56920	A	1.0 ± 0.1	0.6 ± 0.1
E1940	S6940	A	1.2 ± 0.2	1.5 ± 0.2
E1940	S6980	A	0.8 ± 0.1	0.7 ± 0.2
E1940	57000	A	0.7 ± 0.1	0.8 ± 0.2
E1940	S7020	A	0.9 ± 0.1	A
E1940	57070	A	1.2 ± 0.1	0.7 ± 0.2
E1940	57080	6.4 ± 2.5	6.6 ± 0.3	4.0 ± 0.3
E1950	56930	A	2.1 ± 0.1	1.0 ± 0.2
E1950	S6970	2.8 ± 1.3	1.1 ± 0.1	0.9 ± 0.1
E1950	56990	A	1.2 ± 0.1	1.5 ± 0.2
E1950	57010	A	0.9 ± 0.1	0.7 ± 0.2
E1950	57030	3.4 ± 1.6	1.1 ± 0.1	A
E1950	S7070	24.7 ± 4.5	37.4 ± 0.6	16.3 ± 0.8
E1950	S7080	12.7 ± 3.1	6.6 ± 0.3	3.8 ± 0.4
E1950	57090	A	1.0 ± 0.1	0.8 ± 0.2
E1950	57100	A	2.3 ± 0.2	1.2 ± 0.2
E1960	S6900	A	1.5 ± 0.1	1.5 ± 0.2
E1960	56920	A	0.8 ± 0.1	0.5 ± 0.1
E1960	S6940	A	1.4 ± 0.1	1.3±0.2
E1960	56970	0.8 ± 1.1	0.8 ± 0.1	1.0 ± 0.2
E1960	57000	A	0.9 ± 0.1	0.9 ± 0.1
E1960	57020	2.8 ± 1.3	0.7 ± 0.1	1.2 ± 0.2
E1960	S7050	A	11.9 ± 0.3	4.6 ± 0.4
E1960	S7060	4.2 ± 1.7	1.7 ± 0.2	2.0 ± 0.3
E1960	S7070	A	1.1 ± 0.1	0.9 ± 0.2
E1960	S7080	A	1.7 ± 0.1	1.1 ± 0.2

TABLE 7 (continued)

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E1970	S6920	A	1.2 ± 0.1	0.6 ± 0.1
E1970	S6930	A	0.8 ± 0.1	0.5 ± 0.1
E1970	S6970	A	1.0 ± 0.1	1.0 ± 0.2
E1970	S6990	A	0.8 ± 0.1	0.9 ± 0.2
E1970	S7010	2.5 ± 1.1	1.1 ± 0.1	0.9 ± 0.1
E1970	S7030	A	1.1 ± 0.2	1.3 ± 0.3
E1970	S7040	A	1.2 ± 0.1	1.3 ± 0.2
E1970	S7050	A	4.5 ± 0.2	3.5 ± 0.3
E1970	S7050	12.2 ± 3.5	11.9 ± 0.4	5.9 ± 0.4
E1970	S7070	A	1.0 ± 0.1	0.7 ± 0.2
E1970	S7090	A	A	1.2 ± 0.2
E1980	S6920	3.6 ± 1.5	1.2 ± 0.1	1.0 ± 0.1
E1980	S6940	A	0.8 ± 0.1	0.9 ± 0.2
E1980	S7020	6.1 ± 2.4	7.1 ± 0.3	3.4 ± 0.4
E1980	S7030	A	0.9 ± 0.1	1.7 ± 0.2
E1980	S7040	A	1.0 ± 0.1	1.0 ± 0.2
E1980	S7050	A	0.9 ± 0.1	1.1 ± 0.2
E1980	S7060	9.4 ± 2.8	19.9 ± 0.5	9.2 ± 0.7
E1980	S7070	3.5 ± 1.5	1.1 ± 0.1	1.4 ± 0.2
E1980	S7080	A	1.9 ± 0.2	1.4 ± 0.3
E1990	S6910	A	1.3 ± 0.1	1.5 ± 0.2
E1990	S6930	A	1.0 ± 0.1	1.2 ± 0.2
E1990	S7030	4.0 ± 1.8	0.7 ± 0.1	0.8 ± 0.3
E1990	S7040	A	1.1 ± 0.1	1.3 ± 0.2
E1990	S7060	A	1.0 ± 0.1	1.1 ± 0.2
E1990	S7070	A	1.0 ± 0.1	1.1 ± 0.2
E1990	S7090	3.0 ± 1.9	3.3 ± 0.2	2.1 ± 0.2
E2000	S7020	A	0.6 ± 0.1	A
E2000	S7040	A	0.6 ± 0.1	0.7 ± 0.2
E2000	S7060	28.5 ± 1.1	1.1 ± 0.1	0.7 ± 0.1
E2000	S7080	A	0.9 ± 0.1	A
E2025	S6347	A	1.2 ± 0.1	1.3 ± 0.2
E2060	S6215	A	1.3 ± 0.1	A
E2076	S6229	A	0.9 ± 0.1	0.4 ± 0.1
E2076	S6238	A	1.0 ± 0.2	0.9 ± 0.2
E2105	S6293	A	0.8 ± 0.1	A
E2114	S6244	A	0.5 ± 0.1	A
E2130	S6281	A	1.4 ± 0.2	1.1 ± 0.2
E2131	S6294	A	1.1 ± 0.1	1.0 ± 0.2
E2142	S6306	A	1.4 ± 0.1	2.1 ± 0.2
E2144	S4715	7.1 ± 5.1	1.0 ± 0.3	1.4 ± 0.3
E2149	S6251	A	1.0 ± 0.1	1.0 ± 0.2
E2170	S4670	A	1.2 ± 0.1	1.4 ± 0.2

TABLE 7 (continued)

Page 3 of 4

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E2170	S4690	A	1.4 ± 0.1	1.6 ± 0.2
E2170	S4710	A	1.2 ± 0.1	0.4 ± 0.3
E2170	S4730	A	1.0 ± 0.1	1.7 ± 0.2
E2170	S4750	A	1.4 ± 0.1	1.6 ± 0.2
E2170	S4770	A	0.6 ± 0.1	1.0 ± 0.2
E2170	S4790	A	0.8 ± 0.1	1.2 ± 0.2
E2180	S4680	A	1.3 ± 0.1	1.6 ± 0.2
E2180	S4700	A	1.2 ± 0.1	0.7 ± 0.1
E2180	S4720	A	1.3 ± 0.2	1.4 ± 0.2
E2180	S4740	A	0.8 ± 0.1	0.5 ± 0.1
E2180	S4760	A	1.0 ± 0.1	1.2 ± 0.2
E2180	S4780	A	1.0 ± 0.1	1.0 ± 0.2
E2180	S4800	A	0.8 ± 0.1	0.8 ± 0.2
E2190	S4670	A	0.9 ± 0.1	1.1 ± 0.2
E2190	S4690	A	0.6 ± 0.1	0.6 ± 0.2
E2190	S4710	A	1.3 ± 0.1	1.0 ± 0.2
E2190	S4730	A	1.2 ± 0.1	1.1 ± 0.2
E2190	S4750	A	0.8 ± 0.1	1.2 ± 0.2
E2190	S4770	A	0.8 ± 0.1	1.1 ± 0.2
E2190	S4790	A	0.9 ± 0.1	1.0 ± 0.2
E2190	S4810	A	0.8 ± 0.1	0.6 ± 0.1
E2200	S4660	A	1.7 ± 0.1	0.7 ± 0.1
E2200	S4680	A	0.7 ± 0.1	A
E2200	S4700	A	0.8 ± 0.1	0.7 ± 0.2
E2200	S4720	A	3.2 ± 0.2	1.2 ± 0.2
E2200	S4740	A	0.8 ± 0.1	1.0 ± 0.2
E2200	S4780	A	1.9 ± 0.3	1.5 ± 0.2
E2200	S4800	A	0.7 ± 0.1	1.0 ± 0.2
E2205	S4800	A	0.5 ± 0.1	1.1 ± 0.2
E2205	S4820	0.6 ± 1.4	1.1 ± 0.1	1.4 ± 0.2
E2205	S4840	2.8 ± 1.6	1.0 ± 0.2	A
E2205	S4860	A	0.9 ± 0.1	0.8 ± 0.1
E2205	S4880	A	0.7 ± 0.1	1.0 ± 0.1
E2210	S4670	A	0.9 ± 0.1	0.6 ± 0.1
E2210	S4690	A	0.7 ± 0.1	A
E2210	S4710	A	1.2 ± 0.1	1.2 ± 0.2
E2210	S4730	A	1.0 ± 0.1	1.1 ± 0.2
E2210	S4750	A	0.8 ± 0.1	0.9 ± 0.1
E2210	S4770	4.5 ± 1.2	1.3 ± 0.1	1.3 ± 0.2
E2210	S4790	A	1.1 ± 0.1	0.9 ± 0.2
E2260	S4760	A	1.1 ± 0.1	1.0 ± 0.2
E2298	S5605	A	5.5 ± 0.3	1.3 ± 0.3
E2300	S5845	A	1.0 ± 0.1	0.6±0.2

TABLE 7 (continued)

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E2315	S5940	A	1.5 ± 0.4	1.2 ± 0.8
E2315	S5947	A	1.7 ± 0.4	A
E2320	S5631	A	5.0 ± 0.3	1.5 ± 0.4
E2321	S5779	3.9 ± 2.0	1.6 ± 0.2	1.6 ± 0.3
E2323	S57I5	A	2.1 ± 0.2	1.8±0.3
E2325	S5635	A	1.7 ± 0.3	1.5 ± 0.3
E2328	S5631	A	2.7 ± 0.2	0.3 ± 0.3
E2336	S5635	A	3.8 ± 0.6	3.9 ± 0.7
E2340	S5605	A	11.9 ± 1.3	0.7± 1.4
E2340	S5615	A	7.5 ± 0.7	2.3 ± 0.8
E2342	S5572	A	2.0±0.6	2.5 ± 0.5
E2343	S5590	A	3.7±0.6	2.1 ± 0.5
E2350	S5620	A	7.5 ± 0.9	1.8 ± 1.7

‘A’ denotes less than detectable activity

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Verification Data

Excerpt from Verification of 1983 and 1984 Remedial Actions Niagara Falls Storage Site Vicinity Properties, Lewiston, New York, December 1989

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VERIFICATION
OF
1983 AND 1984 REMEDIAL ACTIONS
NIAGARA FALLS STORAGE SITE
VICINITY PROPERTIES
LEWISTON, NEW YORK

Prepared by

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as part of the
Formerly Utilized Sites - Remedial Action Program

FINAL REPORT

December 1989

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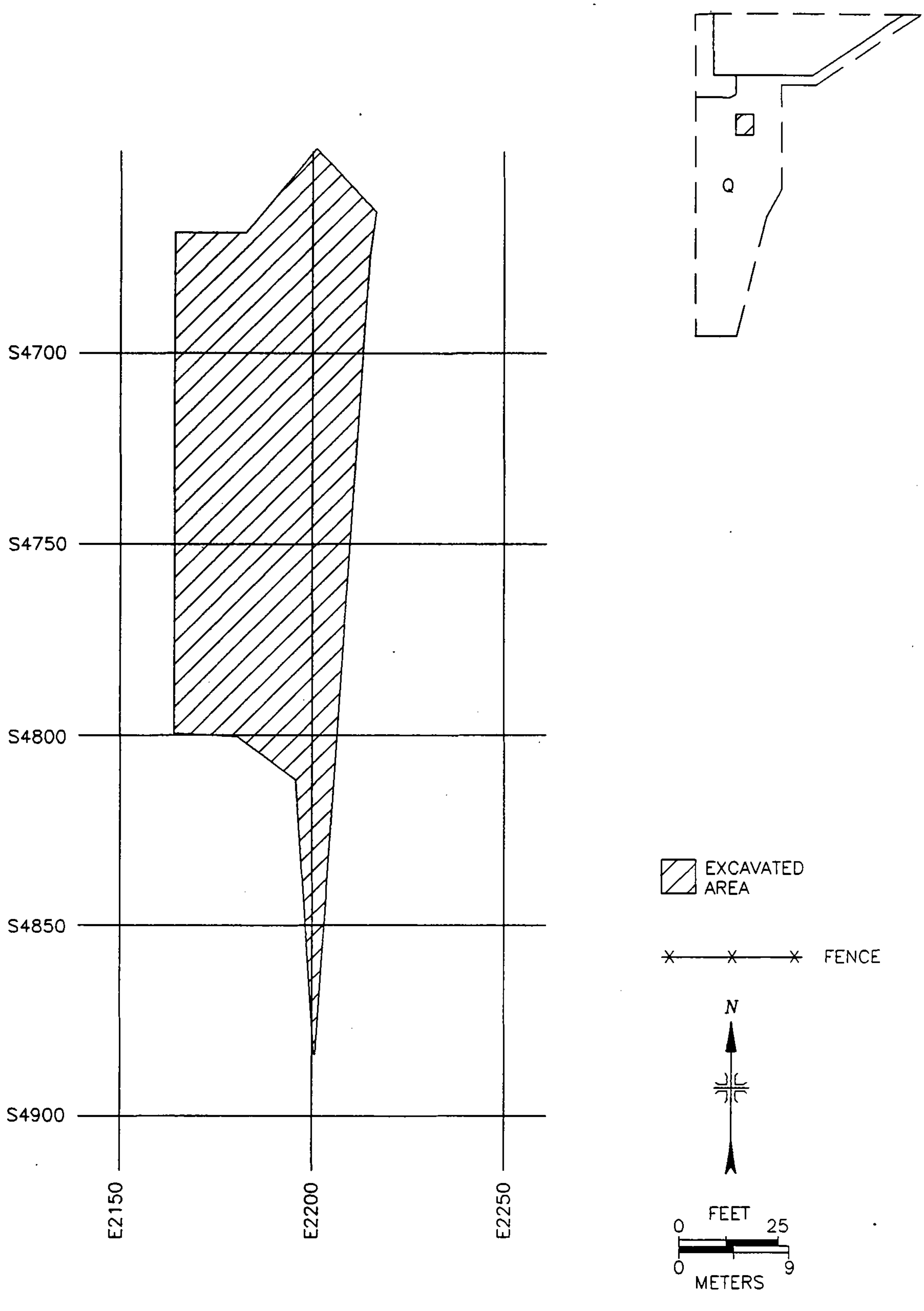
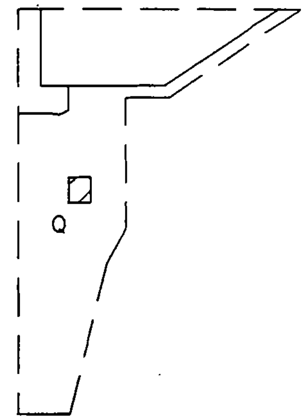


FIGURE 10: Plot Plan of Remediated Section 1 of Vicinity Property Q



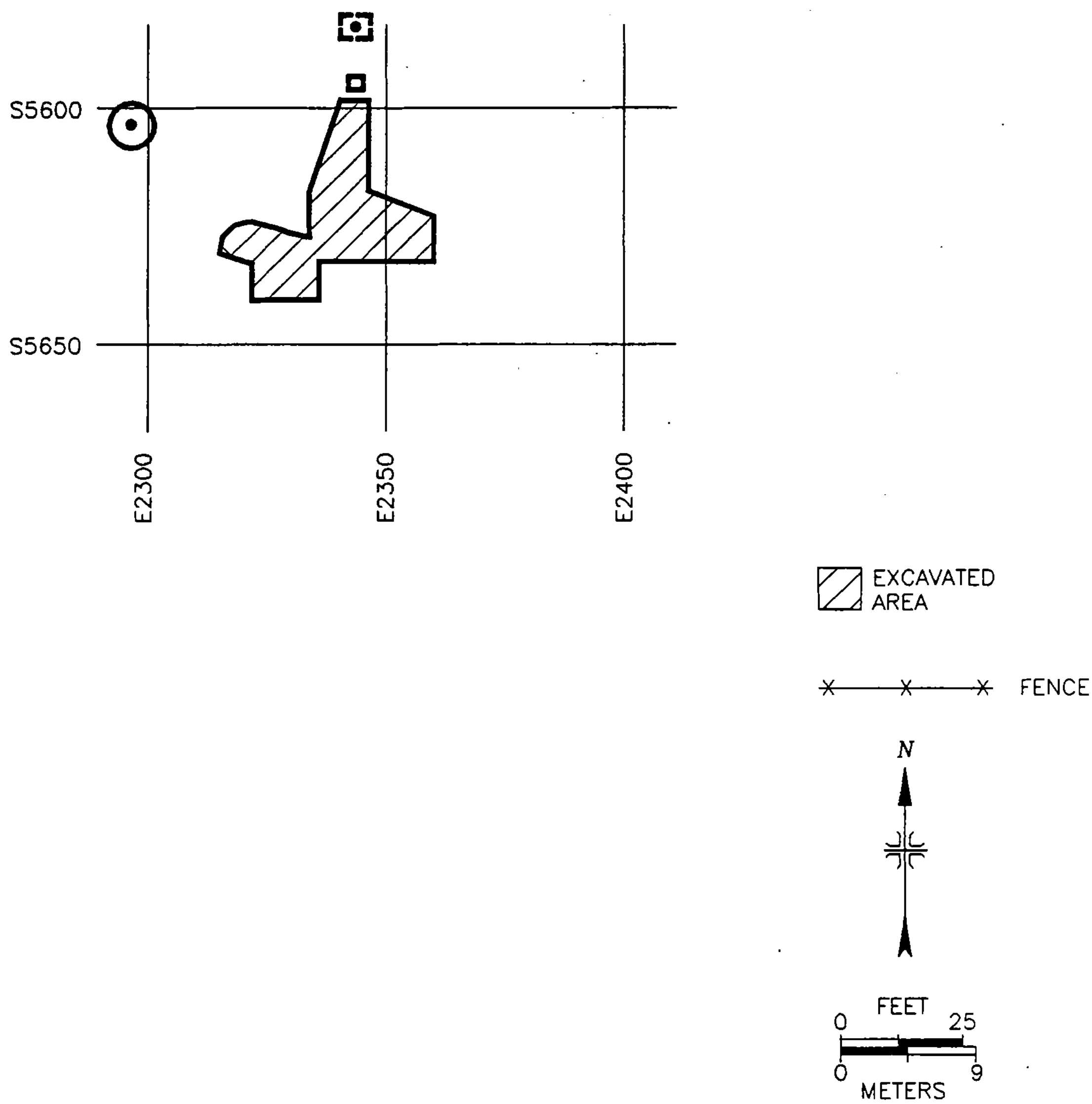


FIGURE 11: Plot Plan of Remediated Section 2 of Vicinity Property Q

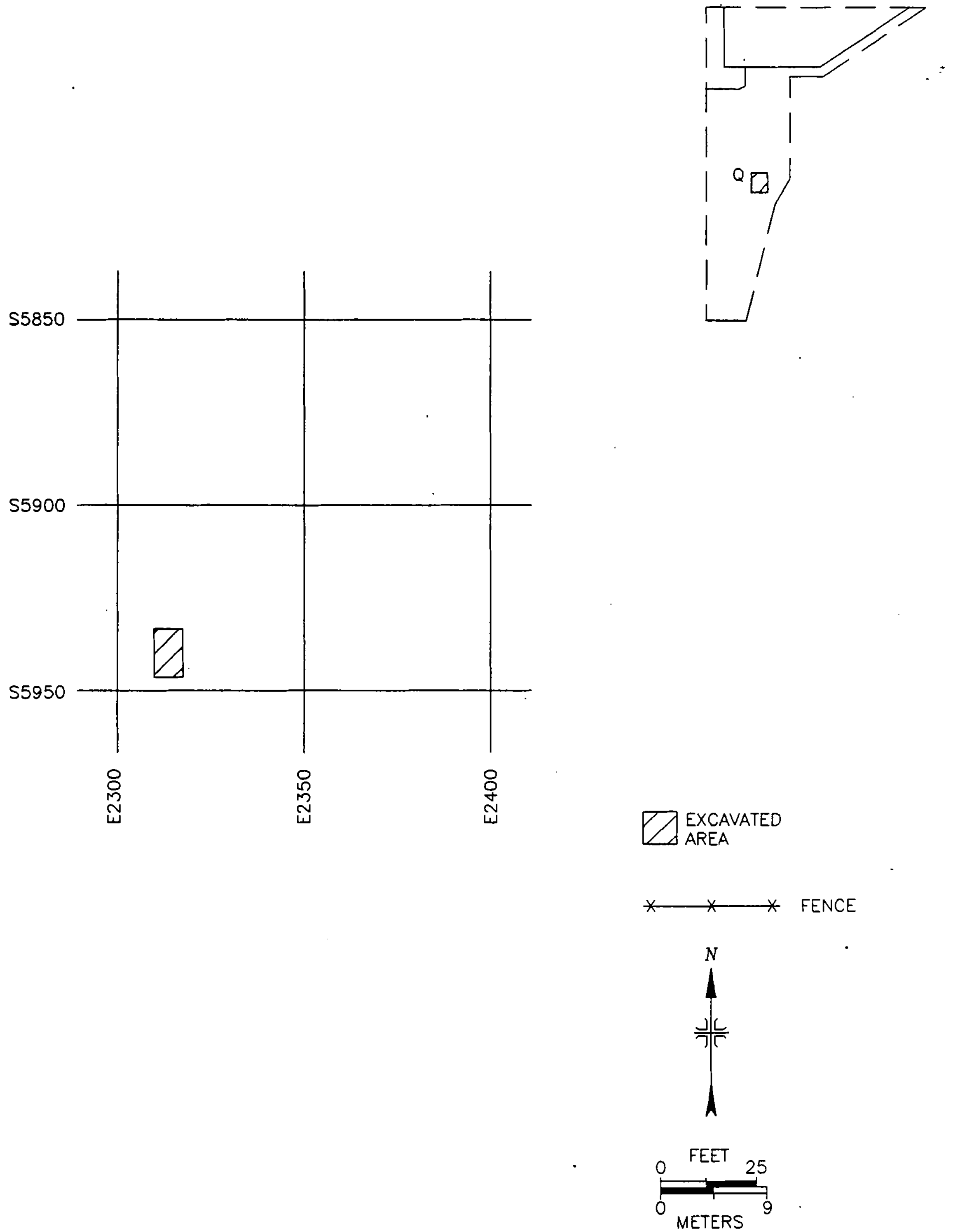


FIGURE 12: Plot Plan of Remediated Section 3 of Vicinity Property Q

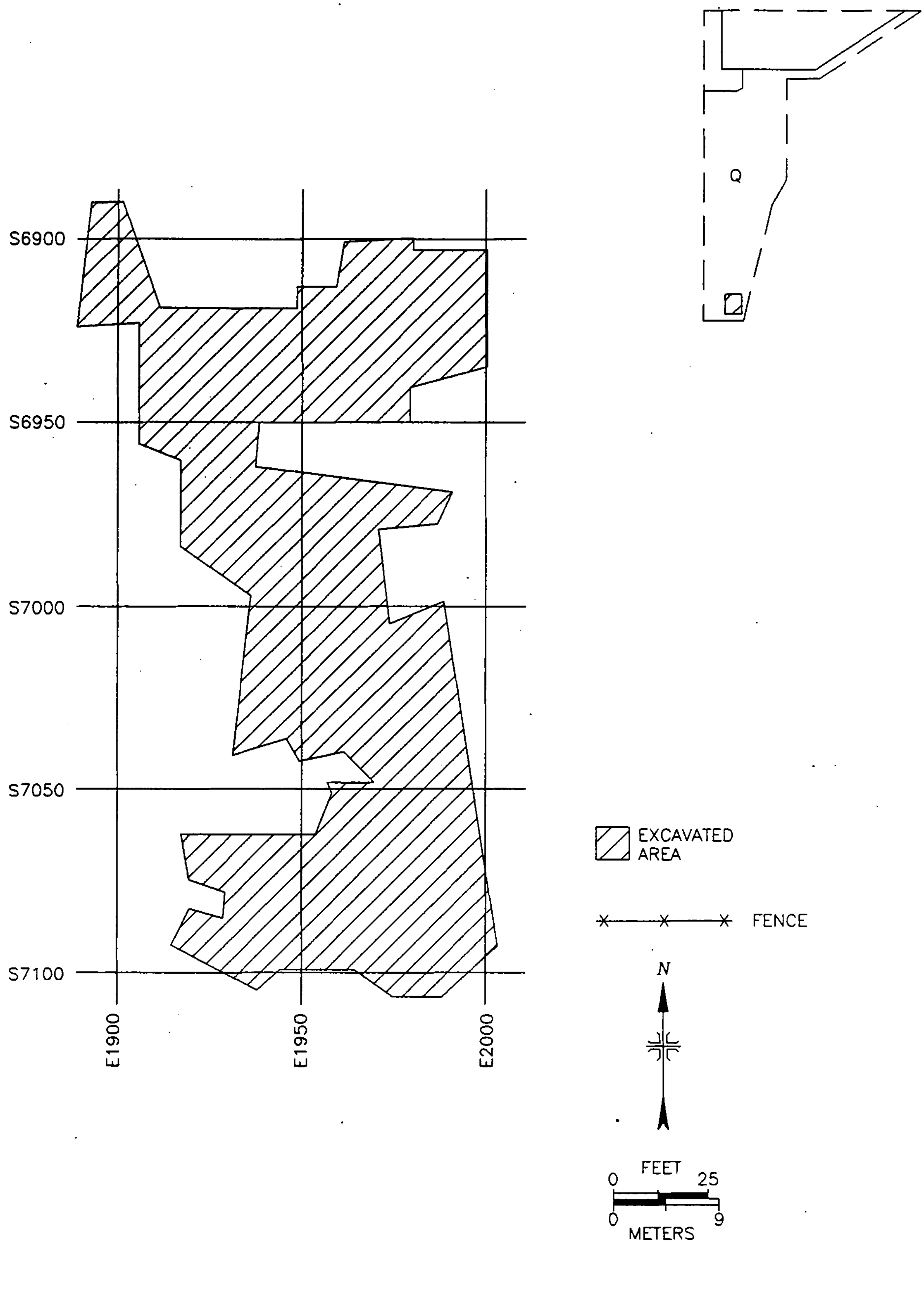


FIGURE 13: Plot Plan of Remediated Section 5 of Vicinity Property Q

TABLE 9

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM THE VICINITY OF THE OLD WAREHOUSE - PROPERTY Q
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a] S	Location[a] E	Depth (m)	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
4646	2178	Surface	1.4 ± 0.2[b]	<0.8	0.5 ± 0.5
4665	2192	0.45 - 0.6	0.7 ± 0.2	0.6 ± 0.4	0.5 ± 0.2
4665	2211	Surface	4.0 ± 0.4	0.7 ± 1.3	0.8 ± 0.4
4708	2165	Surface	1.2 ± 0.3	4.5 ± 1.6	1.4 ± 0.5
4708	2177	0.45 - 0.6	1.1 ± 0.2	1.6 ± 1.3	1.8 ± 0.5
4736	2204	0.3 - 0.45	0.6 ± 0.2	0.8 ± 0.4	0.9 ± 0.3
4749	2167	Surface	0.9 ± 0.3	2.4 ± 1.7	0.7 ± 0.3
4749	2213	Surface	0.8 ± 0.2	1.3 ± 1.2	0.9 ± 0.3
4782	2199	0.45 - 0.6	1.0 ± 0.3	2.1 ± 1.4	1.3 ± 0.4
4798	2193	Surface	1.1 ± 0.2	0.9 ± 0.9	1.1 ± 0.3
4833	2213	Surface	0.9 ± 0.2	1.2 ± 1.9	2.1 ± 1.1
4840	2197	Surface	0.6 ± 0.2	<0.4	0.4 ± 0.3

[a]Refer to Figure 10.
[b]Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

TABLE 10

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM AREA ALONG RAILROAD TRACKS - PROPERTY Q
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a] S	Location[a] E	Depth (m)	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
Prior to Additional Remediation					
5612	2345	Surface	47.9 ± 1.5[b]	2.6 ± 3.6	1.5 ± 1.1
5620	2339	0.45 - 0.6	110 ± 3.0	<4.2	2.6 ± 1.8
		0.6 - 0.75	200 ± 3.0	27 ± 25	2.0 ± 2.0
5621	2352	1.2 - 1.4	7.2 ± 0.9	3.1 ± 3.6	1.1 ± 0.7
5632	2314	0.3 - 0.4	77.9 ± 2.1	<2.6	2.0 ± 1.5
Random Samples Collected Following Additional Remediation					
		Surface	1.1 ± 0.3	<0.9	1.2 ± 0.4
		Surface	1.9 ± 0.3	<0.7	0.9 ± 0.4
		0.6 - 0.75	2.0 ± 0.4	<1.1	1.6 ± 0.6
		0.6 - 0.75	4.4 ± 0.7	4.7 ± 3.4	2.5 ± 0.8
		Surface	1.1 ± 0.2	1.2 ± 1.4	1.0 ± 0.3
		Surface	0.8 ± 0.2	<0.7	0.9 ± 0.4

[a]Refer to Figure 11.
[b]Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

TABLE 11

RADIONCULIDE CONCENTRATIONS IN SOIL SAMPLES
FROM ACCESS ROAD FOLLOWING REMOVAL OF ASH MATERIAL - PROPERTY Q
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a]		Depth	Radionuclide Concentrations (pCi/g)		
S	E	(m)	Ra-226	U-238	Th-232
5938	2315	0.6	3.1 ± 0.5[b]	1.5 ± 2.4	1.7 ± 0.5
5944	2317	0.6	5.0 ± 0.7	1.9 ± 2.5	1.8 ± 0.7
5943	2315	0.9 - 1.1	4.5 ± 0.6	4.1 ± 2.4	1.8 ± 0.6
5948	2316	0.3	2.4 ± 0.5	1.9 ± 2.8	2.0 ± 0.6

[a]Refer to Figure 12.
[b]Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

TABLE 12

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM AREA SOUTH OF MAINTENANCE GARAGE - PROPERTY Q
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a]		Radionuclide Concentrations (pCi/g)		
S	E	Ra-226	U-238	Th-232
6902	1988	1.2 ± 0.2[b]	1.0 ± 0.5	0.9 ± 0.3
6904	1894	1.5 ± 0.3	<1.1	1.5 ± 0.5
6918	1934	2.0 ± 0.4	2.9 ± 0.9	1.2 ± 0.7
6993	1922	1.2 ± 0.3	2.2 ± 2.3	0.9 ± 0.6
7044	1924	0.7 ± 0.2	1.7 ± 0.9	1.1 ± 0.4
7062	1992	1.0 ± 0.2	0.5 ± 1.8	0.9 ± 0.4
7065	1933	1.3 ± 0.3	1.7 ± 1.9	1.4 ± 0.6
7097	1955	0.7 ± 0.2	0.6 ± 0.8	0.6 ± 0.3
7099	1921	0.8 ± 0.2	1.0 ± 0.6	1.0 ± 0.4

[a]Refer to Figure 13.
[b]Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

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Appendix B

NFSS Vicinity Property R

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Assessment Data

Excerpt from Comprehensive Radiological Survey
Off-Site Property R
Niagara Falls Storage Site

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COMPREHENSIVE RADIOLOGICAL SURVEY

OFF-SITE PROPERTY R
NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

Prepared for

U.S. Department of Energy
as part of the
Formerly Utilized Sites -- Remedial Action Program

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FINAL REPORT

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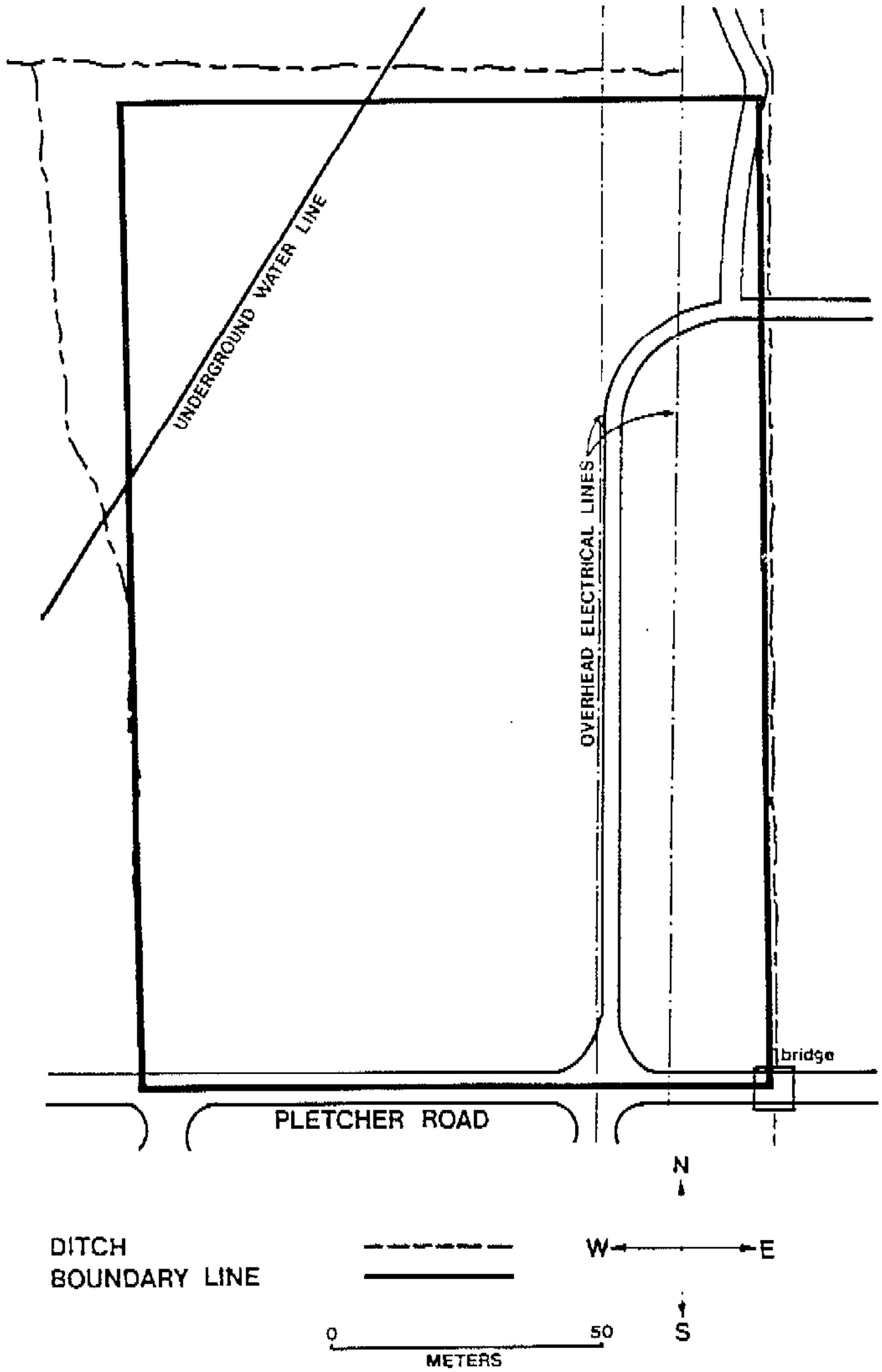

FIGURE 2. Plan View of NFSS Off-Site Property R Indicating Prominent Surface Features.

11

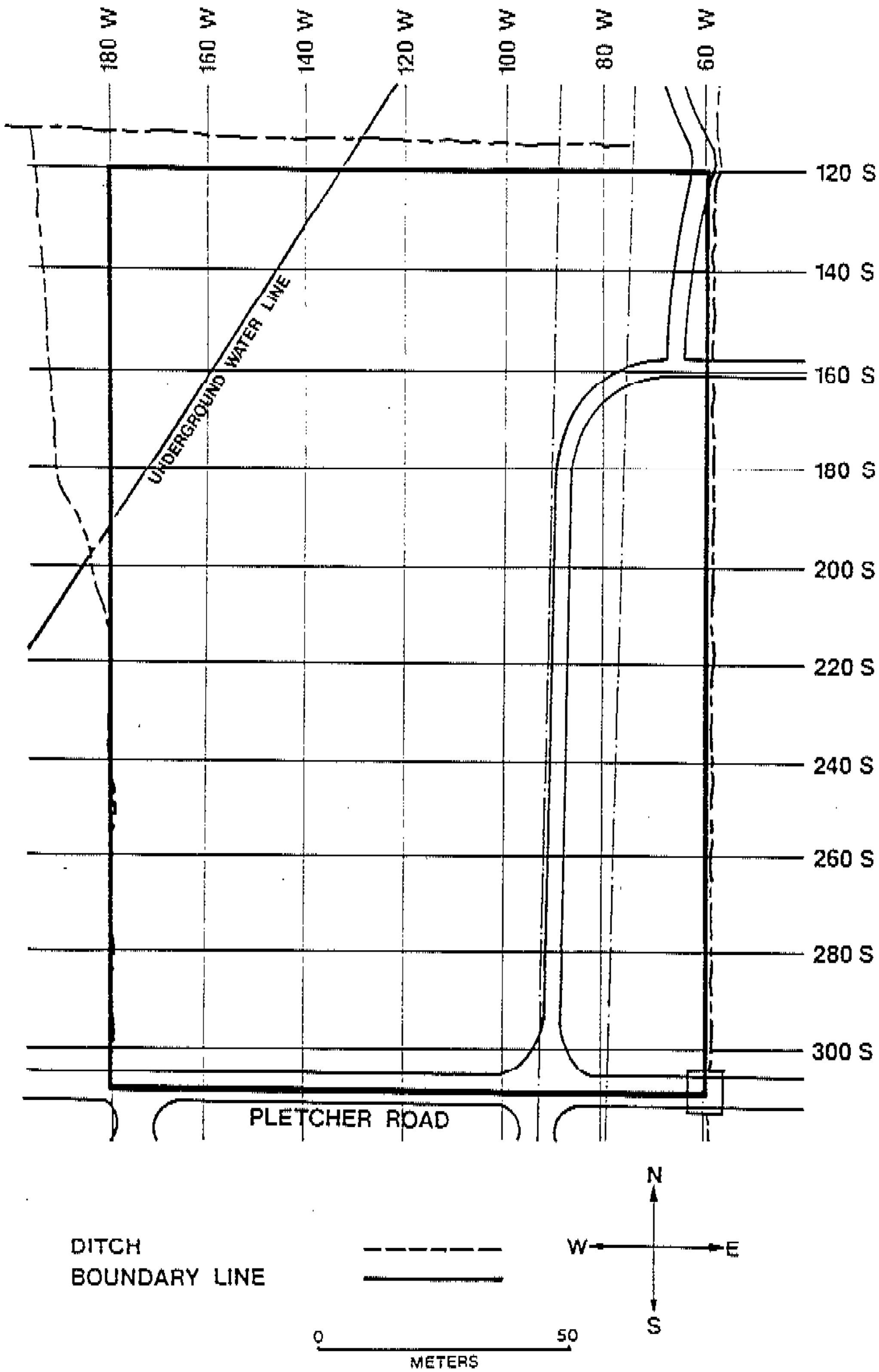

FIGURE 3. Plan View of NFSS Off-Site Property R Indicating the Grid System Established for Survey Reference.

12

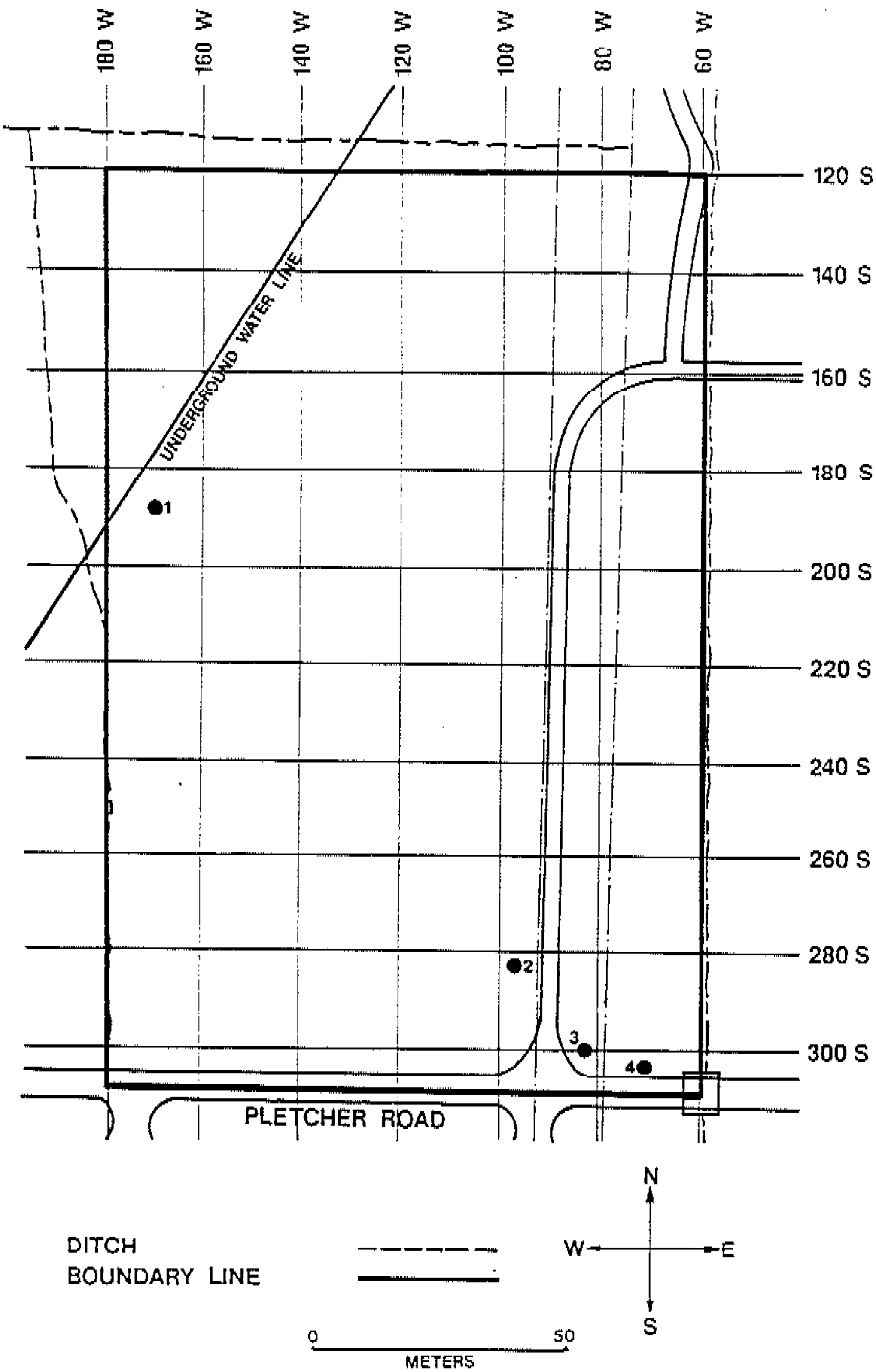

FIGURE 4. Locations of Areas of Elevated Direct Radiation.

13

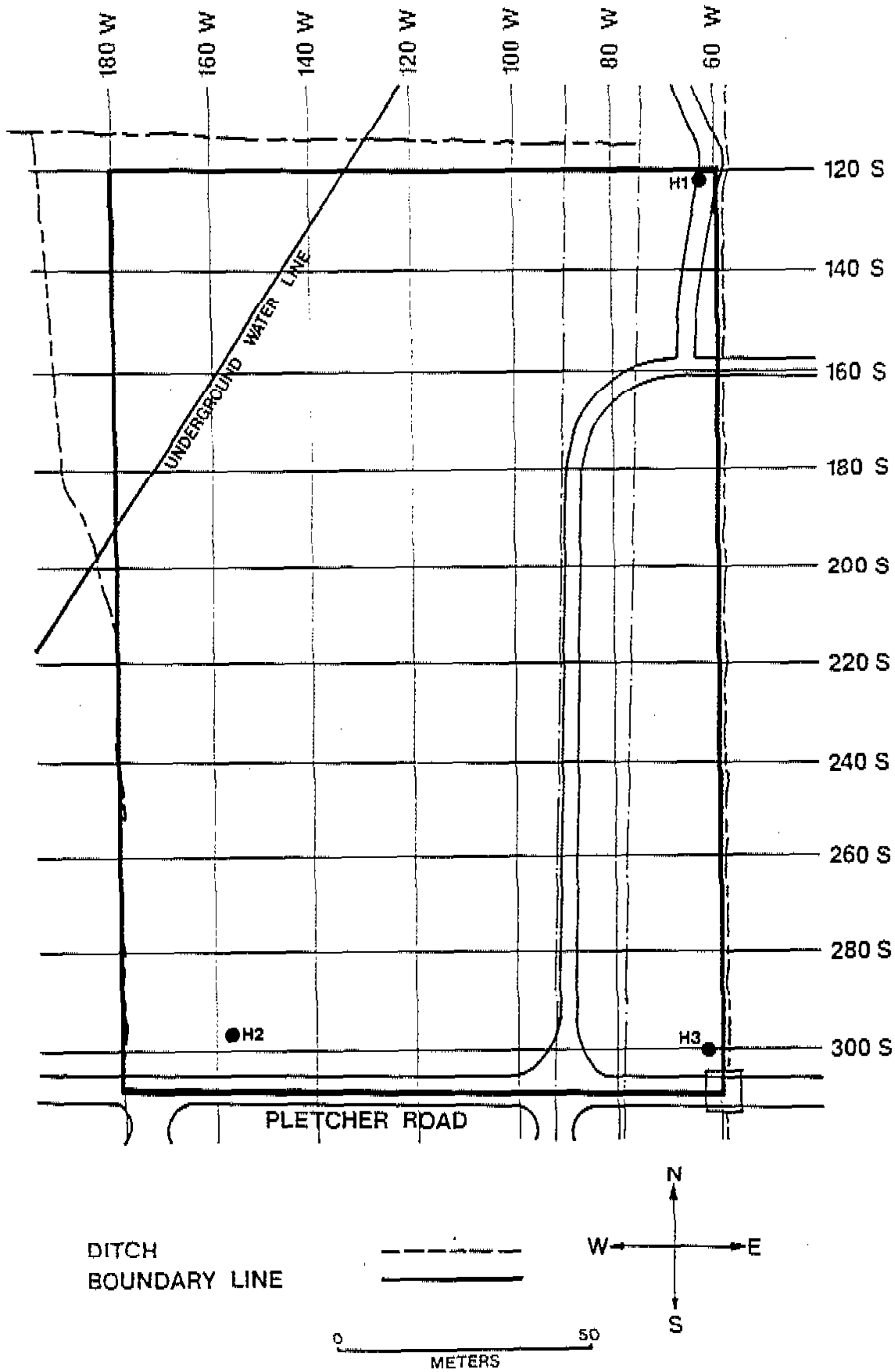

FIGURE 5. Locations of Boreholes for Subsurface Investigations.

14

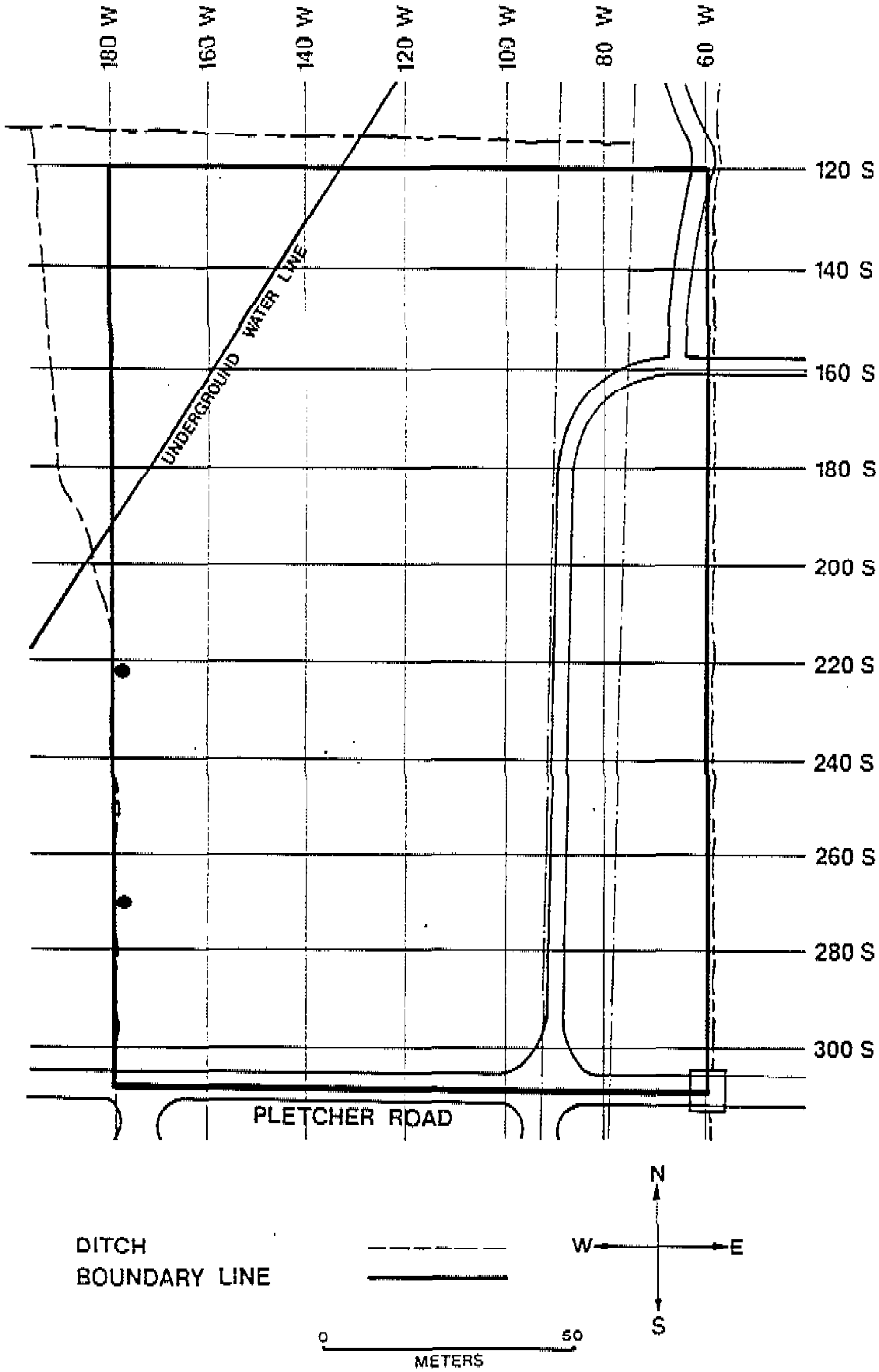

FIGURE 6. Locations of Ditch Sediment Samples.

15

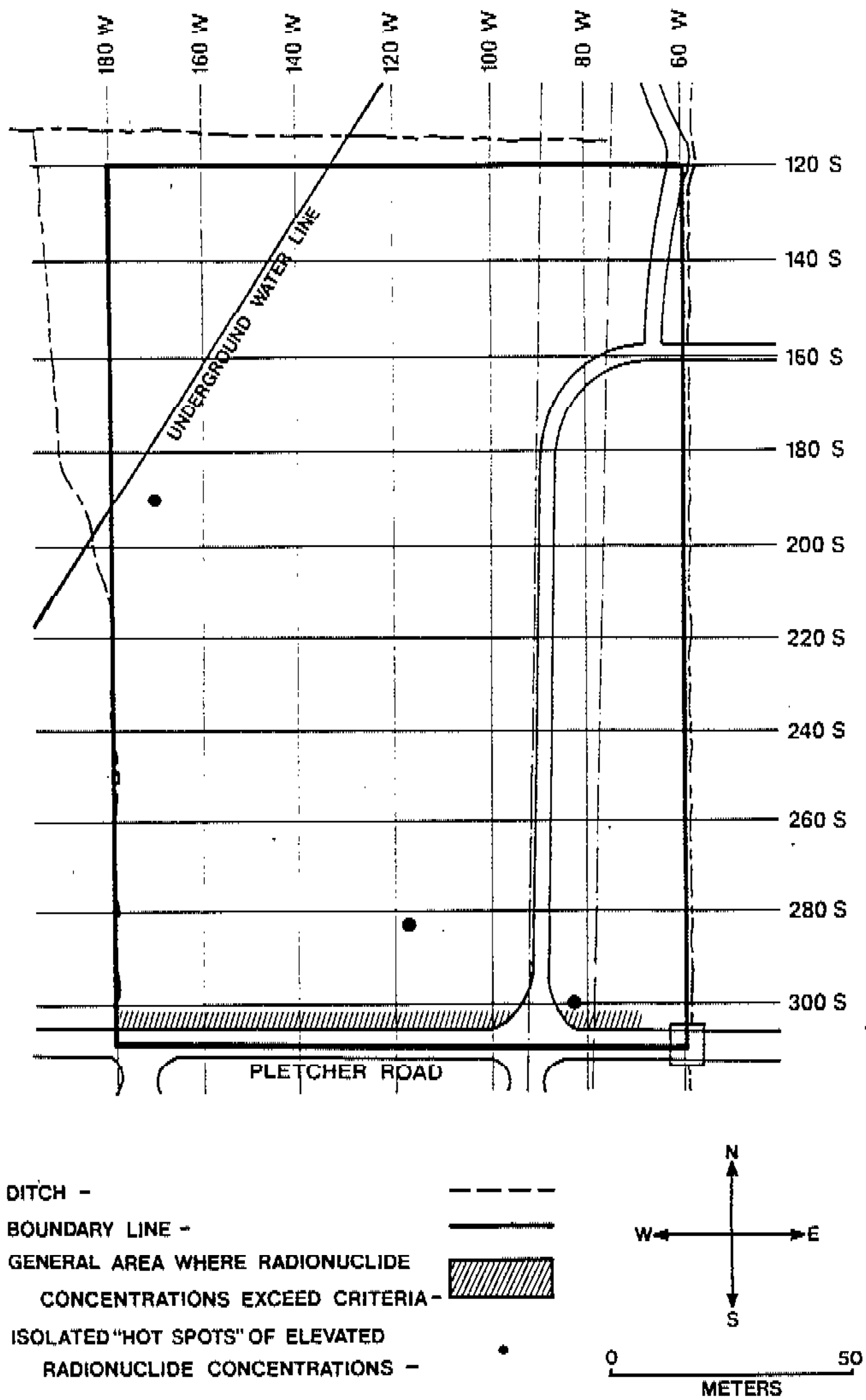

FIGURE 8. Map of NFSS Off-Site Property R Indicating Areas Where Radionuclide Concentrations in Soil Exceed Criteria Levels.

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TABLE 2

DIRECT RADIATION LEVELS MEASURED
AT 20 M GRID INTERVALS

Grid Location S	Grid Location W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
120	60	9	9	47
120	80	9	9	22
120	100	9	9	10
120	120	8	9	20
120	140	8	8	41
120	160	8	8	23
120	180	8	9	20
140	60	8	8	16
140	80	8	9	13
140	100	8	8	8
140	120	9	9	12
140	140	9	9	14
140	160	8	9	36
140	180	8	8	32
160	60	7	6	14
160	80	7	7	12
160	100	8	9	19
160	120	9	9	9
160	140	8	9	21
160	160	8	9	22
160	180	8	8	10
180	60	8	9	20
180	80	8	8	8
180	100	8	9	23
180	120	9	9	37
180	140	8	8	26
180	160	8	8	23
180	180	8	9	9
200	60	8	8	11
200	80	8	8	8
200	100	8	8	16
200	120	9	9	22
200	140	8	8	22
200	160	8	9	20
200	180	8	8	10

TABLE 2, cont.

DIRECT RADIATION LEVELS MEASURED AT 20 M GRID INTERVALS

Grid Location S	Grid Location W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
220	60	8	8	27
220	80	8	10	23
220	100	8	8	20
220	120	7	7	17
220	140	7	8	22
220	160	7	7	13
220	180	8	8	11
240	60	9	9	32
240	80	8	9	13
240	100	8	7	27
240	120	7	8	18
240	140	7	7	17
240	160	7	8	27
240	180	7	8	8
260	60	8	9	23
260	80	8	8	26
260	100	7	7	46
260	120	8	8	22
260	140	8	8	21
260	160	7	7	20
260	180	7	8	8
280	60	9	8	26
280	80	9	8	44
280	100	7	7	25
280	120	7	8	19
280	140	8	10	21
280	160	8	9	21
280	180	7	7	23
300	60	9	9	29
300	80	9	9	25
300	100	9	11	38
300	120	9	9	31
300	140	9	9	31
300	160	8	9	30
300	180	8	9	25

TABLE 2, cont.

DIRECT RADIATION LEVELS MEASURED
AT 20 M GRID INTERVALS

Grid Location S	Grid Location W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
304	60	9	10	15
304	80	9	8	12
304	100	8	7	8
304	120	11	12	21
304	140	10	12	51
304	160	10	13	32
304	180	10	17	34

TABLE 3

DIRECT RADIATION LEVELS AT LOCATIONS IDENTIFIED BY THE WALKOVER SURFACE SCAN

Location	Grid Location[a]		Exposure Rates (μR/h)		Surface Dose Rate (μrad/h)	Sample No.[b]	Contact Exposure Rate After Sample Removal (μR/h)
	S	W	Contact	1 m Above Surface			
1	187	171	29	14	--[c]	B1	29
2	281	97	16	12	20	B2	14
3	300	83	16	12	56	B3	14
4	304	73	21	12	47	B4	20

[a] Refer to Figure 4.
[b] Radionuclide analyses of samples are presented in Table 5.
[c] Dash indicates measurement or sampling not performed.

TABLE 4

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)			
S	W	Ra-226	U-235	U-238	Cs-137
120	60	0.91 ± 0.25[a]	<0.18	1.28 ± 0.91	0.64 ± 0.14
120	80	0.61 ± 0.30	<0.24	2.61 ± 2.06	0.58 ± 0.12
120	100	1.01 ± 0.39	<0.34	4.73 ± 2.07	0.72 ± 0.15
120	120	1.13 ± 0.31	0.60 ± 0.62	3.26 ± 1.90	0.80 ± 0.16
120	140	1.08 ± 0.32	<0.25	<0.92	0.54 ± 0.17
120	160	0.84 ± 0.27	<0.20	1.67 ± 0.62	0.82 ± 0.16
120	180	1.22 ± 0.32	<0.40	4.35 ± 2.36	1.19 ± 0.22
140	60	1.03 ± 0.25	<0.19	0.71 ± 0.72	0.54 ± 0.10
140	80	1.33 ± 0.31	<0.39	0.94 ± 3.72	0.84 ± 0.17
140	100	0.85 ± 0.20	<0.22	1.57 ± 1.93	0.63 ± 0.15
140	120	0.98 ± 0.32	0.34 ± 0.50	3.37 ± 0.84	1.11 ± 0.17
140	140	<0.16	<0.22	4.56 ± 2.63	0.07 ± 0.05
140	160	1.04 ± 0.29	<0.23	1.50 ± 0.67	0.93 ± 0.18
140	180	0.39 ± 0.19	<0.46	4.03 ± 5.06	0.68 ± 0.21
159	60	1.44 ± 0.31	<0.47	1.86 ± 2.51	6.45 ± 0.38
160	81	1.04 ± 0.21	<0.15	<0.33	1.23 ± 0.26
160	100	1.17 ± 0.32	<0.39	4.15 ± 2.22	1.05 ± 0.20
160	120	0.90 ± 0.33	<0.24	2.93 ± 1.20	0.72 ± 0.14
160	140	0.71 ± 0.29	<0.28	1.87 ± 1.78	0.36 ± 0.19
160	160	1.38 ± 0.35	<0.39	1.69 ± 3.96	0.82 ± 0.18
160	180	1.49 ± 0.31	<0.29	5.23 ± 1.70	0.61 ± 0.13
180	60	0.84 ± 0.28	<0.29	1.15 ± 1.76	0.27 ± 0.11
180	80	1.34 ± 0.33	<0.33	<1.08	1.01 ± 0.16
180	100	0.89 ± 0.26	<0.28	1.68 ± 0.91	0.72 ± 0.10
180	120	1.01 ± 0.21	<0.30	<0.97	0.71 ± 0.12
180	140	1.15 ± 0.23	<0.23	<0.74	0.59 ± 0.11
180	160	0.93 ± 0.24	<0.31	1.76 ± 2.57	0.53 ± 0.18
180	180	0.95 ± 0.24	<0.35	<1.08	0.99 ± 0.16
200	60	0.69 ± 0.18	<0.13	0.21 ± 0.28	0.40 ± 0.09
200	80	0.98 ± 0.27	<0.18	0.98 ± 0.98	0.30 ± 0.10
200	100	0.98 ± 0.24	<0.28	0.78 ± 1.47	0.75 ± 0.13
200	120	1.17 ± 0.26	<0.30	2.02 ± 1.95	0.73 ± 0.13
200	140	1.13 ± 0.22	<0.33	2.83 ± 1.37	0.57 ± 0.15
200	160	1.09 ± 0.29	<0.28	<0.95	0.48 ± 0.15
200	180	0.71 ± 0.25	<0.19	0.73 ± 1.14	1.03 ± 0.20

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL
SAMPLES FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)			
S	W	Ra-226	U-235	U-238	Cs-137
220	60	0.20 ± 0.21	<0.24	<0.77	0.16 ± 0.08
220	80	1.02 ± 0.24	<0.31	<1.01	0.27 ± 0.10
220	100	1.42 ± 0.27	<0.30	1.86 ± 2.53	0.82 ± 0.14
220	120	0.75 ± 0.29	<0.23	2.96 ± 1.16	0.56 ± 0.11
220	140	0.59 ± 0.18	<0.16	<0.54	0.59 ± 0.11
220	160	0.65 ± 0.23	<0.13	0.19 ± 0.62	0.66 ± 0.10
220	180	0.73 ± 0.28	<0.22	1.09 ± 0.86	1.53 ± 0.21
240	60	0.99 ± 0.23	<0.21	1.76 ± 0.56	0.64 ± 0.16
240	80	0.85 ± 0.24	<0.21	1.71 ± 1.43	0.36 ± 0.12
240	100	<0.19	<0.14	0.66 ± 0.75	0.63 ± 0.11
240	120	0.76 ± 0.23	<0.27	<0.77	0.56 ± 0.11
240	140	0.18 ± 0.23	<0.14	1.24 ± 0.64	<0.06
240	160	0.83 ± 0.24	<0.16	0.88 ± 0.47	0.39 ± 0.08
240	180	0.65 ± 0.23	<0.15	0.68 ± 0.64	0.41 ± 0.10
260	60	0.95 ± 0.29	<0.19	0.84 ± 0.54	<0.09
260	80	1.03 ± 0.31	<0.22	1.71 ± 1.63	0.52 ± 0.13
260	100	0.73 ± 0.19	<0.15	0.57 ± 1.47	0.24 ± 0.07
260	120	1.06 ± 0.28	0.20 ± 0.55	<0.39	0.37 ± 0.16
260	140	<0.14	<0.23	<0.71	<0.06
260	160	0.74 ± 0.20	<0.24	<0.74	0.59 ± 0.12
260	180	0.64 ± 0.24	<0.14	1.06 ± 0.50	0.57 ± 0.12
280	60	1.16 ± 0.30	<0.30	2.72 ± 1.11	0.45 ± 0.10
280	80	2.43 ± 0.35	<0.22	2.41 ± 1.10	0.52 ± 0.12
280	100	0.73 ± 0.14	<0.20	2.22 ± 1.20	0.49 ± 0.10
280	120	0.60 ± 0.14	<0.23	<0.68	0.50 ± 0.09
280	140	0.83 ± 0.18	<0.15	0.63 ± 0.69	0.56 ± 0.09
280	160	<0.16	<0.20	<0.61	0.04 ± 0.04
280	180	0.86 ± 0.21	<0.21	4.02 ± 0.93	0.67 ± 0.14
300	60	1.43 ± 0.46	<0.34	<1.08	<0.07
300	80	1.76 ± 0.31	<0.35	<1.04	0.48 ± 0.11
300	100	2.65 ± 0.36	<0.19	1.75 ± 0.74	0.35 ± 0.08
300	120	<0.26	<0.30	<1.00	0.24 ± 0.12
300	140	1.98 ± 0.48	<0.37	<1.09	0.71 ± 0.17
300	160	1.75 ± 0.29	<0.20	1.36 ± 0.53	0.69 ± 0.14
300	180	1.79 ± 0.30	<0.32	2.30 ± 1.80	0.65 ± 0.15

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)			
S	W	Ra-226	U-235	U-238	Cs-137
304	60	1.90 ± 0.39	<0.21	<0.50	0.33 ± 0.12
303	80	17.3 ± 0.8	<0.56	<1.56	0.38 ± 0.12
302	100	15.9 ± 0.8	1.76 ± 1.13	<1.95	3.46 ± 0.27
303	120	8.73 ± 0.58	<0.29	<0.55	1.14 ± 0.14
304	140	5.68 ± 0.55	0.74 ± 0.78	<1.16	1.10 ± 0.17
302	160	7.98 ± 0.55	1.10 ± 0.80	<1.40	1.26 ± 0.17
304	180	6.29 ± 0.49	<0.48	<1.34	1.87 ± 0.19

[a] Errors are 2σ based on counting statistics.

TABLE 5

RADIONUCLIDE CONCENTRATIONS IN SURFACE SAMPLES FROM LOCATIONS IDENTIFIED BY THE WALKOVER SCAN

Sample No.[a]	Grid Location		Radionuclide Concentrations (pCi/g)[c]			
	S	W	Ra-226	U-235	U-238	Cs-137
B1	187	171	25.1 ± 1.2[b]	2.16 ± 1.56	4.94 ± 3.84	0.28 ± 0.12
B2	281	97	6.55 ± 0.49	0.57 ± 0.71	4.16 ± 0.76	0.82 ± 0.11
B3	300	83	20.7 ± 0.9	0.88 ± 0.78	<0.68	1.58 ± 0.17
B4	304	73	29.9 ± 1.2	<0.97	<2.62	1.49 + 0.18

[a] Refer to Figure 4.
[b] Errors are 2σ based on counting statistics.
[c] Refer to Table 3 for direct radiation levels.

TABLE 6

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE SOIL SAMPLES

Borehole No.[a]	Grid Location S	Grid Location W	Depth (m)	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137
H1	120	62	Surface	1.30 ± 0.28[b]	<0.32	1.56 ± 2.72	<0.05
			0.5	1.26 ± 0.29	<0.35	<1.11	<0.05
			1.5	1.09 ± 0.22	<0.30	1.78 ± 1.69	<0.04
H2	296	156	Surface	1.03 ± 0.30	<0.33	3.68 ± 1.91	0.54 ± 0.12
			0.5	0.76 ± 0.19	<0.17	0.50 ± 0.57	<0.04
			1.5	0.87 ± 0.26	<0.29	1.80 ± 1.74	<0.04
H3	300	61	Surface	1.15 ± 0.40	<0.19	0.71 ± 0.82	0.64 ± 0.13
			0.5	0.81 ± 0.25	<0.30	1.83 ± 1.60	<0.04
			1.5	0.66 ± 0.20	<0.14	0.69 ± 0.62	<0.03

[a] Refer to Figure 5.
[b] Errors are 2σ based on counting statistics.

TABLE 7

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE WATER SAMPLE

Sample Identification	Sample Type	Grid Location		Radionuclide Concentrations (pCi/l)		
		S	W	Gross Alpha	Gross Beta	Ra-226
W1	Subsurface (Borehole H3)[a]	300	61	15.4 ± 3.1[b]	8.10 ± 2.09	0.38 ± 0.19

[a] Refer to Figure 5.
[b] Errors are 2σ based on counting statistics.

TABLE 8

RADIONUCLIDE CONCENTRATIONS IN SEDIMENT SAMPLES FROM DRAINAGE DITCHES

Grid Location[a] S	Grid Location[a] W	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137
224	179	0.92 ± 0.27[b]	0.28 ± 0.52	1.74 ± 0.63	0.62 ± 0.16
270	179	1.30 ± 0.33	<0.39	3.89 ± 2.20	1.62 ± 0.19

[a] Refer to Figure 6.
[b] Errors are 2σ based on counting statistics.

Excavated Area

Excerpt from Post-Remedial Action Report for the Niagara Falls Storage Site Vicinity Properties 1983 and 1984

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DOE/OR/20722-84

Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-ACO5-810R20722

POST-REMEDIAL ACTION REPORT FOR THE NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES - 1983 AND 1984

Lewiston, New York

December 1986

Bechtel National, Inc.

56

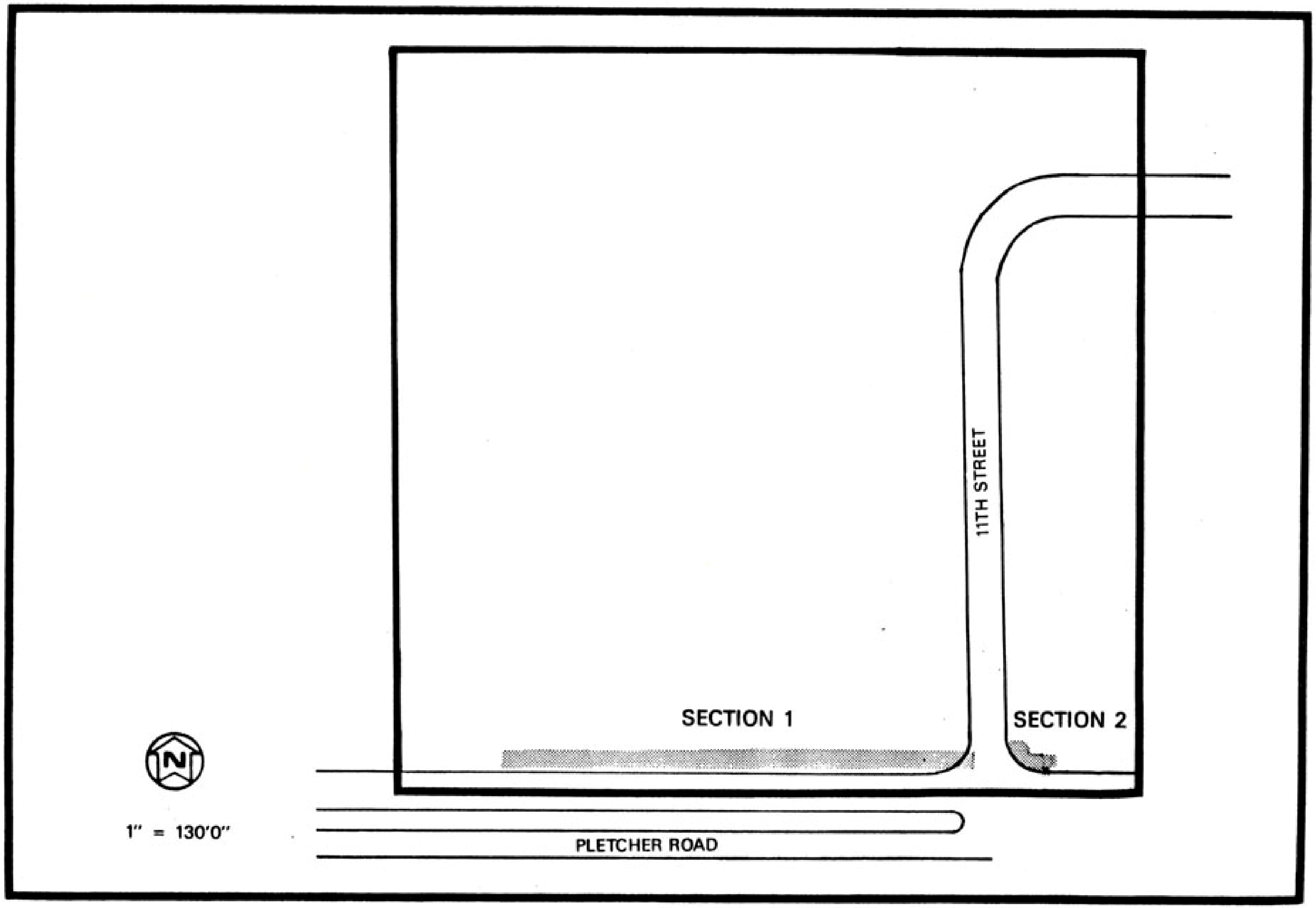

FIGURE 23 EXCAVATED AREA ON PROPERTY R

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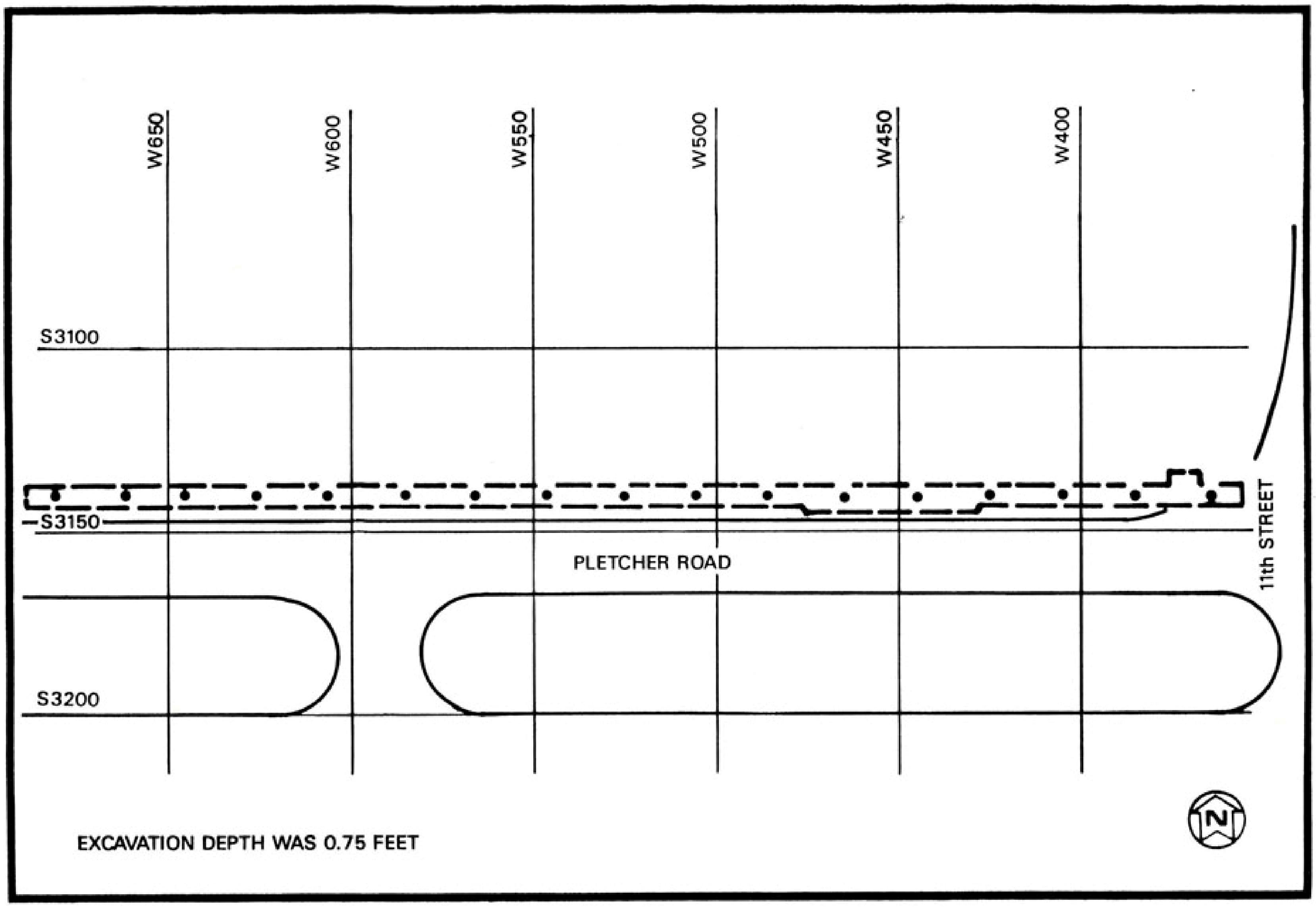

FIGURE 24 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY R - SECTION 1

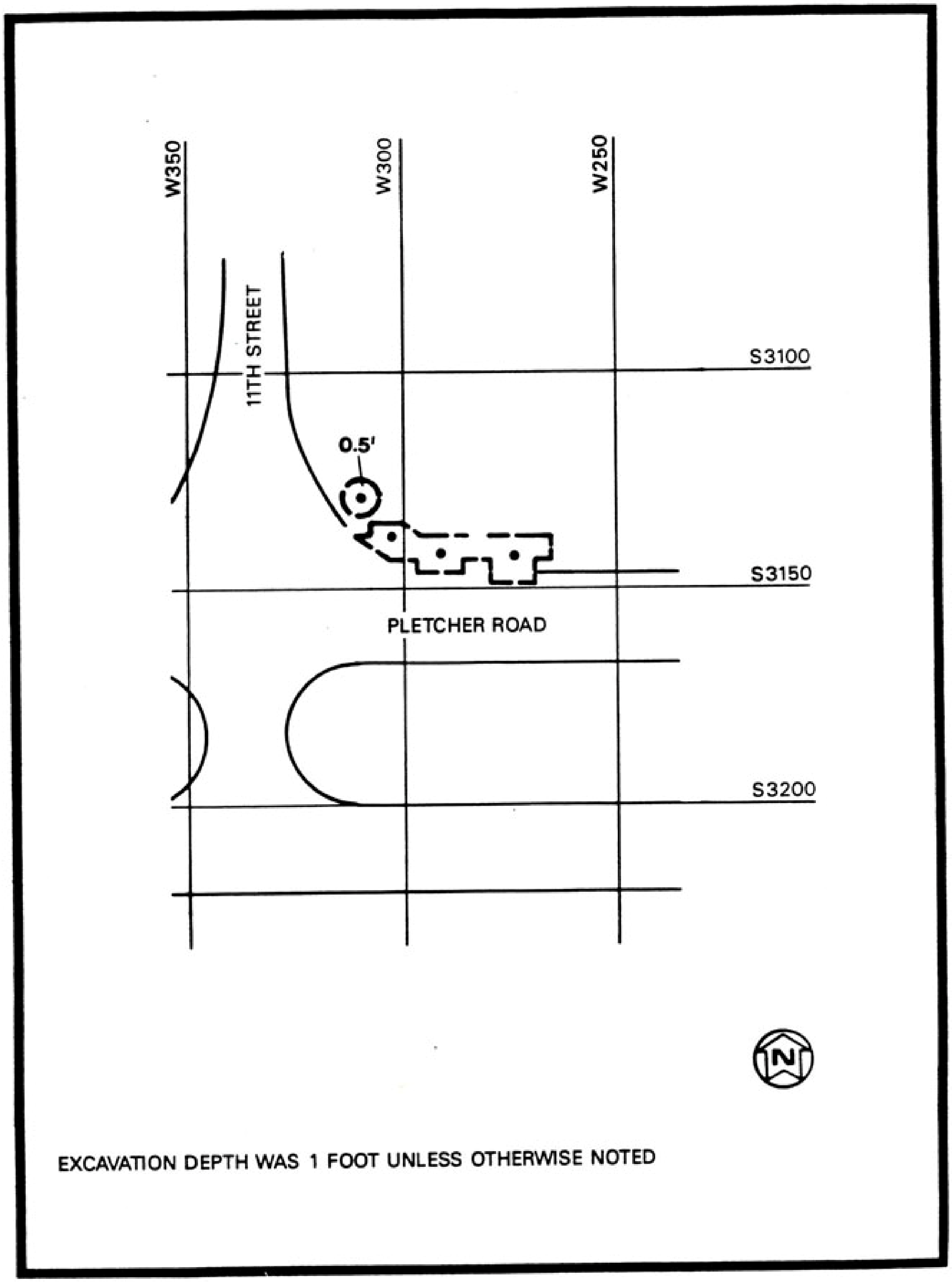

FIGURE 25 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY R - SECTION 2

TABLE 8

POST-REMEDIAL ACTION SAMPLING RESULTS

FOR PROPERTY R

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W0265	53140	A	1.2 ± 0.2	0.6 ± 0.2
W0285	53140	A	0.7 ± 0.1	0.7 ± 0.2
W0305	53140	A	11.7 ± 0.8	A
W0310	S3130	A	1.4 ± 0.1	1.3 ± 0.2
W0367	S3140	A	2.2 ± 0.2	1.1 ± 0.2
W0387	53140	A	0.9 ± 0.1	1.2 ± 0.2
W0407	S3140	A	1.7 ± 0.1	0.8 ± 0.2
W0427	53140	A	1.2 ± 0.1	0.6 ± 0.1
W0447	S3140	A	0.8 ± 0.1	1.1 ± 0.2
W0467	S3140	A	1.2 ± 0.1	1.0 ± 0.1
W0487	53140	A	1.0 ± 0.1	1.2 ± 0.3
W0507	53140	A	0.7 ± 0.1	0.9 ± 0.2
W0527	53140	A	1.3 ± 0.1	A
W0547	53140	A	1.6 ± 0.2	1.0±0.2
W0567	53140	A	1.5 ± 0.2	1.1 ± 0.2
W0587	S3140	A	0.9 ± 0.1	A
W0607	S3140	A	4.0 ± 0.2	1.1 ± 0.3
W0627	53140	A	4.2 ± 0.2	1.4 ± 0.2
W0645	53140	A	1.5 ± 0.1	0.9 ± 0.2
W0665	53140	4.2 ± 1.4	1.4 ± 0.1	1.4 ± 0.2
W0685	53140	A	1.4 ± 0.1	1.1 ± 0.2

‘A’ denotes less than detectable activity

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Verification Data

Excerpt from Verification of 1983 and 1984 Remedial Actions Niagara Falls Storage Site Vicinity Properties, Lewiston, New York, December 1989

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VERIFICATION
OF
1983 AND 1984 REMEDIAL ACTIONS
NIAGARA FALLS STORAGE SITE
VICINITY PROPERTIES
LEWISTON, NEW YORK

Prepared by

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as part of the
Formerly Utilized Sites - Remedial Action Program

FINAL REPORT

December 1989

This report is based on work performed under contract number DE-AC05-76OR00033 with the U.S. Department of Energy.

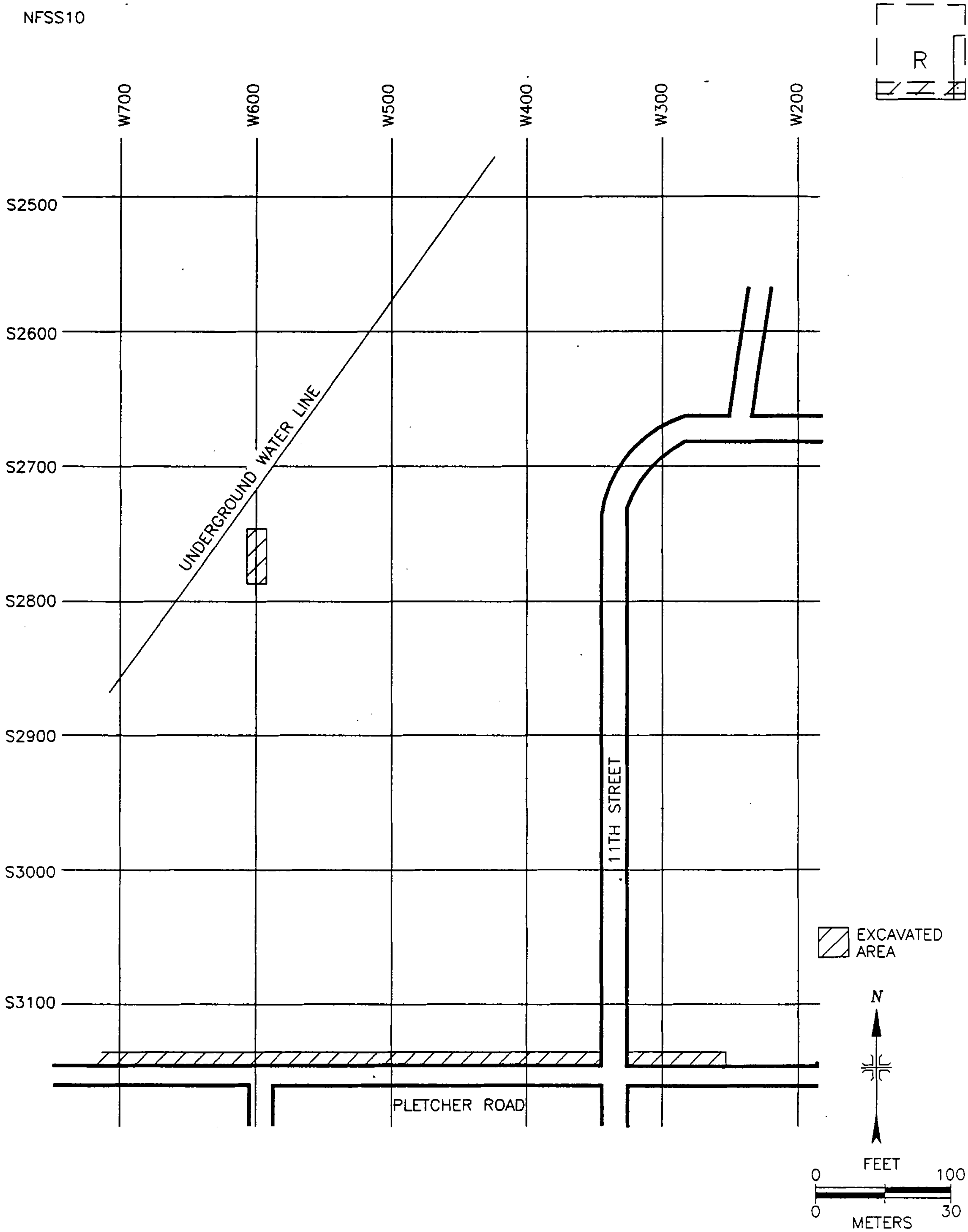

FIGURE 14: Plot Plan of Remediated Sections of Vicinity Property R

TABLE 1 (continued)

RESULTS OF CONFIRMATORY ANALYSES ON SOIL SAMPLES
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Property	Sample ID[a]	Grid Location	Analysis By	Radionuclide Concentration(pCi/g)[b] Ra-226	U-238	Th-232
	63	S2320, E3660	BNI	0.6 ± 0.2	<MDA	0.7 ± 0.2
			ORAU	0.6 ± 0.2	1.1 ± 0.6	0.7 ± 0.4
	69	S2330, E3690	BNI	0.6 ± 0.2	<MDA	0.7 ± 0.2
			ORAU	0.6 ± 0.2	1.1 ± 0.6	0.7 ± 0.4
R	2	S3140, W 607	BNI	4.0 ± 0.4	<MDA	1.1 ± 0.6
			ORAU	3.8 ± 0.5	<0.8	0.5 ± 0.3
	6	S3140, W 527	BNI	1.3 ± 0.2	<MDA	<MDA
			ORAU	1.2 ± 0.3	<0.7	1.6 ± 0.5
S	3	N1305, E 885	BNI	2.8 ± 0.6	<MDA	0.9 ± 0.4
			ORAU	2.1 ± 0.3	1.5 ± 0.9	1.0 ± 0.4
V	2	N3709, E1138	BNI	0.8 ± 0.2	<MDA	1.1 ± 0.4
			ORAU	0.9 ± 0.3	6.9 ± 1.3	1.0 ± 0.5
X	312	N 640, W 410	BNI	1.2 ± 0.2	1.3 ± 3.6	0.8 ± 0.4
			ORAU	1.0 ± 0.3	4.3 ± 2.0	1.4 ± 0.4
	4	N 690, W 420	BNI	1.0 ± 0.2	<MDA	0.7 ± 0.2
			ORAU	0.9 ± 0.3	2.9 ± 1.4	0.7 ± 0.3
	9	N 710, W 400	BNI	1.1 ± 0.2	<MDA	1.3 ± 0.4
			ORAU	0.8 ± 0.2	2.1 ± 2.2	1.3 ± 0.3
West Ditch	67	N 820, W 170.5	BNI	0.9 ± 0.2	<MDA	1.2 ± 0.6
			ORAU	1.0 ± 0.2	0.3 ± 1.1	0.9 ± 0.4
	125	N1560, W 170	BNI	1.3 ± 0.4	<MDA	1.2 ± 0.6
			ORAU	1.5 ± 0.3	1.5 ± 1.3	1.0 ± 0.3
	128	N1600, W 160	BNI	<MDA	<MDA	0.9 ± 1.2
			ORAU	78.7 ± 1.8	9.3 ± 12.5	0.9 ± 1.1
	200	N2220, W 110	BNI	1.3 ± 0.4	<MDA	0.6 ± 0.4
			ORAU	1.4 ± 0.3	1.3 ± 1.1	1.1 ± 0.4
	252	W2500, E 090	BNI	1.0 ± 0.2	<MDA	0.8 ± 0.4
			ORAU	1.0 ± 0.3	2.2 ± 1.4	1.2 ± 0.4

TABLE 13

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM PROPERTY R
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a]		Depth	Radionuclide Concentrations (pCi/g)		
S	W	(m)	Ra-226	U-238	Th-232
3124	320	Surface	2.0 ± 0.4[b]	<0.9	1.1 ± 0.5
3128	388	Surface	1.4 ± 0.3	1.5 ± 3.7	0.8 ± 0.3
3130	548	Surface	2.0 ± 0.3	0.8 ± 0.3	1.0 ± 0.2
3135	260	Surface	0.8 ± 0.3	1.2 ± 1.3	1.0 ± 0.5
3138	650	Surface	1.0 ± 0.2	4.1 ± 1.2	1.3 ± 0.5
3142	268	Surface	0.2 ± 0.2	0.7 ± 1.7	0.8 ± 0.5
3142	460	Surface	5.3 ± 0.5	<1.1	0.9 ± 0.9
3142	550	Surface	2.9 ± 0.4	<1.0	0.9 ± 0.4
3132	320	0.15 - 0.3	1.1 ± 0.2	3.8 ± 1.3	1.6 ± 0.5
		0.3 - 0.45	0.1 ± 0.1	<0.5	0.2 ± 0.2
3134	416	0.15 - 0.3	1.3 ± 0.3	3.0 ± 1.7	0.9 ± 0.5
3136	592	0.15 - 0.3	1.4 ± 0.3	2.0 ± 1.4	0.9 ± 2.1

[a]Refer to Figure 14.
[b]Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

TABLE 14

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM AREAS NEAR UNDERGROUND
WATER LINE - PROPERTY R
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a]		Depth	Radionuclide Concentrations (pCi/g)		
S	E	(m)	Ra-226	U-238	Th-232
2741	590	Surface	13.3 ± 0.9[b,c]	8.8 ± 7.1	0.6 ± 0.6
2759	601	Surface	3.7 ± 0.4	<0.7	1.3 ± 0.5
2762	598	Surface	1.2 ± 0.3	<0.8	1.0 ± 0.5
2762	601	0.2 - 0.3	10.0 ± 0.8[c]	<1.6	1.3 ± 0.5
2762	604	Surface	1.5 ± 0.2	<0.5	1.1 ± 0.4
2765	601	Surface	1.2 ± 0.3	<0.8	0.6 ± 0.3

[a]Refer to Figure 14.
[b]Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.
[c]Sample depths are relative to the exposed surface following excavation; after backfilling of the excavation, these locations were subsurface and therefore satisfy the guideline level of 15 pCi/g for Ra-226, below the 15 cm depth.

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Appendix C

NFSS Vicinity Property S

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Assessment Data

Excerpt from Comprehensive Radiological Survey
Off-Site Property S
Niagara Falls Storage Site

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COMPREHENSIVE RADIOLOGICAL SURVEY

OFF-SITE PROPERTY S
NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

Prepared for

U.S. Department of Energy
as part of the
Formerly Utilized Sites — Remedial Action Program

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FINAL REPORT

February 1984

This report is based on work performed under contract number DE-AC05-76OR00033 with the Department of Energy.

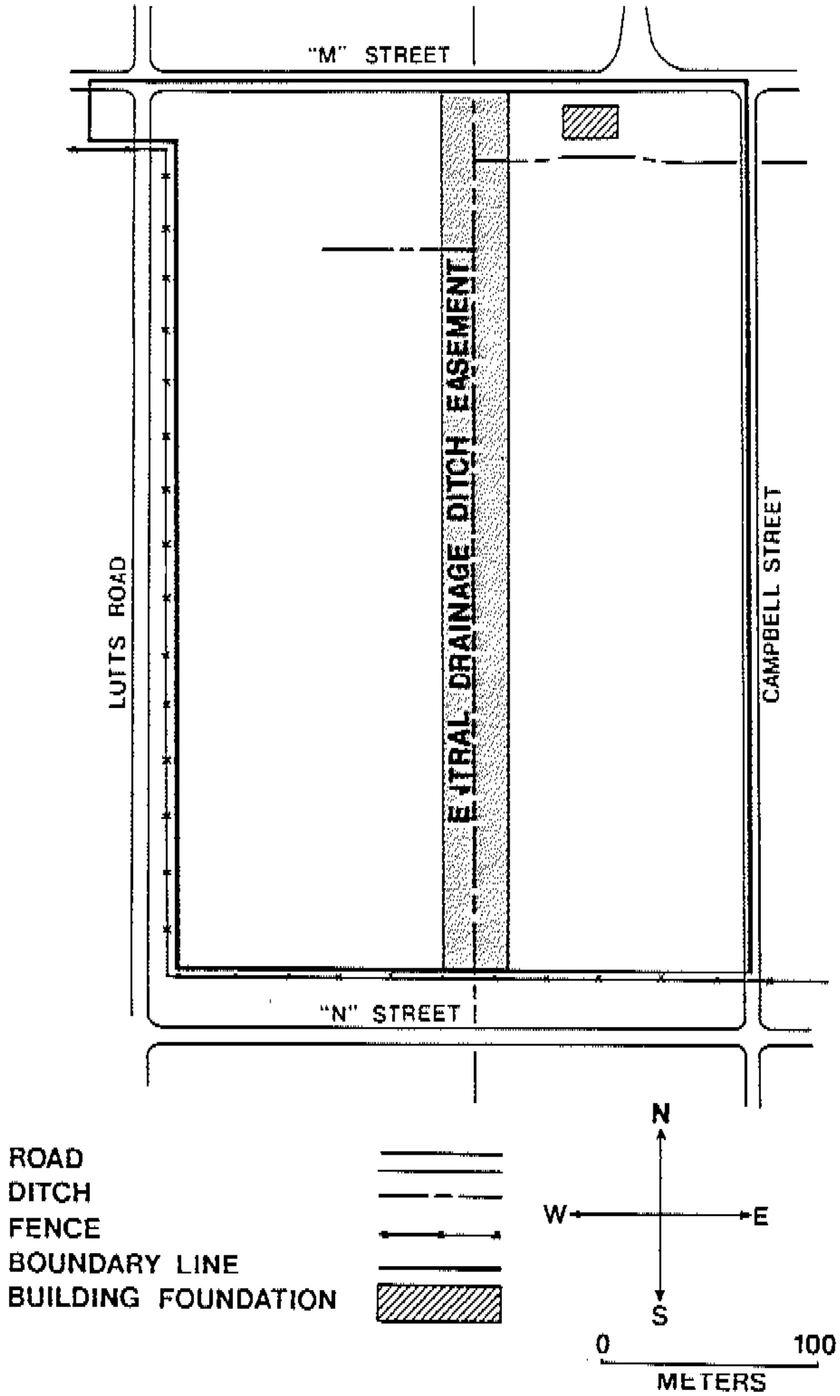

FIGURE 2. Plan View of Off-Site Property S, Indicating Prominent Surface Features. (Note: The Central Drainage Ditch and its Easement are Being Surveyed by Bechtel National, Inc., and are Therefore Excluded From the ORAU Survey.)

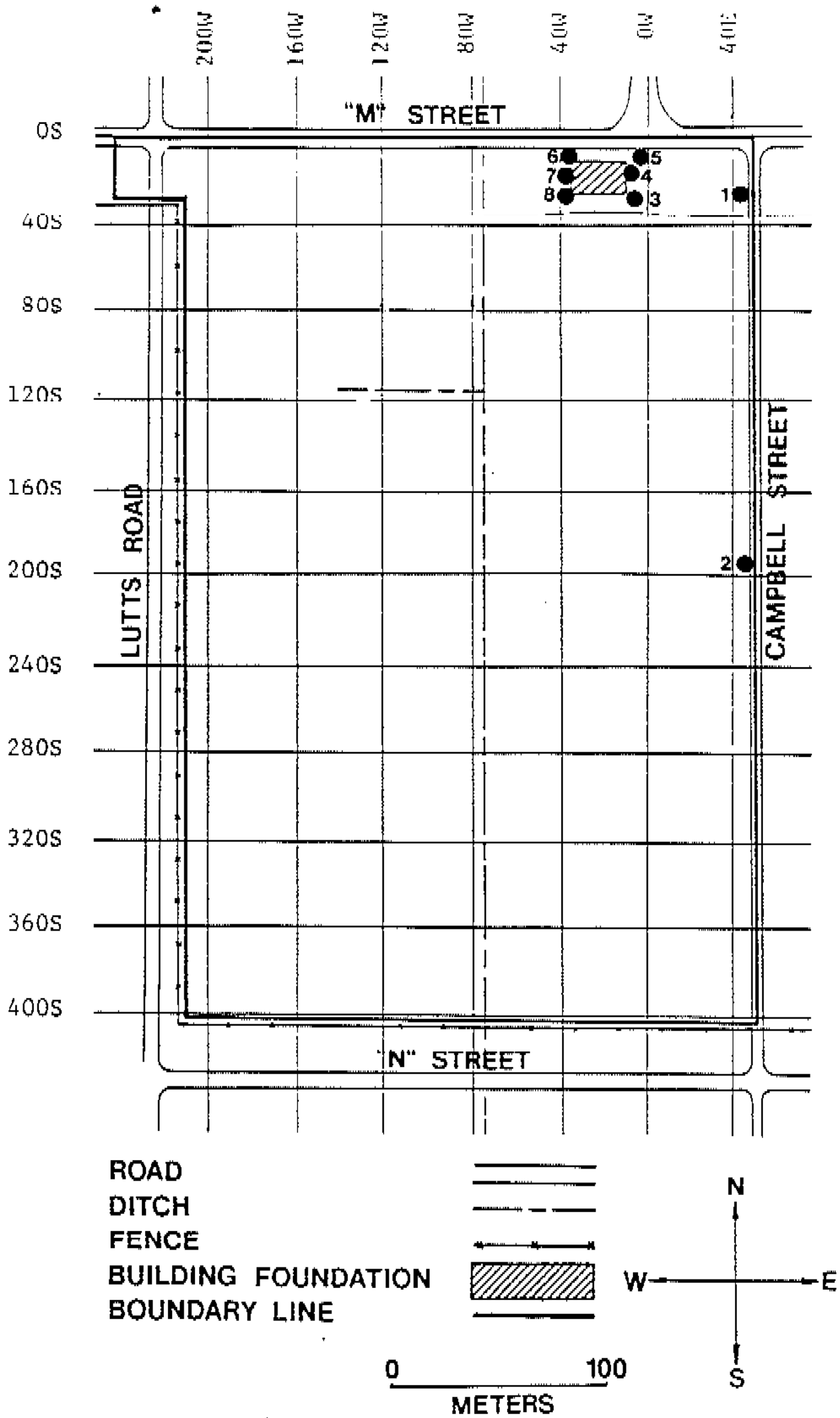

FIGURE 3. Areas of Elevated Direct Radiation Levels Identified by the Walkover Surface Scan.

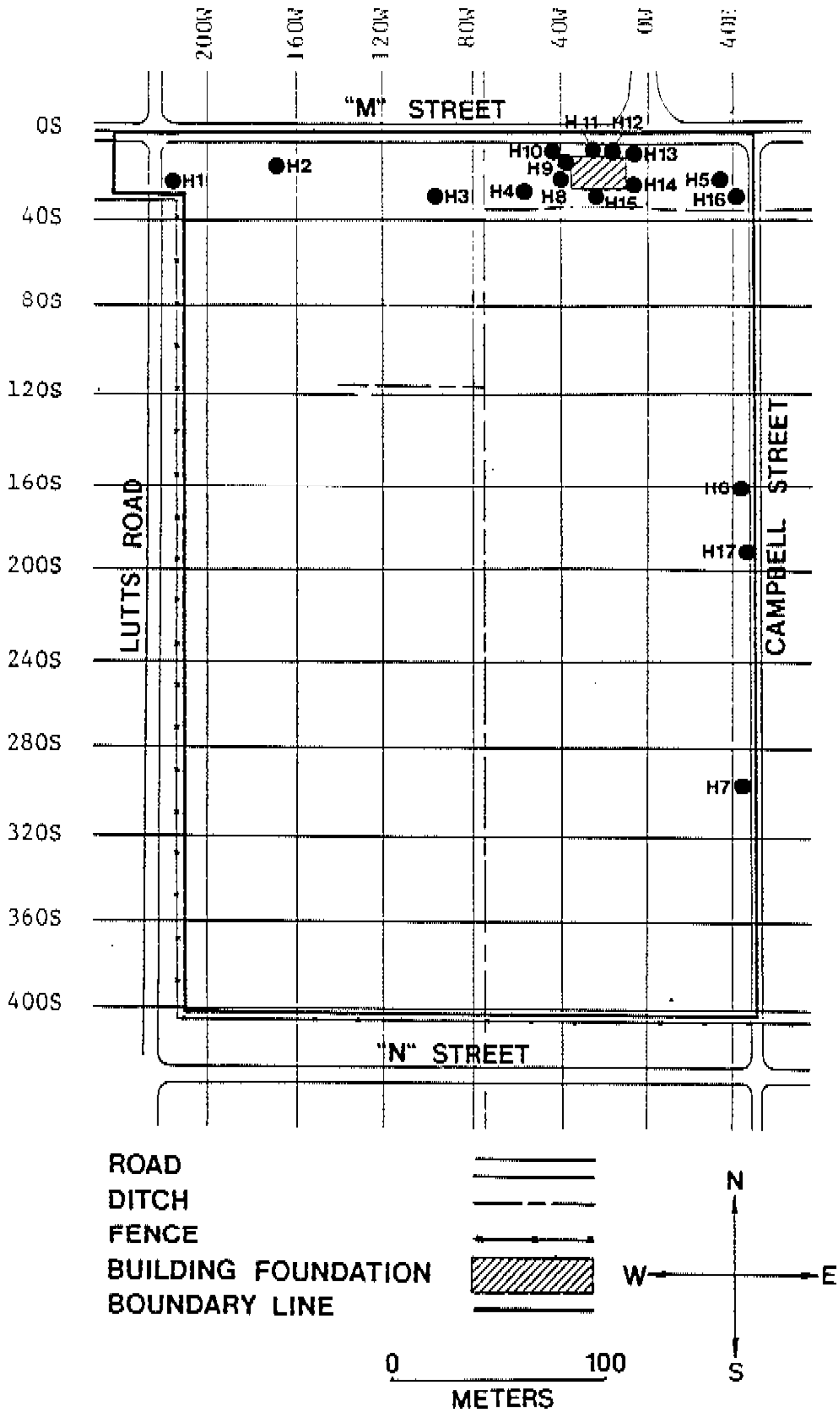

FIGURE 4. Locations of Boreholes for Subsurface Investigations

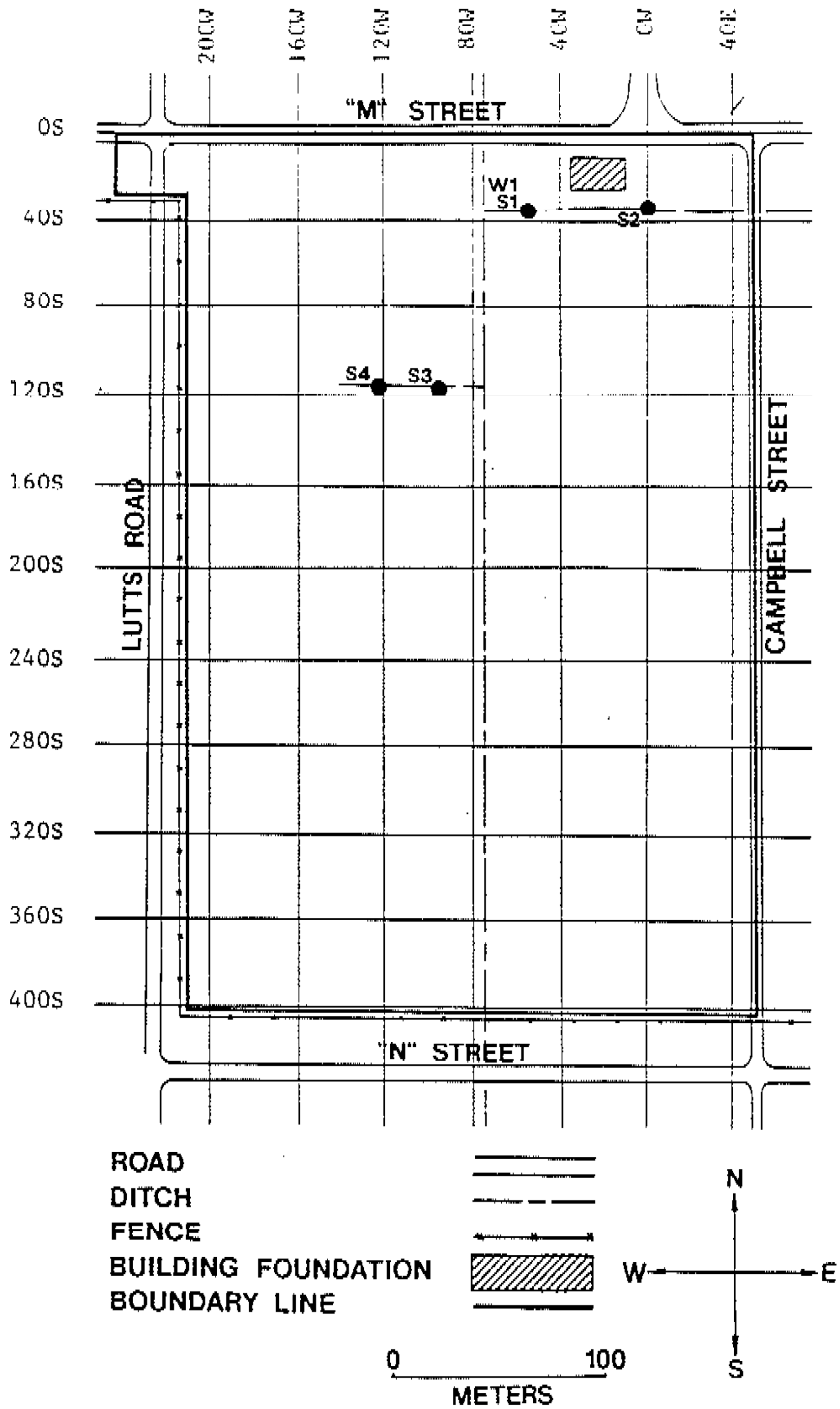

FIGURE 5. Locations of Surface Water (W1) and Sediment (S1-S4) Samples Collected from Drainage Ditches.

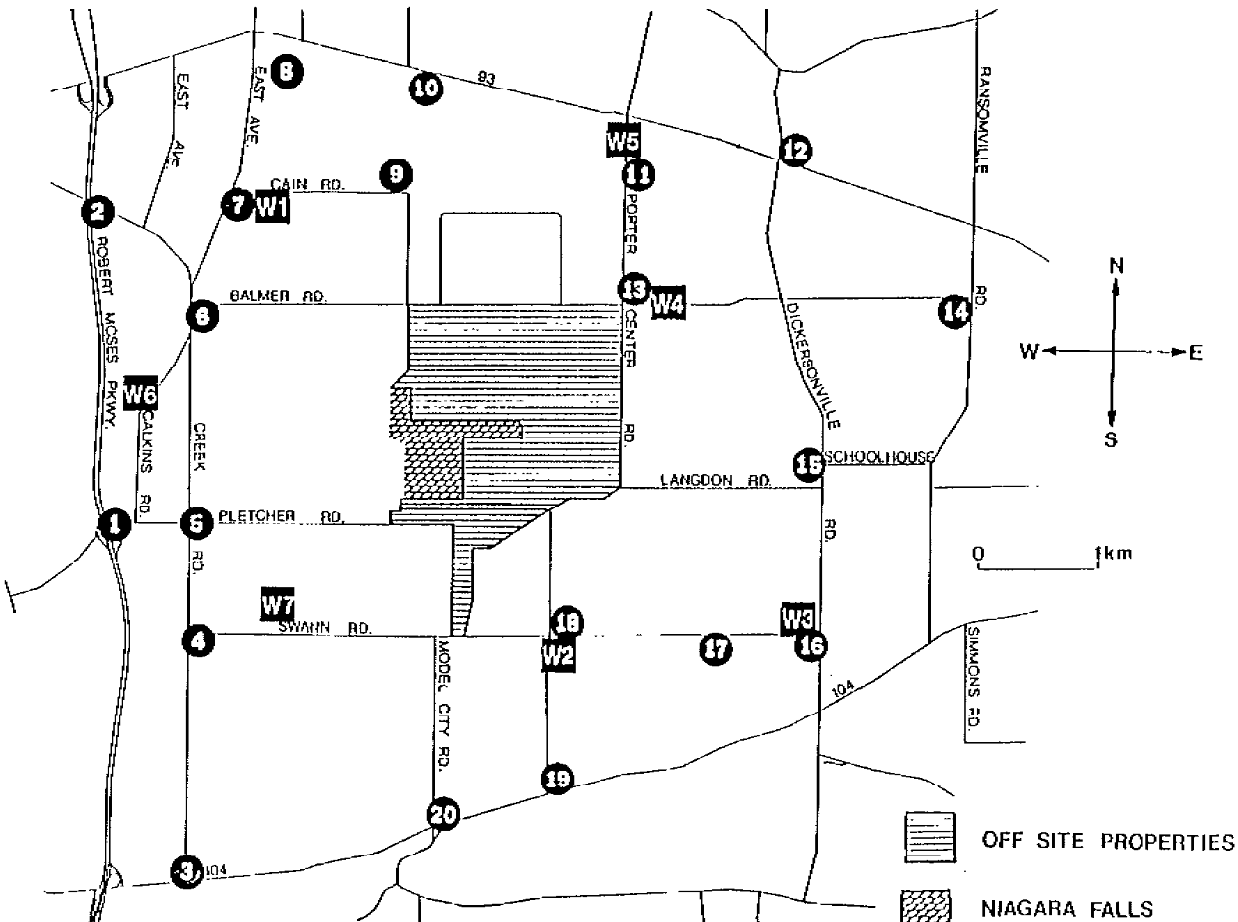

FIGURE 6. Map of Northern Niagara County, New York, Showing Locations of Background Measurements and Baseline Samples (#1-20: Soil Samples and Direct Measurements; W1-W7: Water Samples).

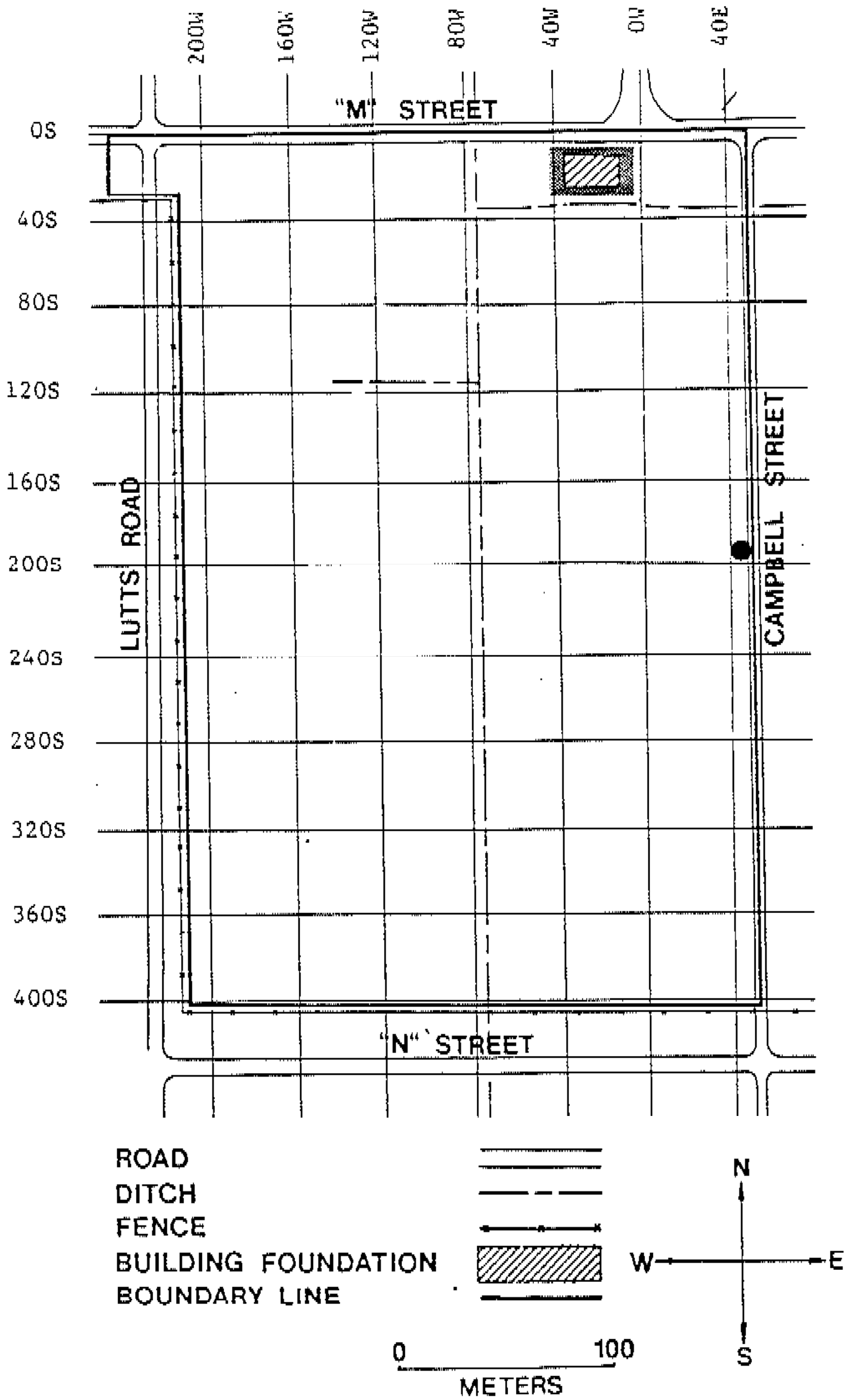

FIGURE 7. Locations (Shaded) on Property S Where Ra-226 Concentrations in Soil Exceed Guideline Levels. (Radionuclides are Either of Natural Origin or Would not Exceed Criteria When Averaged Over an Area of 100 m^2.)

TABLE 1-A

BACKGROUND EXPOSURE RATES
AND
RADIONUCLIDE CONCENTRATIONS IN BASELINE SOIL SAMPLES

Location [a]	Exposure Rate [b] (μR/h)	Radionuclide Concentrations (pCi/g)				
		Ra-226	U-235	U-238	Th-232	Cs-137
1	6.8	0.74 ± 0.16 [c]	<0.19	<2.89	0.70 ± 0.46	0.29 ± 0.08
2	6.8	0.75 ± 0.19	<0.19	<3.35	0.86 ± 0.24	0.24 ± 0.08
3	8.3	0.71 ± 0.18	0.46 ± 0.41	<3.72	0.88 ± 0.33	0.34 ± 0.09
4	7.9	0.67 ± 0.18	<0.22	<4.10	1.18 ± 0.35	0.12 ± 0.07
5	7.3	0.70 ± 0.16	<0.17	<3.34	0.68 ± 0.24	0.14 ± 0.07
6	7.7	0.50 ± 0.15	<0.16	<2.33	0.52 ± 0.38	0.17 ± 0.09
7	7.7	0.63 ± 0.13	<0.17	<2.73	0.83 ± 0.24	0.35 ± 0.08
8	7.6	0.59 ± 0.12	<0.14	<2.20	0.54 ± 0.23	<0.02
9	7.1	0.63 ± 0.20	<0.23	<4.16	0.83 ± 0.38	0.69 ± 0.11
10	7.1	0.70 ± 0.16	<0.19	<2.98	0.59 ± 0.25	0.69 ± 0.10
11	6.7	<0.09	<0.19	<2.83	0.49 ± 0.31	0.48 ± 0.14
12	7.1	0.48 ± 0.13	<0.16	<2.84	0.65 ± 0.26	0.68 ± 0.10
13	6.7	0.57 ± 0.14	<0.17	<2.36	0.49 ± 0.26	0.41 ± 0.08
14	6.8	0.68 ± 0.17	<0.19	<3.24	0.67 ± 0.25	0.70 ± 0.10
15	8.2	0.65 ± 0.14	<0.17	<3.20	0.72 ± 0.35	0.23 ± 0.08
16	7.4	0.91 ± 0.17	<0.71	<3.58	0.83 ± 0.28	0.61 ± 0.09
17	7.0	0.48 ± 0.14	<0.16	<2.73	0.32 ± 0.22	0.38 ± 0.08
18	7.7	0.73 ± 0.16	<0.18	6.26 ± 9.23	1.01 ± 0.44	0.32 ± 0.12
19	8.8	1.22 ± 0.22	<0.23	<3.79	1.08 ± 0.49	1.05 ± 0.13
20	8.6	0.83 ± 0.17	<0.21	<3.59	0.84 ± 0.29	0.08 ± 0.07
Range	6.8 to 8.8	<0.09 to 1.22	<0.14 to 0.46	<2.20 to 6.26	0.32 to 1.18	<0.02 to 1.05

[a] Refer to Figure 6.
[b] Measured at 1 m above the surface.
[c] Errors are 2σ based on counting statistics.

TABLE 1-B

RADIONUCLIDE CONCENTRATIONS IN BASELINE WATER SAMPLES

Location[a]	Radionuclide Concentrations (pCi/l)	
	Gross Alpha	Gross Beta
W1	0.95 ± 0.93 [b]	4.79 ± 1.15
W2	0.95 ± 0.94	9.17 ± 1.31
W3	0.55 ± 0.78	2.73 ± 1.05
W4	0.63 ± 0.89	5.37 ± 1.17
W5	0.73 ± 0.68	<0.64
W6	1.87 ± 1.84	14.3 ± 2.4
W7	1.16 ± 0.66	<0.63
Range	0.55 to 1.87	<0.63 to 14.3

[a] Refer to Figure 6.
[b] Errors are 2σ based on counting statistics.

TABLE 2

DIRECT RADIATION LEVELS MEASURED
AT 40 M GRID INTERVALS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
0 , 50E[a]	12	12	12
0 , 40E	12	13	13
0 , 0	12	13	13
0 , 40W	13	12	15
0 , 52W[b]	13	13	17
0 , 97W[b]	12	13	13
0 ,120W	12	13	13
0 ,160W	12	12	12
0 ,200W	11	13	14
0 ,235W[a]	11	12	12
40S, 50E[a]	16	16	18
40S, 40E	11	12	12
40S, 0	11	11	15
40S, 40W	12	11	11
40S, 54W[b]	12	12	12
40S, 95W[b]	10	10	10
40S,120W	10	10	18
40S,160W	10	10	10
80S, 50E[a]	16	16	16
80S, 40E	10	10	10
80S, 4E[c]	10	10	10
80S, 40W	10	11	16
80S, 54W[b]	11	12	18
80S, 95W[b]	10	11	11
80S,120W	10	10	15
80S,165W[c]	9	10	10
80S,200W	10	10	11
120S, 50E	14	14	14
120S, 40E	9	9	9
120S, 0	10	10	12
120S, 40W	10	10	12
120S, 55W[b]	11	11	12
120S, 95W[b]	10	10	10
120S,120W	10	10	13
120S,160W	10	10	11
120S,200W	10	10	10
160S, 50E[a]	14	14	14
160S, 40E	10	10	11
160S, 0	11	10	12
160S, 40W	10	11	11
160S, 53W[b]	10	10	15

TABLE 2, cont.

DIRECT RADIATION LEVELS MEASURED
AT 40 M INTERVALS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
160S, 96W[b]	10	10	15
160S,120W	10	10	10
160S,160W	10	10	10
160S,200W	10	9	9
200S, 50E[a]	16	16	16
200S, 40E	10	10	10
200S, 0	10	10	10
200S, 40W	10	10	16
200S, 54W[b]	10	10	10
200S, 97W[b]	10	11	11
200S,120W	10	10	10
200S,160W	9	9	11
200S,200W	10	10	10
240S, 50E[a]	13	16	18
240S, 40E	10	10	11
240S, 0	10	10	16
240S, 40W	10	10	10
240S, 53W[b]	10	10	14
240S, 95W[b]	10	11	11
240S,120W	10	10	10
240S,160W	9	9	11
280S, 50E[a]	16	16	16
280S, 40E	11	10	10
280S, 0	10	10	10
280S, 40W	10	10	12
280S, 54W[b]	10	11	11
280S, 95W[b]	10	10	13
280S,120W	10	11	11
280S,160W	10	10	10
280S,200W	9	10	12
320S, 50E[a]	15	16	16
320S, 40E	11	10	10
320S, 0	10	10	10
320S, 40W	10	11	13
320S, 51W[b]	11	11	11
320S, 95W[b]	10	10	11
320S,120W	10	10	10
320S,160W	9	10	12
320S,200W	10	10	10
360S, 50E[a]	16	16	16
360S, 40E	12	11	11

TABLE 2, cont.

DIRECT RADIATION LEVELS MEASURED
AT 40 M INTERVALS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
360S, 0	10	10	10
360S, 40W	11	10	15
360S, 53W[b]	11	10	11
360S, 95W[b]	10	10	10
360S,120W	10	10	11
360S,160W	9	10	12
360S,200W	10	10	10
400S, 50E[a]	16	16	17
400S, 40E	10	11	11
400S, 0	11	11	12
400S, 53W[b]	10	10	11
400S, 96W[b]	10	11	11
400S,120W	10	10	10
400S,160W	10	10	13
400S,200W	10	10	11

[a] Measurement performed at property boundary.
[b] Measurement performed at edge of drainage ditch easement.
[c] 40 m grid intersection not accessible; measurement performed at closest accessible point.

TABLE 3

DIRECT RADIATION LEVELS MEASURED AT 5 M GRID INTERVALS
IN THE VICINITY OF THE CONCRETE PAD

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
5S, 0	16	11	13
5S, 5W	11	11	11
5S, 10W	14	16	16
5S, 15W	11	10	11
5S, 20W	11	11	15
5S, 25W	10	12	12
5S, 30W	10	12	12
5S, 35W	11	13	15
5S, 40W	14	21	21
5S, 45W	10	12	15
5S, 50W	11	12	21
10S, 0	10	11	14
10S, 5W	11	12	12
10S, 10W	16	20	20
10S, 15W	12	16	16
10S, 20W	12	12	17
10S, 25W	13	12	12
10S, 30W	12	11	15
10S, 35W	13	11	18
10S, 40W	12	13	16
10S, 45W	12	12	12
10S, 50W	12	12	15
15S, 0	11	11	11
15S, 5W	13	12	44
15S, 10W	16	14	43
15S, 15W	14	12	12
15S, 20W	10	10	10
15S, 25W	10	11	11
15S, 30W	10	11	12
15S, 35W	12	12	12
15S, 40W	22	35	65
15S, 45W	14	13	13
15S, 50W	12	14	14
20S, 0	11	11	13
20S, 5W	13	12	15
20S, 10W	30	50	96
20S, 15W	12	10	11
20S, 20W	10	10	10
20S, 25W	11	10	10
20S, 30W	11	10	14

TABLE 3, cont.

DIRECT RADIATION LEVELS MEASURED AT 5 M GRID INTERVALS
IN THE VICINITY OF THE CONCRETE PAD

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
20S, 35W	11	10	10
20S, 40W	28	49	120
20S, 45W	12	11	16
20S, 50W	11	11	11
25S, 0	10	11	12
25S, 5W	19	21	64
25S, 10W	32	42	130
25S, 15W	20	19	42
25S, 20W	21	27	73
25S, 25W	22	23	52
25S, 30W	21	22	22
25S, 35W	24	22	75
25S, 40W	29	37	110
25S, 45W	17	12	15
25S, 50W	11	11	14
30S, 0	11	11	11
30S, 5W	12	11	11
30S, 10W	13	11	11
30S, 15W	16	12	12
30S, 20W	16	12	12
30S, 25W	19	12	14
30S, 30W	16	12	12
30S, 35W	16	13	13
30S, 40W	14	12	12
30S, 45W	11	11	11
30S, 50W	10	10	13

TABLE 4

DIRECT RADIATION LEVELS AT LOCATIONS
IDENTIFIED BY THE WALKOVER SURFACE SCAN

Location[a]	Grid Location	Exposure Rate (μR/h) Contact	Exposure Rate (μR/h) 1 m Above Surface	Surface Dose Rate (μrad/h)	Sample[b]	Contact Exposure Rate After Sample Removal (μR/h)
1	22S, 42E	24	16	40	B1 A & B	24
2	192S, 47E	41	22	100	B2	73
3	22S, 11W	88	82	82	B3	120
4	13S, 15W	28	19	44	B4	30
5	8S, 8W	38	18	61	B5	35
6	5S, 39W	28	17	35	B6	25
7	14S, 39W	38	27	69	B7	41
8	20S, 40W	75	30	100	B8	70

[a] Refer to Figure 3.
[b] Soil concentrations presented in Table 7.

TABLE 5

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 40 M GRID INTERVALS

Grid Location	Radionuclide Concentrations (pCi/g)			
	Ra-226	U-235	U-238	Cs-137
7S, 40E[b]	2.28 ± 0.48[a]	<0.27	<1.06	1.69 ± 0.20
4S, 0[b]	1.78 ± 0.43	<0.28	1.55 ± 0.99	0.71 ± 0.16
3S, 40W[b]	2.03 ± 0.38	<0.27	2.77 ± 2.01	0.63 ± 0.16
3S, 52W[b,c]	2.31 ± 0.39	<0.31	2.32 ± 1.82	0.53 ± 0.14
3S, 97W[b,c]	2.23 ± 0.41	<0.27	1.94 ± 2.20	0.73 ± 0.15
3S,120W[b]	2.90 ± 0.41	<0.31	<1.27	0.76 ± 0.16
3S,160W[b]	1.75 ± 0.36	<0.26	2.17 ± 1.97	0.70 ± 0.15
3S,200W[b]	1.48 ± 0.33	<0.24	1.93 ± 2.09	0.76 ± 0.14
40S, 40E	0.94 ± 0.31	0.40 ± 0.05	2.47 ± 1.19	0.28 ± 0.16
40S, 0	1.01 ± 0.38	<0.13	0.73 ± 0.83	0.21 ± 0.11
40S, 40W	0.66 ± 0.25	<0.24	1.58 ± 1.13	0.38 ± 0.11
40S, 54W[c]	0.96 ± 0.23	<0.50	1.06 ± 0.69	<0.09
40S, 95W[c]	0.61 ± 0.28	<0.22	1.47 ± 0.93	0.44 ± 0.15
40S,120W	1.05 ± 0.42	<0.21	<0.95	0.67 ± 0.14
40S,160W	0.81 ± 0.21	<0.49	0.96 ± 0.79	0.67 ± 0.10
40S,200W	0.85 ± 0.21	<0.52	0.88 ± 0.78	0.67 ± 0.14
80S, 40E	1.04 ± 0.34	<0.22	<0.94	0.86 ± 0.18
80S, 4E[b]	0.73 ± 0.28	<0.49	0.61 ± 1.04	0.21 ± 0.08
80S, 40W	0.59 ± 0.23	0.14 ± 0.08	1.72 ± 1.54	<0.04
80S, 54W[c]	0.69 ± 0.17	<0.51	0.83 ± 0.86	<0.07
80S, 95W[c]	0.76 ± 0.33	<0.20	1.76 ± 1.89	0.49 ± 0.11
80S,120W	0.84 ± 0.30	<0.51	0.67 ± 0.98	0.67 ± 0.12
80S,165W[b]	0.80 ± 0.26	<0.20	<1.02	0.68 ± 0.16
80S,200W	0.78 ± 0.23	<0.23	<0.97	0.69 ± 0.14
120S, 40E	0.74 ± 0.28	<0.27	<1.04	0.72 ± 0.15
120S, 0	0.95 ± 0.24	<0.27	1.47 ± 1.58	0.11 ± 0.12
120S, 40W	1.08 ± 0.33	<0.27	1.27 ± 1.98	0.39 ± 0.11

TABLE 5. cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 40 M GRID INTERVALS

Grid Location	Radionuclide Concentrations (pCi/g)			
	Ra-226	U-235	U-238	Cs-137
120S, 55W[c]	0.78 ± 0.21	<0.51	1.44 ± 0.69	<0.07
120S, 95W[c]	0.45 ± 0.23	<0.44	<0.94	0.33 ± 0.10
120S,120W	0.85 ± 0.30	<0.29	1.70 ± 2.18	0.96 ± 0.16
120S,160W	0.74 ± 0.40	<0.33	1.78 ± 2.28	1.00 ± 0.17
120S,200W	0.66 ± 0.23	<0.27	1.61 ± 1.93	0.49 ± 0.11
160S, 40E	0.91 ± 0.30	<0.26	2.59 ± 1.66	0.67 ± 0.13
160S, 0	0.83 ± 0.23	<0.48	1.19 ± 0.81	<0.11
160S, 40W	0.70 ± 0.26	<0.21	<0.90	0.26 ± 0.11
160S, 53W[c]	0.70 ± 0.25	<0.27	<0.97	0.22 ± 0.13
160S, 96W[c]	0.79 ± 0.30	0.26 ± 0.12	5.12 ± 1.88	0.68 ± 0.13
160S,120W	0.94 ± 0.24	<0.20	1.24 ± 2.34	0.75 ± 0.14
160S,160W	0.99 ± 0.32	<0.30	2.72 ± 0.58	0.55 ± 0.20
160S,200W	0.54 ± 0.40	<0.20	<0.88	0.69 ± 0.14
200S, 40E	0.80 ± 0.26	<0.49	0.98 ± 0.91	0.78 ± 0.12
200S, 0	0.76 ± 0.21	<0.21	1.22 ± 1.64	0.70 ± 0.14
200S, 40W	0.78 ± 0.28	<0.29	<0.94	0.61 ± 0.14
200S, 54W[c]	0.95 ± 0.26	0.23 ± 0.12	<0.91	0.52 ± 0.19
200S, 97W[c]	0.53 ± 0.30	<0.24	<0.89	0.71 ± 0.14
200S,120W	0.65 ± 0.25	<0.25	2.25 ± 1.54	0.65 ± 0.14
200S,160W	0.45 ± 0.20	<0.34	0.63 ± 0.62	0.50 ± 0.10
200S,200W	0.73 ± 0.21	<0.51	1.51 ± 0.57	0.67 ± 0.11
240S 40E	0.91 ± 0.38	<0.25	2.02 ± 1.57	0.29 ± 0.11
240S, 0	0.79 ± 0.30	<0.21	<0.84	0.45 ± 0.12
240S, 40W	0.78 ± 0.33	<0.22	<0.88	0.38 ± 0.10
240S, 52W[c]	0.80 ± 0.33	<0.20	2.14 ± 1.31	0.78 ± 0.17
240S, 95W[c]	1.01 ± 0.30	<0.23	<0.89	0.64 ± 0.18
240S,120W	0.68 ± 0.21	0.27 ± 0.22	0.50 ± 0.78	0.78 ± 0.18
240S,160W	0.70 ± 0.30	<0.21	<0.81	0.24 ± 0.13
240S,200W	0.66 ± 0.23	<0.53	0.75 ± 0.94	0.64 ± 0.15

TALBE 5, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 40 M GRID INTERVALS

Grid Location	Radionuclide Concentrations (pCi/g)			
	Ra-226	U-235	U-238	Cs-137
280S, 40E	0.79 ± 0.23	<0.47	1.12 ± 0.67	0.24 ± 0.09
280S, 0	0.81 ± 0.26	0.12 ± 0.07	1.62 ± 2.12	0.31 ± 0.09
280S, 40W	0.51 ± 0.35	<0.26	<0.87	0.52 ± 0.14
280S, 54W[c]	1.64 ± 0.31	0.24 ± 0.34	0.80 ± 0.45	0.95 ± 0.16
280S, 95W[c]	0.84 ± 0.30	<0.20	<0.93	0.60 ± 0.17
280S,120W	0.66 ± 0.28	<0.27	3.60 ± 1.65	0.44 ± 0.17
280S,160W	0.55 ± 0 18	<0.48	0.56 ± 1.29	0.50 ± 0.14
280S,200W	0.66 ± 0.23	0.19 ± 0.15	2.89 ± 1.28	0.69 ± 0.19
320S, 40E	0.91 ± 0.25	<0.22	2.17 ± 1.78	0.88 ± 0.18
320S, 0	1.01 ± 0.24	<0.54	0.61 ± 1.39	0.79 ± 0.15
320S, 40W	0.93 ± 0.25	<0.29	<0.29	0.71 ± 0.15
320S, 51W[c]	0.73 ± 0.28	<0.21	<0.95	0.78 ± 0.17
320S, 95W[c]	0.79 ± 0.28	0.53 ± 0.46	2.17 ± 1.42	0.66 ± 0.17
320S,120W	0.63 ± 0.29	<0.34	2.25 ± 1.55	0.87 ± 0.16
320S,160W	0.69 ± 0.26	<0.23	<0.83	0.95 ± 0.24
320S,200W	0.88 ± 0.26	<0.30	1.74 ± 1.12	0.57 ± 0.12
360S, 40E	1.03 ± 0.34	<0.23	<0.90	1.03 ± 0.19
360S, 0	0.69 ± 0.25	<0.50	1.03 ± 0.81	0.68 ± 0.12
360S, 40W	0.94 ± 0.25	<0.49	0.59 ± 1.07	0.67 ± 0.16
360S, 53W[c]	0.73 ± 0.28	0.26 ± 0.42	1.60 ± 0.92	0.80 ± 0.15
360S, 95W[c]	0.64 ± 0.25	<0.23	<0.96	0.58 ± 0.14
360S,120W	0.74 ± 0.21	<0.29	3.30 ± 1.62	0.68 ± 0.20
360S,160W	0.31 ± 0.25	<0.17	<0.71	0.61 ± 0.12
360S,200W	0.46 ± 0.30	<0.41	1.33 ± 0.69	0.42 ± 0.10
400S, 40E	1.03 ± 0.33	<0.25	<0.94	0.67 ± 0.15
400S, 0	0.74 ± 0.29	<0.22	<0.96	0.66 ± 0.13

TABLE 5, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES FROM 40 M GRID INTERVALS

Grid Location	Radionuclide Concentrations (pCi/g)			
	Ra-226	U-235	U-238	Cs-137
400S, 40W	0.79 ± 0.52	<0.27	<0.96	0.80 ± 0.15
400S, 53W[c]	1.10 ± 0.28	<0.27	<1.05	0.63 ± 0.13
400S, 96W[c]	0.94 ± 0.23	<0.54	0.41 ± 0.13	0.76 ± 0.15
400S,120W	0.89 ± 0.28	0.25 ± 0.12	<0.98	0.52 ± 0.13
400S,160W	0.75 ± 0.28	<0.24	1.24 ± 2.06	0.79 ± 0.16
400S,200W	0.65 ± 0.30	<0.19	<0.93	0.81 ± 0.15

[a] Errors are 2σ based on counting statistics.
[b] 40 m grid intersection not accessible or soil not available; sample collected from nearest available location.
[c] Sampling at edge of drainage ditch easement.

TALBE 6

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 5 M GRID INTERVALS
IN THE VICINITY OF THE CONCRETE PAD

Grid Location	Radionuclide Concentrations (pCi/g)			
	Ra-226	U-235	U-238	Cs-137
5S, 0	0.74 ± 0.30[a]	<0.54	1.59 ± 0.89	0.78 ± 0.16
5S, 5W	1.11 ± 0.31	<0.57	0.84 ± 1.17	0.66 ± 0.12
5S, 10W	5.13 ± 0.63	0.59 ± 0.82	1.86 ± 3.69	0.55 ± 0.18
5S, 15W	0.70 ± 0.23	<0.54	0.86 ± 0.85	0.32 ± 0.11
5S, 20W	1.13 ± 0.34	<0.29	<1.13	0.61 ± 0.17
5S, 25W	0.79 ± 0.30	<0.21	<0.95	0.53 ± 0.15
5S, 30W	1.11 ± 0.21	<0.51	1.30 ± 0.80	0.54 ± 0.12
5S, 35W	1.11 ± 0.28	0.21 ± 0.07	<1.03	0.36 ± 0.12
5S, 40W	3.19 ± 0.45	<0.28	2.45 ± 1.62	0.32 ± 0.13
10S, 0	1.15 ± 0.33	<0.28	1.59 ± 1.61	0.58 ± 0.20
10S, 5W	0.75 ± 0.16	<0.49	1.03 ± 0.63	0.05 ± 0.07
10S, 10W	2.31 ± 0.35	<0.31	2.24 ± 2.41	0.13 ± 0.10
10S, 15W	1.89 ± 0.39	<0.33	2.30 ± 1.24	0.18 ± 0.11
10S, 20W	0.91 ± 0.21	<0.26	1.88 ± 1.29	0.10 ± 0.08
10S, 25W	0.86 ± 0.28	<0.27	1.68 ± 1.13	0.13 ± 0.06
10S, 30W	1.01 ± 0.29	<0.23	2.55 ± 1.25	0.15 ± 0.09
10S, 35W	1.64 ± 0.34	<0.31	1.50 ± 0.99	0.13 ± 0.09
10S, 40W	0.95 ± 0.20	<0.54	0.63 ± 1.28	<0.10
10S, 45W	1.00 ± 0.34	<0.24	<0.94	<0.05
10S, 50W	1.48 ± 0.40	<0.26	1.67 ± 1.24	<0.05
15S, 0	1.03 ± 0.35	<0.29	2.00 ± 1.05	0.34 ± 0.10
15S, 5W	1.16 ± 0.30	<0.20	1.59 ± 2.01	0.24 ± 0.16
15S, 10W	0.98 ± 0.23	<0.45	0.97 ± 0.70	0.06 ± 0.07
15S, 15W	1.03 ± 0.25	<0.25	4.28 ± 2.12	0.34 ± 0.09
15S, 20W	0.99 ± 0.45	<0.30	1.38 ± 2.34	0.11 ± 0.07
15S, 25W	0.84 ± 0.26	<0.22	3.62 ± 1.15	0.08 ± 0.05

TABLE 6, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 5 M GRID INTERVALS
IN THE VICINITY OF THE CONCRETE PAD

Grid Location	Radionuclide Concentrations (pCi/g)			
	Ra-226	U-235	U-238	Cs-137
15S, 30W	0.91 ± 0.28	0.18 ± 0.11	2.22 ± 1.71	<0.06
15S, 35W	0.96 ± 0.29	<0.28	1.28 ± 1.49	0.30 ± 0.14
15S, 40W	5.25 ± 0.80	<0.52	5.28 ± 2.72	0.43 ± 0.19
15S, 45W	0.96 ± 0.25	<0.28	1.25 ± 1.62	0.29 ± 0.09
15S, 50W	1.90 ± 0.36	<0.26	2.94 ± 2.43	0.44 ± 0.16
20S, 0	0.68 ± 0.15	0.30 ± 0.03	1.17 ± 1.67	0.36 ± 0.12
20S, 5W	0.88 ± 0.20	<0.48	<1.09	0.43 ± 0.08
20S, 10W	26.9 ± 1.1	<0.99	25.8 ± 3.7	1.15 ± 0.20
20S, 15W	b	b	b	b
20S, 20W	b	b	b	b
20S, 25W	b	b	b	b
20S, 30W	b	b	b	b
20S, 35W	b	b	b	b
20S, 40W	34.9 ± 1.2	<1.16	34.2 ± 4.4	0.40 ± 0.17
20S, 45W	0.84 ± 0.30	<0.23	1.36 ± 1.70	0.54 ± 0.13
20S, 50W	0.98 ± 0.23	<0.52	1.26 ± 0.72	0.68 ± 0.15
25S, 0	0.55 ± 0.19	<0.21	<0.84	0.40 ± 0.15
25S, 5W	1.04 ± 0.28	<0.31	2.37 ± 1.84	0.64 ± 0.16
25S, 10W	31.5 ± 1.0	1.94 ± 1.30	15.2 ± 1.9	0.65 ± 0.14
25S, 15W	5.51 ± 0.59	<0.93	3.19 ± 2.39	0.46 ± 0.15
25S, 20W	16.7 ± 0.9	1.86 ± 1.27	11.6 ± 1.4	0.41 ± 0.13
25S, 25W	2.98 ± 0.48	<0.41	2.88 ± 3.32	0.78 ± 0.16
25S, 30W	6.89 ± 0.68	<0.55	3.47 ± 1.94	0.55 ± 0.19
25S, 35W	2.55 ± 0.38	<0.25	2.99 ± 2.60	0.48 ± 0.18
25S, 40W	15.3 ± 0.8	0.96 ± 1.00	11.2 ± 2.3	0.98 ± 0.17
25S, 45W	0.78 ± 0.29	<0.55	1.12 ± 0.79	0.78 ± 0.15
25S, 50W	1.45 ± 0.31	<0.24	1.63 ± 1.88	0.07 ± 0.11

TABLE 6, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 5 M GRID INTERVALS
IN THE VICINITY OF THE CONCRETE PAD

Grid Location	Radionuclide Concentrations (pCi/g)			
	Ra-226	U-235	U-238	Cs-137
30S, 0	0.91 ± 0.35	<0.55	1.45 ± 1.08	0.65 ± 0.14
30S, 5W	0.95 ± 0.29	<0.24	<0.97	0.64 ± 0.13
30S, 10W	0.71 ± 0.28	<0.20	1.80 ± 2.59	0.57 ± 0.16
30S, 15W	0.59 ± 0.43	<0.28	<1.03	0.59 ± 0.24
30S, 20W	0.70 ± 0.20	<0.27	2.47 ± 1.67	0.45 ± 0.12
30S, 25W	0.83 ± 0.34	<0.28	2.25 ± 1.19	0.75 ± 0.16
30S, 30W	0.95 ± 0.31	<0.27	<0.93	0.51 ± 0.14
30S, 35W	0.70 ± 0.26	0.32 ± 0.51	<0.85	0.54 ± 0.15
30S, 40W	0.98 ± 0.25	<0.47	1.10 ± 0.79	<0.25
30S, 45W	1.06 ± 0.29	<0.27	1.52 ± 1.27	0.70 ± 0.18
30S, 50W	0.65 ± 0.20	<0.52	0.97 ± 0.75	0.12 ± 0.08

[a] Errors are 2σ based on counting statistics.
[b] Sample not available due to presence of concrete pad.

TABLE 7

RADIONUCLIDE CONCENTRATIONS IN SURFACE SAMPLES
FROM LOCATIONS IDENTIFIED BY THE WALKOVER SCAN

Sample[a] No.	Grid Location	Radionuclide Concentrations (pCi/g)[b] Ra-226	U-235	U-238	Cs-137
B1-A (Gravel)	22S, 42E	8.47 ± 0.71[c]	<0.48	9.68 ± 4.04	0.65 ± 0.16
B1-B (Rock)	22S, 42E	168 ± 7	10.3 ± 11.1	126 ± 23	<0.64
B2	192S, 47E	62.3 ± 1.8	<1.46	12.2 ± 7.2	1.59 ± 0.24
B3	22S, 1W	32.1 ± 1.2	<0.91	32.2 ± 4.9	0.92 ± 0.18
B4	13S, 15W	11.6 ± 0.7	<0.58	6.21 ± 4.04	0.53 ± 0.13
B5	8S, 8E	23.7 ± 1.1	<0.98	22.0 ± 3.7	0.55 ± 0.16
B6	5S, 39W	15.9 ± 0.8	<0.82	15.5 ± 4.5	0.34 ± 0.12
B7	14S, 39W	4.33 ± 0.42	<0.81	2.56 ± 1.56	0.23 ± 0.15
B8	20S, 40W	33.2 ± 1.2	<1.10	26.6 ± 4.0	0.26 ± 0.15

[a] Refer to Figure 3.
[b] Refer to Table 4 for direct radiation levels.
[c] Errors are 2σ based on counting statistics.

TABLE 8

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE SOIL SAMPLES

Borehole[a] No.	Grid Location	Depth (m)	Radionuclide Concentrations (pCi/g)			
			Ra-226	U-235	U-238	Cs-137
H1	27S,220W	Surface	1.18 ± 0.73[b]	<0.29	1.59 ± 1.39	0.40 ± 0.10
		0.5	0.78 ± 0.26	<0.21	2.01 ± 1.49	<0.03
		1.0	0.78 ± 0.20	<0.21	0.91 ± 1.72	<0.03
		2.0	0.83 ± 0.29	<0.23	<0.82	<0.04
		3.0	1.03 ± 0.24	<0.27	<0.85	<0.03
H2	16S,173W	Surface	0.88 ± 0.20	<0.26	1.70 ± 0.79	<0.03
		0.5	0.65 ± 0.24	<0.18	0.63 ± 0.37	<0.03
		1.0	0.90 ± 0.19	<0.16	0.52 ± 1.60	<0.04
		2.0	0.74 ± 0.18	<0.17	0.51 ± 0.29	<0.03
		3.0	0.76 ± 0.24	<0.20	0.87 ± 0.89	<0.03
H3	32S, 97W	Surface	0.73 ± 0.23	<0.20	1.41 ± 1.48	0.10 ± 0.05
		0.5	0.96 ± 0.26	<0.24	0.64 ± 0.51	<0.03
		1.0	0.84 ± 0.21	<0.21	1.45 ± 0.51	<0.03
		2.0	1.14 ± 0.39	<0.33	2.58 ± 3.65	<0.06
		3.0	0.85 ± 0.28	<0.20	1.08 ± 1.85	<0.03
H4	25S, 52W	Surface	0.96 ± 0.29	<0.29	<0.92	<0.03
		0.5	0.85 ± 0.25	<0.17	1.49 ± 1.45	<0.04
		1.0	0.80 ± 0.23	<0.28	<0.88	<0.04
		2.0	0.94 ± 0.33	<0.22	1.00 ± 0.74	<0.03
		3.0	0.64 ± 0.19	<0.20	1.35 ± 1.66	<0.04
H5	22S, 30E	Surface	0.70 ± 0.23	<0.22	1.62 ± 1.75	0.19 ± 0.07
		0.5	0.91 ± 0.24	<0.20	0.83 ± 1.41	<0.03
		1.0	0.69 ± 0.24	<0.20	1.02 ± 0.67	<0.03
		2.0	1.39 ± 0.41	<0.32	2.05 ± 1.99	<0.05

TABLE 8, cont.

RADIONUCLIDE CONENTRATIONS IN BOREHOLE SOIL SAMPLES

Borehole No.	Grid Location	Depth (m)	Radionuclide Concentrations (pCi/g)			
			Ra-226	U-235	U-238	Cs-137
H6	160S, 45E	Surface	0.67 ± 0.25	<0.20	2.44 ± 1.69	<0.03
		0.5	0.84 ± 0.20	<0.20	1.07 ± 0.75	<0.04
		1.0	0.78 ± 0.24	<0.20	<0.82	<0.04
		2.0	0.77 ± 0.21	<0.22	1.17 ± 0.80	<0.03
H7	296S, 45E	Surface	1.26 ± 0.33	<0.25	4.63 ± 2.11	0.68 ± 0.13
		0.5	0.90 ± 0.19	<0.24	2.04 ± 0.62	<0.04
		1.0	0.91 ± 0.31	<0.22	1.90 ± 0.61	<0.04
H8	19S, 40W	Surface	21.7 ± 0.8	1.78 ± 0.99	17.8 ± 1.5	0.32 ± 0.10
		0.5	3.43 ± 0.55	<0.23	2.37 ± 2.13	<0.02
		1.0	1.70 ± 0.33	<0.35	<1.19	<0.05
H9	14S, 37W	Surface	6.73 ± 0.58	<0.37	4.56 ± 2.53	0.33 ± 0.09
		0.5	2.30 ± 0.34	<0.26	2.30 ± 1.74	<0.04
		1.0	1.55 ± 0.36	<0.25	1.16 ± 0.56	<0.04
H10	8S, 41W	Surface	0.91 ± 0.20	<0.21	2.98 ± 1.23	0.04 ± 0.08
		0.5	0.88 ± 0.19	<0.29	1.59 ± 1.71	<0.04
		1.0	1.08 ± 0.26	<0.24	1.00 ± 0.53	<0.04
H11	13S, 23W	Surface	0.89 ± 0.19	<0.20	0.74 ± 0.65	<0.04
		0.5	0.69 ± 0.25	<0.20	1.39 ± 1.76	<0.04
		1.0	0.89 ± 0.29	<0.23	1.66 ± 1.70	<0.04
H12	13S, 19W	Surface	1.93 ± 0.35	<0.23	2.14 ± 1.09	0.19 ± 0.10
		0.5	0.83 ± 0.29	<0.23	<0.86	<0.04
		1.0	0.92 ± 0.26	<0.23	1.59 ± 1.77	<0.04

TABLE 8, cont.

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE SOIL SAMPLES

Borehole No.	Grid Location	Depth (m)	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137
H13	13S, 9W	Surface	0.18 ± 0.26	<0.18	1.56 ± 1.42	0.06 ± 0.05
		0.5	0.78 ± 0.38	<0.21	2.38 ± 1.78	<0.04
		1.0	0.79 ± 0.24	<0.21	1.01 ± 0.51	<0.03
H14	22S, 10W	Surface	4.34 ± 0.40	0.66 ± 0.45	3.74 ± 0.67	0.23 ± 0.10
		0.5	0.83 ± 0.40	<0.25	1.14 ± 1.80	<0.03
		1.0	1.09 ± 0.23	<0.21	<0.87	<0.03
H15	25S, 25W	Surface	1.08 ± 0.25	<0.20	1.87 ± 1.98	0.06 ± 0.10
		0.5	0.84 ± 0.24	<0.22	1.71 ± 0.66	0.05 ± 0.08
		1.0	0.91 ± 0.24	<0.29	2.81 ± 0.62	<0.04
H16	23S, 41E	Surface	0.99 ± 0.25	<0.23	1.14 ± 0.52	0.09 ± 0.09
		0.5	0.89 ± 0.26	<0.20	<0.85	<0.04
		1.0	0.95 ± 0.24	<0.20	<0.75	<0.03
H17	193S, 46E	Surface	0.84 ± 0.23	<0.28	1.18 ± 1.99	<0.04
		0.5	0.84 ± 0.28	<0.24	1.05 ± 1.69	<0.04
		1.0	1.04 ± 0.23	<0.27	2.34 ± 0.62	<0.05

[a] Refer to Figure 4.
[b] Errors are 2σ based on counting statistics.

TABLE 9

RADIONUCLIDE CONCENTRATIONS IN WATER SAMPLES

Sample No.	Sample Type	Grid Location	Radionuclide Concentrations (pCi/l)		
			Gross Alpha[a]	Gross Beta	Ra-226
W1	Surface[b] (Drainage Ditch)	35S, 54W	15.1 ± 2.1[d]	41.4 ± 3.1	0.27 ± 0.06
W2	Subsurface (Borehole H1)[c]	27S,220W	6.87 ± 3.17	26.3 ± 3.7	0.28 ± 0.06
W3	Subsurface (Borehole H2)[c]	16S,173W	2.52 ± 2.66	<2.75	---[e]
W4	Subsurface (Borehole H3)[c]	32S, 97W	4.21 ± 2.32	19.7 ± 3.8	---
W5	Subsurface (Borehole H4)[c]	25S, 52W	3.49 ± 3.20	7.70 ± 3.69	---
W6	Subsurface (Borehole H5)[c]	22S, 30E	<3.32	15.6 ± 7.5	---
W7	Subsurface (Borehole H7)[c]	296S, 45E	<1.70	7.99 ± 4.12	---

[a] Large amounts of dissolved solids resulted in relatively poor detection sensitivities.
[b] Refer to Figure 5.
[c] Refer to Figure 4.
[d] Errors are 2σ based on counting statistics.
[e] Dash indicates the analysis was not performed.

TABLE 10

RADIONUCLIDE CONCENTRATIONS IN SEDIMENT SAMPLES FROM DRAINAGE DITCHES

Sample[a] No.	Grid Location	Radionuclide Concentrations (pCi/g)			
		Ra-226	U-235	U-238	Cs-137
S1	35S, 54W	0.81 ± 0.23[b]	<0.49	0.57 ± 1.36	0.08 ± 0.10
S2	35S, 0	1.19 ± 0.29	0.08 ± 0.11	<0.83	0.15 ± 0.07
S3	118S, 95W	0.69 ± 0.24	<0.39	0.49 ± 0.51	0.25 ± 0.06
S4	118S,120W	0.99 ± 0.26	<0.23	<0.99	1.27 ± 0.20

[a] Refer to Figure 5.
[b] Errors are 2σ based on counting statistics.

Excavated Area

Excerpt from Post-Remedial Action Report for the Niagara Falls Storage Site Vicinity Properties 1983 and 1984

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DOE/OR/20722-84

Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-ACO5-810R20722

POST-REMEDIAL ACTION REPORT FOR THE NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES - 1983 AND 1984

Lewiston, New York

December 1986

Bechtel National, Inc.

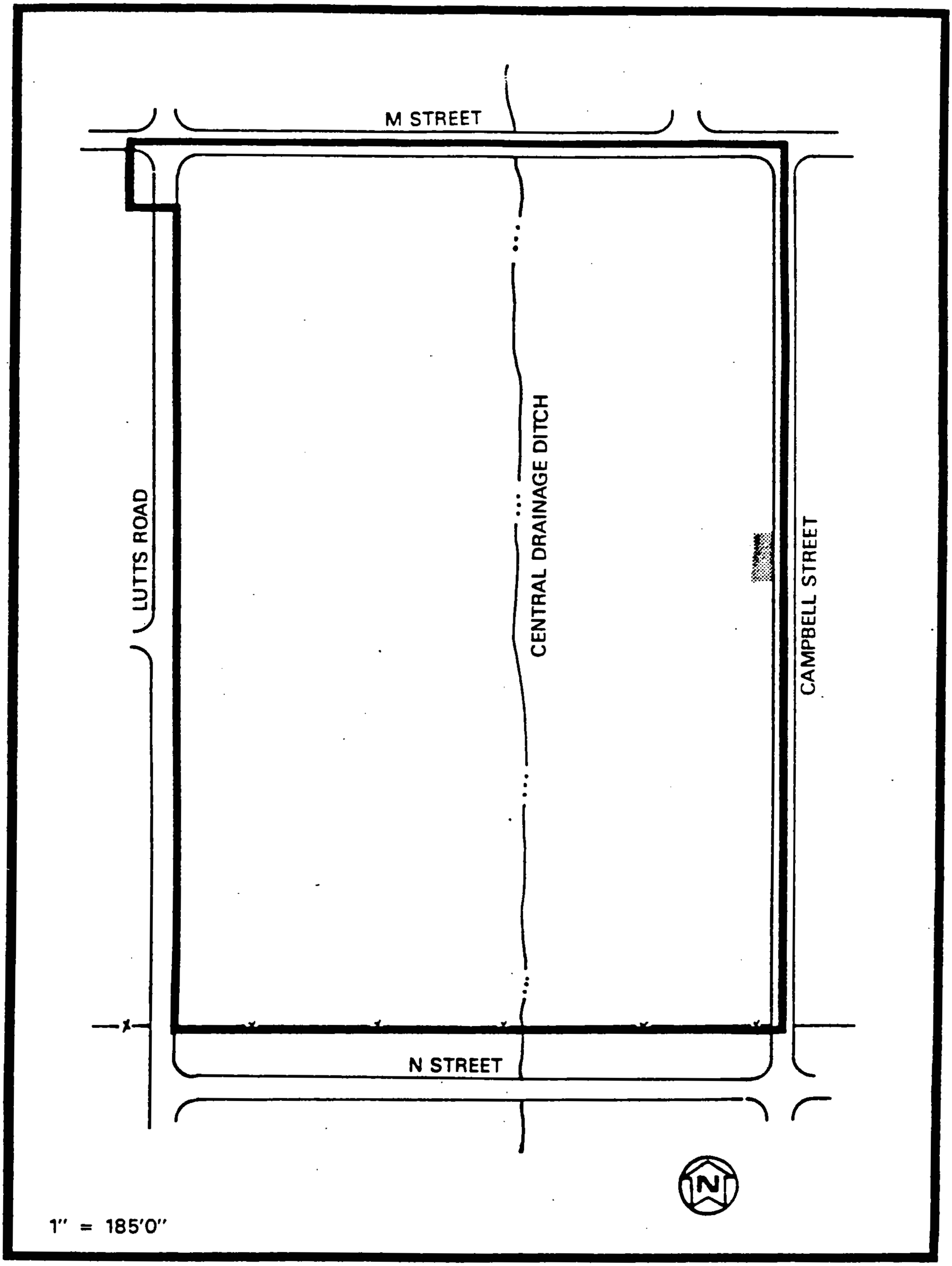

FIGURE 26 EXCAVATED AREA ON PROPERTY S

60

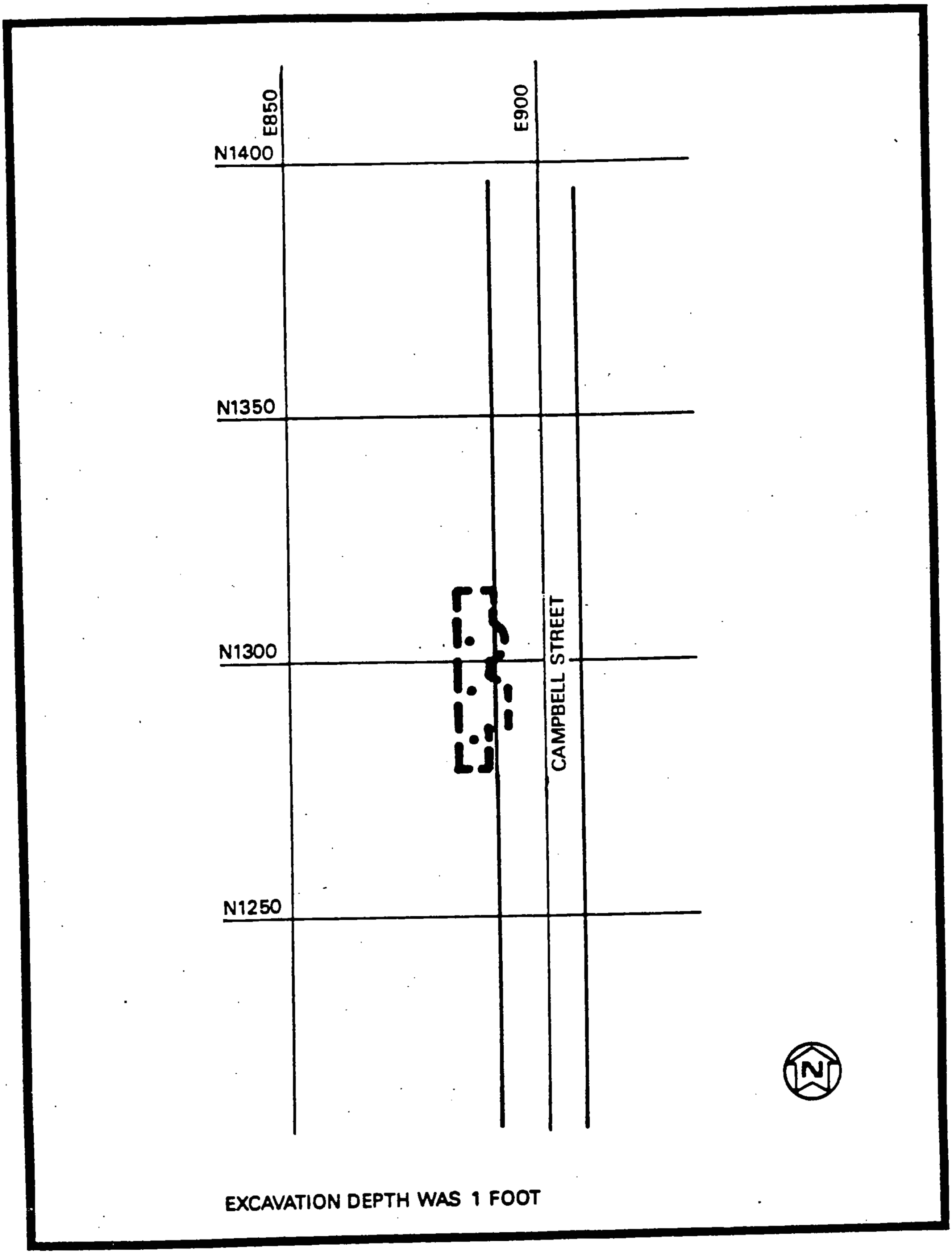

FIGURE 27 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY S

TABLE 9

POST-REMEDIAL ACTION SAMPLING RESULTS

FOR PROPERTY S

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E0885	N1305	A	2.8 ± 0.3	0.9 ± 0.2
E0886	N1285	5.3 ± 0.4	5.3 ± 0.4	1.1 ± 0.2
E0895	N1295	A	5.3 ± 0.4	0.8 ± 0.3

‘A’ denotes less than detectable activity

Verification Data

Excerpt from Verification of 1983 and 1984 Remedial Actions Niagara Falls Storage Site Vicinity Properties, Lewiston, New York, December 1989

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VERIFICATION
OF
1983 AND 1984 REMEDIAL ACTIONS
NIAGARA FALLS STORAGE SITE
VICINITY PROPERTIES
LEWISTON, NEW YORK

Prepared by

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Prepared for

U.S. Department of Energy
as part of the
Formerly Utilized Sites - Remedial Action Program

FINAL REPORT

December 1989

This report is based on work performed under contract number DE-AC05-76OR00033 with the U.S. Department of Energy.

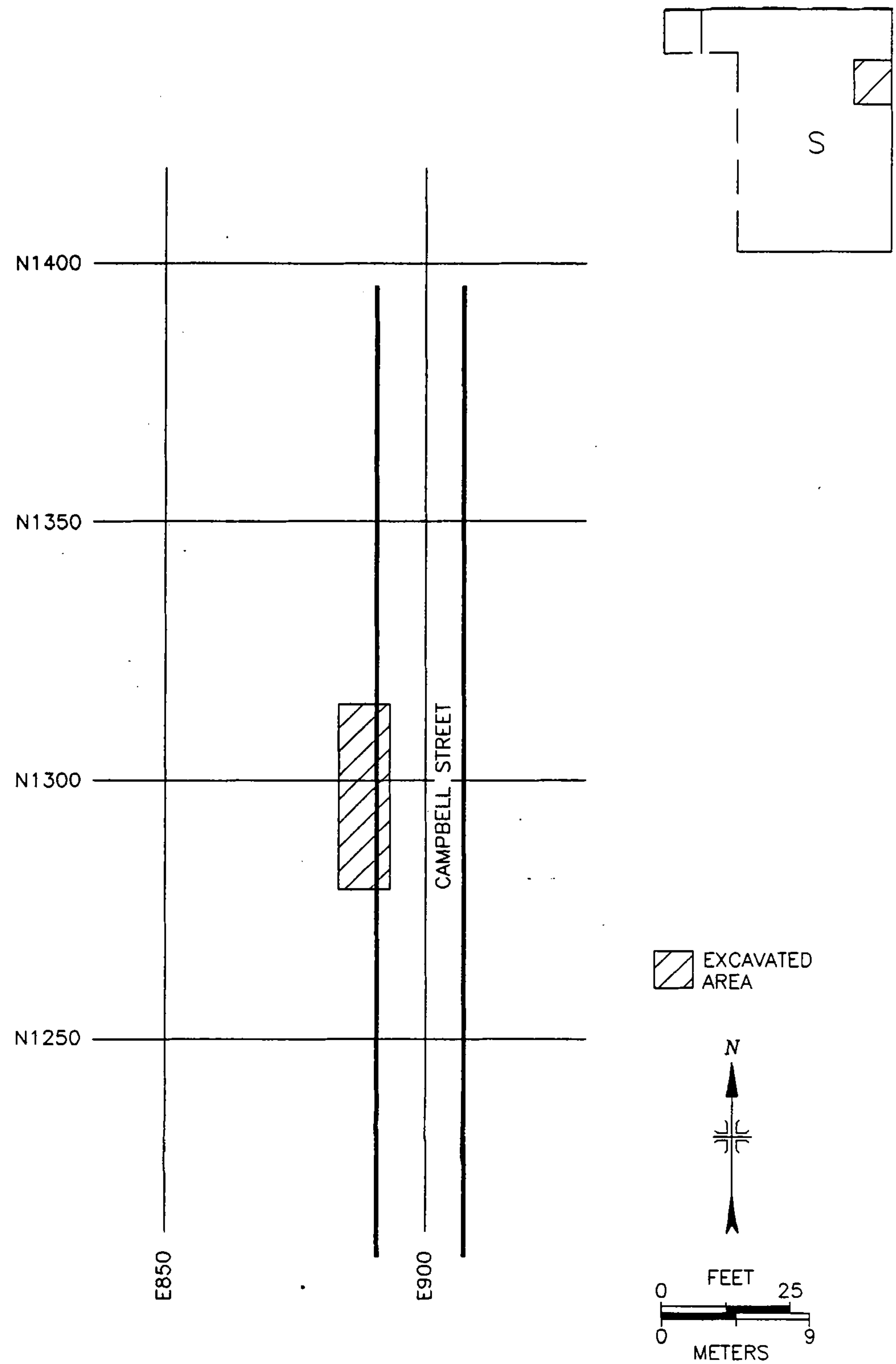

FIGURE 15: Plot Plan of Remediated Section of Vicinity Property S

TABLE 1 (continued)

RESULTS OF CONFIRMATORY ANALYSES ON SOIL SAMPLES
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Property	Sample ID[a]	Grid Location	Analysis By	Radionuclide Concentration(pCi/g)[b]		
				Ra-226	U-238	Th-232
	63	S2320, E3660	BNI	0.6 ± 0.2	<MDA	0.7 ± 0.2
			ORAU	0.6 ± 0.2	1.1 ± 0.6	0.7 ± 0.4
	69	S2330, E3690	BNI	0.6 ± 0.2	<MDA	0.7 ± 0.2
			ORAU	0.6 ± 0.2	1.1 ± 0.6	0.7 ± 0.4
R	2	S3140, W 607	BNI	4.0 ± 0.4	<MDA	1.1 ± 0.6
			ORAU	3.8 ± 0.5	<0.8	0.5 ± 0.3
	6	S3140, W 527	BNI	1.3 ± 0.2	<MDA	<MDA
			ORAU	1.2 ± 0.3	<0.7	1.6 ± 0.5
S	3	N1305, E 885	BNI	2.8 ± 0.6	<MDA	0.9 ± 0.4
			ORAU	2.1 ± 0.3	1.5 ± 0.9	1.0 ± 0.4
V	2	N3709, E1138	BNI	0.8 ± 0.2	<MDA	1.1 ± 0.4
			ORAU	0.9 ± 0.3	6.9 ± 1.3	1.0 ± 0.5
X	312	N 640, W 410	BNI	1.2 ± 0.2	1.3 ± 3.6	0.8 ± 0.4
			ORAU	1.0 ± 0.3	4.3 ± 2.0	1.4 ± 0.4
	4	N 690, W 420	BNI	1.0 ± 0.2	<MDA	0.7 ± 0.2
			ORAU	0.9 ± 0.3	2.9 ± 1.4	0.7 ± 0.3
	9	N 710, W 400	BNI	1.1 ± 0.2	<MDA	1.3 ± 0.4
			ORAU	0.8 ± 0.2	2.1 ± 2.2	1.3 ± 0.3
West Ditch	67	N 820, W 170.5	BNI	0.9 ± 0.2	<MDA	1.2 ± 0.6
			ORAU	1.0 ± 0.2	0.3 ± 1.1	0.9 ± 0.4
	125	N1560, W 170	BNI	1.3 ± 0.4	<MDA	1.2 ± 0.6
			ORAU	1.5 ± 0.3	1.5 ± 1.3	1.0 ± 0.3
	128	N1600, W 160	BNI	<MDA	<MDA	0.9 ± 1.2
			ORAU	78.7 ± 1.8	9.3 ± 12.5	0.9 ± 1.1
	200	N2220, W 110	BNI	1.3 ± 0.4	<MDA	0.6 ± 0.4
			ORAU	1.4 ± 0.3	1.3 ± 1.1	1.1 ± 0.4
	252	W2500, E 090	BNI	1.0 ± 0.2	<MDA	0.8 ± 0.4
			ORAU	1.0 ± 0.3	2.2 ± 1.4	1.2 ± 0.4

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Appendix D

NFSS Vicinity Property T

Assessment Data

Excerpt from Comprehensive Radiological Survey
Off-Site Property T
Niagara Falls Storage Site

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BECHTEL - OAK RIDGE
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COMPREHENSIVE RADIOLOGICAL SURVEY

OFF-SITE PROPERTY T
NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

Prepared for

U.S. Department of Energy
as part of the
Formerly Utilized Sites -- Remedial Action Program

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FINAL REPORT

March 1984

This report is based on work performed under contract number DE-AC05-76OR00033 with the Department of Energy.

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sample was analyzed for Ra-226 and found to contain <0.22 pCi/l - well below the EPA limit for that radionuclide. Gamma scans of buildings and foundations did not identify evidence of contaminated residues.

SUMMARY

A comprehensive survey of off-site property T at the Niagara Falls Storage Site was conducted during May-August 1983. The survey included: surface radiation scans, measurements of direct radiation levels, and analyses for radionuclide concentrations in soil and water samples, both surface and subsurface. Analyses of sediment samples were also performed. Ground penetrating radar was used to identify subsurface utilities which might preclude borehole drilling.

The results of the survey indicated small areas and isolated "hot spots" of Ra-226, U-238, and Th-232 contamination, which result in elevated direct radiation levels. The contamination is principally in the form of crushed rock or slag commonly used for fill and as a paving base in the Niagara Falls area; this material is not attributable to previous radioactive waste handling and storage activities at this site. Piles of Ra-226 contaminated sediment from dredging activities along the West Drainage Ditch were also identified. These piles and adjacent surface areas contain a volume of about 216 m^3.

Although the contaminated residues on small portions of this property exceed the guidelines established for release of the site for unrestricted use by the general public, the contaminants do not pose potential health risks to the public or site workers. There is no evidence that migration of the radioactive materials is adversely affecting adjacent properties or the ground water.

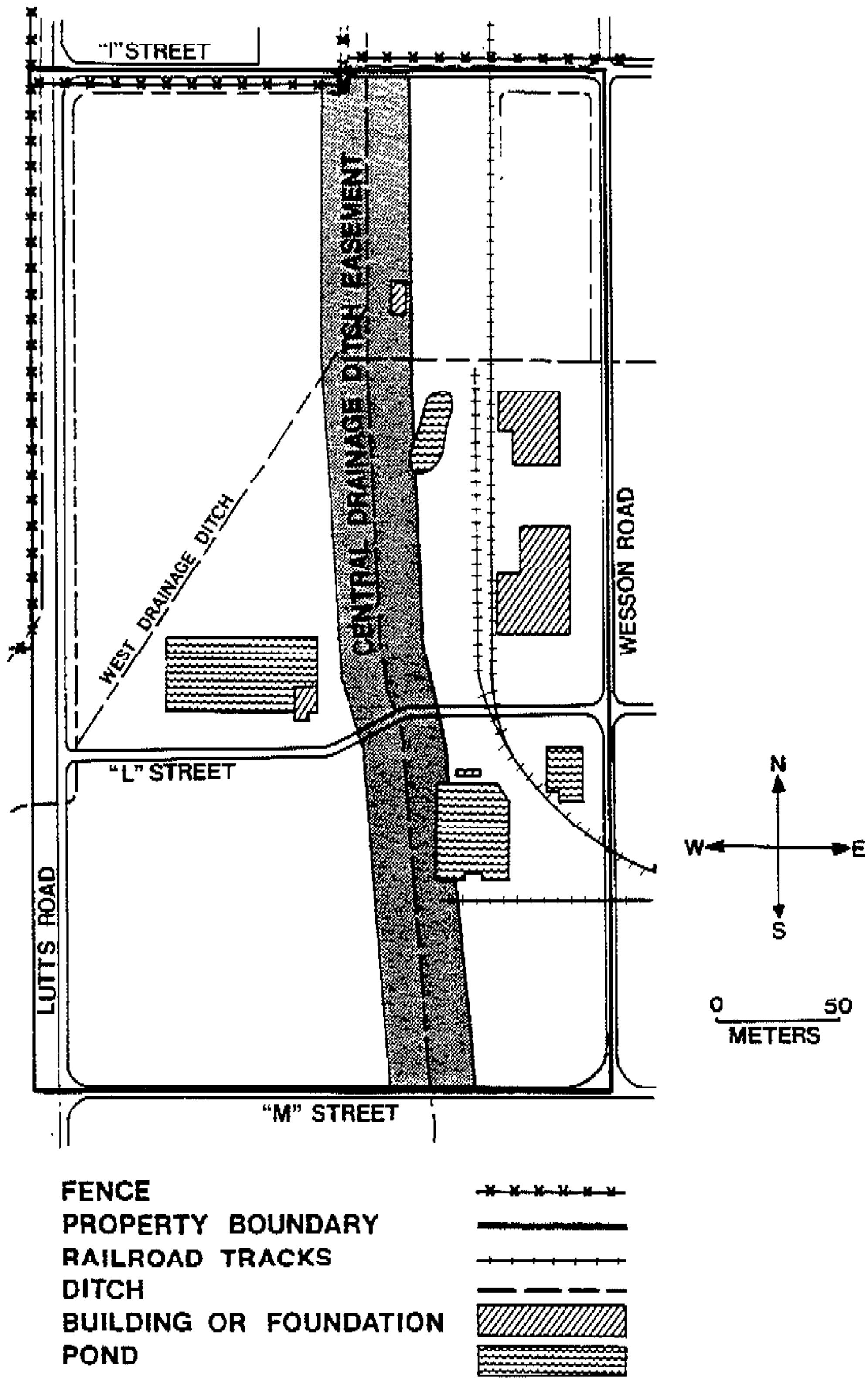

FIGURE 2. Plan View of NFSS Off-Site Property T Indicating Prominent Surface Features.

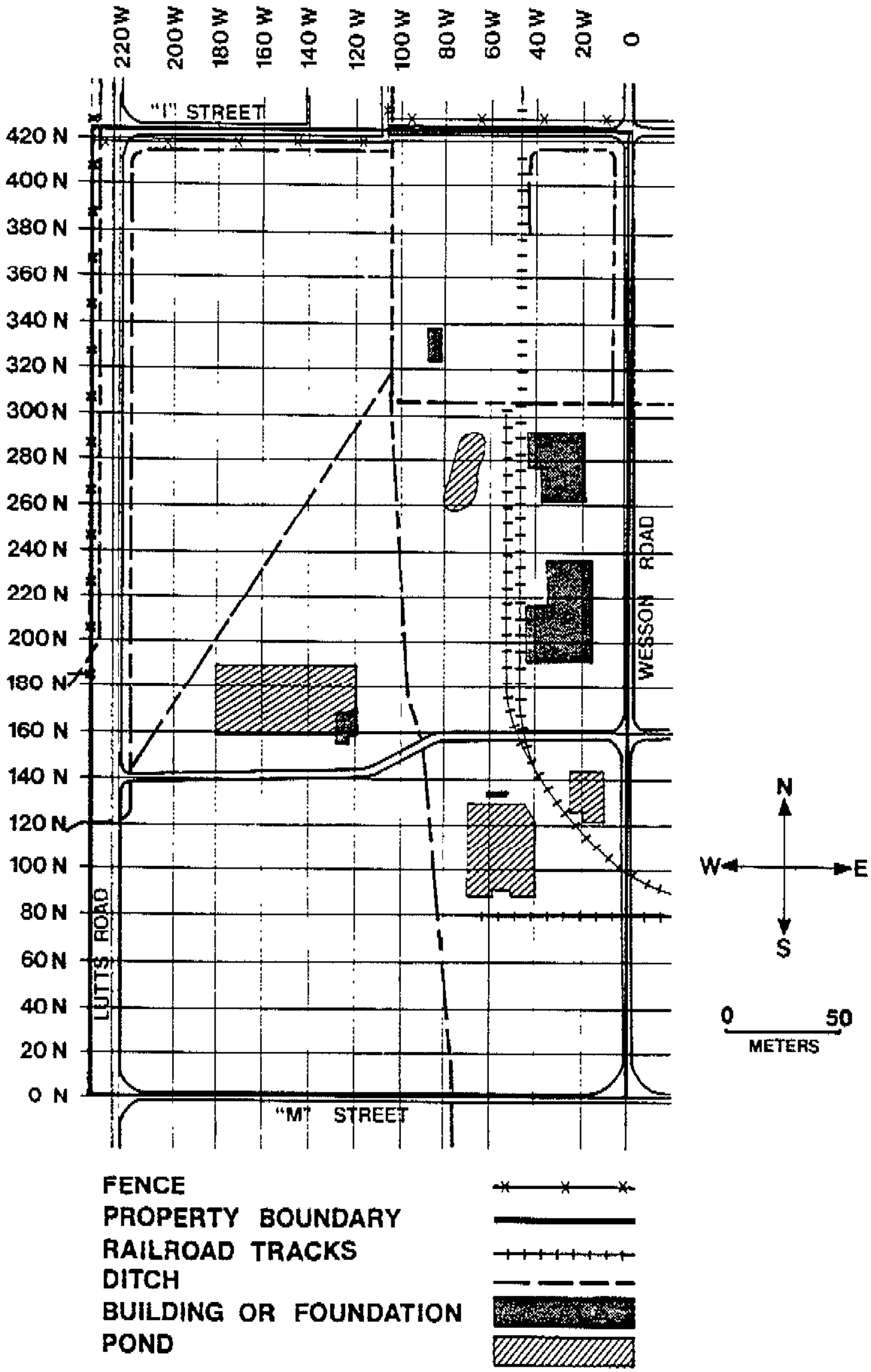

FIGURE 3. Plan View of NFSS Off-Site Property T Indicating the Grid System Established for Survey Reference.

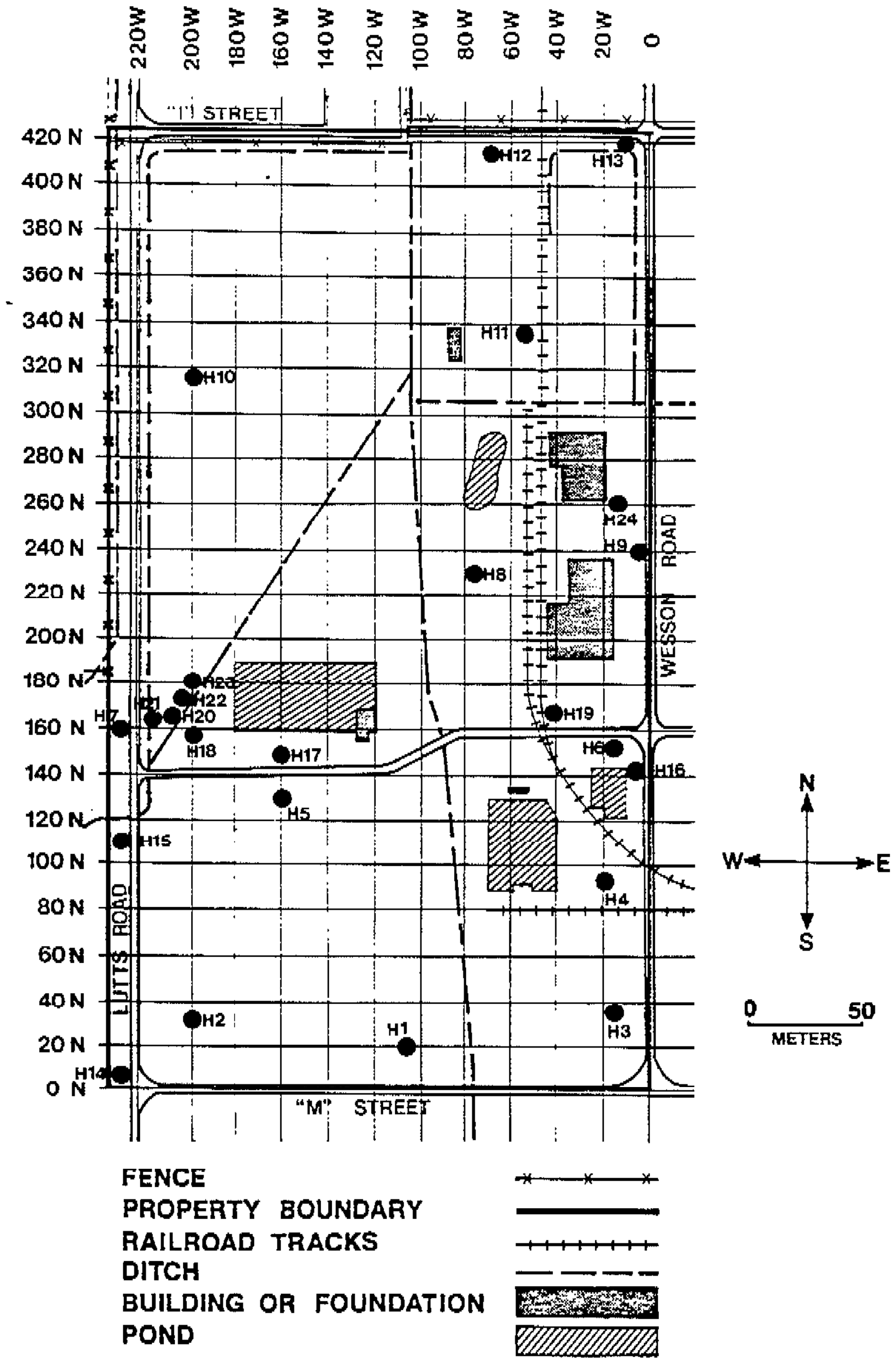

FIGURE 4. Locations of Boreholes for Subsurface Investigations.

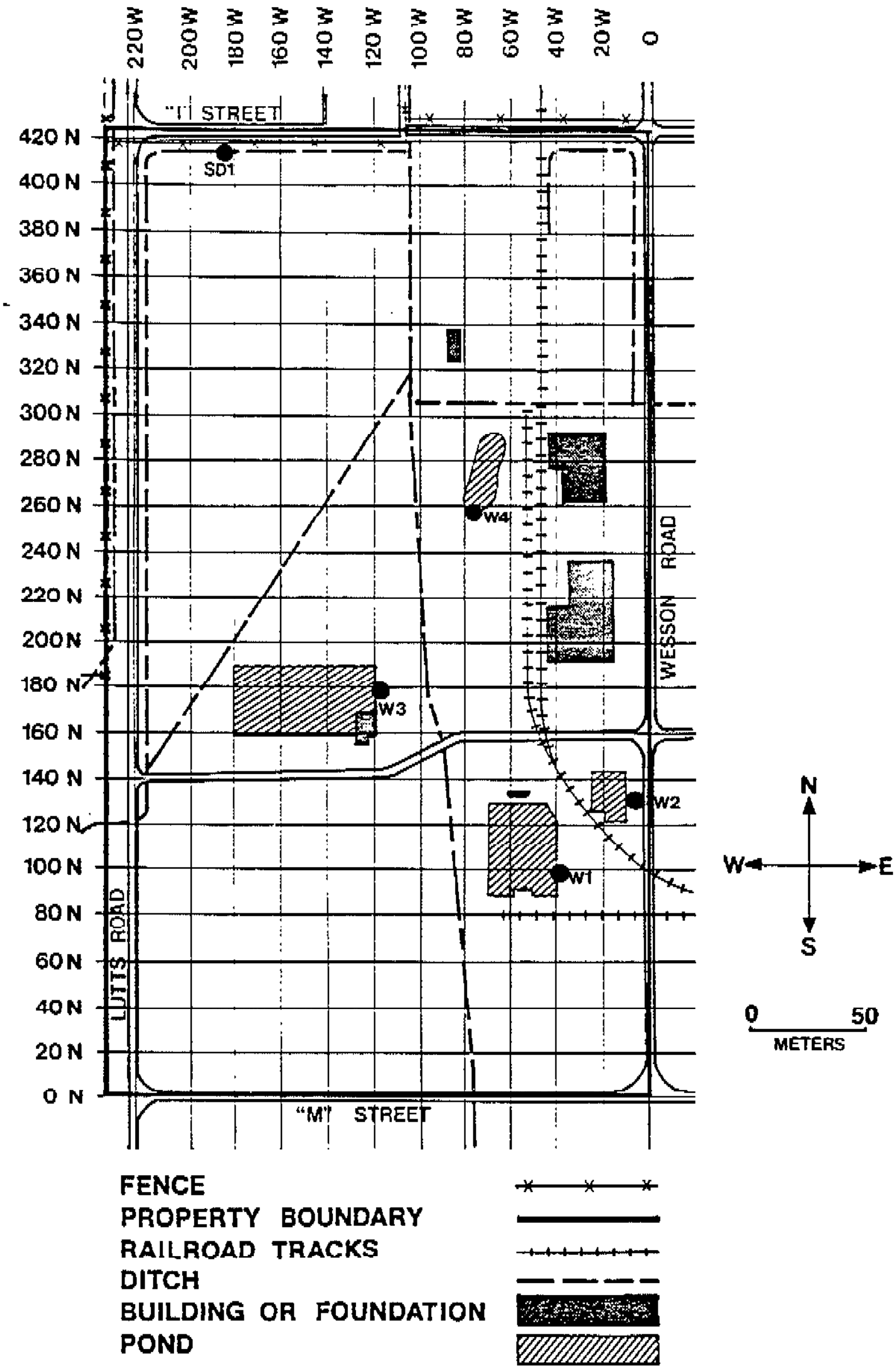

FIGURE 5. Locations of Water and Sediment Samples from Areas of Standing Water and Drainage Ditches.

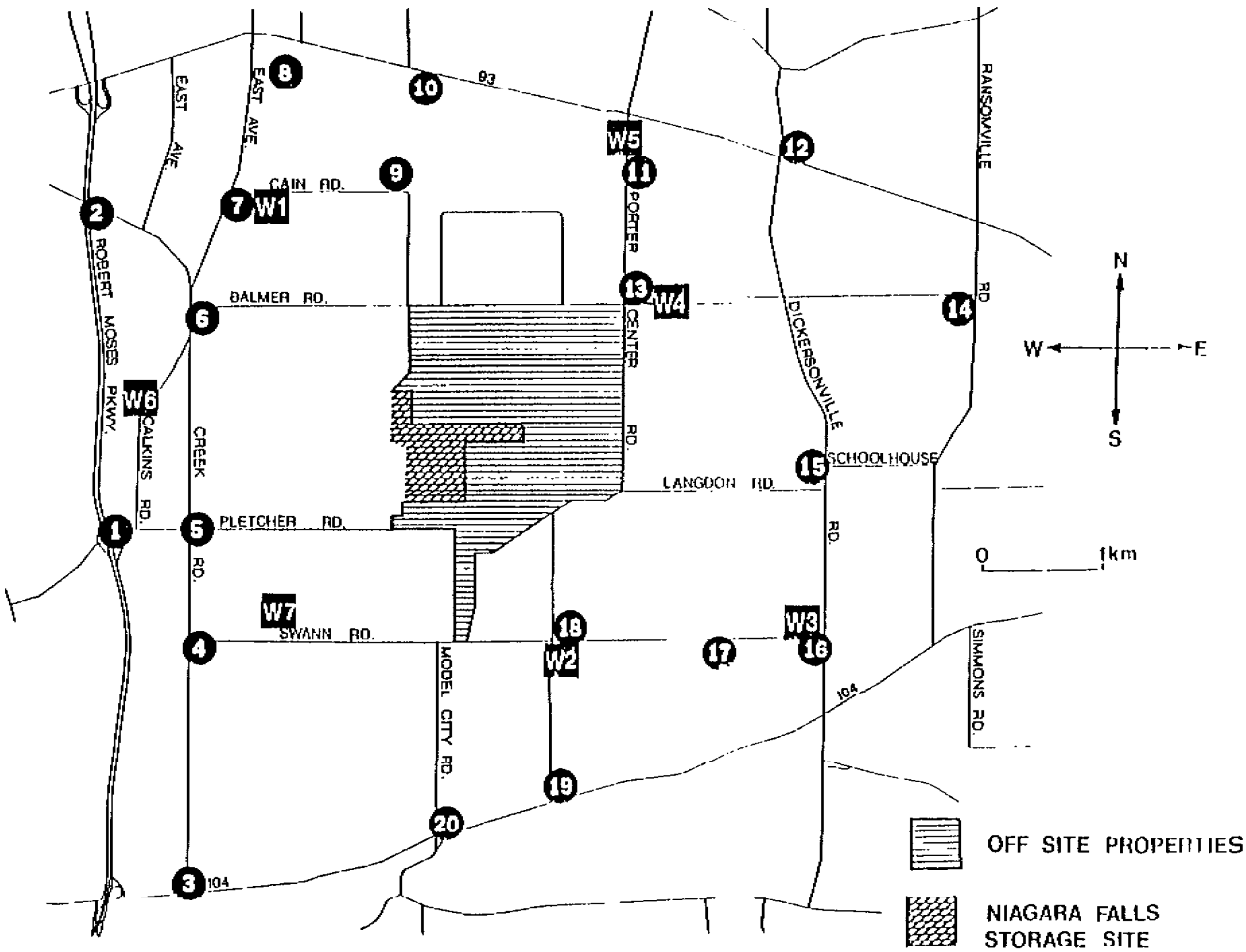

FIGURE 6. Map of Northern Niagara County, New York, Showing Locations of Background Measurements and Baseline Samples. (#1-20: soil samples and direct measurements; W1-W7: water samples.)

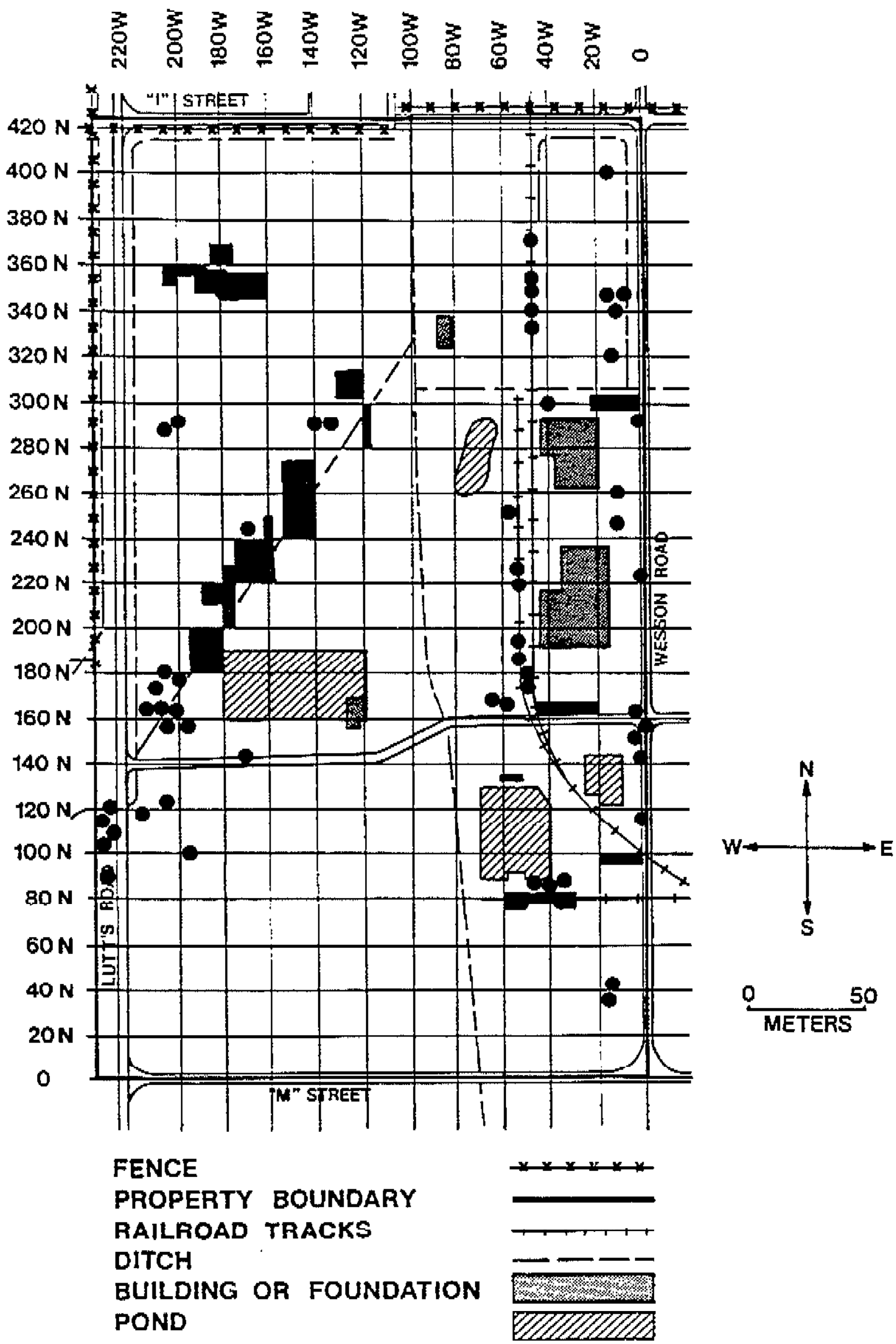

FIGURE 7. Locations of Areas of Elevated Direct Radiation and Areas Where Radionuclide Concentrations in Soil Exceed Criteria.

TABLE 1-A

BACKGROUND EXPOSURE RATES
AND
RADIONUCLIDE CONCENTRATIONS IN BASELINE SOIL SAMPLES

Location[a]	Exposure Rate[b] (μR/h)	Radionuclide Concentrations (pCi/g)				
		Ra-226	U-235	U-238	Th-232	Cs-137
1	6.8	0.74 ± 0.16[c]	<0.19	<2.89	0.70 ± 0.46	0.29 ± 0.08
2	6.8	0.75 ± 0.19	<0.19	<3.35	0.84 ± 0.24	0.24 ± 0.08
3	8.3	0.71 ± 0.18	0.46 ± 0.41	<3.72	0.88 ± 0.33	0.34 ± 0.09
4	7.9	0.67 ± 0.18	<0.22	<4.10	1.18 ± 0.35	0.12 ± 0.07
5	7.3	0.70 ± 0.16	<0.17	<3.34	0.68 ± 0.24	0.14 ± 0.07
6	7.7	0.50 ± 0.15	<0.16	<2.33	0.52 ± 0.38	0.17 ± 0.09
7	7.7	0.63 ± 0.13	<0.17	<2.73	0.83 ± 0.24	0.35 ± 0.08
8	7.6	0.59 ± 0.12	<0.14	<2.20	0.54 ± 0.23	<0.02
9	7.1	0.63 ± 0.20	<0.23	<4.16	0.83 ± 0.38	0.69 ± 0.11
10	7.1	0.70 ± 0.16	<0.19	<2.98	0.59 ± 0.25	0.69 ± 0.10
11	6.7	<0.09	<0.19	<2.83	0.49 ± 0.31	0.48 ± 0.14
12	7.1	0.48 ± 0.13	<0.16	<2.84	0.65 ± 0.26	0.68 ± 0.10
13	6.7	0.57 ± 0.14	<0.17	<2.36	0.49 ± 0.26	0.41 ± 0.08
14	6.8	0.68 ± 0.17	<0.19	<3.24	0.67 ± 0.25	0.70 ± 0.10
15	8.2	0.65 ± 0.14	<0.17	<3.20	0.72 ± 0.35	0.23 ± 0.08
16	7.4	0.91 ± 0.17	<0.71	<3.58	0.83 ± 0.28	0.61 ± 0.09
17	7.0	0.48 ± 0.14	<0.16	<2.73	0.32 ± 0.22	0.38 ± 0.08
18	7.7	0.73 ± 0.16	<0.18	6.26 ± 9.23	1.01 ± 0.44	0.32 ± 0.12
19	8.8	1.22 ± 0.22	<0.23	<3.79	1.08 ± 0.49	1.05 ± 0.13
20	8.6	0.83 ± 0.17	<0.21	<3.59	0.84 ± 0.29	0.08 ± 0.07
Range	6.8 to 8.8	<0.09 to 1.22	<0.14 to 0.46	<2.20 to 6.26	0.32 to 1.18	<0.02 to 1.05

[a] Refer to Figure 6.
[b] Measured at 1 m above the surface.
[c] Errors are 2σ based on counting statistics.

TABLE 1-E

RADIONUCLIDE CONCENTRATIONS IN BASELINE WATER SAMPLES

Location[a]	Radionuclide Concentrations (pCi/l)	
	Gross Alpha	Gross Beta
W1	0.95 ± 0.93[b]	4.79 ± 1.15
W2	0.95 ± 0.94	9.17 ± 1.31
W3	0.55 ± 0.78	2.73 ± 1.05
W4	0.63 ± 0.89	5.37 ± 1.17
W5	0.73 ± 0.68	<0.64
W6	1.87 ± 1.84	14.3 ± 2.4
W7	1.16 ± 0.66	<0.63
Range	0.55 to 1.87	<0.63 to 14.3

[a] Refer to Figure 6.
[b] Errors are 2σ based on counting statistics.

TABLE 2

DIRECT RADIATION LEVELS
MEASURED AT 20 M GRID INTERVALS

Grid Location N	Grid Location W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
0	0	9	10	22
0	20	10	9	9
0	40	9	10	20
0	55	10	10	18
0	80	a	a	a
0	97	8	9	16
0	100	8	9	9
0	120	9	9	19
0	140	9	10	25
0	160	9	8	14
0	180	10	10	11
0	200	8	8	11
0	220	9	9	13
0	235	6	6	6
20	0	8	8	17
20	20	7	7	21
20	40	7	7	7
20	55	7	7	9
20	97	9	9	13
20	100	8	8	14
20	120	8	8	11
20	140	7	7	26
20	160	8	8	8
20	180	8	8	21
20	200	7	7	14
20	220	8	8	8
20	235	7	7	17
40	0	8	9	20
40	20	9	8	19
40	40	7	7	9
40	57	8	9	19
40	97	8	8	10
40	100	8	8	21
40	120	7	7	17
40	140	8	7	7
40	160	7	7	7
40	180	7	7	16
40	200	7	7	13
40	220	8	8	8
40	235	8	8	24

TABLE 2, cont.

DIRECT RADIATION LEVELS
MEASURED AT 20 M GRID INTERVALS

Grid Location N	W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
60	0	10	10	33
60	20	7	7	7
60	40	7	7	12
60	55	7	8	29
60	60	a	a	a
60	80	a	a	a
60	100	9	8	8
60	120	8	8	11
60	140	8	8	8
60	160	7	7	17
60	180	7	7	7
60	200	8	8	15
60	220	7	7	16
60	235	8	8	15
80	0	7	7	12
80	20	6	6	12
80	40	8	21	110
80	60	8	10	10
80	80	a	a	a
80	100	a	a	a
80	102	8	8	8
80	120	7	8	21
80	140	7	8	8
80	160	8	8	9
80	180	7	7	22
80	200	7	7	13
80	220	8	8	28
80	235	9	9	23
100	0	9	10	14
100	20	9	10	31
100	40	6	6	8
100	60	a	a	a
100	80	a	a	a
100	100	a	a	a
100	102	8	8	8
100	120	7	7	13
100	140	8	11	22
100	160	8	8	19
100	180	8	7	7
100	200	12	12	21

TABLE 2, cont.

DIRECT RADIATION LEVELS
MEASURED AT 20 M GRID INTERVALS

Grid Location N	Grid Location W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
100	220	8	7	12
100	235	12	10	27
120	0	11	9	11
120	20	8	7	12
120	40	7	7	13
120	60	a	a	a
120	80	a	a	a
120	100	a	a	a
120	105	7	7	10
120	120	7	8	12
120	140	7	7	7
120	160	7	8	12
120	180	7	7	7
120	200	12	13	35
120	220	10	9	12
120	235	a	a	a
140	0	9	9	17
140	20	a	a	a
140	40	6	6	6
140	60	7	8	19
140	64	7	7	7
140	105	7	7	14
140	120	7	7	7
140	140	9	8	15
140	160	8	8	24
140	180	9	8	16
140	200	10	10	35
140	220	11	7	16
140	235	8	8	15
160	0	12	11	17
160	20	8	8	31
160	40	11	10	25
160	60	12	12	32
160	67	12	14	29
160	106	7	7	16
160	120	6	7	12
160	140	a	a	a
160	160	a	a	a
160	181	7	7	7

TABLE 2, cont.

DIRECT RADIATION LEVELS
MEASURED AT 20 M GRID INTERVALS

Gird Location N	W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
160	200	16	16	70
160	220	9	10	10
160	235	7	7	14
180	0	9	8	8
180	20	7	7	7
180	40	8	8	8
180	60	13	17	37
180	71	9	9	27
180	110	7	8	8
180	120	7	7	15
180	140	a	a	a
180	160	a	a	a
180	181	7	7	7
180	200	16	15	72
180	220	8	8	10
180	235	7	7	17
200	0	8	9	32
200	16	7	7	8
200	40	6	6	6
200	60	7	8	8
200	70	8	9	19
200	113	8	8	8
200	120	7	7	7
200	140	7	7	19
200	160	6	7	7
200	180	10	10	16
200	200	7	7	7
200	220	8	8	8
200	235	7	7	20
220	0	9	8	13
220	20	5	5	14
220	40	7	7	10
220	60	6	6	12
220	75	8	8	26
220	100	a	a	a
220	116	8	8	8
220	120	7	7	7
220	140	7	7	7
220	160	8	9	19

TABLE 2, cont.

DIRECT RADIATION LEVELS
MEASURED AT 20 M GRID INTERVALS

Grid Location N	Grid Location W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
220	180	13	12	18
220	200	7	8	16
220	220	7	7	7
220	235	6	7	15
240	0	9	9	32
240	20	8	8	17
240	40	8	8	21
240	60	7	7	8
240	79	8	8	21
240	100	a	a	a
240	118	8	8	16
240	120	8	8	13
240	140	8	8	16
240	160	12	13	26
240	180	8	8	14
240	200	8	8	14
240	220	6	7	14
240	235	7	7	10
260	0	7	7	7
260	20	7	7	8
260	40	7	7	22
260	60	7	7	26
260	78	7	8	28
260	100	a	a	a
260	118	10	10	40
260	120	8	8	8
260	140	10	10	24
260	160	8	8	14
260	180	6	6	11
260	200	7	7	7
260	220	7	7	12
260	235	6	6	6
280	0	10	10	31
280	20	6	6	6
280	40	6	6	20
280	60	7	7	16
280	78	7	8	22
280	100	a	a	a
280	119	9	9	9

DIRECT RADIATION LEVELS
MEASURED AT 20 M GRID INTERVALS

Grid Location N	Grid Location W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
280	120	9	8	8
280	140	11	12	29
280	160	9	10	26
280	180	7	7	7
280	200	7	7	7
280	220	6	6	11
280	235	6	7	18
300	0	9	9	29
300	20	11	12	19
300	40	10	12	25
300	60	7	7	20
300	80	7	7	15
300	100	a	a	a
300	118	10	10	11
300	120	8	8	22
300	140	10	12	25
300	160	8	8	12
300	180	8	8	10
300	200	7	7	7
300	220	6	7	11
300	235	7	7	11
320	0	8	9	17
320	20	7	7	14
320	40	7	7	10
320	60	7	7	7
320	79	7	7	12
320	100	a	a	a
320	121	9	9	27
320	140	8	8	24
320	160	7	8	9
320	180	8	8	15
320	200	8	8	16
320	220	7	7	16
320	235	7	7	12
340	0	9	8	36
340	20	7	7	20
340	40	7	8	15
340	60	7	8	22
340	78	6	7	7

TABLE 2, cont.

DIRECT RADIATION LEVELS
MEASURED AT 20 M GRID INTERVALS

Grid Location N	Grid Location W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
340	100	a	a	a
340	118	10	11	34
340	120	10	11	27
340	140	12	12	30
340	160	11	11	21
340	180	8	8	18
340	200	8	8	8
340	200	8	8	8
340	220	7	7	17
340	235	7	7	23
360	0	8	8	27
360	20	7	7	7
360	40	7	7	8
360	60	8	8	12
360	78	8	8	8
360	100	a	a	a
360	117	12	12	32
360	120	8	8	24
360	140	9	9	13
360	160	9	9	19
360	180	9	10	16
360	200	12	12	18
360	220	7	7	12
360	235	7	7	19
380	0	8	8	15
380	20	7	8	8
380	40	7	7	7
380	60	7	7	23
380	78	9	9	24
380	100	a	a	a
380	118	8	8	8
380	120	8	7	7
380	140	7	7	11
380	160	7	7	20
380	180	7	7	11
380	200	7	7	7
380	220	7	7	10
380	235	7	7	7

TABLE 2, cont.

DIRECT RADIATION LEVELS
MEASURED AT 20 M GRID INTERVALS

Grid Location N	Grid Location W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
400	0	8	8	26
400	20	7	7	7
400	40	7	7	20
400	60	7	8	12
400	79	9	10	20
400	100	a	a	a
400	119	7	8	18
400	120	8	7	7
400	140	7	7	6
400	160	7	7	7
400	180	7	7	7
400	200	7	6	16
400	220	7	7	16
400	235	7	7	20
420	0	8	8	23
420	20	8	8	8
420	40	7	8	10
420	60	10	12	72
420	78	8	8	20
420	100	a	a	a
420	117	8	9	17
420	120	8	7	23
420	140	7	7	18
420	160	7	8	8
420	180	7	7	9
420	200	6	6	7
420	220	6	6	6
420	235	7	7	24

[a] No measurement taken due to presence of the West and Central Drainage Ditches, areas of standing water, or buildings.

TABLE 3

DIRECT RADIATION LEVELS AT LOCATIONS
IDENTIFIED BY THE WALKOVER SURFACE SCAN

Grid Location[a] N	Grid Location[a] W	Exposure Rate (μR/h) Contact	Exposure Rate (μR/h) 1 m Above Surface	Surface Dose Rate (μrad/h)	Sample Identification	Contact Exposure Rates After Sample Removal (μR/h)
35	18	220	17	380	B1	240
35	19	76	----[b]	----	----	----
41	18	20	13	----	----	----
79	37	20	----	----	----	----
79	50	68	----	----	----	----
79	52	37	----	----	----	----
79	55	68	----	----	----	----
80	34	68	----	----	----	----
80	35	68	12	1020	B2	12
80	38	84	----	----	----	----
80	39	59	----	----	----	----
80	40	84	13	1730	B3	10
80	43	72	----	----	----	----
80	45	29	----	----	----	----
80	46	84	12	1330	B4	8
80	50	33	12	390	B5	8
80	51	68	----	----	----	----
80	53	84	----	----	----	----
80	56	84	11	1550	B6	9
85	40	17	12	17	B7	17
87	43	21	14	68	B8	27
90	32	23	12	26	B9	37
90	230	21	13	42	B10	20
94-99	4-18	23-29	----	----	----	----
95	5	29	20	43	----	----
97	7	40	----	----	----	----

TABLE 3, cont.

DIRECT RADIATION LEVELS AT LOCATIONS
IDENTIFIED BY THE WALKOVER SURFACE SCAN

Grid Location		Exposure Rate (μR/h)		Surface Dose Rate (μrad/h)	Sample Identification	Contact Exposure Rates After Sample Removal (μR/h)
N	W	Contact	1 m Above Surface			
99	15	23	8	110	----	----
100	196	36	12	52	B11	46
105	228	21	14	30	B12	29
103-106	230-234	25-27	----	----	----	----
107-116	224-229	20-40	----	----	----	----
109	228	30	----	----	----	----
110	228	39	----	----	----	----
111	228	35	18	85	B13	35
114	228	40	----	----	B14	----
112	1	35	----	----	----	----
113	0	40	----	----	----	----
115	7	31	17	60	B15	33
115	228	31	20	130	B16	44
119	214	27	----	----	----	----
119	215	42	----	----	----	----
119	230	24	----	----	----	----
120	234	31	14	92	B17	34
123	203	45	----	----	----	----
123	205	42	----	----	----	----
143	6	40	12	110	B18	----
143-146	169-170	21-25	----	----	B19	----
154	202	40	----	----	----	----
155	2	29	----	----	----	----
155	4	30	18	69	B20	----
156	2	31	----	----	----	----
159	2	26	----	----	----	----

TABLE 3, cont.

DIRECT RADIATION LEVELS AT LOCATIONS
IDENTIFIED BY THE WALKOVER SURFACE SCAN

Grid Location N	Grid Location W	Exposure Rate (μR/h) Contact	Exposure Rate (μR/h) 1 m Above Surface	Surface Dose Rate (μrad/h)	Sample Identification	Contact Exposure Rates After Sample Removal (μR/h)
159	51	20	----	----	----	----
159	52	20	----	----	----	----
159	198	29	----	----	B21	----
162	43	26	----	----	----	----
162	46	23	----	----	----	----
162	202	40	----	----	----	----
164	7	21	----	----	----	----
162-164	20-40	14-27	----	----	----	----
164	24	27	----	----	----	----
164	26	24	----	----	----	----
163-164	44-46	17-29	----	----	B22	----
164	212	29	----	----	B23	----
165	60	27	----	----	----	----
165	209	22	----	----	B24	----
167	65	22	----	----	----	----
168	210	22	----	----	B25	----
173	49	38	----	----	----	----
177	49	95	----	----	B26	----
178	201	23	----	----	B27	----
178	207	33	----	----	----	----
180	49	40	----	----	----	----
180	52	76	----	----	----	----
180-200	180-196	12-84	----	----	B28	----
181	192	84	----	----	----	----
184	52	95	----	----	B29	----
185	52	84	----	----	----	----

TABLE 3, cont.

DIRECT RADIATION LEVELS AT LOCATIONS
IDENTIFIED BY THE WALKOVER SURFACE SCAN

Grid Location N	Grid Location W	Exposure Rate (μR/h) Contact	Exposure Rate (μR/h) 1 m Above Surface	Surface Dose Rate (μrad/h)	Sample Identification	Contact Exposure Rates After Sample Removal (μR/h)
185	56	84	----	----	----	----
187	56	50	----	----	----	----
189	52	43	----	----	----	----
189	56	36	----	----	----	----
190	52	38	----	----	----	----
190	56	53	----	----	----	----
195	56	31	----	----	----	----
215	54	45	----	----	----	----
220	54	44	----	----	----	----
206-211	114-118	17-40	----	----	----	----
207	114	40	----	----	----	----
209	118	22	----	----	----	----
200-217	175-180	23-25	----	----	----	----
210-219	183-187	17-27	----	----	----	----
215	186	27	----	----	----	----
221	0	22	----	----	----	----
221	3	44	----	----	----	----
221	175	40	----	----	----	----
221	178	40	----	----	----	----
222-240	160-174	29-40	----	----	----	----
225	178	25	----	----	----	----
228	54	50	----	----	----	----
228	55	31	----	----	----	----
241-247	6-7	29-40	----	----	----	----
242	6	32	----	----	----	----
242	7	40	----	----	----	----

TABLE 3, cont.

DIRECT RADIATION LEVELS AT LOCATIONS
IDENTIFIED BY THE WALKOVER SURFACE SCAN

Grid Location N	Grid Location W	Exposure Rate (μR/h) Contact	Exposure Rate (μR/h) 1 m Above Surface	Surface Dose Rate (μrad/h)	Sample Identification	Contact Exposure Rates After Sample Removal (μR/h)
245	6	38	----	----	----	----
244	13	25	----	----	----	----
250	59	47	----	----	----	----
260	14	27	----	----	B30	----
240-274	140-157	12-33	----	----	B31	----
243-247	159-162	14-25	----	----	B32	----
243-245	165-168	14-38	----	----	----	----
290	201	106	----	----	----	----
292	136	20	----	----	----	----
292	138	22	----	----	----	----
292	200	21	----	----	----	----
294	4	27	14	56	B33	28
298-300	4-20	17-28	----	----	----	----
300	40	20	----	----	----	----
280-300	118-119	17-20	----	----	----	----
300-305	8-22	17-29	----	----	----	----
304-314	120-129	14-20	----	----	----	----
323	14	22	----	----	----	----
332	47	36	----	----	----	----
333	47	84	----	----	----	----
340	47	129	----	----	----	----
342	15	25	----	----	----	----
348	14	25	----	----	----	----
348	15	29	----	----	----	----
348	49	27	----	----	----	----
349	49	29	----	----	----	----

TABLE 3, cont.

DIRECT RADIATION LEVELS AT LOCATIONS
IDENTIFIED BY THE WALKOVER SURFACE SCAN

Grid Location		Exposure Rate (μR/h)		Surface Dose Rate (μrad/h)	Sample Identification	Contact Exposure Rates After Sample Removal (μR/h)
N	W	Contact	1 m Above Surface			
356	47	58	----	----	----	----
346-354	161-180	17-22	----	----	----	----
343-347	183-187	20-29	----	----	----	----
353-355	184-187	20-27	----	----	----	----
355-357	188-191	29-48	----	----	B34	----
355-357	192-196	17-22	----	----	----	----
351-357	203-206	29-40	----	----	----	----
360-366	179-183	17-40	----	----	----	----
369	48	76	----	----	B35	----
372	48	36	----	----		---
400	15	29	----	----	----	----

[a] Refer to Figure 7.
[b] Dash indicates measurement or sampling was not performed.

TABLE 4

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)				
N	W	Ra-226	U-235	U-238	Cs-137	Th-232
9	5	2.84 ± 0.40[a]	<0.40	5.19 ± 1.54	1.58 ± 0.18	0.80 ± 0.28
4	20	b	b	b	b	b
4	40	2.85 ± 0.48	<0.27	<0.93	0.79 ± 1.30	1.08 ± 0.32
4	55	1.99 ± 0.32	<0.34	3.84 ± 1.26	0.46 ± 0.14	0.67 ± 0.28
4	97	11.5 ± 0.8	<0.45	<1.31	0.54 ± 1.24	<0.35
4	100	1.15 ± 0.22	<0.30	<0.98	0.54 ± 0.10	1.12 ± 0.46
4	120	1.91 ± 0.30	<0.23	<0.82	0.60 ± 0.12	0.85 ± 0.42
4	140	0.91 ± 0.20	<0.24	<0.68	0.14 ± 0.06	0.86 ± 0.26
4	160	3.21 ± 0.48	<0.27	1.50 ± 1.80	0.89 ± 0.12	0.51 ± 0.38
4	180	8.09 ± 0.78	<0.45	2.62 ± 2.98	1.12 ± 0.20	0.87 ± 0.52
4	200	2.30 ± 0.28	<0.28	<0.91	0.48 ± 0.10	0.89 ± 0.34
4	201	3.26 ± 0.38	<0.37	2.33 ± 1.60	0.78 ± 0.14	0.68 ± 0.42
4	220	0.94 ± 0.18	<0.24	1.17 ± 1.28	<0.04	0.81 ± 0.24
2	235	0.96 ± 0.36	<0.27	1.18 ± 1.28	0.11 ± 0.04	1.06 ± 0.42
20	3	0.51 ± 0.16	<0.15	<0.49	<0.03	0.74 ± 0.28
20	20	0.89 ± 0.22	<0.21	<0.81	<0.49	1.01 ± 0.38
20	40	0.73 ± 0.20	<0.31	<0.90	0.57 ± 0.12	0.04 ± 0.32
20	55	0.69 ± 0.28	<0.18	<0.70	0.45 ± 0.12	0.72 ± 0.28
20	97	1.44 ± 0.38	<0.24	1.60 ± 1.54	0.68 ± 0.12	1.31 ± 0.42
20	100	1.30 ± 0.28	<0.32	0.81 ± 1.44	0.81 ± 0.14	0.97 ± 0.38
20	120	0.91 ± 0.28	<0.21	<0.73	0.75 ± 0.12	0.64 ± 0.38
20	140	0.98 ± 0.40	<0.31	<0.96	0.86 ± 0.16	0.93 ± 0.40
20	160	1.16 ± 0.22	<0.23	0.87 ± 1.60	0.48 ± 0.10	0.68 ± 0.26
20	180	1.39 ± 0.40	<0.33	1.43 ± 0.98	0.42 ± 1.56	1.11 ± 0.50
20	200	1.28 ± 0.22	<0.31	0.86 ± 1.36	0.67 ± 0.12	1.12 ± 0.34
20	220	1.20 ± 0.22	<0.31	<0.97	0.54 ± 0.16	0.97 ± 0.34

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 20 M GRID INTERVALS

Grid Location N	Grid Location W	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137	Th-232
20	235	1.11 ± 0.26	<0.29	1.18 ± 1.56	0.11 ± 0.10	1.12 ± 0.54
40	2	2.46 ± 0.38	0.53 ± 0.27	<0.77	0.48 ± 0.12	0.50 ± 0.38
40	20	b	b	b	b	b
40	40	0.79 ± 0.22	<0.21	<0.85	0.33 ± 0.10	0.95 ± 0.34
40	57	0.54 ± 0.20	<0.19	<0.66	0.40 ± 0.10	0.77 ± 0.28
40	97	0.70 ± 0.20	<0.36	4.06 ± 2.64	0.53 ± 0.12	0.78 ± 0.48
40	100	1.01 ± 0.26	<0.23	<0.93	0.56 ± 0.18	0.87 ± 0.40
40	120	0.85 ± 0.26	<0.22	1.47 ± 1.70	0.35 ± 0.12	0.68 ± 0.26
40	140	0.95 ± 0.28	<0.29	1.90 ± 1.80	0.48 ± 0.12	1.13 ± 0.74
40	160	0.75 ± 0.28	<0.22	<0.89	0.38 ± 0.12	0.85 ± 0.50
40	180	0.83 ± 0.20	<0.21	1.43 ± 1.90	0.40 ± 0.12	0.87 ± 0.30
40	200	0.79 ± 0.26	<0.30	3.53 ± 2.12	0.36 ± 0.14	1.46 ± 0.54
40	220	0.88 ± 0.22	<0.21	1.72 ± 1.74	0.63 ± 0.14	0.66 ± 0.32
40	235	1.00 ± 0.22	<0.20	1.41 ± 1.28	0.07 ± 0.08	0.53 ± 0.36
60	3	1.35 ± 0.32	<0.33	<1.01	0.87 ± 0.14	1.04 ± 0.44
60	20	0.76 ± 0.32	<0.23	<0.80	0.36 ± 0.10	1.07 ± 0.36
60	40	0.63 ± 0.28	<0.22	1.39 ± 1.84	0.29 ± 0.10	0.96 ± 0.38
60	59	1.40 ± 0.36	0.31 ± 0.48	1.53 ± 1.62	0.40 ± 0.12	0.86 ± 0.42
60	100	2.29 ± 0.32	<0.26	<0.74	0.07 ± 0.14	1.18 ± 0.40
60	120	0.94 ± 0.22	<0.24	<0.92	0.47 ± 0.12	0.77 ± 0.42
60	140	0.66 ± 0.22	0.36 ± 0.58	<0.92	0.63 ± 0.12	0.76 ± 0.34
60	160	0.79 ± 0.28	<0.30	1.21 ± 0.94	0.64 ± 0.14	1.46 ± 0.60
60	180	0.83 ± 0.20	0.14 ± 0.06	1.31 ± 1.99	0.36 ± 0.08	0.93 ± 0.55
60	200	0.70 ± 0.28	<0.30	1.74 ± 1.40	0.39 ± 0.14	0.78 ± 0.30
60	220	1.01 ± 0.22	<0.21	0.71 ± 2.22	0.44 ± 0.12	0.53 ± 0.36
60	235	0.98 ± 0.26	<0.31	1.31 ± 0.94	<0.04	1.02 ± 0.32

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)				
N	W	Ra-226	U-235	U-238	Cs-137	Th-232
80	4	1.14 ± 0.30	<0.22	<0.75	0.71 ± 0.14	0.67 ± 0.36
80	20	0.91 ± 0.26	<0.29	<0.94	0.36 ± 0.10	1.52 ± 0.46
79	40	1.23 ± 0.36	<0.35	2.93 ± 2.72	1.01 ± 0.56	1.45 ± 0.56
80	60	1.05 ± 0.14	<0.23	<0.89	0.50 ± 0.14	0.73 ± 0.30
80	102	0.78 ± 0.28	<0.22	2.21 ± 2.26	0.47 ± 0.16	0.67 ± 0.44
80	120	0.91 ± 0.22	<0.20	0.90 ± 2.12	0.65 ± 0.12	0.70 ± 0.40
80	140	0.89 ± 0.22	<0.22	1.37 ± 2.02	0.52 ± 0.10	1.68 ± 0.56
80	160	1.06 ± 0.30	<0.19	<0.85	0.66 ± 0.18	0.97 ± 0.50
80	180	1.06 ± 0.28	<0.28	<1.00	0.49 ± 0.14	1.30 ± 0.42
80	200	1.00 ± 0.26	<0.30	<0.90	0.54 ± 0.14	1.17 ± 0.46
80	220	1.29 ± 0.32	<0.20	1.38 ± 1.28	0.70 ± 0.12	0.24 ± 0.18
80	235	2.29 ± 0.35	<0.33	<1.03	0.30 ± 0.10	1.26 ± 0.49
100	2	3.33 ± 0.58	<0.29	2.60 ± 2.60	0.36 ± 0.14	0.50 ± 0.36
100	20	1.43 ± 0.28	<0.24	1.90 ± 2.24	0.24 ± 0.10	0.69 ± 0.36
100	40	0.79 ± 0.36	<0.20	1.83 ± 0.18	<0.04	0.77 ± 0.36
100	102	0.96 ± 0.31	<0.23	0.84 ± 1.58	0.30 ± 0.12	0.93 ± 0.43
100	120	0.70 ± 0.28	<0.34	2.39 ± 1.66	0.73 ± 0.14	0.97 ± 0.42
100	140	0.90 ± 0.38	<0.31	<0.99	0.62 ± 0.14	0.69 ± 0.26
100	160	1.51 ± 0.32	<0.24	0.70 ± 1.64	0.39 ± 0.14	0.92 ± 0.36
100	180	0.75 ± 0.28	<0.19	<0.77	0.52 ± 0.14	1.03 ± 0.40
100	200	2.60 ± 0.36	<0.38	<1.13	0.52 ± 0.16	1.43 ± 0.42
100	220	1.21 ± 0.22	<0.28	<0.83	0.80 ± 0.12	0.59 ± 0.28
100	235	3.58 ± 0.40	<0.40	<1.16	<0.04	0.95 ± 0.30
120	4	b	b	b	b	b
120	20	0.83 ± 0.28	<0.21	<0.82	0.30 ± 0.14	0.74 ± 0.36
120	40	1.23 ± 0.32	<0.28	0.70 ± 0.88	0.09 ± 0.08	1.11 ± 0.40
120	120	1.26 ± 0.40	<0.32	3.29 ± 1.20	0.60 ± 0.12	0.89 ± 0.34

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)				
N	W	Ra-226	U-235	U-238	Cs-137	Th-232
120	140	0.95 ± 0.28	<0.21	1.20 ± 1.62	0.08 ± 0.08	1.06 ± 0.38
120	160	0.81 ± 0.22	<0.23	<0.84	0.33 ± 0.12	0.73 ± 0.38
120	180	0.80 ± 0.21	<0.27	1.09 ± 0.72	0.21 ± 0.07	0.94 ± 0.38
120	200	1.74 ± 0.38	<0.25	0.99 ± 1.89	0.59 ± 0.16	0.57 ± 0.52
120	220	1.73 ± 0.30	0.22 ± 0.54	1.04 ± 1.46	0.85 ± 0.14	0.43 ± 0.22
120	235	0.74 ± 0.22	<0.28	0.70 ± 1.96	<0.05	1.07 ± 0.40
140	3	1.44 ± 0.26	<0.19	1.12 ± 1.10	0.66 ± 0.12	<0.14
140	20	b	b	b	b	b
140	40	1.14 ± 0.31	<0.40	0.46 ± 2.58	<0.06	1.11 ± 1.42
140	60	0.88 ± 0.22	0.22 ± 0.22	<0.68	0.18 ± 0.06	0.50 ± 0.38
140	64	2.33 ± 0.30	<0.23	1.67 ± 1.54	0.13 ± 0.08	0.57 ± 0.30
140	120	1.29 ± 0.30	<0.32	2.01 ± 1.52	0.37 ± 0.12	1.00 ± 0.38
140	140	0.94 ± 0.20	<0.31	1.69 ± 0.80	0.31 ± 0.14	1.07 ± 0.40
140	160	b	b	b	b	b
140	180	1.86 ± 0.40	<0.30	<0.99	0.15 ± 0.08	0.90 ± 1.42
140	200	2.99 ± 0.40	<0.43	5.10 ± 1.42	<0.04	2.29 ± 0.50
140	220	1.24 ± 0.28	0.07 ± 0.07	<1.00	0.23 ± 0.11	1.15 ± 0.47
140	235	1.20 ± 0.36	<0.31	<0.96	0.14 ± 0.10	1.14 ± 0.52
159	5	3.60 ± 0.42	<0.30	1.96 ± 2.10	0.43 ± 0.12	0.47 ± 0.36
160	20	1.40 ± 0.30	<0.31	1.56 ± 2.16	0.53 ± 0.14	0.81 ± 0.62
160	40	2.00 ± 0.28	<0.30	2.66 ± 1.30	0.34 ± 0.10	0.54 ± 0.26
160	60	b	b	b	b	b
160	106	0.94 ± 0.26	<0.22	<0.68	0.10 ± 0.06	0.99 ± 0.36
160	120	0.93 ± 0.26	<0.31	1.98 ± 0.88	0.14 ± 0.06	1.10 ± 0.38
160	140	0.99 ± 0.28	<0.21	2.05 ± 1.62	0.14 ± 0.06	0.87 ± 0.66
160	160	b	b	b	b	b
160	181	2.20 ± 0.32	<0.29	1.25 ± 1.80	0.32 ± 0.10	1.12 ± 0.36

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)				
N	W	Ra-226	U-235	U-238	Cs-137	Th-232
160	200	9.24 ± 0.70	<0.46	<1.38	0.41 ± 0.20	1.28 ± 0.68
160	220	2.10 ± 0.40	<0.35	2.35 ± 1.66	0.79 ± 0.14	1.04 ± 0.44
160	235	1.00 ± 0.36	<0.18	<0.66	<0.05	1.08 ± 0.38
180	2	1.90 ± 0.40	<0.26	2.13 ± 1.90	0.93 ± 0.16	0.83 ± 0.48
180	20	0.90 ± 0.28	<0.23	<0.76	0.16 ± 0.08	0.93 ± 0.28
180	40	0.64 ± 0.20	<0.19	1.17 ± 1.60	0.36 ± 0.08	0.97 ± 0.32
180	60	0.84 ± 0.20	0.25 ± 0.26	3.11 ± 1.72	0.24 ± 0.08	1.18 ± 0.34
180	71	2.03 ± 0.38	<0.26	1.52 ± 2.14	0.35 ± 0.10	0.90 ± 0.42
180	100	0.79 ± 0.20	<0.17	2.05 ± 1.10	<0.04	0.86 ± 0.28
180	120	0.99 ± 0.20	<0.29	<0.92	0.06 ± 0.06	0.86 ± 0.42
180	140	1.30 ± 0.22	<0.30	2.97 ± 1.04	0.31 ± 0.08	1.22 ± 0.39
180	160	b	b	b	b	b
180	181	0.78 ± 0.26	0.27 ± 0.40	<0.85	0.19 ± 0.06	0.58 ± 0.42
180	200	10.1 ± 0.9	<0.49	<1.47	0.46 ± 0.12	1.12 ± 0.64
180	220	1.44 ± 0.32	<0.35	<1.08	0.45 ± 0.12	0.94 ± 0.50
180	235	0.74 ± 0.20	<0.25	<0.80	0.07 ± 0.06	0.93 ± 0.26
200	5	2.41 ± 0.46	<0.25	<1.10	0.66 ± 0.14	0.63 ± 1.12
200	20	b	b	b	b	b
200	40	b	b	b	b	b
200	60	1.45 ± 0.30	<0.21	1.32 ± 2.02	0.78 ± 0.14	0.56 ± 0.28
200	73	1.41 ± 0.25	<0.23	0.72 ± 3.44	<0.06	0.84 ± 0.36
200	113	1.05 ± 0.20	<0.29	3.48 ± 1.16	0.06 ± 0.02	1.25 ± 0.36
200	120	1.09 ± 0.30	<0.24	1.61 ± 1.90	0.09 ± 0.10	1.10 ± 0.44
200	140	0.74 ± 0.26	<0.25	1.43 ± 1.88	0.06 ± 0.04	1.15 ± 0.38
200	160	0.73 ± 0.18	<0.29	3.00 ± 1.08	0.09 ± 0.08	1.34 ± 0.50
200	180	0.83 ± 0.20	<0.20	<0.82	<0.04	0.81 ± 0.38
200	200	0.41 ± 0.28	<0.21	1.12 ± 1.02	0.44 ± 0.12	0.79 ± 0.40

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)				
N	W	Ra-226	U-235	U-238	Cs-137	Th-232
200	220	1.55 ± 0.30	<0.34	<1.02	0.73 ± 0.12	0.92 ± 0.28
200	235	0.94 ± 0.23	<0.18	0.67 ± 1.16	0.20 ± 0.10	0.48 ± 0.44
220	3	1.83 ± 0.33	<0.24	2.01 ± 1.86	0.75 ± 0.06	<0.27
220	20	b	b	b	b	b
220	40	0.19 ± 0.28	<0.21	2.55 ± 1.92	0.62 ± 0.16	0.65 ± 0.48
220	60	0.99 ± 0.20	<0.22	<0.62	0.30 ± 0.08	<0.12
220	75	0.61 ± 0.25	0.20 ± 0.62	<0.91	0.12 ± 0.56	0.93 ± 0.62
220	120	1.13 ± 0.28	<0.30	1.34 ± 1.48	<0.05	1.36 ± 0.38
220	140	0.83 ± 0.30	<0.35	1.44 ± 0.16	<0.06	0.96 ± 0.32
220	160	0.98 ± 0.35	<0.25	<1.13	0.26 ± 0.16	0.98 ± 0.50
220	180	8.50 ± 0.75	<0.43	<1.50	0.66 ± 0.24	1.71 ± 0.78
220	200	1.00 ± 0.28	<0.29	2.12 ± 1.38	0.68 ± 0.16	0.97 ± 0.50
220	220	0.78 ± 0.25	<0.25	<0.87	0.70 ± 0.19	1.13 ± 0.46
220	235	0.54 ± 0.19	<0.23	0.96 ± 1.36	0.26 ± 0.10	0.59 ± 0.50
240	5	1.44 ± 0.25	<0.20	<0.78	<0.05	0.42 ± 0.40
240	20	1.18 ± 0.28	<0.22	0.91 ± 1.78	0.14 ± 0.06	0.84 ± 0.32
240	40	1.41 ± 0.35	<0.33	2.55 ± 2.06	0.27 ± 0.16	0.93 ± 0.36
240	60	0.59 ± 0.13	<0.17	<0.52	0.34 ± 0.08	0.40 ± 0.23
240	76	0.86 ± 0.25	<0.19	1.55 ± 0.75	0.09 ± 0.10	0.70 ± 0.52
240	116	0.98 ± 0.28	<0.23	1.92 ± 1.68	0.17 ± 0.10	1.00 ± 0.54
240	140	1.08 ± 0.33	0.55 ± 0.50	2.29 ± 1.90	0.49 ± 0.12	0.54 ± 0.56
240	160	9.61 ± 0.78	<0.46	<1.60	0.26 ± 0.10	0.62 ± 0.52
240	180	0.96 ± 0.19	<0.30	2.05 ± 2.56	1.00 ± 0.20	0.62 ± 0.60
240	200	0.94 ± 0.30	<0.31	1.87 ± 1.86	0.62 ± 0.14	0.94 ± 0.38
240	220	0.49 ± 0.28	<0.24	1.91 ± 1.61	1.21 ± 0.18	1.12 ± 0.67
240	235	0.81 ± 0.20	<0.30	<0.94	<0.04	0.83 ± 0.36
260	4	1.39 ± 0.35	<0.32	2.62 ± 0.24	<0.05	1.16 ± 0.38

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)				
N	W	Ra-226	U-235	U-238	Cs-137	Th-232
260	18	0.73 ± 0.23	<0.17	0.85 ± 1.70	0.13 ± 0.08	0.55 ± 0.26
260	40	0.91 ± 0.28	<0.30	0.41 ± 1.70	0.84 ± 0.12	0.85 ± 0.30
260	60	0.86 ± 0.30	<0.21	<0.95	0.20 ± 0.08	0.72 ± 0.28
260	105	1.58 ± 0.30	0.56 ± 0.56	0.90 ± 1.90	0.51 ± 0.12	1.14 ± 0.48
260	120	0.83 ± 0.28	<0.32	3.41 ± 2.05	0.92 ± 0.16	1.10 ± 0.40
260	140	0.76 ± 0.24	<0.25	2.67 ± 1.85	0.76 ± 0.20	1.16 ± 0.42
260	160	0.96 ± 0.25	<0.24	<0.89	0.80 ± 0.12	0.61 ± 0.44
260	180	0.75 ± 0.24	<0.26	<1.06	0.79 ± 0.19	1.27 ± 0.60
260	200	1.01 ± 0.25	<0.26	3.14 ± 2.52	0.54 ± 0.16	1.00 ± 0.44
260	220	1.04 ± 0.33	<0.23	3.32 ± 2.14	0.67 ± 0.16	1.47 ± 1.03
260	235	0.65 ± 0.16	<0.27	2.39 ± 1.41	0.20 ± 0.07	1.79 ± 0.81
280	3	2.26 ± 0.39	<0.35	<1.07	<0.05	1.05 ± 0.39
280	20	b	b	b	b	b
280	40	b	b	b	b	b
280	60	0.19 ± 0.28	<0.30	1.96 ± 1.68	<0.40	1.43 ± 0.42
280	80	0.75 ± 0.38	<0.22	1.07 ± 2.01	0.07 ± 0.12	0.83 ± 0.34
280	106	1.29 ± 0.30	<0.27	2.25 ± 1.56	0.70 ± 0.14	0.90 ± 0.68
280	120	0.81 ± 0.35	<0.38	<1.18	0.80 ± 0.22	1.19 ± 0.72
280	140	4.74 ± 0.68	<0.39	6.38 ± 3.36	1.21 ± 0.22	2.27 ± 0.58
280	160	1.10 ± 0.35	<0.27	2.82 ± 1.78	0.85 ± 0.20	0.87 ± 0.34
280	180	0.98 ± 0.45	<0.46	<1.45	1.14 ± 0.24	0.71 ± 0.94
280	200	0.68 ± 0.35	<0.20	1.00 ± 2.00	0.31 ± 0.12	0.84 ± 0.42
280	220	0.61 ± 0.24	0.19 ± 0.53	0.84 ± 1.87	0.47 ± 0.10	0.47 ± 0.30
280	235	0.70 ± 0.20	<0.27	4.33 ± 1.92	0.10 ± 0.10	0.87 ± 0.42
300	3	1.16 ± 0.28	<0.23	1.77 ± 1.67	0.98 ± 0.18	0.82 ± 0.30
300	20	6.99 ± 0.50	0.41 ± 0.86	4.32 ± 2.10	<0.06	0.16 ± 0.23
300	40	2.19 ± 0.33	<0.22	2.05 ± 1.60	0.27 ± 0.09	0.55 ± 0.42

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)				
N	W	Ra-226	U-235	U-238	Cs-137	Th-232
300	60	0.83 ± 0.29	0.42 ± 0.45	1.65 ± 0.80	<0.04	0.99 ± 0.30
300	80	0.93 ± 0.25	<0.19	1.41 ± 1.42	<0.04	1.02 ± 0.59
300	95	0.78 ± 0.20	<0.21	6.48 ± 1.71	0.23 ± 0.12	1.00 ± 0.30
300	105	2.83 ± 0.48	<0.42	<1.21	0.74 ± 0.16	1.53 ± 0.60
300	120	0.73 ± 0.29	<0.20	<0.75	0.40 ± 0.10	0.64 ± 0.40
300	140	0.50 ± 0.55	0.69 ± 0.75	0.19 ± 2.37	1.20 ± 0.22	0.76 ± 0.32
300	160	1.56 ± 0.38	<0.43	1.74 ± 1.32	1.27 ± 0.23	1.35 ± 0.45
300	180	0.95 ± 0.31	<0.31	2.96 ± 3.72	1.44 ± 0.23	1.32 ± 0.48
300	200	1.19 ± 0.38	<0.30	<1.03	0.58 ± 0.14	1.06 ± 0.60
300	220	0.60 ± 0.35	<0.26	0.76 ± 2.21	0.57 ± 0.16	0.90 ± 0.48
300	235	0.86 ± 0.20	<0.13	1.07 ± 0.48	0.11 ± 0.06	0.70 ± 0.30
320	4	1.26 ± 0.28	<0.23	0.93 ± 2.02	0.66 ± 0.12	0.49 ± 0.23
320	20	0.58 ± 0.31	0.72 ± 0.57	1.12 ± 1.04	0.52 ± 0.13	0.73 ± 0.31
320	40	0.65 ± 0.30	<0.23	1.48 ± 1.98	0.54 ± 0.12	1.09 ± 0.43
320	60	0.89 ± 0.38	0.37 ± 0.55	1.57 ± 0.16	0.37 ± 0.12	1.11 ± 0.48
320	80	0.54 ± 0.18	<0.16	1.19 ± 1.21	0.41 ± 0.08	0.56 ± 0.36
320	121	0.79 ± 0.24	<0.18	<0.72	0.57 ± 0.10	0.88 ± 0.33
320	140	1.24 ± 0.34	<0.23	3.76 ± 1.68	0.82 ± 0.17	0.55 ± 0.46
320	160	1.14 ± 0.31	<0.28	1.72 ± 1.61	0.84 ± 0.21	0.82 ± 0.46
320	180	1.53 ± 0.44	<0.29	<1.40	1.05 ± 0.21	0.70 ± 0.50
320	200	6.49 ± 0.55	<0.38	2.10 ± 3.65	1.02 ± 0.17	0.82 ± 0.40
320	220	0.69 ± 0.19	<0.21	1.02 ± 0.18	0.33 ± 0.10	0.62 ± 0.40
320	235	0.96 ± 0.24	<0.26	<0.52	0.25 ± 0.08	1.16 ± 0.48
340	3	2.49 ± 0.41	<0.28	0.94 ± 2.71	0.99 ± 0.17	0.66 ± 0.28
340	20	0.84 ± 0.26	<0.19	1.02 ± 1.86	0.54 ± 0.13	0.88 ± 0.28
340	40	1.03 ± 0.29	<0.20	<0.95	0.31 ± 0.12	0.98 ± 0.42
340	60	0.68 ± 0.23	<0.22	0.90 ± 1.50	0.71 ± 0.15	2.84 ± 0.54

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)				
N	W	Ra-226	U-235	U-238	Cs-137	Th-232
340	78	0.45 ± 0.19	<0.15	<0.67	0.42 ± 0.10	0.56 ± 0.49
340	120	0.83 ± 0.18	<0.19	<0.63	0.08 ± 0.06	0.74 ± 0.26
340	140	<0.31	<0.28	3.11 ± 2.09	<0.11	0.90 ± 0.43
340	160	3.60 ± 0.45	<0.38	2.72 ± 2.06	1.10 ± 0.15	0.70 ± 0.43
340	180	0.93 ± 0.24	<0.20	0.42 ± 1.34	0.07 ± 0.06	0.64 ± 0.25
340	200	0.83 ± 0.20	<0.25	<0.82	0.36 ± 0.09	1.00 ± 0.52
340	220	0.75 ± 0.21	<0.22	0.67 ± 2.83	0.49 ± 0.12	<0.22
340	235	0.85 ± 0.29	<0.27	2.14 ± 1.48	<0.04	1.08 ± 0.40
360	3	1.43 ± 0.38	<0.25	2.76 ± 2.02	0.88 ± 0.15	0.80 ± 0.29
360	20	0.66 ± 0.23	0.92 ± 0.45	<0.83	0.62 ± 0.12	0.68 ± 0.44
360	40	0.83 ± 0.26	<0.20	<0.75	0.30 ± 0.10	1.03 ± 0.30
360	60	1.66 ± 0.33	<0.27	1.71 ± 2.29	0.44 ± 0.13	1.03 ± 0.42
360	78	1.00 ± 0.30	<0.23	<0.84	0.81 ± 0.16	0.75 ± 0.49
360	120	1.39 ± 0.34	<0.34	2.71 ± 0.17	0.67 ± 0.12	0.74 ± 0.48
360	140	1.24 ± 0.31	<0.34	<1.11	0.85 ± 0.15	1.67 ± 0.42
360	160	1.94 ± 0.29	<0.33	1.65 ± 1.52	0.63 ± 0.12	1.21 ± 0.61
360	180	1.30 ± 0.33	<0.34	3.57 ± 1.46	0.82 ± 0.14	0.70 ± 0.70
360	200	2.63 ± 0.36	<0.27	<0.82	0.81 ± 0.12	0.46 ± 0.46
360	210	1.80 ± 0.34	<0.28	3.13 ± 1.69	0.60 ± 0.15	1.27 ± 0.38
360	220	1.05 ± 0.28	0.36 ± 0.66	<0.90	0.43 ± 0.11	0.85 ± 0.33
360	235	0.78 ± 0.20	<0.26	1.39 ± 0.99	0.13 ± 0.09	1.23 ± 0.58
380	3	1.21 ± 0.30	<0.25	0.72 ± 1.93	0.99 ± 0.14	0.76 ± 0.34
380	20	0.61 ± 0.24	<0.22	1.65 ± 1.00	0.79 ± 0.15	0.74 ± 0.46
380	40	0.74 ± 0.31	<0.21	<0.77	0.50 ± 0.11	0.67 ± 0.37
380	60	1.09 ± 0.43	<0.22	1.61 ± 0.16	0.26 ± 0.09	1.14 ± 0.44
380	78	1.45 ± 0.41	<0.22	2.12 ± 2.23	0.29 ± 0.11	1.10 ± 0.32
380	120	0.55 ± 0.07	0.08 ± 0.09	0.48 ± 0.33	0.07 ± 0.01	0.15 ± 0.07

45

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)				
N	W	Ra-226	U-235	U-238	Cs-137	Th-232
380	140	1.11 ± 0.30	<0.31	1.61 ± 1.44	0.68 ± 0.14	0.83 ± 0.31
380	160	0.90 ± 0.40	<0.32	<1.06	0.75 ± 0.16	1.15 ± 0.38
380	180	0.89 ± 0.28	<0.30	1.49 ± 1.61	0.85 ± 0.13	0.47 ± 0.52
380	200	0.28 ± 0.38	<0.41	<1.18	1.22 ± 0.19	1.31 ± 0.54
380	220	b	b	b	b	b
380	235	0.71 ± 0.26	<0.20	0.81 ± 0.76	<0.04	0.60 ± 0.43
400	3	1.24 ± 0.54	<0.21	<0.92	0.45 ± 0.12	0.56 ± 0.38
400	20	1.44 ± 0.29	<0.22	1.42 ± 1.49	0.43 ± 0.27	0.33 ± 0.27
400	40	0.85 ± 0.20	<0.18	<0.83	0.72 ± 0.12	0.61 ± 0.39
400	60	1.23 ± 0.25	<0.24	1.03 ± 1.69	0.28 ± 0.04	0.92 ± 0.31
400	77	5.96 ± 0.55	<0.52	<1.40	0.62 ± 0.15	1.29 ± 0.76
400	120	0.36 ± 0.68	<0.19	<0.59	<0.05	<0.20
400	140	0.34 ± 0.06	<0.05	1.10 ± 0.30	0.21 ± 0.03	0.14 ± 0.08
400	160	1.04 ± 0.39	<0.35	<1.11	0.88 ± 0.13	0.86 ± 0.43
400	180	0.53 ± 0.11	0.19 ± 0.22	0.96 ± 0.34	0.38 ± 0.04	0.31 ± 0.11
400	200	b	b	b	b	b
400	220	0.80 ± 0.40	<0.22	0.54 ± 1.49	0.78 ± 0.14	1.00 ± 0.47
400	235	0.75 ± 0.21	<0.28	<0.85	0.22 ± 0.10	0.65 ± 0.29
420	4	2.51 ± 0.39	<0.36	4.01 ± 1.24	0.52 ± 0.12	<0.24
420	20	0.58 ± 0.31	<0.41	<1.11	0.85 ± 0.20	<0.33
420	40	1.00 ± 0.43	<0.28	<0.91	1.01 ± 0.19	1.08 ± 0.36
420	60	2.26 ± 0.43	<0.28	<1.21	0.37 ± 0.14	0.91 ± 0.50
420	78	1.75 ± 0.38	<0.28	<0.92	1.08 ± 0.17	0.99 ± 0.44
420	120	2.60 ± 0.34	<0.34	<0.98	0.36 ± 0.13	0.87 ± 0.36
420	140	1.68 ± 0.39	<0.32	1.96 ± 1.49	0.80 ± 0.14	0.42 ± 0.27
416	160	1.55 ± 0.34	<0.25	<0.90	0.74 ± 0.17	1.17 ± 0.42
419	180	0.85 ± 0.21	<0.33	2.20 ± 1.49	1.05 ± 0.15	0.69 ± 0.35

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 20 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)				
N	W	Ra-226	U-235	U-238	Cs-137	Th-232
400	200	1.21 ± 0.29	<0.31	<0.95	0.72 ± 0.13	1.16 ± 0.34
419	220	1.80 ± 0.43	<0.38	4.00 ± 0.25	0.57 ± 0.16	4.21 ± 0.66
420	235	0.78 ± 0.35	<0.28	1.64 ± 1.24	0.07 ± 0.08	1.17 ± 0.33
430	10	1.46 ± 0.35	<0.33	2.14 ± 1.23	1.69 ± 0.25	0.85 ± 0.57
430	20	1.51 ± 0.35	<0.27	2.08 ± 2.25	0.99 ± 0.17	0.76 ± 0.68
430	40	1.98 ± 0.35	<0.37	1.86 ± 2.02	1.14 ± 0.16	0.92 ± 0.33
430	60	1.03 ± 0.24	<0.30	2.20 ± 0.10	0.25 ± 0.10	0.94 ± 0.34
430	80	2.76 ± 0.38	<0.38	<1.18	0.41 ± 0.11	0.95 ± 0.29
430	100	3.24 ± 0.40	<0.39	1.59 ± 2.24	1.11 ± 0.20	1.00 ± 0.72

[a] Errors are 2σ based on counting statistics.
[b] No sample collected; grid point inaccessible due to presence of standing water, buildings, or drainage ditches.

TABLE 5

RADIONUCLIDE CONCENTRATIONS IN SURFACE SAMPLES
FROM LOCATIONS IDENTIFIED BY THE WALKOVER SCAN

Sample Identification	Sample Description	Grid[a] Location N	Grid[a] Location W	Radionuclide Concentrations (pCi/g) Ra-226	U-235[b]	U-238[b]	Cs-137[b]	Th-232[b]
B1	Rock	35	18	570 ± 8[c]	<5.29	<8.72	<0.67	19.6 ± 5.8
B2	Rock	80	35	244 ± 6	22.8 ± 15.1	272 ± 170	<1.21	973 ± 15
B3	Rock	80	40	179 ± 16	<11.4	213 ± 3	<2.68	804 ± 38
B4	Rock	80	46	247 ± 7	10.9 ± 16.3	257 ± 205	<1.29	1180 ± 20
B5	Rock	80	50	84.4 ± 3.6	6.79 ± 7.05	91.4 ± 1.4	<0.55	189 ± 8
B6	Rock	80	56	165 ± 5	25.5 ± 11.8	184 ± 1.7	<0.97	674 ± 12
B7	Rock	85	40	32.5 ± 0.8	3.11 ± 1.23	40.6 ± 17.1	<0.07	<0.31
B8	Rock	87	43	13.1 ± 0.7	1.21 ± 1.02	10.1 ± 7.6	0.60 ± 0.13	1.03 ± 0.61
B9	Rock	90	32	12.2 ± 0.7	<0.55	12.0 ± 2.8	0.11 ± 0.08	0.45 ± 0.51
B10	Soil	90	230	12.0 ± 0.8	0.56 ± 0.90	<1.35	0.15 ± 0.09	0.70 ± 0.56
B11	Soil	100	196	37.0 ± 1.5	4.47 ± 1.67	7.08 ± 5.37	0.61 ± 0.61	0.95 ± 0.77
B12	Soil	105	228	31.6 ± 1.4	0.69 ± 1.51	<2.21	0.50 ± 0.14	0.63 ± 0.96
B13	Soil	110	228	3.26 ± 0.39	<0.34	<1.06	<0.06	<0.25
B14	Soil	111	228	44.8 ± 1.5	<1.16	<3.20	0.61 ± 0.16	<0.55
B15	Rock	115	7	19.2 ± 0.9	1.73 ± 1.50	14.4 ± 2.9	0.28 ± 0.11	0.71 ± 0.86
B16	Soil	115	228	78.1 ± 2.0	2.79 ± 2.46	8.87 ± 6.61	<0.23	<0.75
B17	Soil	120	234	86.0 ± 2.7	3.59 ± 2.79	<3.77	<0.16	<0.68
B18	Soil & Gravel	143	6	10.7 ± 0.6	<0.56	6.20 ± 2.64	<0.06	1.04 ± 0.52
B19	Soil	146	160	0.94 ± 0.30	<0.22	1.70 ± 1.12	<0.03	0.71 ± 0.26
B20	Soil & Gravel	155	4	33.3 ± 1.1	3.28 ± 1.59	31.5 ± 3.5	<0.08	0.59 ± 0.47
B21	Soil	159	198	31.5 ± 1.1	<0.90	7.14 ± 2.97	0.37 ± 0.12	2.93 ± 0.93
B22	Rock	164	45	9.09 ± 0.56	1.41 ± 0.79	10.6 ± 2.0	0.06 ± 0.05	0.64 ± 0.34
B23	Soil	164	212	24.8 ± 1.1	<0.92	<2.44	1.02 ± 0.17	<0.43
B24	Soil	165	209	47.8 ± 1.6	<0.79	<2.05	1.18 ± 0.19	1.04 ± 0.87
B25	Soil	168	210	67.8 ± 1.6	2.04 ± 1.30	<1.22	<0.11	<0.45
B26	Rock	177	49	38.4 ± 0.9	2.89 ± 2.10	41.3 ± 0.4	<0.35	153 ± 2

TABLE 5, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SAMPLES
FROM LOCATIONS IDENTIFIED BY THE WALKOVER SCAN

Sample Identification	Sample Description	Grid Location N	Grid Location W	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137	Th-232
B27	Soil	178	201	39.0 ± 1.4	<0.81	<2.07	0.25 ± 0.12	0.60 ± 0.83
B28	Soil	198	193	1.41 ± 0.30	<0.17	0.99 ± 0.80	0.21 ± 0.08	1.13 ± 0.45
B29	Rock	184	52	63.0 ± 2.7	<3.42	62.4 ± 0.6	<0.53	241 ± 6
B30	Soil	260	14	0.91 ± 0.28	<0.24	1.06 ± 0.82	<0.03	1.15 ± 0.31
B31	Soil	256	142	24.2 ± 1.0	1.30 ± 1.04	<0.81	0.80 ± 0.13	1.01 ± 0.50
B32	Soil	244	160	5.24 ± 0.46	<0.42	<1.21	0.09 ± 0.05	1.49 ± 0.58
B33	Soil & Gravel	294	4	14.8 ± 0.6	1.50 ± 0.97	15.7 ± 2.2	<0.07	0.82 ± 0.42
B34	Rock	357	189	54.9 ± 1.2	4.48 ± 1.56	61.5 ± 14.3	<0.11	<0.38
B35	Rock	369	48	63.6 ± 2.4	<3.83	70.5 ± 0.6	<0.56	267 ± 7

[a] Refer to Figure 7.
[b] Large relative errors and minimum detectable activities are the result of high continuum count rates caused by high Ra-226 levels.
[c] Errors are 2σ based on counting statistics.

TABLE 6

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE SOIL SAMPLES

Borehole No.[a]	Grid Location N	Grid Location W	Depth (m)	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137	Th-232
H1	20	106	Surface	0.69 ± 0.26[b]	<0.16	0.78 ± 1.50	0.10 ± 0.09	0.79 ± 0.32
			0.5	0.98 ± 0.30	<0.30	1.93 ± 1.24	<0.04	0.97 ± 0.44
			1.0	1.08 ± 0.28	<0.21	1.01 ± 1.64	<0.04	0.92 ± 0.71
			2.0	0.98 ± 0.13	<0.21	<0.74	<0.03	0.96 ± 0.34
H2	31	200	Surface	0.89 ± 0.33	<0.28	<0.85	0.37 ± 0.11	0.97 ± 0.31
			2.0	1.28 ± 0.26	<0.23	0.76 ± 0.63	<0.04	1.30 ± 0.64
H3	37	19	Surface	0.88 ± 0.25	<0.20	<0.69	0.18 ± 0.06	0.70 ± 0.41
			0.5	0.83 ± 0.23	<0.24	2.18 ± 1.49	<0.03	1.12 ± 0.31
			1.0	0.66 ± 0.24	<0.13	0.62 ± 0.53	<0.02	0.54 ± 0.21
			2.0	0.58 ± 0.19	<0.18	1.36 ± 1.24	<0.03	0.48 ± 0.38
H4	94	20	Surface	1.01 ± 0.25	<0.26	<0.79	0.07 ± 0.06	0.65 ± 0.41
			0.5	1.33 ± 0.28	<0.17	0.94 ± 0.76	<0.03	0.85 ± 0.27
			1.0	1.15 ± 0.23	<0.28	0.79 ± 1.53	<0.04	1.00 ± 0.42
			2.0	0.85 ± 0.21	<0.15	0.57 ± 0.45	<0.03	1.12 ± 0.36
H5	130	160	Surface	1.20 ± 0.36	<0.36	<1.07	<0.05	1.70 ± 0.38
			0.5	0.09 ± 0.28	<0.19	1.26 ± 1.70	0.08 ± 0.13	1.29 ± 0.48
			1.0	1.35 ± 0.30	<0.34	<1.07	<0.05	1.16 ± 0.54
			2.0	1.10 ± 0.30	<0.19	0.91 ± 0.83	<0.03	1.08 ± 0.36
H6	148	18	Surface	0.80 ± 0.24	<0.29	3.99 ± 1.24	0.42 ± 0.14	0.36 ± 0.42
			0.5	0.83 ± 0.19	<0.27	<0.77	<0.03	1.08 ± 0.33
			1.0	1.00 ± 0.45	<0.32	4.23 ± 2.03	<0.05	2.13 ± 0.62
			2.0	1.15 ± 0.21	<0.28	1.07 ± 1.52	<0.04	1.32 ± 0.40

TABLE 6, cont.

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE SOIL SAMPLES

Borehole No.	Grid Location N	Grid Location W	Depth (m)	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137	Th-232
H7	160	229	Surface	0.83 ± 0.20	<0.25	1.36 ± 1.43	0.12 ± 0.04	1.01 ± 0.29
			0.5	0.79 ± 0.21	<0.21	<0.69	<0.03	0.85 ± 0.34
			1.0	1.01 ± 0.24	<0.26	2.19 ± 1.93	<0.04	0.70 ± 0.26
			2.0	0.98 ± 0.29	<0.25	1.72 ± 1.81	<0.04	0.62 ± 0.44
H8	229	78	Surface	1.09 ± 0.20	<0.30	<0.81	<0.04	2.52 ± 0.83
			2.0	1.08 ± 0.35	<0.33	2.91 ± 1.39	<0.05	1.09 ± 0.40
H9	240	2	Surface	1.24 ± 0.23	<0.26	<0.9	0.16 ± 0.08	0.41 ± 0.18
			0.5	0.73 ± 0.20	<0.24	1.96 ± 1.47	<0.03	0.87 ± 0.50
			1.0	0.73 ± 0.15	<0.24	<0.72	<0.03	1.21 ± 0.37
			2.0	1.08 ± 0.28	<0.31	1.45 ± 1.49	<0.04	0.87 ± 0.37
H10	316	200	Surface	0.90 ± 0.25	<0.28	1.93 ± 1.60	<0.04	0.80 ± 0.37
			0.5	1.08 ± 0.24	<0.16	0.99 ± 1.05	0.05 ± 0.17	1.47 ± 0.80
			1.0	1.15 ± 0.33	<0.21	1.83 ± 1.74	<0.03	0.96 ± 0.40
			2.0	1.26 ± 0.26	<0.32	2.57 ± 1.19	<0.05	1.20 ± 0.45
H11	339	53	Surface	0.55 ± 0.14	<0.24	1.64 ± 1.55	0.17 ± 0.09	1.03 ± 0.39
			0.5	0.91 ± 0.26	<0.15	0.79 ± 0.46	<0.03	0.77 ± 0.30
			1.0	0.83 ± 0.19	<0.20	<0.72	<0.03	1.00 ± 0.38
			2.0	<0.16	<0.26	2.72 ± 1.55	<0.03	1.15 ± 0.35
H12	418	70	Surface	0.91 ± 0.23	0.42 ± 0.64	5.01 ± 2.35	<0.03	0.82 ± 0.28
			0.5	0.78 ± 0.29	<0.22	1.42 ± 1.53	<0.03	1.19 ± 0.36
			1.0	1.11 ± 0.25	<0.27	1.86 ± 0.89	<0.04	1.07 ± 0.39
			2.0	0.89 ± 0.19	<0.19	1.25 ± 1.73	<0.03	0.79 ± 0.33

TABLE 6, cont.

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE SOIL SAMPLES

Borehole No.	Grid Location N	Grid Location W	Depth (m)	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137	Th-232
H13	419	10	Surface	1.18 ± 0.26	<0.29	1.57 ± 0.89	0.11 ± 0.07	1.21 ± 0.41
			0.5	1.03 ± 0.26	<0.30	<0.88	<0.04	1.15 ± 0.37
			1.0	0.69 ± 0.19	<0.22	2.18 ± 1.55	<0.05	0.57 ± 0.42
			2.0	1.03 ± 0.23	<0.17	0.74 ± 0.71	<0.02	0.63 ± 0.42
H14	4	235	Surface	4.00 ± 0.49	<0.29	1.75 ± 1.89	0.25 ± 0.08	0.73 ± 0.24
			0.3	1.15 ± 0.25	<0.28	<0.92	<0.04	0.86 ± 0.33
			0.6	1.29 ± 0.25	<0.26	1.61 ± 1.77	0.08 ± 0.13	1.26 ± 0.32
H15	110	228	Surface	3.26 ± 0.39	<0.34	<1.06	<0.06	<0.25
			0.5	1.46 ± 0.31	<0.32	<1.08	<0.04	1.18 ± 0.42
			1.0	1.38 ± 0.26	<0.23	0.75 ± 0.14	0.04 ± 0.04	0.68 ± 0.33
H16	143	6	Surface	10.7 ± 0.6	<0.56	6.20 ± 2.64	<0.06	1.04 ± 0.52
			0.5	6.61 ± 0.59	<0.32	3.82 ± 0.95	<0.05	0.90 ± 0.46
			1.0	1.80 ± 0.33	<0.26	2.16 ± 1.88	<0.04	0.96 ± 0.55
H17	146	160	Surface	0.94 ± 0.30	<0.22	1.70 ± 1.12	<0.03	0.71 ± 0.26
H18	159	198	Surface	31.5 ± 1.1	<0.90	7.14 ± 2.97	0.37 ± 0.12	2.93 ± 0.93
			1.0	1.46 ± 0.25	<0.14	1.07 ± 0.73	<0.03	0.84 ± 0.30
H19	164	45	Surface	9.09 ± 0.56	1.41 ± 0.79	10.6 ± 2.0	0.06 ± 0.05	0.64 ± 0.34
			0.15	1.18 ± 0.24	<0.16	1.57 ± 0.47	<0.03	0.93 ± 0.32
			0.6	1.60 ± 0.30	<0.25	1.23 ± 1.72	<0.05	0.94 ± 0.46

TABLE 6, cont.

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE SOIL SAMPLES

Borehole No.	Grid Location N	Grid Location W	Depth (m)	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Co-137	Th-232
H20	165	209	Surface	47.8 ± 1.6	<0.79	<2.05	1.18 ± 0.19	1.04 ± 0.87
			0.3	36.4 ± 1.3	<0.98	<2.69	0.92 ± 0.16	3.78 ± 1.53
			0.6	9.59 ± 0.84	<0.42	<1.14	0.44 ± 0.10	0.40 ± 0.31
H21	164	212	Surface	24.8 ± 1.1	<0.92	<2.44	1.02 ± 0.17	<0.43
			0.3	3.49 ± 0.49	<0.45	<1.40	0.33 ± 0.15	0.87 ± 0.67
H22	168	210	Surface	67.8 ± 1.6	2.04 ± 1.30	<1.22	<0.11	<0.45
			0.15	32.1 ± 1.5	<0.77	<2.17	0.19 ± 0.12	1.49 ± 0.58
H23	178	201	Surface	39.0 ± 1.4	<0.81	<2.07	0.25 + 0.12	0.60 + 0.83
H24	260	14	Surface	0.91 ± 0.28	<0.24	1.06 ± 0.82	<0.03	1.15 ± 0.31

[a] Refer to Figure 4.
[b] Errors are 2σ based on counting statistics.

TABLE 7

RADIONUCLIDE CONCENTRATIONS IN WATER SAMPLES

Sample No.	Sample Type	Grid Location N	Grid Location W	Radionuclide Concentrations (pCi/l) Gross Alpha	Gross Beta	Ra-226
W1	Surface[a]	100	41	<1.35	20.3 ± 3.0[c]	----[d]
W2	Surface[a]	130	10	<0.30	5.13 ± 0.83	----
W3	Surface[a]	180	120	<1.67	7.39 ± 3.31	----
W4	Surface[a]	255	75	0.86 ± 0.54	1.76 ± 0.67	----
W5	Subsurface, Borehole H5[b]	130	160	4.73 ± 1.39	5.71 ± 1.26	----
W6	Subsurface, Borehole H6[b]	148	18	8.29 ± 3.41	11.6 ± 3.7	----
W7	Subsurface, Borehole H7[b]	160	229	4.23 ± 1.49	6.62 ± 1.42	----
W8	Subsurface, Borehole H11[b]	339	53	1.07 ± 0.79	2.47 ± 0.89	----
W9	Subsurface, Borehole H12[b]	418	70	5.27 ± 1.29	5.59 ± 1.15	----
W10	Subsurface, Borehole H13[b]	419	10	6.63 ± 1.90	2.27 ± 1.63	----
W11	Subsurface, Borehole H17[b]	146	160	17.0 ± 5.5	8.22 ± 5.12	<0.22

[a] Refer to Figure 5.
[b] Refer to Figure 4.
[c] Errors are 2σ based on counting statistics.
[d] Dash indicates analysis was not performed.

TABLE 8

RADIONUCLIDE CONCENTRATIONS IN SEDIMENT SAMPLE
FROM DRAINAGE DITCH

Sample No.	Grid Location[a]		Radionuclide Concentrations (pCi/g)				
	N	W	Ra-226	U-235	U-238	Cs-137	Th-232
SD1	415	182	9.15 ± 0.80[b]	0.63 ± 0.91	<1.58	0.16 ± 0.09	0.56 ± 1.26

[a] Refer to Figure 5.
[b] Errors are 2σ based on counting statistics.

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TABLE 9

LISTING OF AREAS ON PROPERTY T WHICH
EXCEED RESIDUAL CONTAMINATION CRITERIA

Grid Location[a] N	Grid Location[a] W	Radionuclides[b]	Estimated Quantities of Material Exceeding Guidelines: Area (m^2)	Avg. Depth (m)	Volume (m^3)	Remarks
94-99	4-18	Ra-226, U-238[c]	70	0.15	10.5	Areas of rock fill or paving. Rock contains approximately equal amounts of Ra-226 and U-238 and its radionuclide content is considered of natural origin.
143-146	169-170	Ra-226, U-238[c]	3	0.15	.5	
162-164	20-40	Ra-226, U-238[c]	40	0.30	12	
163-164	44-46	Ra-226, U-238[c]	2	0.30	0.6	
241-247	6-7	Ra-226, U-238[c]	6	0.15	0.9	
298-300	4-20	Ra-226, U-238[c]	32	0.15	4.8	
300-305	8-22	Ra-226, U-238[c]	70	0.15	10.5	
346-354	161-180	Ra-226, U-238[c]	152	0.15	22.8	
343-347	183-187	Ra-226, U-238[c]	16	0.15	2.4	
353-355	184-187	Ra-226, U-238[c]	6	0.15	0.9	
355-357	188-191	Ra-226, U-238[c]	6	0.15	0.9	
355-357	192-196	Ra-226, U-238[c]	8	0.15	1.2	
351-357	203-206	Ra-226, U-238[c]	18	0.15	2.7	
360-366	179-183	Ra-226, U-238[c]	24	0.15	3.6	
103-106	230-234	Ra-226	12	0.30	3.6	Areas of contamination associated with material dredged from the West or Central Drainage Ditches.
107-116	224-229	Ra-226	45	0.15	6.8	
180-200	180-196	Ra-226	320	0.15	48	
200-217	175-180	Ra-226	85	0.15	12.8	
206-211	114-118	Ra-226	20	0.30	6.0	
210-219	183-187	Ra-226	36	0.30	10.8	
222-240	160-174	Ra-226	112	0.15	16.8	
240-274	140-157	Ra-226	578	0.15	86.5	
243-247	159-162	Ra-226	12	0.30	3.6	
243-245	165-168	Ra-226	6	0.30	1.8	
280-300	118-119	Ra-226	20	0.30	6	
304-314	120-129	Ra-226	90	0.15	13.5	

TABLE 9, cont.

LISTING OF AREAS ON PROPERTY T WHICH
EXCEED RESIDUAL CONTAMINATION CRITERIA

Grid Location N	Grid Location W	Radionuclides	Estimated Quantities of Material Exceeding Guidelines: Area (m^2)	Avg. Depth (m)	Volume (m^3)	Remarks
35	18	Ra-226	----	----	----	Small isolated surface or near surface "hot-spot" (<1 m^2 area) or individual piece of contaminated rock-like material. The total value represented by these locations is estimated to be less than 15 m^3.
35	19	Ra-226	----	----	----	
41	18	Ra-226	----	----	----	
79	37	Th-232, Ra-226, U-238[c]	----	----	----	
79	50	Th-232, Ra-226, U-238[c]	----	----	----	
79	52	Th-232, Ra-226, U-238[c]	----	----	----	
79	55	Th-232, Ra-226, U-238[c]	----	----	----	
80	34	Th-232, Ra-226, U-238[c]	----	----	----	
80	38	Th-232, Ra-226, U-238[c]	----	----	----	
80	39	Th-232, Ra-226, U-238[c]	----	----	----	
80	43	Th-232, Ra-226, U-238[c]	----	----	----	
80	45	Th-232, Ra-226, U-238[c]	----	----	----	
80	51	Th-232, Ra-226, U-238[c]	----	----	----	
80	53	Th-232, Ra-226, U-238[c]	----	----	----	
85	40	Ra-226, U-238[c]	----	----	----	
87	43	Ra-226, U-238[c]	----	----	----	
90	32	Ra-226, U-238[c]	----	----	----	
90	230	Ra-226	----	----	----	
100	196	Ra-226	----	----	----	
105	228	Ra-226	----	----	----	
112	1	Ra-226, U-238[c]	----	----	----	
113	0	Ra-226, U-238[c]	----	----	----	
115	7	Ra-226, U-238[c]	----	----	----	
119	214	Ra-226	----	----	----	
119	215	Ra-226	----	----	----	
119	230	Ra-226	----	----	----	
120	234	Ra-226	----	----	----	

TABLE 9, cont.

LISTING OF AREAS ON PROPERTY T WHICH
EXCEED RESIDUAL CONTAMINATION CRITERIA

Grid location N	Grid location W	Radionuclides	Estimated Quantities of Material Exceeding Guidelines: Area (m^2)	Avg. Depth (m)	Volume (m^3)	Remarks
120	203	Ra-226	----	----	----	
123	205	Ra-226	----	----	----	
143	6	Ra-226, U-238[c]	----	----	----	
154	202	Ra-226	----	----	----	
155	2	Ra-226, U-238[c]	----	----	----	
155	4	Ra-226, U-238[c]	----	----	----	
156	2	Ra-226, U-238[c]	----	----	----	
159	2	Ra-226, U-238[c]	----	----	----	
159	51	Ra-226, U-238[c]	----	----	----	
159	52	Ra-226, U-238[c]	----	----	----	Small isolated surface or near surface "hot-spot" (<1 m^2 area) or individual piece of contaminated rock-like material. The total value represented by these locations is estimated to be less than 15 m^3.
159	198	Ra-226	----	----	----	
162	43	Ra-226, U-238[c]	----	----	----	
162	46	Ra-226, U-238[c]	----	----	----	
162	202	Ra-226	----	----	----	
164	7	Ra-226, U-238[c]	----	----	----	
164	212	Ra-226	----	----	----	
165	60	Ra-226, U-238[c]	----	----	----	
165	209	Ra-226	----	----	----	
167	65	Ra-226, U-238[c]	----	----	----	
168	201	Ra-226	----	----	----	
173	49	Th-232, Ra-226, U-238[c]	----	----	----	
177	49	Th-232, Ra-226, U-238[c]	----	----	----	
178	201	Ra-226	----	----	----	
178	207	Ra-226	----	----	----	
180	49	Th-232, Ra-226, U-238[c]	----	----	----	
180	52	Th-232, Ra-226, U-238[c]	----	----	----	
184	52	Th-232, Ra-226, U-238[c]	----	----	----	

TABLE 9, cont.

LISTING OF AREAS ON PROPERTY T WHICH
EXCEED RESIDUAL CONTAMINATION CRITERIA

Grid Location N	Grid Location W	Radionuclides	Estimated Quantities of Material Exceeding Guidelines: Area (m^2)	Avg. Depth (m)	Volume (m^3)	Remarks
185	56	Th-232, Ra-226, U-238[c]	----	----	----	
187	56	Th-232, Ra-226, U-238[c]	----	----	----	
189	52	Th-232, Ra-226, U-238[c]	----	----	----	
189	56	Th-232, Ra-226, U-238[c]	----	----	----	
190	52	Th-232, Ra-226, U-238[c]	----	----	----	
190	56	Th-232, Ra-226, U-238[c]	----	----	----	
195	56	Th-232, Ra-226, U-238[c]	----	----	----	
215	54	Th-232, Ra-226, U-238[c]	----	----	----	
220	54	Th-232, Ra-226, U-238[c]	----	----	----	
221	0	Ra-226, U-238[c]	----	----	----	
221	3	Ra-226, U-238[c]	----	----	----	
221	175	Ra-226	----	----	----	
221	178	Ra-226	----	----	----	
225	178	Ra-226	----	----	----	Small isolated surface or near surface "hot-spot" (<1 m^2 area) or individual piece of contaminated rock-like material. The total value represented by these locations is estimated to be less than 15 m^3.
228	54	Th-232, Ra-226, U-238[c]	----	----	----	
228	55	Th-232, Ra-226, U-238[c]	----	----	----	
244	13	Ra-226, U-238[c]	----	----	----	
250	59	Th-232, Ra-226, U-238[c]	----	----	----	
260	14	Ra-226, U-238[c]	----	----	----	
290	201	Ra-226, U-238[c]	----	----	----	
292	136	Ra-226, U-238[c]	----	----	----	
292	138	Ra-226, U-238[c]	----	----	----	
292	200	Ra-226, U-238[c]	----	----	----	
294	4	Ra-226, U-238[c]	----	----	----	
300	40	Ra-226, U-238[c]	----	----	----	
323	14	Ra-226, U-238[c]	----	----	----	
332	47	Th-232, Ra-226, U-238[c]	----	----	----	

TABLE 9, cont.

LISTING OF AREAS ON PROPERTY T WHICH
EXCEED RESIDUAL CONTAMINATION CRITERIA

Grid Location		Radionuclides	Estimated Quantities of Material Exceeding Guidelines			Remarks
N	W		Area (m^2)	Avg. Depth (m)	Volume (m^3)	
333	47	Th-232, Ra-226, U-238[c]	----	----	----	Small isolated surface or near surface "hot-spot" (<1 m^2 area) or individual piece of contaminated rock-like material. The total value represented by these locations is estimated to be less than 15 m^3.
340	47	Th-232, Ra-226, U-238[c]	----	----	----	
342	15	Ra-226, U-238[c]	----	----	----	
348	14	Ra-226, U-238[c]	----	----	----	
348	15	Ra-226, U-238[c]	----	----	----	
348	49	Th-232, Ra-226, U-238[c]	----	----	----	
349	49	Th-232, Ra-226, U-238[c]	----	----	----	
356	47	Th-232, Ra-226, U-238[c]	----	----	----	
369	48	Th-232, Ra-226, U-238[c]	----	----	----	
372	48	Th-232, Ra-226, U-238[c]	----	----	----	
400	15	Ra-226, U-238[c]	----	----	----	

[a] Refer to Figure 7.
[b] Based on locations, physical appearance, direct radiation levels and analyses of similiar materials.
[c] Naturally occuring material in rock fill.

Excavated Area

Excerpt from Post-Remedial Action Report for the Niagara Falls Storage Site Vicinity Properties—1985 and 1986

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DOE/OR/20722-133

Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-AC05-81OR20722

POST-REMEDIAL ACTION REPORT FOR THE NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES—1985 AND 1986

Lewiston, New York

January 1989

Bechtel National, Inc.

C22/F-1134.1

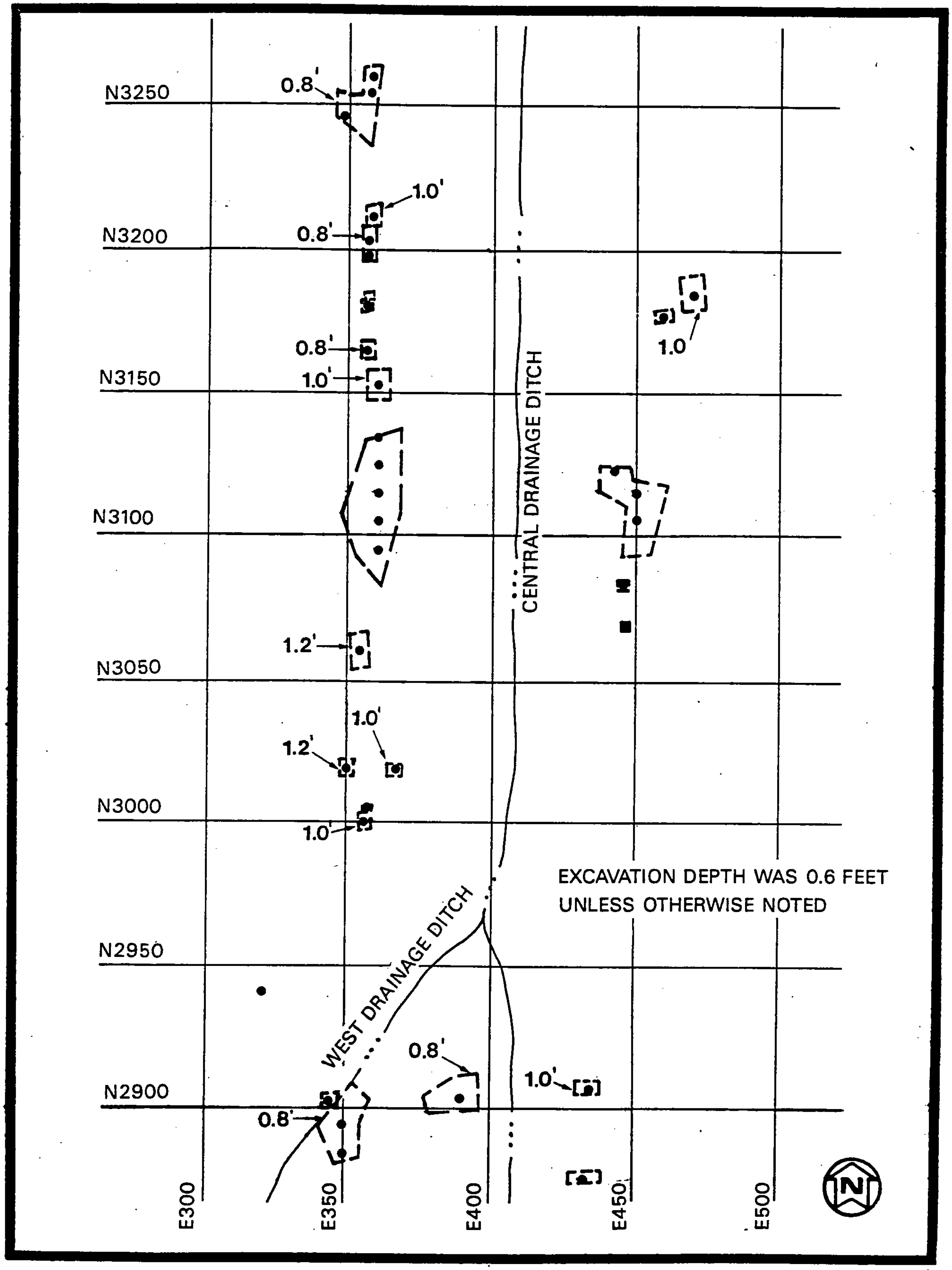

FIGURE 33 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY T - SECTION 1

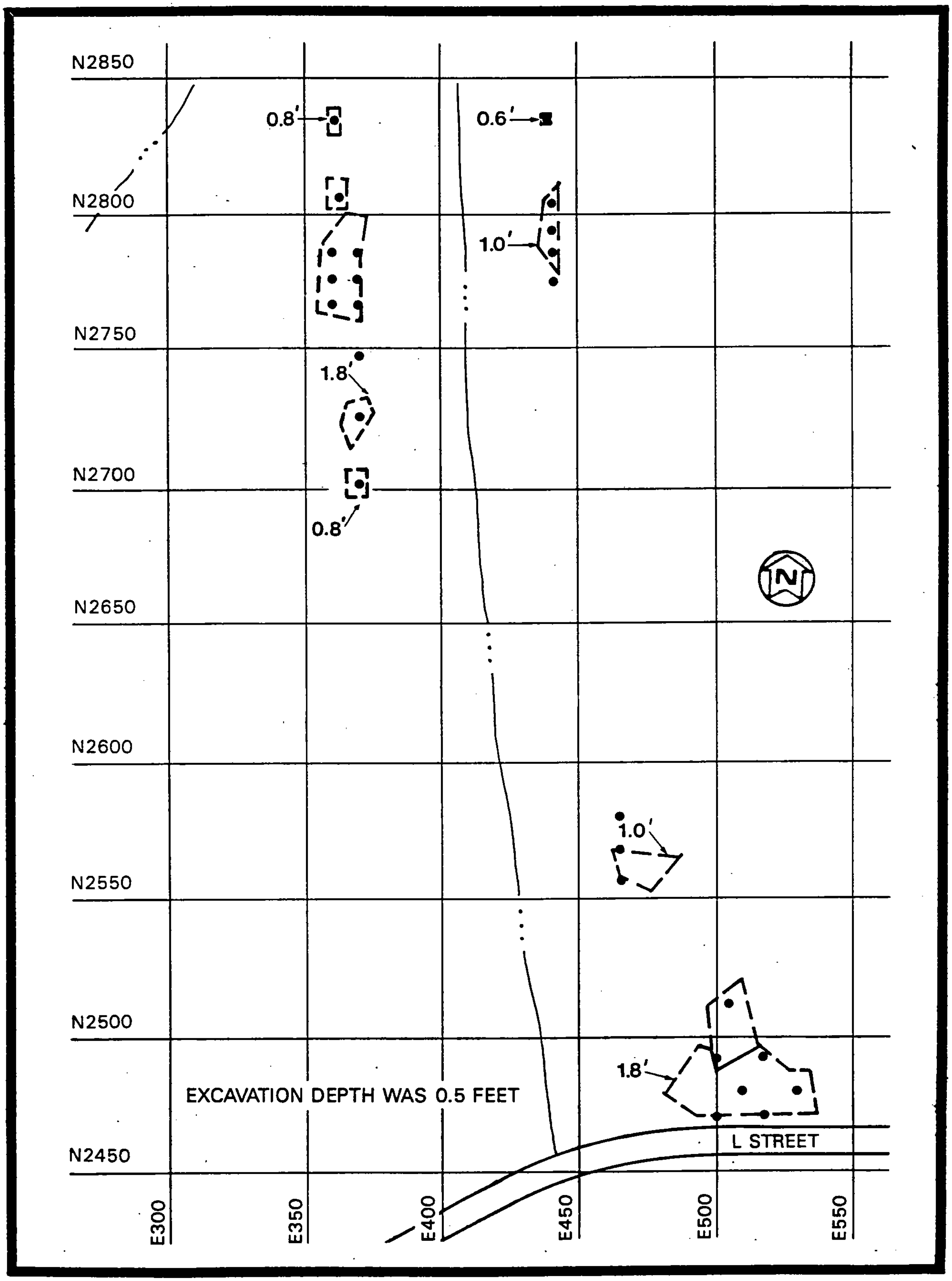

FIGURE 34 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY T - SECTION 2

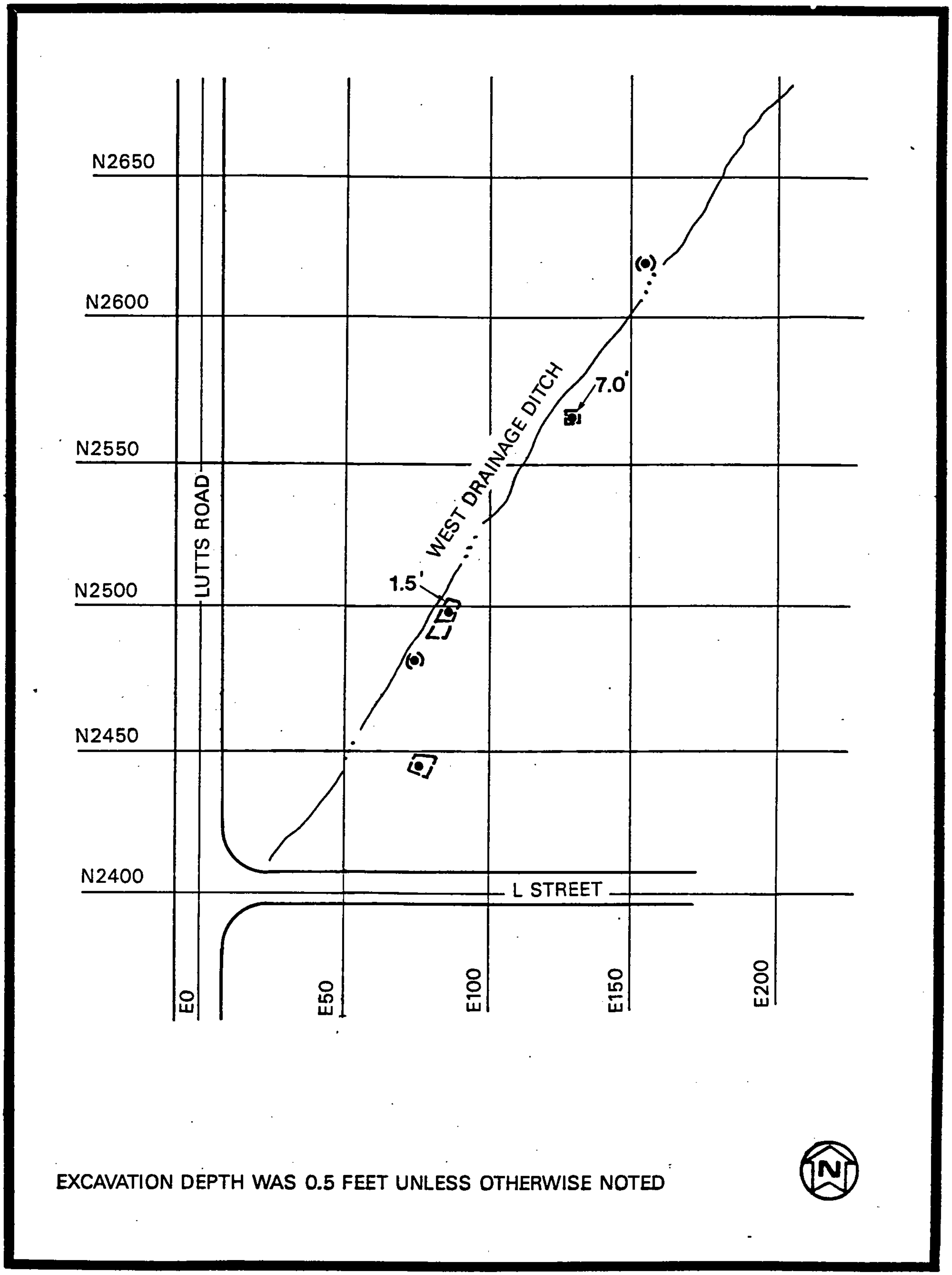

FIGURE 35 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY T - SECTION 3

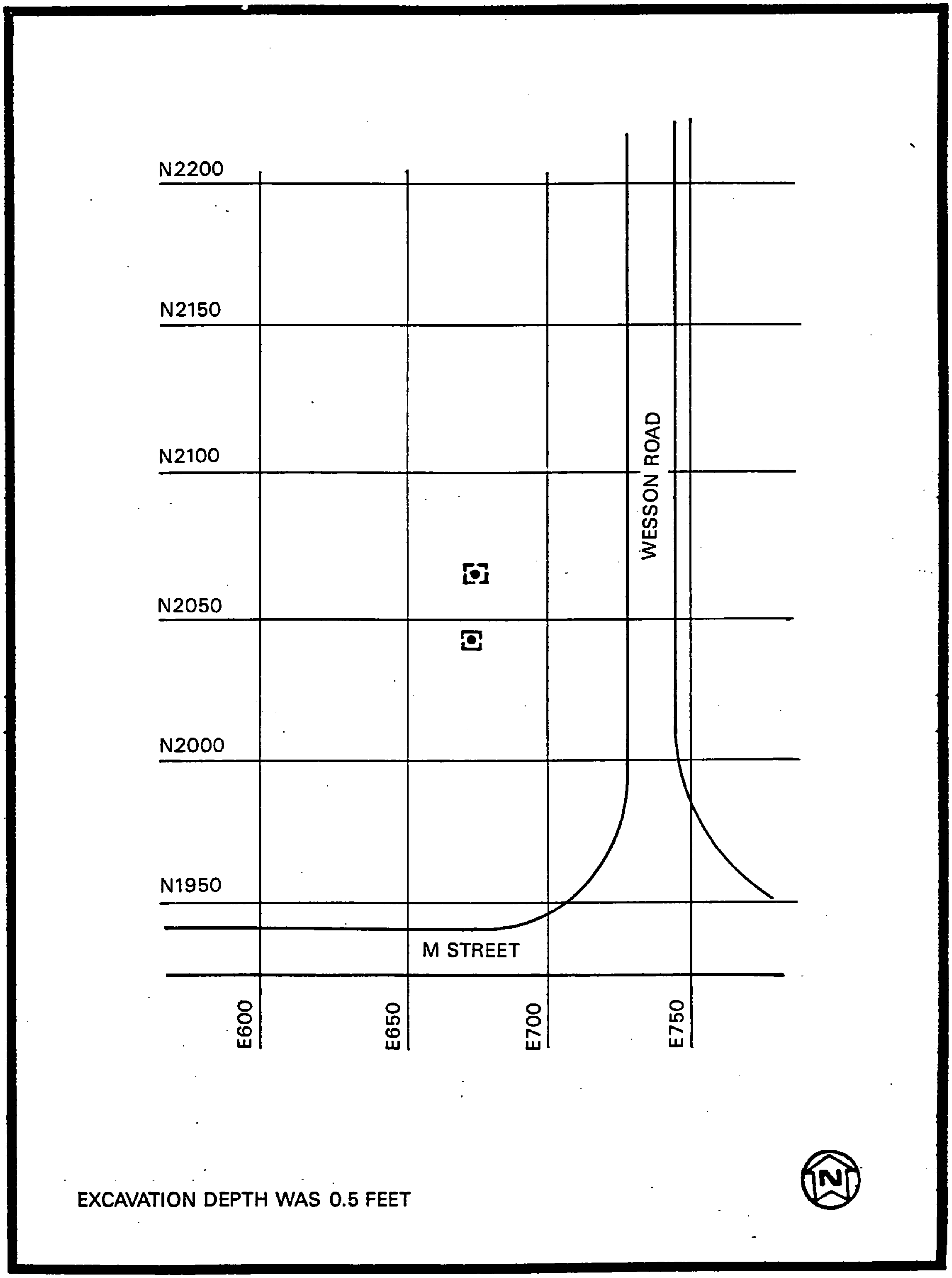

FIGURE 36 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY T - SECTION 4

TABLE 10

POST-REMEDIAL ACTION SAMPLING RESULTS

FOR PROPERTY T

Page 1 of 2

Grid Coordinates		Concentrations (pCi/g +/- 1 sigma)		
E,W	N,S	Uranium-238	Radium-226	Thorium-232
E0077	N2445	A	1.2 ± 0.3	0.7 ± 0.4
E0077	N2485	A	0.9 ± 0.3	0.6 ± 0.4
E0088	N2502	A	3.1 ± 0.5	2.0 ± 0.8
E0129	N2567	A	4.4 ± 0.4	A
E0153	N2620	A	0.9 ± 0.5	0.8 ± 0.8
E0320	N2940	A	1.0 ± 0.1	0.9 ± 0.2
E0335	N3007	A	1.0 ± 0.1	1.3 ± 0.2
E0345	N2906	A	3.9 ± 0.2	0.9 ± 0.2
E0347	N3247	A	1.0 ± 0.1	1.3 ± 0.2
E0350	N3022	A	0.8 ± 0.1	0.8 ± 0.2
E0351	N3187	7.0 ± 1.5	1.1 ± 0.1	0.9 ± 0.2
E0352	N3205	A	0.9 ± 0.1	1.4 ± 0.2
E0354	N3059	A	1.1 ± 0.1	1.5 ± 0.3
E0356	N3196	A	4.4 ± 0.2	1.3 ± 0.3
E0357	N2880	A	3.7 ± 0.2	1.1 ± 0.2
E0357	N2890	A	1.5 ± 0.1	1.2 ± 0.3
E0357	N3002	A	1.2 ± 0.1	1.1 ± 0.2
E0357	N3213	A	3.1 ± 0.2	1.4 ± 0.4
E0357	N3256	A	5.3 ± 0.4	A
E0357	N3262	A	4.9 ± 0.3	1.5 ± 0.3
E0360	N2765	A	7.8 ± 0.3	1.3 ± 0.3
E0360	N2775	A	2.4 ± 0.2	1.2 ± 0.2
E0360	N2785	A	1.4 ± 0.1	1.8 ± 0.2
E0360	N3095	A	5.4 ± 0.3	1.5 ± 0.4
E0360	N3105	A	2.9 ± 0.2	1.2 ± 0.2
E0360	N3115	A	2.9 ± 0.3	1.7 ± 0.4
E0360	N3125	A	0.9 ± 0.2	1.1 ± 0.2
E0360	N3135	A	1.1 ± 0.5	1.7 ± 0.4
E0360	N3152	A	1.3 ± 0.1	0.8 ± 0.2
E0364	N2807	A	2.1 ± 0.2	0.9 ± 0.2
E0364	N3164	A	1.0 ± 0.1	1.6 ± 0.3
E0365	N3021	A	0.9 ± 0.1	1.0 ± 0.2
E0366	N2835	A	5.1 ± 0.2	0.8 ± 0.2
E0370	N2703	A	1.0 ± 0.1	1.1 ± 0.1
E0370	N2725	A	1.0 ± 0.1	1.0 ± 0.1
E0370	N2747	A	0.8 ± 0.1	1.2 ± 0.2
E0370	N2765	A	8.1 ± 0.3	1.3 ± 0.3
E0370	N2775	A	1.0 ± 0.1	1.0 ± 0.2
E0370	N2785	A	1.0 ± 0.1	1.1 ± 0.3
E0390	N2905	A	5.2 ± 0.2	0.7 ± 0.2
E0430	N2877	A	5.3 ± 0.2	1.2 ± 0.2
E0431	N2910	A	2.9 ± 0.2	0.9 ± 0.2
E0438	N2833	5.5 ± 2.9	8.0 ± 0.4	1.2 ± 0.3

TABLE 10

(continued)

Page 2 of 2

Grid Coordinates E,W	N,S	Concentrations (pCi/g +/- 1 sigma) Uranium-238	Radium-226	Thorium-232
E0440	N2775	4.9 ± 1.6	1.6 ± 0.2	0.9 ± 0.2
E0440	N2785	A	7.5 ± 0.3	1.8 ± 0.3
E0440	N2795	A	1.2 ± 0.1	1.4 ± 0.2
E0440	N2805	A	7.4 ± 0.1	0.8 ± 0.2
E0445	N3070	6.5 ± 3.1	1.1 ± 0.3	1.0 ± 0.2
E0445	N3125	A	0.7 ± 0.1	0.9 ± 0.1
E0446	N3084	2.8 ± 1.4	1.0 ± 0.1	1.4 ± 0.2
E0450	N3105	1.3 ± 1.5	1.4 ± 0.1	1.0 ± 0.2
E0450	N3115	A	2.2 ± 0.2	1.4 ± 0.3
E0458	N3179	A	0.8 ± 0.1	1.2 ± 0.2
E0465	N2560	A	4.4 ± 0.2	1.4 ± 0.2
E0465	N2570	A	3.9 ± 0.2	1.5 ± 0.3
E0465	N2580	A	2.4 ± 0.2	1.1 ± 0.1
E0469	N3182	A	6.9 ± 0.3	1.6 ± 0.2
E0500	N2470	7.5 ± 1.4	1.5 ± 0.1	A
E0500	N2490	A	0.9 ± 0.1	1.4 ± 0.2
E0505	N2510	A	1.1 ± 0.1	1.1 ± 0.2
E0510	N2480	A	0.8 ± 0.1	1.3 ± 0.2
E0520	N2470	A	1.0 ± 0.1	1.2 ± 0.2
E0520	N2493	5.3 ± 1.5	1.3 ± 0.1	1.0 ± 0.2
E0530	N2480	A	1.0 ± 0.1	1.3 ± 0.2
E0674	N2044	A	0.7 ± 0.3	1.0 ± 0.5
E0674	N2071	A	1.2 ± 0.4	A

'A' denotes less than detectable activity.

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Verification Data

Excerpt from Verification of 1985 and 1986 Remedial Actions, Niagara Falls Storage Site Vicinity Properties, Lewiston, New York, December 1989

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NY.17

(VPa)

Prepared by
Oak Ridge Associated Universities

Prepared for the
Decontamination and
Decommissioning
Division

U.S. Department
of Energy

VERIFICATION OF 1985 AND 1986 REMEDIAL ACTIONS NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES LEWISTON, NEW YORK

J. D. BERGER

Environmental Survey and Site Assessment Program
Energy/Environment Systems Division

FINAL REPORT
JULY 1990

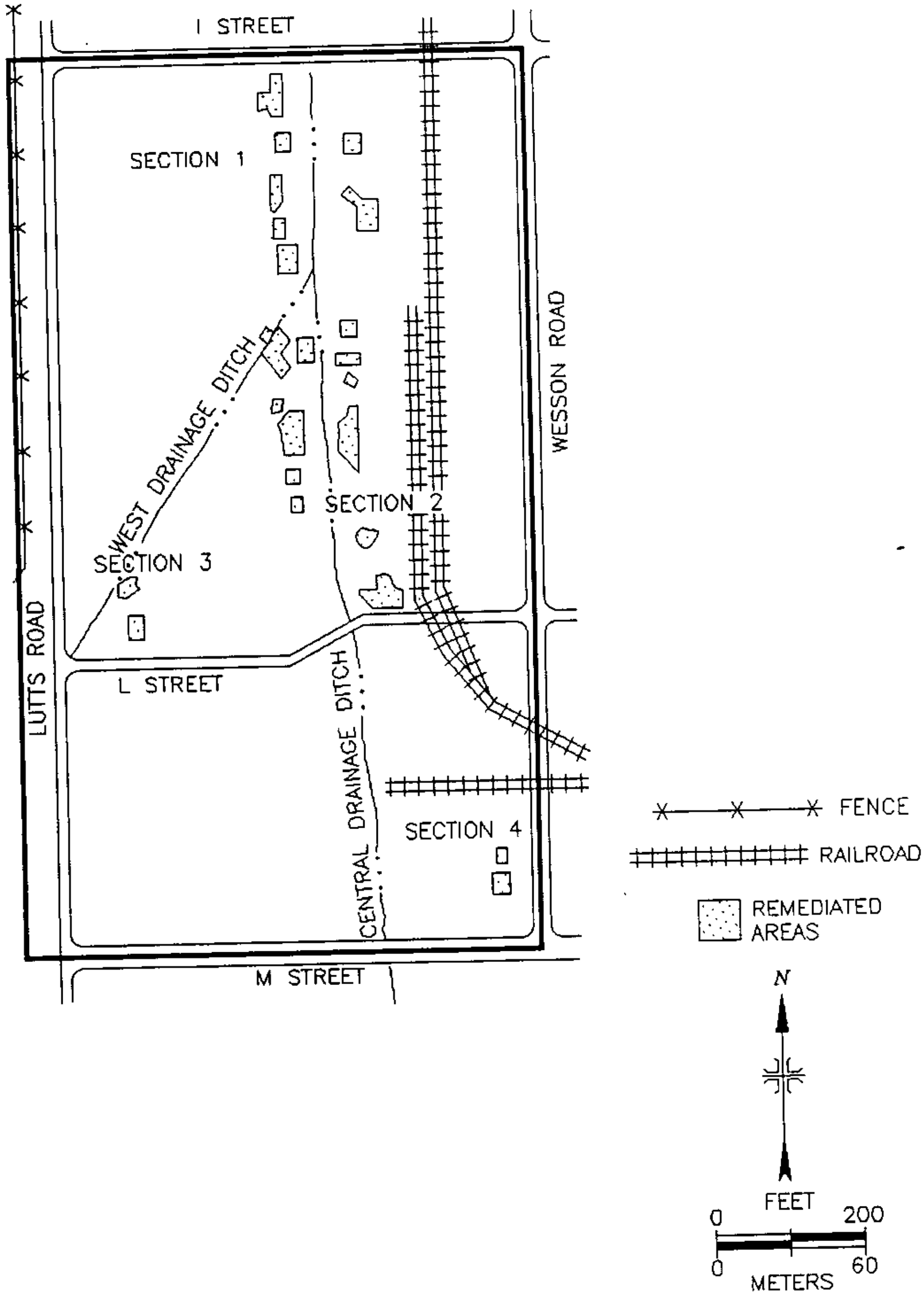

FIGURE 26: Plot Plan of Property T Indicating Remediated Areas

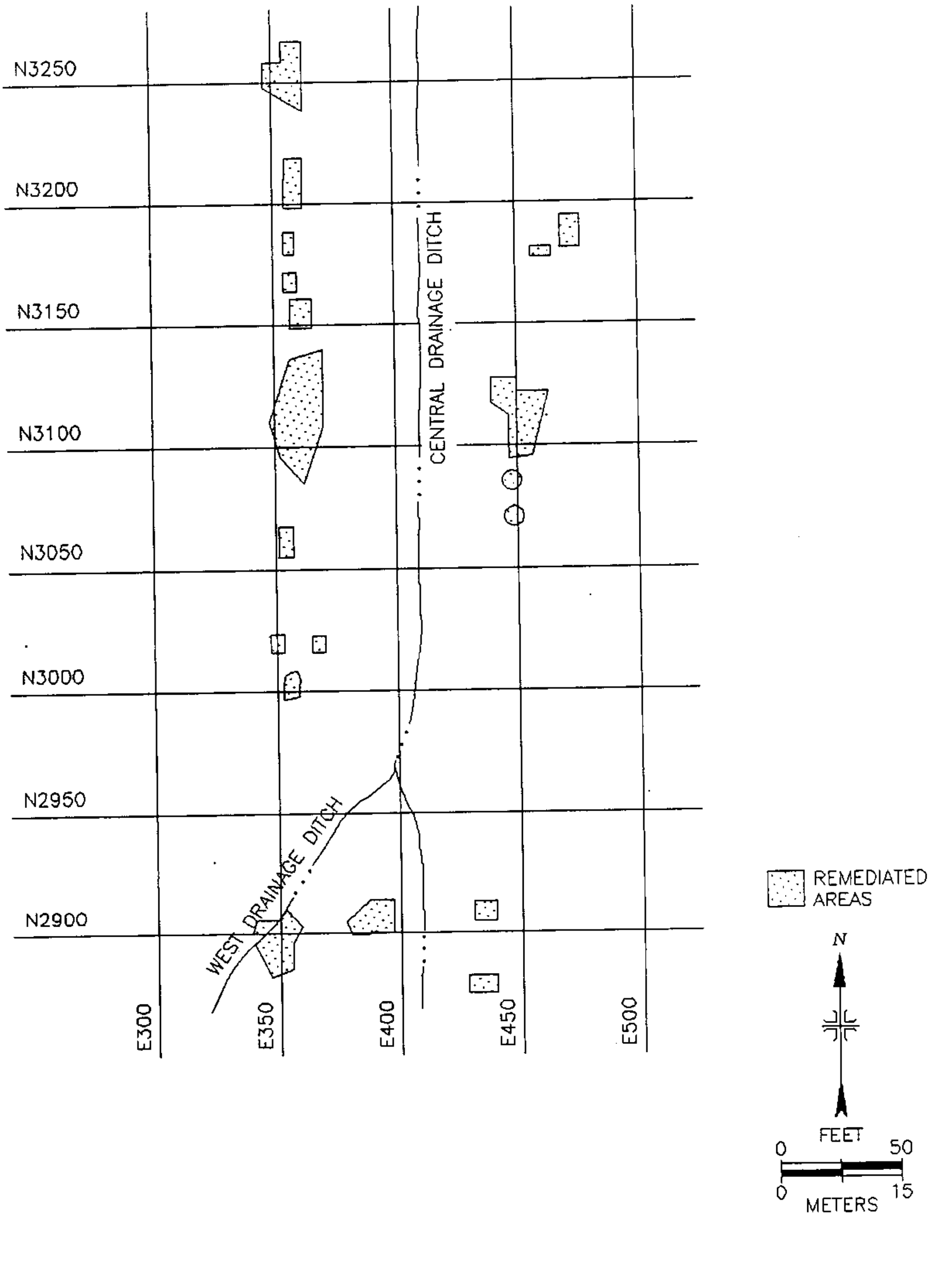

FIGURE 27: Plot Plan of Property T–Section 1 Indicating Remediated Areas

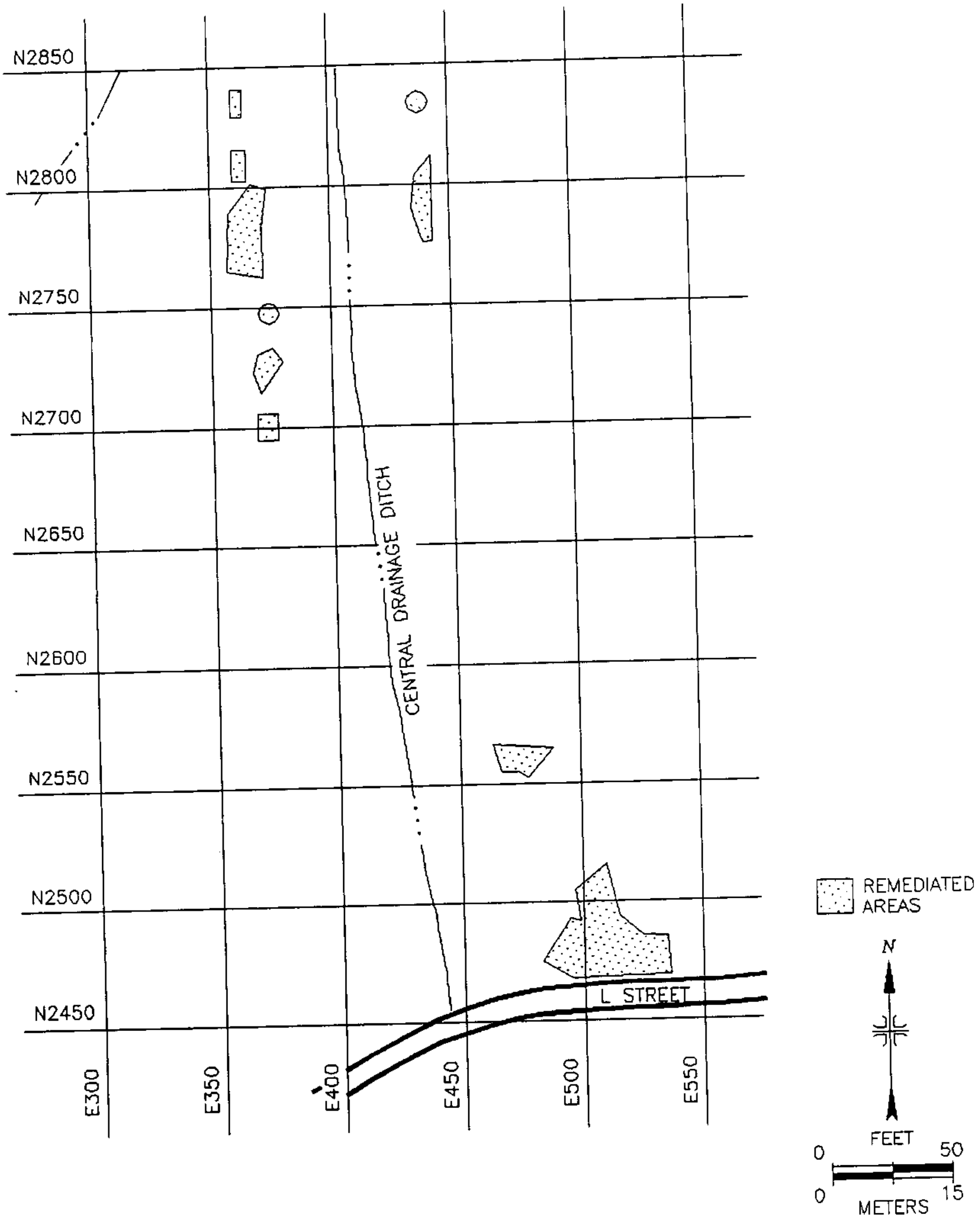

FIGURE 28: Plot Plan of Property T–Section 2 Indicating Remediated Areas

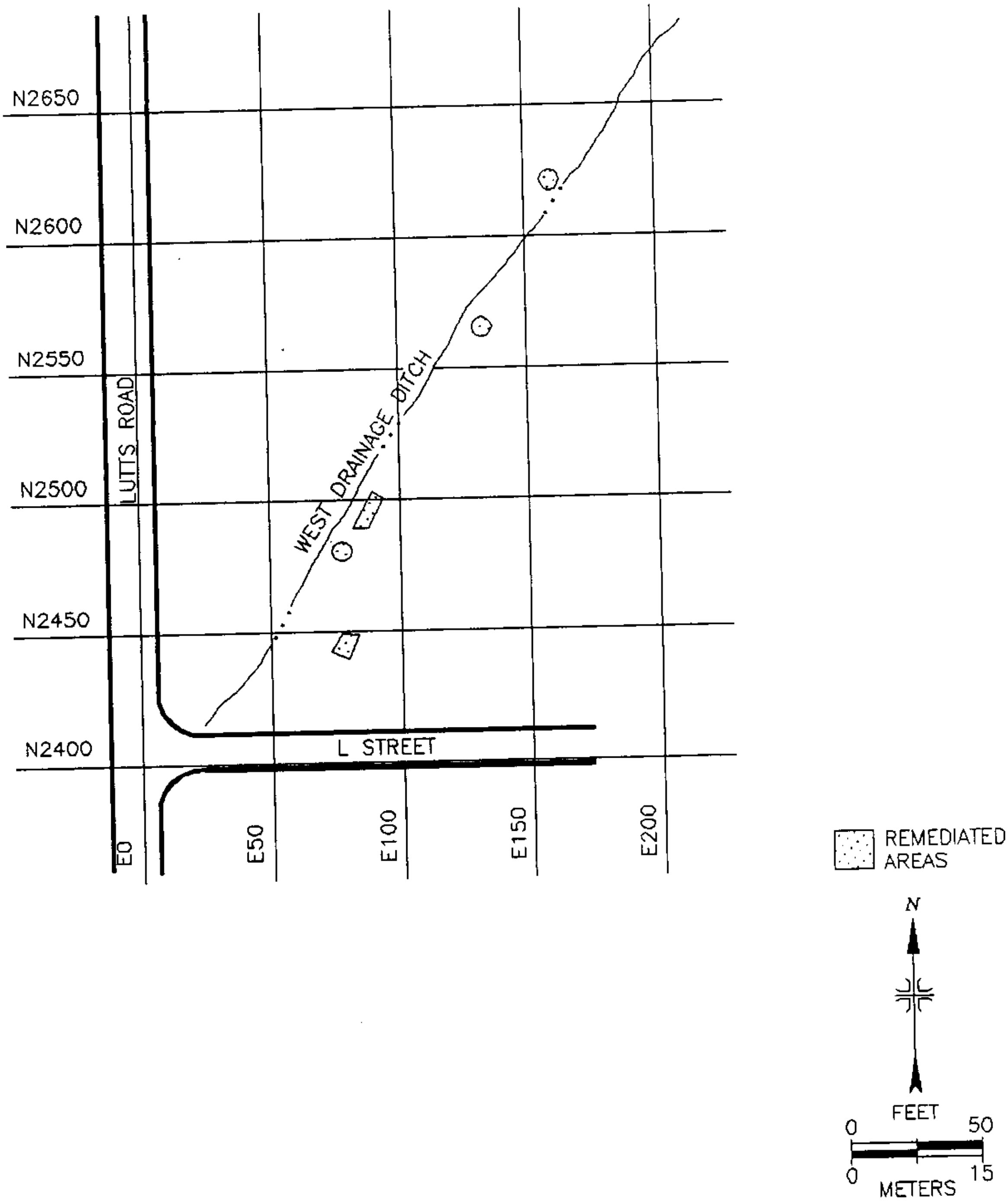

FIGURE 29: Plot Plan of Property T–Section 3 Indicating Remediated Areas

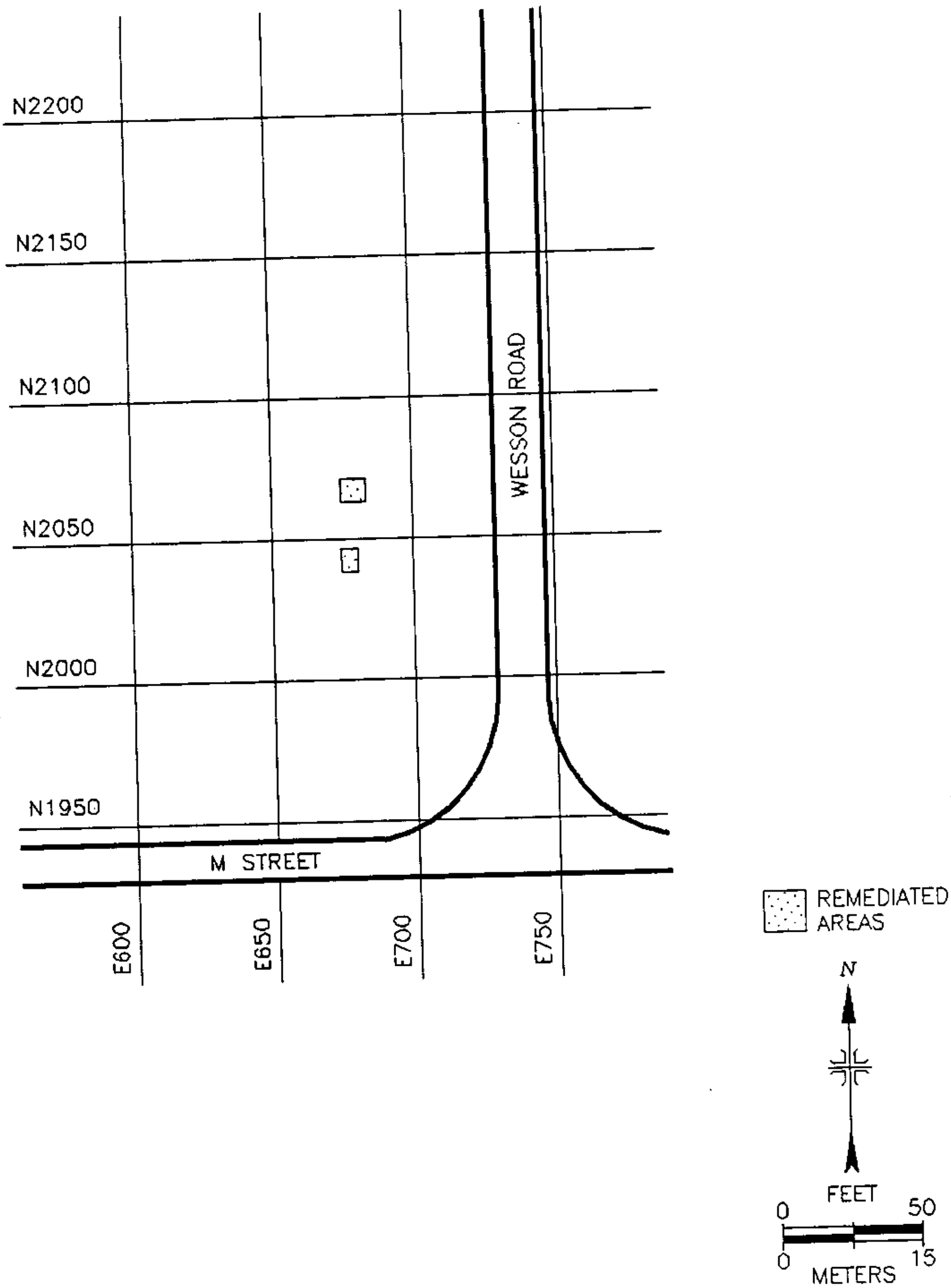

FIGURE 30: Plot Plan of Property T–Section 4 Indicating Remediated Areas

TABLE 11

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM PROPERTY T
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a] N	E		Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
ALONG WEST DITCH					
2457	83		1.0 ± 0.3[b]	1.1 ± 1.5	0.5 ± 0.3
2473	37		0.9 ± 0.2	0.7 ± 1.8	0.8 ± 0.5
2516	76		103 ± 2	<18.8	<0.6
2516	76	(15-30 cm depth)	10.4 ± 0.5	0.5 ± 2.3	1.0 ± 0.4
2519	73		1.0 ± 0.2	<0.7	1.1 ± 0.5
2558	89		1.1 ± 0.2	1.2 ± 0.7	0.6 ± 0.4
2558	148		1.0 ± 0.2	0.9 ± 1.2	1.1 ± 0.3
2646	154		0.9 ± 0.2	1.4 ± 1.2	1.2 ± 0.3
2706	197		1.3 ± 0.3	1.5 ± 1.3	0.8 ± 0.4
2706	161		1.1 ± 0.2	0.7 ± 1.1	0.9 ± 0.3
2738	227		1.1 ± 0.2	0.8 ± 1.7	1.3 ± 0.4
2814	273		21.2 ± 0.8	2.8 ± 1.9	0.7 ± 0.7
2814	273	(15-30 cm depth)	14.3 ± 0.7	<1.0	1.4 ± 0.6
2836	278		0.7 ± 0.2	1.6 ± 0.5	0.6 ± 0.3
2903	342		0.8 ± 0.2	1.3 ± 0.5	0.7 ± 0.3
2942	322		0.6 ± 0.2	<0.7	0.8 ± 0.5
2947	328		2.9 ± 0.4	<0.7	0.7 ± 0.7
2952	322		1.0 ± 0.2	0.9 ± 1.2	0.6 ± 0.5
ALONG CENTRAL DITCH					
2475	495		17.4 ± 0.9	13.8 ± 3.0	0.5 ± 0.6
2555	475		6.2 ± 0.5	<0.8	0.9 ± 0.4
2560	465		1.1 ± 0.2	0.8 ± 1.0	0.9 ± 0.5
2570	475		1.7 ± 0.2	0.6 ± 1.0	0.7 ± 0.3
2700	370		2.1 ± 0.3	1.9 ± 1.1	1.2 ± 0.4
2720	365		48.3 ± 1.3	10.6 ± 3.0	1.6 ± 0.9
2735	365		2.2 ± 0.3	2.3 ± 1.4	1.7 ± 0.5
2745	370		1.1 ± 0.2	1.7 ± 0.6	0.8 ± 0.3
2755	440		1.9 ± 0.3	1.1 ± 0.9	0.6 ± 0.3
2765	370		6.5 ± 0.5	1.3 ± 1.9	0.7 ± 0.5
2775	365		2.3 ± 0.3	1.4 ± 1.2	1.0 ± 0.4
2795	430		1.1 ± 0.2	1.0 ± 0.6	0.7 ± 0.4
2795	435		62.7 ± 1.7	<2.2	1.5 ± 1.0
2800	365		1.2 ± 0.2	<0.5	0.8 ± 0.4
2810	355		1.3 ± 0.2	1.2 ± 1.1	0.9 ± 0.5
2810	360		0.9 ± 0.2	0.8 ± 1.3	0.9 ± 0.4
2810	440		1.3 ± 0.3	0.9 ± 1.8	0.9 ± 0.3
2835	360		1.0 ± 0.2	0.6 ± 1.3	0.7 ± 0.4

TABLE 11 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM PROPERTY T
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a] N	E	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
2835	365	5.0 ± 0.5	<5.7	1.6 ± 0.8
2870	425	1.8 ± 0.3	0.4 ± 1.3	1.1 ± 0.3
2875	435	1.9 ± 0.3	<0.6	0.6 ± 0.4
2880	350	0.9 ± 0.2	<0.6	0.9 ± 0.5
2890	360	8.5 ± 0.5	<0.8	0.9 ± 0.5
2905	355	17.3 ± 0.8	8.0 ± 2.4	1.0 ± 0.6
2905	380	1.8 ± 0.2	0.9 ± 1.2	1.2 ± 0.4
2905	395	18.2 ± 0.8	3.7 ± 3.5	1.2 ± 0.4
2910	430	43.6 ± 1.3	<1.6	2.2 ± 1.1
2910	440	1.8 ± 0.3	0.9 ± 0.5	0.7 ± 0.4
2915	390	1.4 ± 0.3	<0.5	0.6 ± 0.3
2915	435	4.9 ± 0.4	1.0 ± 1.6	1.0 ± 0.3
3020	350	1.5 ± 0.2	0.8 ± 0.7	0.9 ± 0.4
3020	355	5.9 ± 0.4	<0.8	1.1 ± 0.5
3110	350	3.0 ± 0.3	1.7 ± 1.3	0.9 ± 0.4
3110	365	2.0 ± 0.3	1.8 ± 0.6	1.0 ± 0.4
3245	360	7.5 ± 0.6	1.4 ± 1.6	1.0 ± 0.4
3250	355	11.5 ± 0.6	<0.8	0.8 ± 0.6
OTHER AREAS				
2034	399	1.8 ± 0.3	2.0 ± 2.0	0.5 ± 0.4
2041	399	0.8 ± 0.2	<0.6	1.0 ± 0.4
2058	399	1.7 ± 0.7	11.4 ± 8.8	0.9 ± 0.3

[a]Refer to Figures 26-30.
[b]Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

Appendix E

NFSS Vicinity Property W

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Assessment Data

Excerpt from Comprehensive Radiological Survey
Off-Site Property W
Niagara Falls Storage Site

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COMPREHENSIVE RADIOLOGICAL SURVEY

OFF-SITE PROPERTY W
NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

Prepared for

U.S. Department of Energy
as part of the
Formerly Utilized Sites — Remedial Action Program

J.D. Berger

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Radiological Site Assessment Program
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Oak Ridge, Tennessee 37831-0117

FINAL REPORT

February 1984

This report is based on work performed under contract number DE-AC05-76OR00033 with the Department of Energy.

*Evaluation Research Corporation, Oak Ridge, Tennessee

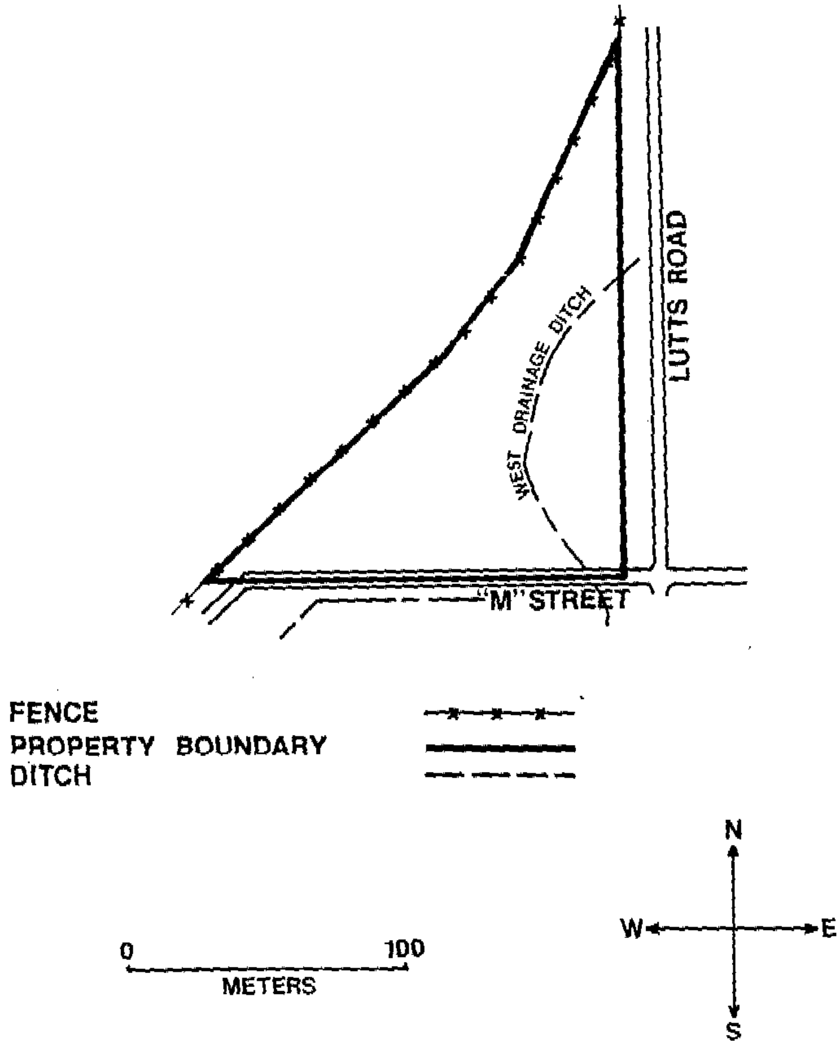

FIGURE 2. Plan View of Off-Site Property W Indicating Prominent Surface Features.

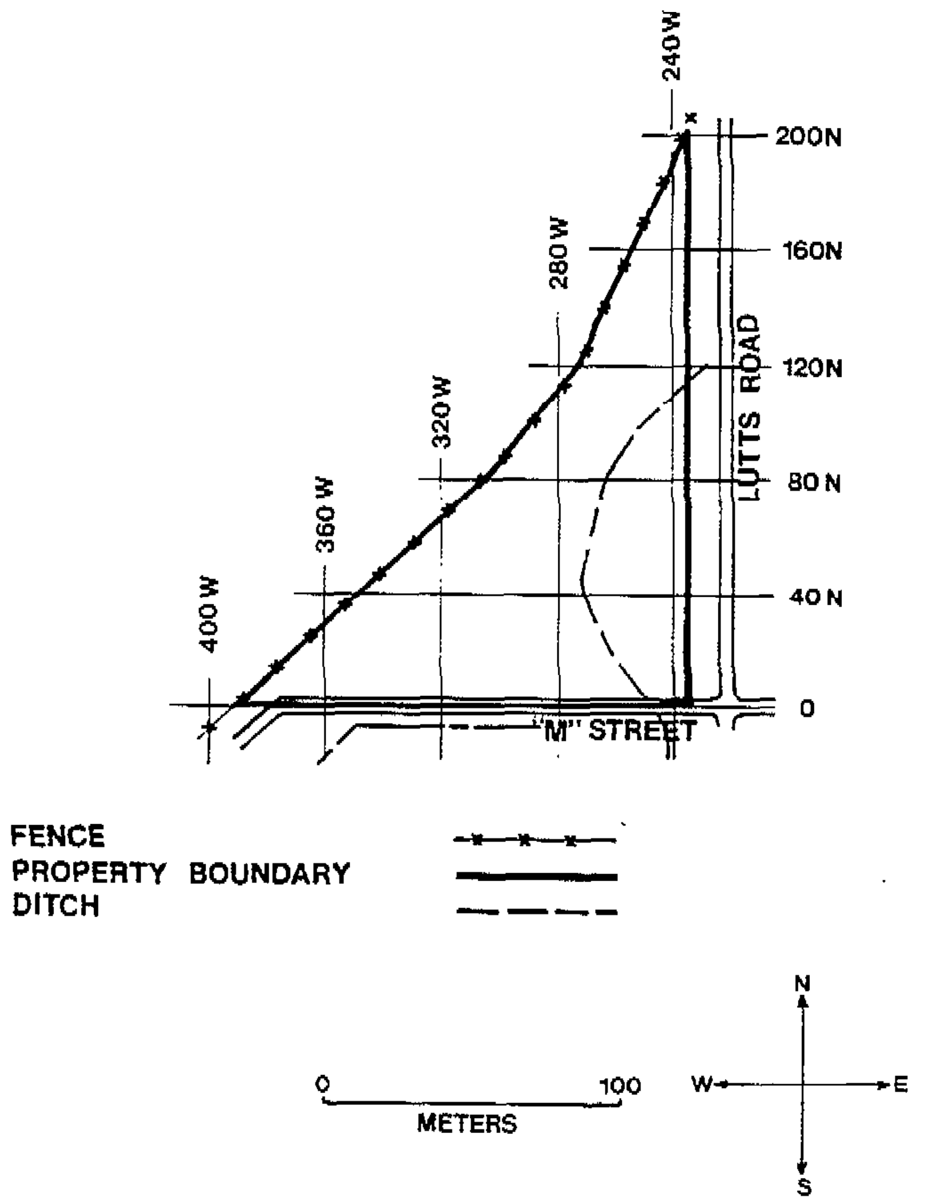

FIGURE 3. Map of Off-Site Property W Indicating the Grid System Established for Survey Reference.

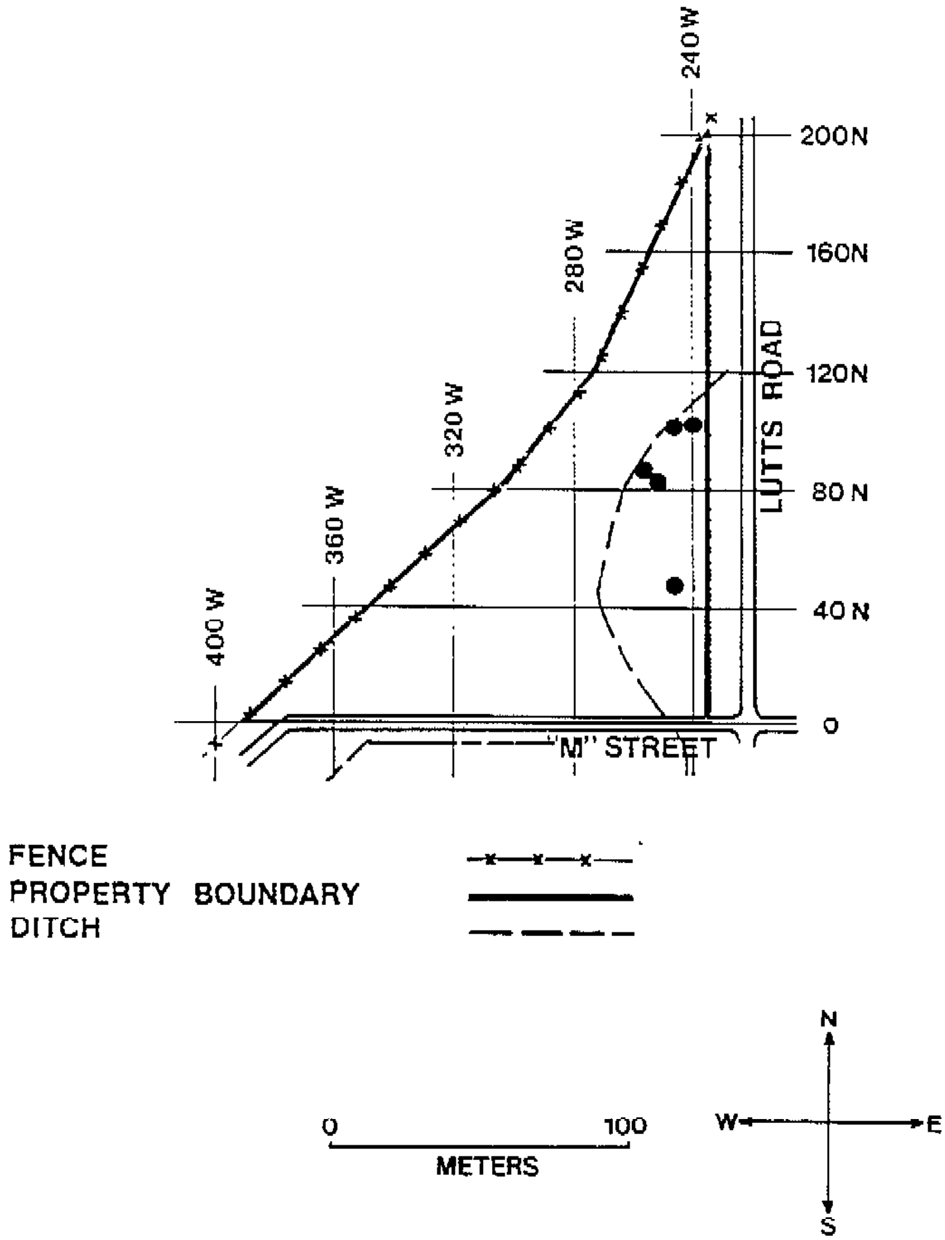

FIGURE 4. Locations of Elevated Direct Radiation Levels Identified by the Walkover Scan.

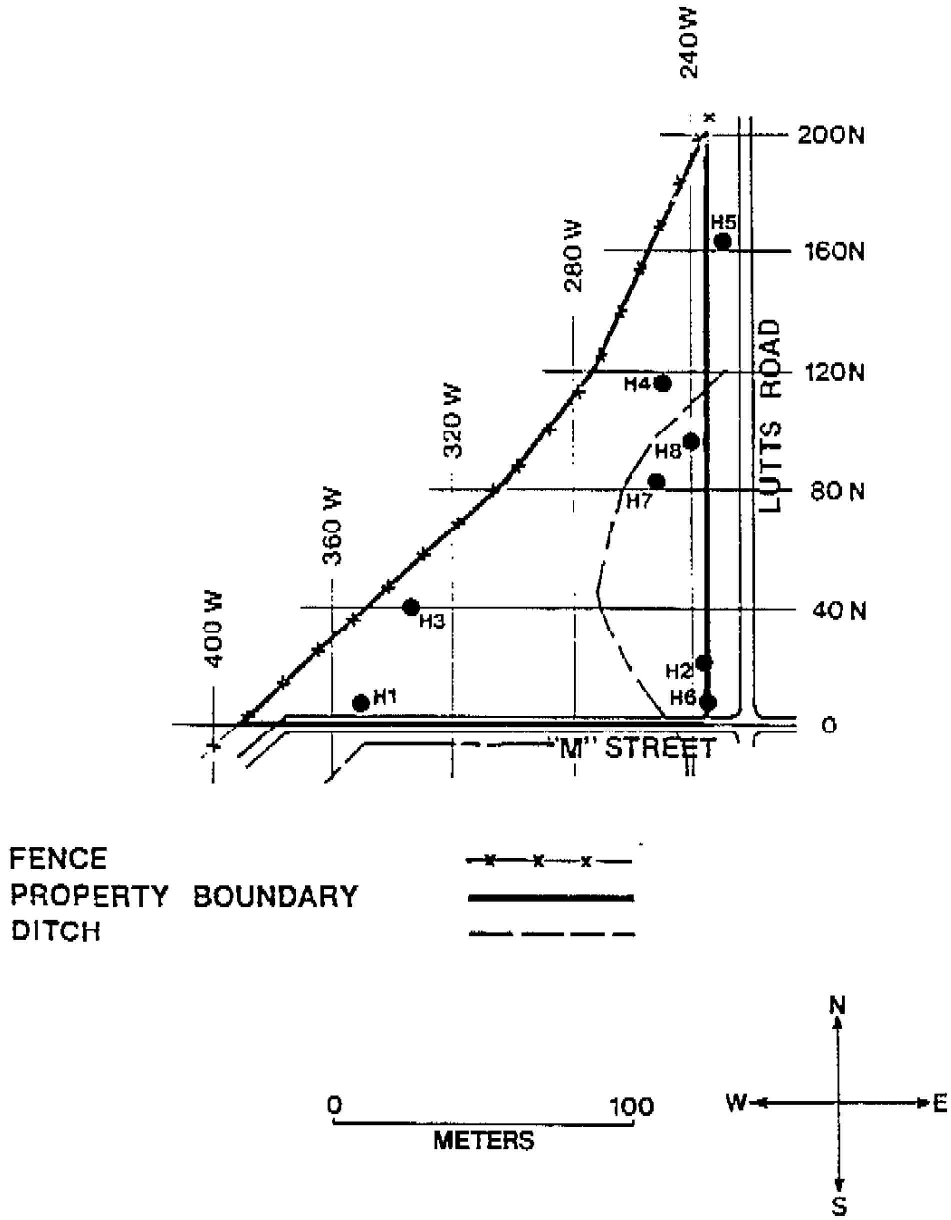

FIGURE 5. Locations of Boreholes for Subsurface Investigations.

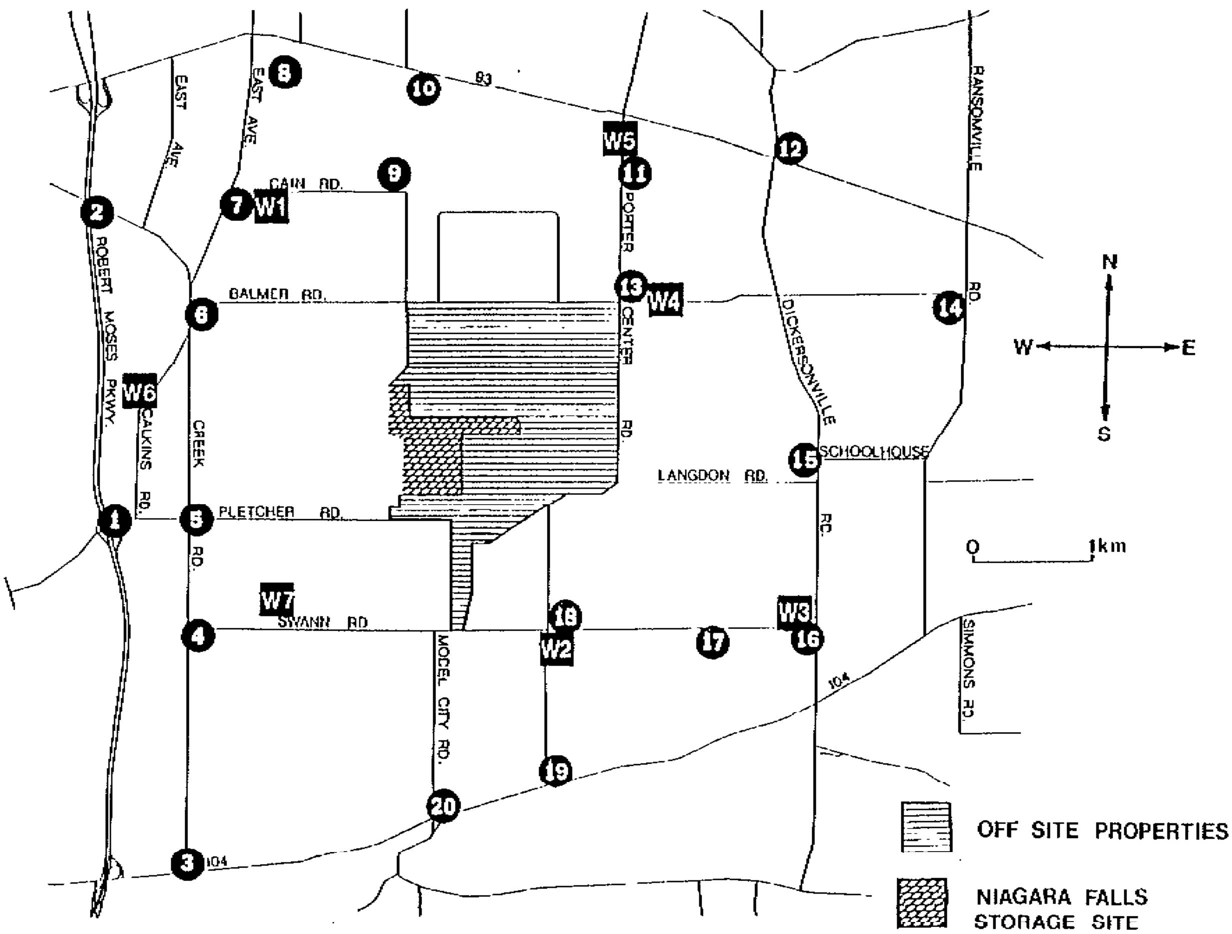

FIGURE 6. Map of Northern Niagara County, New York, Showing Locations of Background Measurements and Baseline Samples (#1-20: Soil Samples and Direct Measurements; W1-W7: Water Samples).

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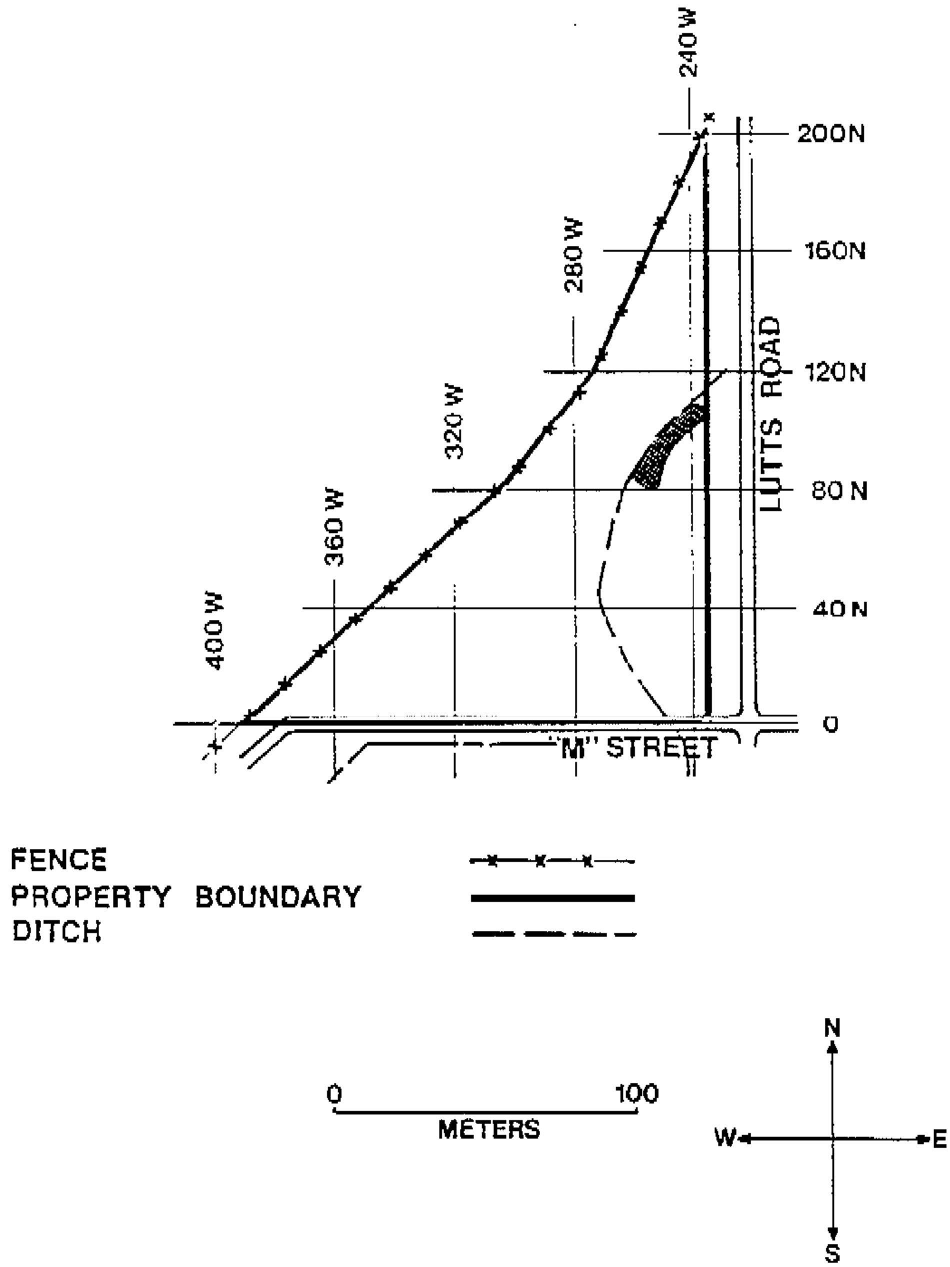

FIGURE 7. Map of NFSS Off-Site Property W Indicating Locations (Shaded) Where Ra-226 Concentrations in Soil Exceed Criteria Levels.

TABLE 1-A

BACKGROUND EXPOSURE RATES
AND
RADIONUCLIDE CONCENTRATIONS IN BASELINE SOIL SAMPLES

Location [a]	Exposure Rate [b] (μR/h)	Radionuclide Concentrations (pCi/g)				
		Ra-226	U-235	U-238	Th-232	Cs-137
1	6.8	0.74 ± 0.16[c]	<0.19	<2.89	0.70 ± 0.46	0.29 ± 0.08
2	6.8	0.75 ± 0.19	<0.19	<3.35	0.86 ± 0.24	0.24 ± 0.08
3	8.3	0.71 ± 0.18	0.46 ± 0.41	<3.72	0.88 ± 0.33	0.34 ± 0.09
4	7.9	0.67 ± 0.18	<0.22	<4.10	1.18 ± 0.35	0.12 ± 0.07
5	7.3	0.70 ± 0.16	<0.17	<3.34	0.68 ± 0.24	0.14 ± 0.07
6	7.7	0.50 ± 0.15	<0.16	<2.33	0.52 ± 0.38	0.17 ± 0.09
7	7.7	0.63 ± 0.13	<0.17	<2.73	0.83 ± 0.24	0.35 ± 0.08
8	7.6	0.59 ± 0.12	<0.14	<2.20	0.54 ± 0.23	<0.02
9	7.1	0.63 ± 0.20	<0.23	<4.16	0.83 ± 0.38	0.69 ± 0.11
10	7.1	0.70 ± 0.16	<0.19	<2.98	0.59 ± 0.25	0.69 ± 0.10
11	6.7	<0.09	<0.19	<2.83	0.49 ± 0.31	0.48 ± 0.14
12	7.1	0.48 ± 0.13	<0.16	<2.84	0.65 ± 0.26	0.68 ± 0.10
13	6.7	0.57 ± 0.14	<0.17	<2.36	0.49 ± 0.26	0.41 ± 0.08
14	6.8	0.68 ± 0.17	<0.19	<3.24	0.67 ± 0.25	0.70 ± 0.10
15	8.2	0.65 ± 0.14	<0.17	<3.20	0.72 ± 0.35	0.23 ± 0.08
16	7.4	0.91 ± 0.17	<0.71	<3.58	0.83 ± 0.28	0.61 ± 0.09
17	7.0	0.48 ± 0.14	<0.16	<2.73	0.32 ± 0.22	0.38 ± 0.08
18	7.7	0.73 ± 0.16	<0.18	6.26 ± 9.23	1.01 ± 0.44	0.32 ± 0.12
19	8.8	1.22 ± 0.22	<0.23	<3.79	1.08 ± 0.49	1.05 ± 0.13
20	8.6	0.83 ± 0.17	<0.21	<3.59	0.84 ± 0.29	0.08 ± 0.07
Range	6.8 to 8.8	<0.09 to 1.22	<0.14 to 0.46	<2.20 to 6.26	0.32 to 1.18	<0.02 to 1.05

[a] Refer to Figure 6.
[b] Measured at 1 m above the surface.
[c] Errors are 2σ based on counting statistics.

TABLE 1-B

RADIONUCLIDE CONCENTRATIONS IN BASELINE WATER SAMPLES

Location[a]	Radionuclide Concentrations (pCi/l)	
	Gross Alpha	Gross Beta
W1	0.95 ± 0.93 [b]	4.79 ± 1.15
W2	0.95 ± 0.94	9.17 ± 1.31
W3	0.55 ± 0.78	2.73 ± 1.05
W4	0.63 ± 0.89	5.37 ± 1.17
W5	0.73 ± 0.68	<0.64
W6	1.87 ± 1.84	14.3 ± 2.4
W7	1.16 ± 0.66	<0.63
Range	0.55 to 1.87	<0.63 to 14.3

[a] Refer to Figure 6.

[b] Errors are 2σ based on counting statistics.

TABLE 2

DIRECT RADIATION LEVELS MEASURED
AT APPROXIMATELY 40 M GRID INTERVALS

Grid Location	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
0 ,240W	6	6	7
0 ,280W	6	6	6
0 ,320W	6	6	6
0 ,360W	6	6	6
0 ,380W	7	7	30
40N,240W	8	8	16
40N,280W	9	8	11
40N,320W	8	8	14
40N,350W	8	8	26
80N,240W	9	9	19
80N,280W	8	8	17
80N,300W	8	8	30
120N,240W	9	8	26
120N,278W	8	8	8
160N,240W	7	8	22
200N,235W	8	8	21

TABLE 3

DIRECT RADIATION LEVELS AT LOCATIONS
IDENTIFIED BY THE WALKOVER SURFACE SCAN

Grid Point	Exposure Rate (μR/h) Contact	Exposure Rate (μR/h) 1 m above surface	Surface Dose Rate (μrad/h)	Sample[a] Identification	Contact Exposure Rate after Sample Removal (μR/h)
46N,246W	22	10	110	B1	17
80-83N,251-255W	29-68	---[b]	---	---	---
80N,253W	43	27	160	B2	40
81N,252W	68	27	120	B3	90
81N,254W	53	23	220	B4	57
83N,260W	76	20	250	B5	90
95N,250W	54	---	---	---	---
97-102N,238-242W	17-45	---	---	---	---
99N,240W	45	21	130	B6	68
98-103N,250-253W	29-55	---	---	---	---
100N,250W	36	---	---	---	---
102N,252W	55	---	---	---	---
102N,253W	42	---	---	---	---

[a] Soil concentrations presented in Table 4.
[b] Dash indicates measurement or sampling was not performed.

TABLE 4

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM APPROXIMATELY 40 M GRID INTERVALS

Grid Location	Radionuclide Concentrations (pCi/g)			
	Ra-226	U-235	U-238	Cs-137
0 240W	1.23 ± 0.28[a]	<0.22	<0.78	0.83 ± 0.14
0 280W	1.03 ± 0.23	<0.29	<0.86	1.33 ± 0.16
0 320W	0.87 ± 0.19	<0.29	<4.92	0.65 ± 0.14
0 360W	0.54 ± 0.18	0.33 ± 0.40	<0.63	0.81 ± 0.11
0 380W	1.00 ± 0.20	0.59 ± 0.47	<0.74	0.33 ± 0.10
40N 240W	0.58 ± 0.22	<0.17	0.96 ± 0.92	0.36 ± 0.15
40N 280W	0.68 ± 0.20	<0.29	4.67 ± 1.68	0.42 ± 0.09
40N 320W	1.00 ± 0.27	<0.22	0.94 ± 1.66	0.31 ± 0.15
40N 350W	0.82 ± 0.22	<0.28	3.06 ± 1.31	0.42 ± 0.09
80N 240W	0.71 ± 0.25	<0.22	<0.65	0.54 ± 0.11
80N 280W	<0.15	<0.21	1.58 ± 1.97	<0.08
80N 300W	0.68 ± 0.21	<0.27	<0.83	0.38 ± 0.09
120N 240W	0.80 ± 0.24	<0.27	<0.85	0.22 ± 0.08
120N 278W	0.51 ± 0.23	<0.27	<0.85	0.43 ± 0.09
160N 240W	0.58 ± 0.17	<0.19	1.63 ± 1.67	0.39 ± 0.13
200N 235W	0.58 ± 0.18	<0.20	2.14 ± 1.12	<0.03

[a] Errors are 2σ based on counting statistics.

TABLE 5

RADIONUCLIDE CONCENTRATIONS IN SURFACE SAMPLES
FROM SELECTED LOCATIONS IDENTIFIED BY THE WALKOVER SCAN

Sample Identification	Grid Location	Radionuclide Concentrations (pCi/g)[a]			
		Ra-226	U-235	U-238	Cs-137
B1	46N,246W	55.0 ± 1.8[b]	1.83 ± 2.30	<3.66	0.51 ± 0.17
B2	80N,253W	81.8 ± 1.8	<1.42	9.31 ± 5.68	<0.16
B3	81N,252W	102 ± 2	<1.30	<3.58	0.90 ± 0.23
B4	81N,254W	66.1 ± 1.8	4.14 ± 2.21	4.73 ± 5.30	0.80 ± 0.17
B5	83N,260W	25.3 ± 4.9	7.05 ± 3.94	10.8 ± 11.4	1.64 ± 0.40
B6[c]	99N,240W	91.4 ± 2.1	1.36 ± 2.60	<4.67	1.31 ± 0.26

[a] Refer to Table 3 for direct radiation levels.
[b] Errors are 2σ based on counting statistics.
[c] Also contains 0.35 ± 0.19 pCi/g of Sr-90.

TABLE 6

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE SOIL SAMPLES

Borehole No.[a]	Grid Location	Depth (m)	Radionuclide Concentrations (pCi/g)			
			Ra-226	U-235	U-238	Cs-137
H1	4N,351W	Surface	0.81 ± 0.33[b]	<0.27	<0.88	0.28 ± 0.10
		0.5	0.95 ± 0.23	<0.19	<0.80	<0.04
		1.0	1.29 ± 0.33	<0.35	2.70 ± 2.27	<0.05
		2.0	0.81 ± 0.20	<0.31	1.35 ± 0.96	<0.04
H2	20N,236W	Surface	0.78 ± 0.28	<0.31	0.83 ± 1.85	0.37 ± 0.11
		0.5	1.00 ± 0.26	<0.24	<0.85	<0.04
		1.0	0.69 ± 0.16	<0.28	<0.85	<0.03
		2.0	0.55 ± 0.16	<0.18	1.58 ± 1.83	<0.03
H3	40N,335W	Surface	0.68 ± 0.26	<0.19	1.84 ± 1.38	0.15 ± 0.06
		0.5	1.15 ± 0.26	<0.33	<1.06	<0.04
		1.0	0.83 ± 0.23	<0.20	<0.70	<0.02
		2.0	0.88 ± 0.24	<0.28	<0.95	<0.04
H4	118N,255W	Surface	1.01 ± 0.29	<0.27	<0.87	<0.04
		0.5	0.65 ± 0.23	<0.22	1.79 ± 1.50	<0.04
		1.0	0.84 ± 0.35	<0.27	<0.80	<0.04
		2.0	0.85 ± 0.18	<0.19	0.94 ± 1.42	<0.03
H5	160N,229W	Surface	0.83 ± 0.20	<0.25	1.36 ± 1.43	0.12 ± 0.04
		0.5	0.79 ± 0.21	<0.21	<0.69	<0.03
		1.0	1.01 ± 0.24	<0.26	2.19 ± 1.93	<0.04
		2.0	0.98 ± 0.29	<0.25	1.72 ± 1.81	<0.04
H6	4N,235W	Surface	4.00 ± 0.49	<0.29	1.75 ± 1.89	0.25 ± 0.08
		0.3	1.15 ± 0.25	<0.28	<0.92	<0.04
		0.6	1.29 ± 0.25	<0.26	1.61 ± 1.77	0.08 ± 0.13

TABLE 6, Cont.

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE SOIL SAMPLES

Borehole No.	Grid Location	Depth (m)	Radionuclide Concentrations (pCi/g)			
			Ra-226	U-235	U-238	Cs-137
H7	81N,252W	Surface	102 ± 2	<1.30	<3.58	0.90 ± 0.23
		0.15	3.93 ± 0.44	<0.39	1.60 ± 2.02	0.20 ± 0.09
		0.5	2.19 ± 0.30	<0.33	0.90 ± 1.45	<0.05
		2.0	1.01 ± 0.24	<0.29	<0.94	<0.04
H8[c]	99N,240W	Surface	91.4 ± 2.1	1.36 ± 2.60	<4.67	1.31 ± 0.26
		0.15	81.5 ± 2.0	3.23 ± 2.51	<4.39	0.42 ± 0.18
		0.5	3.59 ± 0.44	<0.30	<0.86	<0.04
		1.0	4.20 ± 0.49	<0.40	3.15 ± 1.44	<0.04
		2.0	2.38 ± 0.29	0.33 ± 0.54	<0.73	<0.04

[a] Refer to Figure 5.
[b] Errors are 2σ based on counting statistics.
[c] Also contains 0.35 ± 0.19 pCi/g of Sr-90 at surface and 0.23 ± 0.18 pCi/g of Sr-90 at 0.15 m depth.

TABLE 7

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE WATER SAMPLES

Sample Identification	Sample Type	Grid Location	Radionuclide Concentrations (pCi/l)	
			Gross Alpha	Gross Beta
W1	Subsurface (Borehole H2)[a]	20N,236W	<0.66	1.00 ± 1.08[b]
W2	Subsurface (Borehole H3)	40N,335W	7.09 ± 3.88	6.88 ± 3.61
W3	Subsurface (Borehole H5)	160N,229W	4.23 ± 1.49	6.62 ± 1.42

[a] Refer to Figure 5.

[b] Errors are 2σ based on counting statistics.

Excavated Area

Excerpt from Post-Remedial Action Report for the Niagara Falls Storage Site Vicinity Properties—1985 and 1986

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DOE/OR/20722-133

Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-AC05-81OR20722

POST-REMEDIAL ACTION REPORT FOR THE NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES—1985 AND 1986

Lewiston, New York

January 1989

Bechtel National, Inc.

C22/F-1134.1

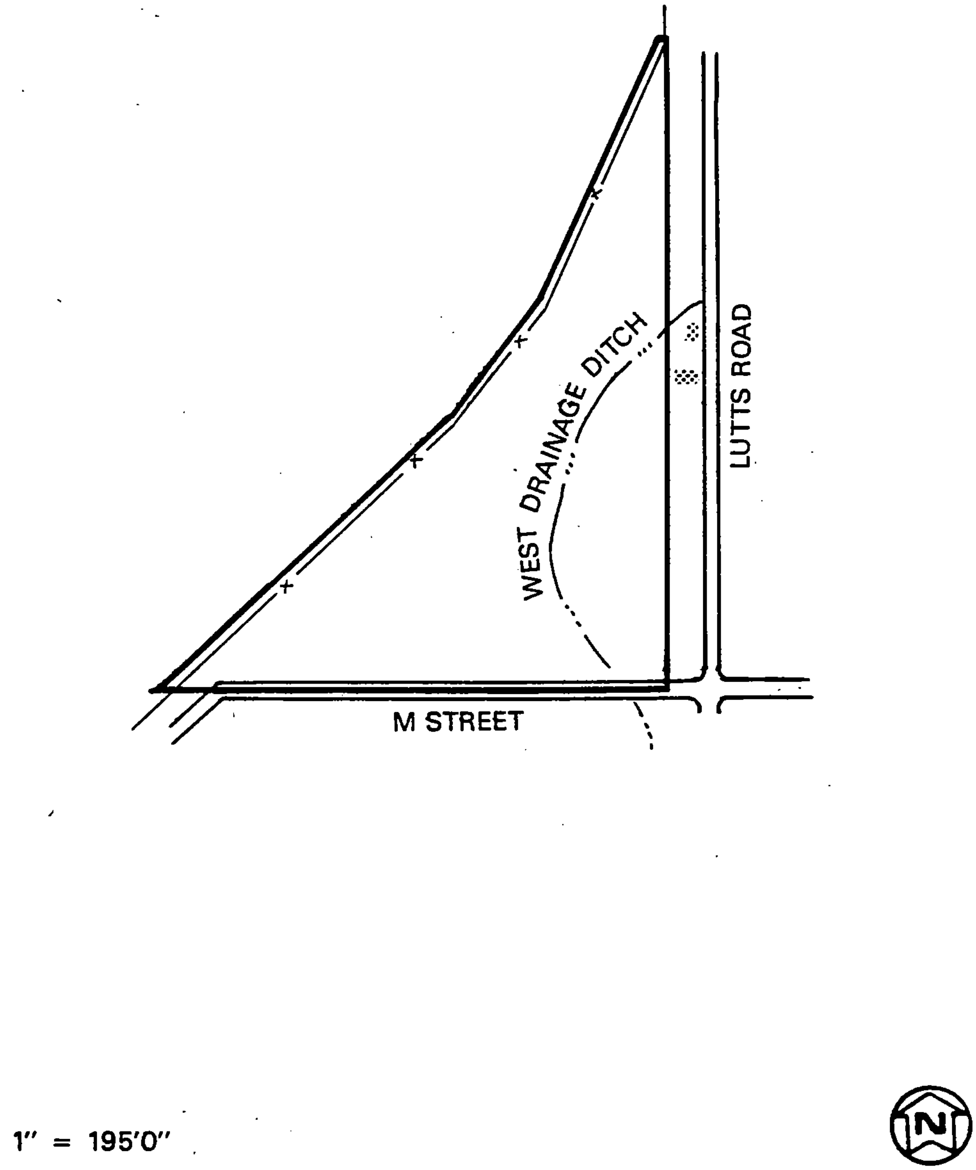

FIGURE 37 EXCAVATED AREAS ON PROPERTY W

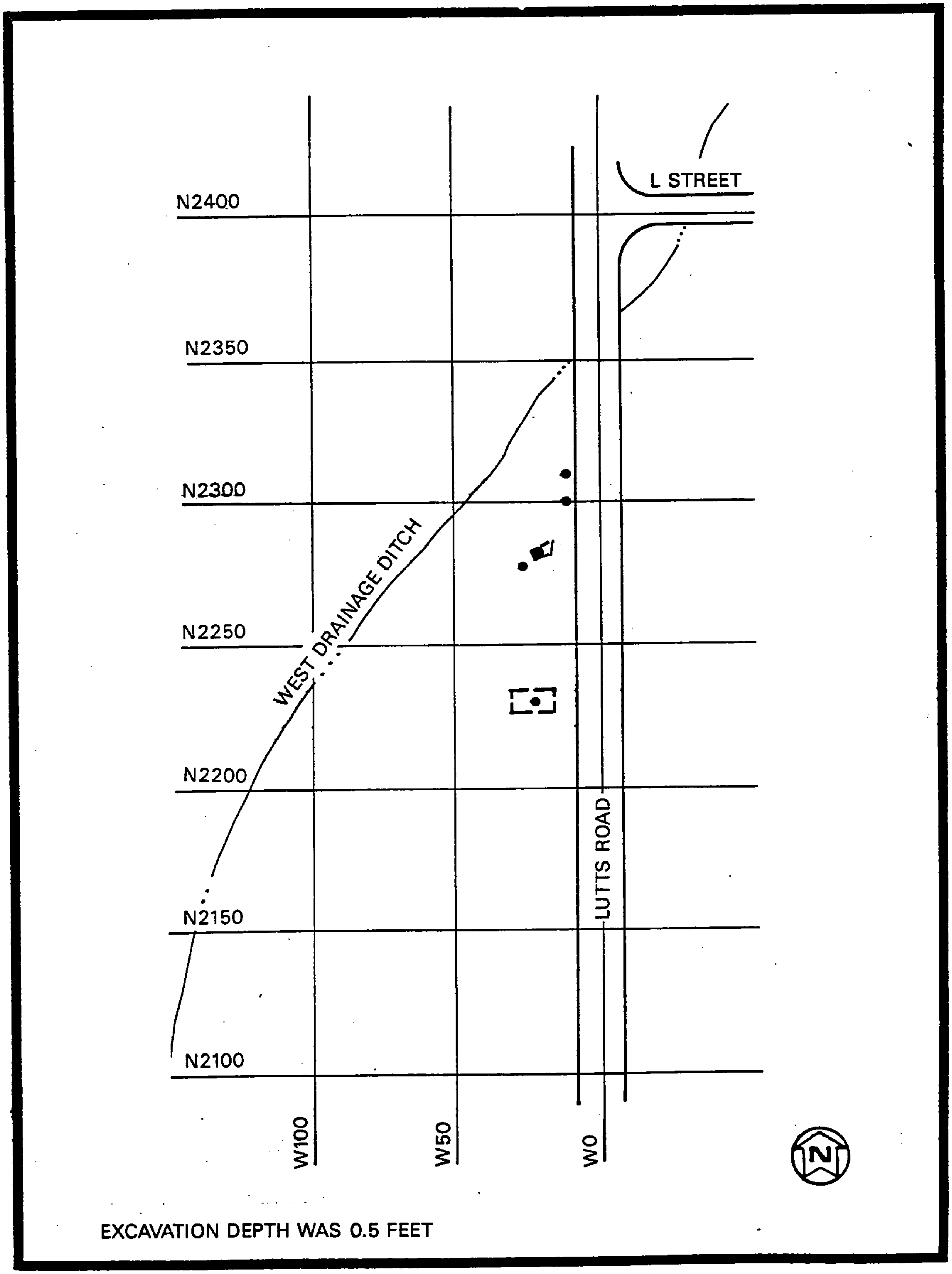

FIGURE 38 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY W

TABLE 11

POST-REMEDIAL ACTION SAMPLING RESULTS

FOR PROPERTY W

Grid Coordinates		Concentrations (pCi/g +/- 1 sigma)		
E,W	N,S	Uranium-238	Radium-226	Thorium-232
W0010	N2300	A	4.3 ± 0.2	1.0 ± 0.2
W0010	N2310	A	1.2 ± 0.1	1.7 ± 0.2
W0021	N2280	3.6 ± 1.3	1.0 ± 0.1	1.5 ± 0.2
W0022	N2230	A	1.8 ± 0.4	2.0 ± 0.4
W0026	N2277	A	4.1 ± 0.2	0.8 ± 0.2

'A' denotes less than detectable activity.

Verification Data

Excerpt from Verification of 1985 and 1986 Remedial Actions, Niagara Falls Storage Site Vicinity Properties, Lewiston, New York, July 1990

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NY.17

(VP.)

Prepared by
Oak Ridge Associated
Universities

Prepared for the
Decontamination and
Decommissioning
Division

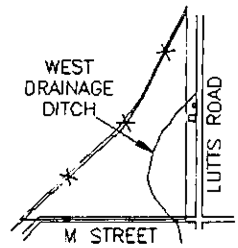
U.S. Department
of Energy

VERIFICATION OF 1985 AND 1986 REMEDIAL ACTIONS NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES LEWISTON, NEW YORK

J. D. BERGER

Environmental Survey and Site Assessment Program
Energy/Environment Systems Division

FINAL REPORT
JULY 1990



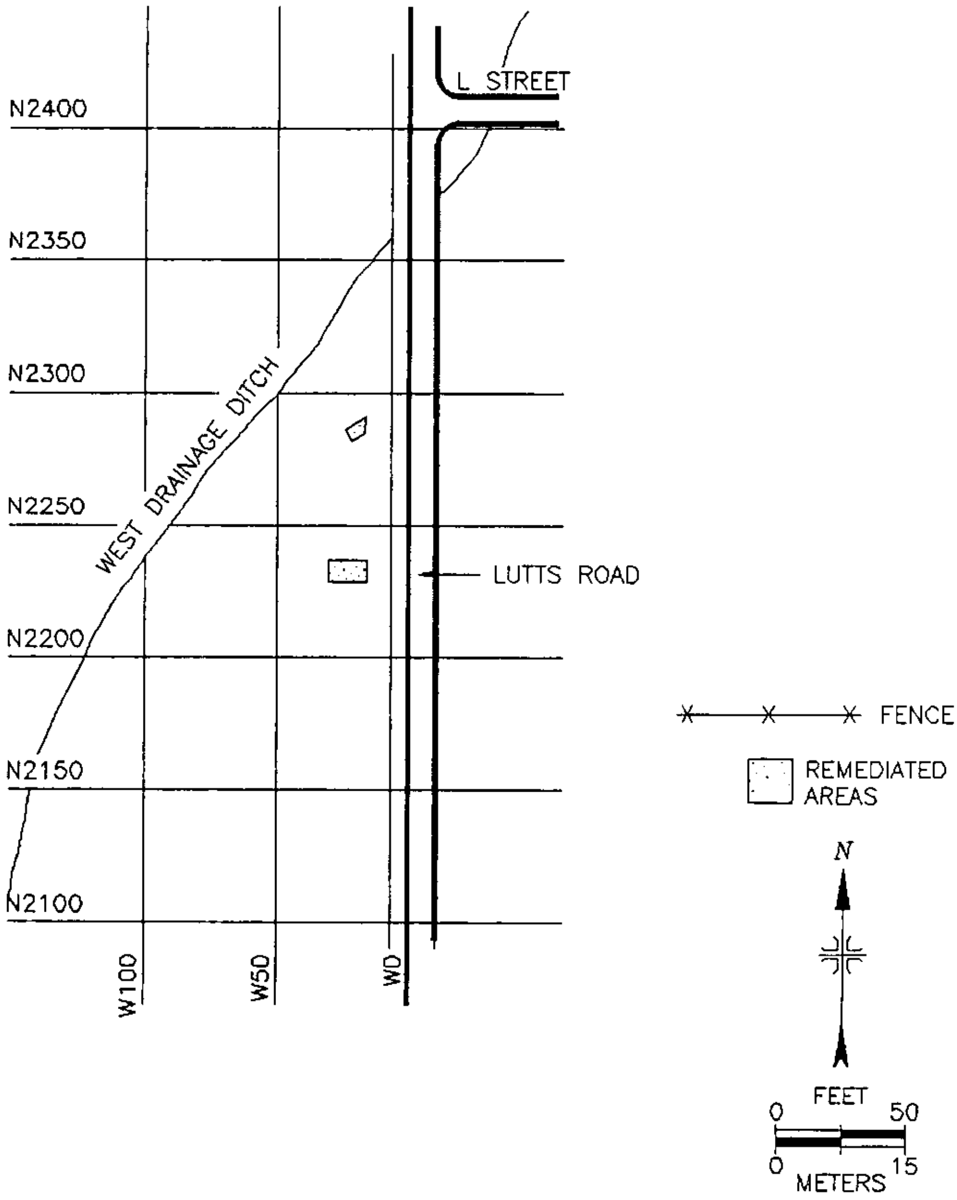


FIGURE 31: Plot Plan of Remediated Areas of Vicinity Property W

TABLE 12

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM PROPERTY W
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a]		Radionuclide Concentrations (pCi/g)		
N	W	Ra-226	U-238	Th-232
2138	121	3.4 ± 1.2[b]	1.8 ± 1.3	1.2 ± 0.4
2227	55	1.0 ± 0.3	0.6 ± 1.2	0.9 ± 0.3
2227	111	0.8 ± 0.3	<0.6	0.7 ± 0.3
2250	65	1.3 ± 0.3	1.5 ± 1.7	1.0 ± 0.4
2267	72	1.1 ± 0.3	<0.8	1.1 ± 0.4
2272	34	5.2 ± 0.5	<0.8	0.9 ± 0.6
2276	49	1.7 ± 0.3	0.5 ± 1.3	0.6 ± 0.5

[a]Refer to Figure 31.
[b]Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

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Appendix F

NFSS Vicinity Property X

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Assessment Data

Excerpt from Comprehensive Radiological Survey
Off-Site Property X
Niagara Falls Storage Site

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COMPREHENSIVE RADIOLOGICAL SURVEY

OFF-SITE PROPERTY X
NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

Prepared for

U.S. Department of Energy
as part of the
Formerly Utilized Sites -- Remedial Action Program

J.D. Berger

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Prepared by

Radiological Site Assessment Program
Manpower Education, Research, and Training Division
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Oak Ridge, Tennessee 37831-0117

FINAL REPORT

May 1984

This report is based on work performed under contract number DE-AC05-76OR00033 with the Department of Energy.

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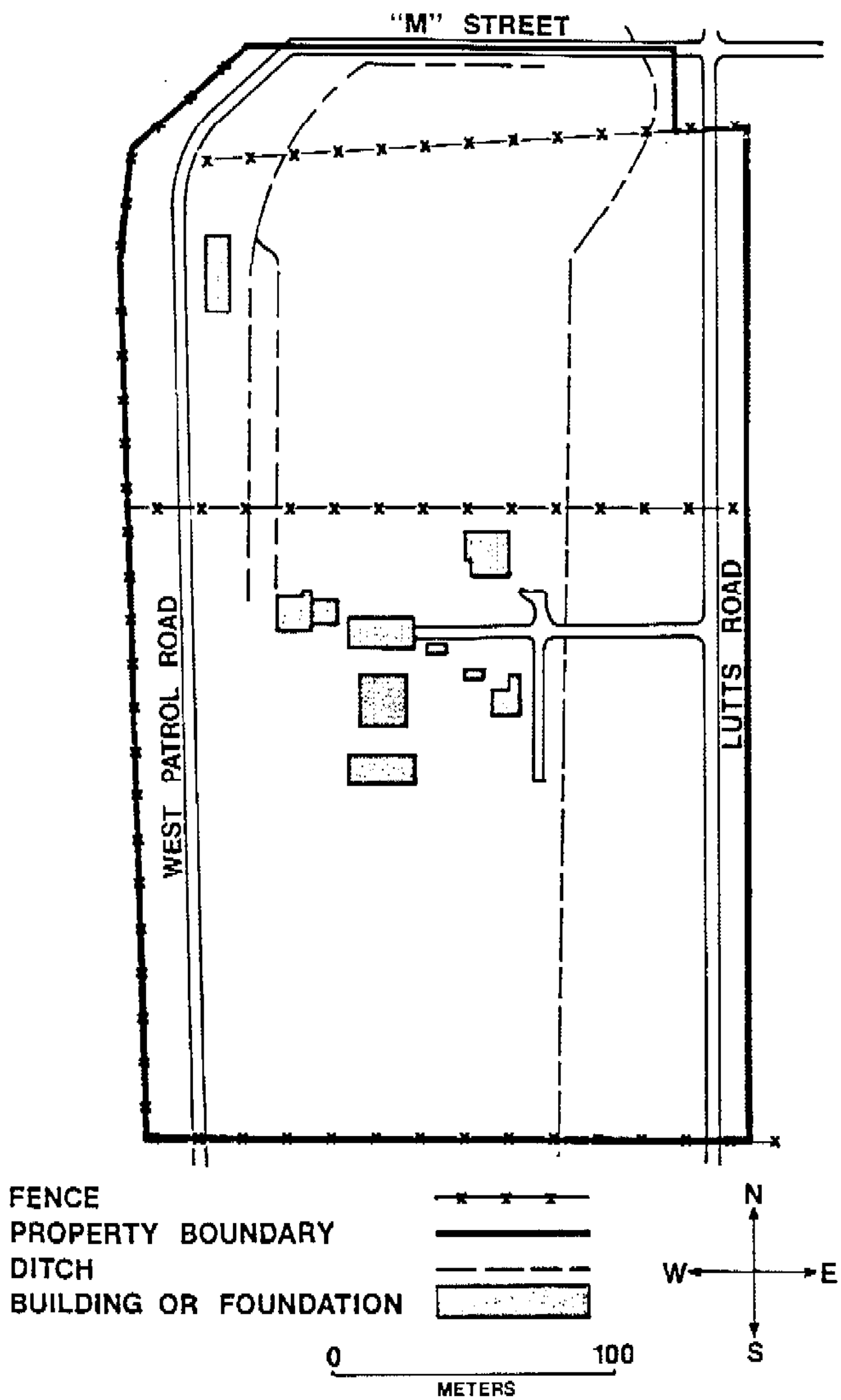

FIGURE 2. Plan View of NFSS Off-Site Property X Indicating Prominent Surface Features.

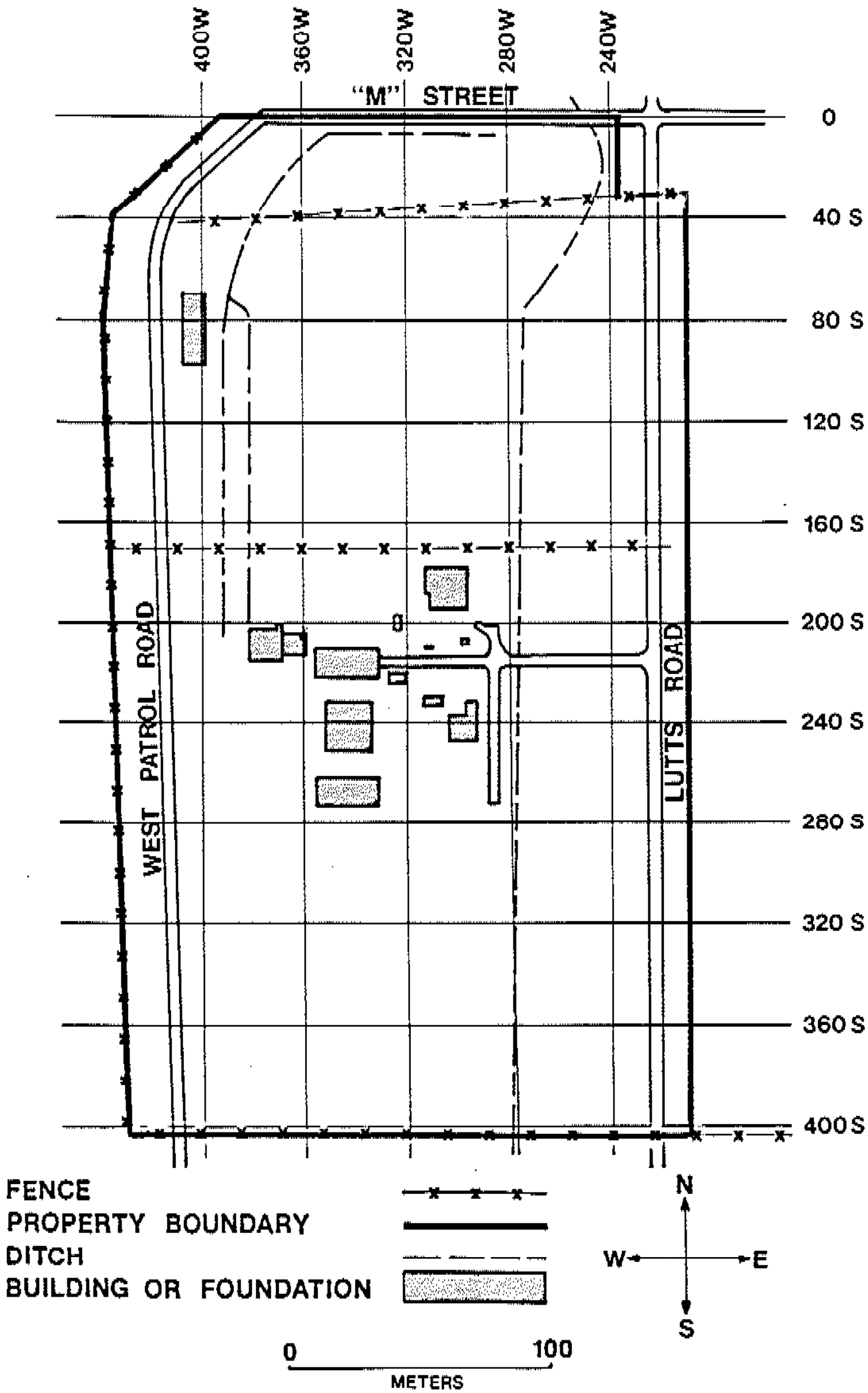

FIGURE 3. Plan View of NFSS Off-Site Property X Indicating the Grid System Established for Survey Reference.

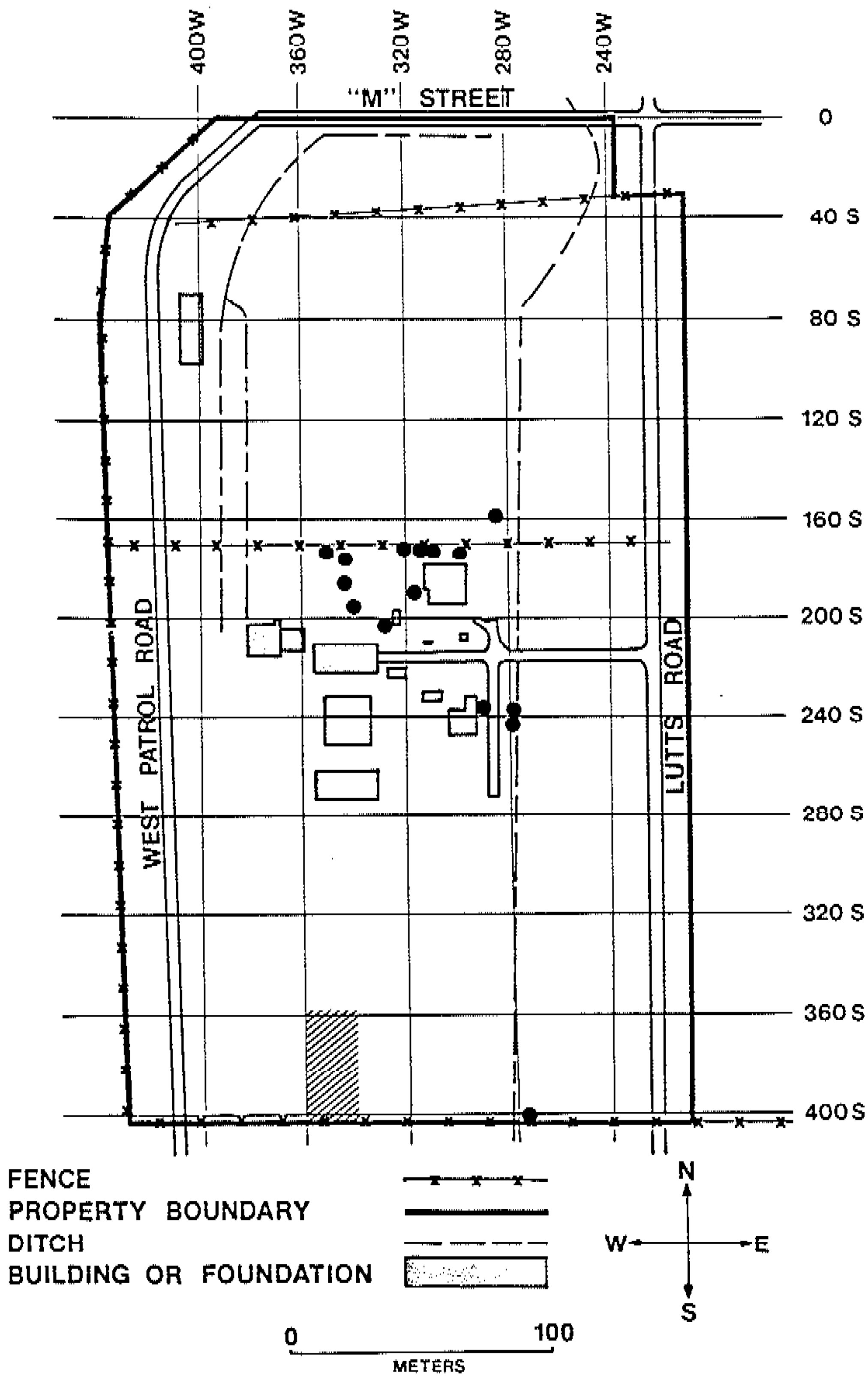

FIGURE 4. Locations of Areas of Elevated Direct Radiation. (Dots indicate small areas and cross hatching indicates a larger general area.)

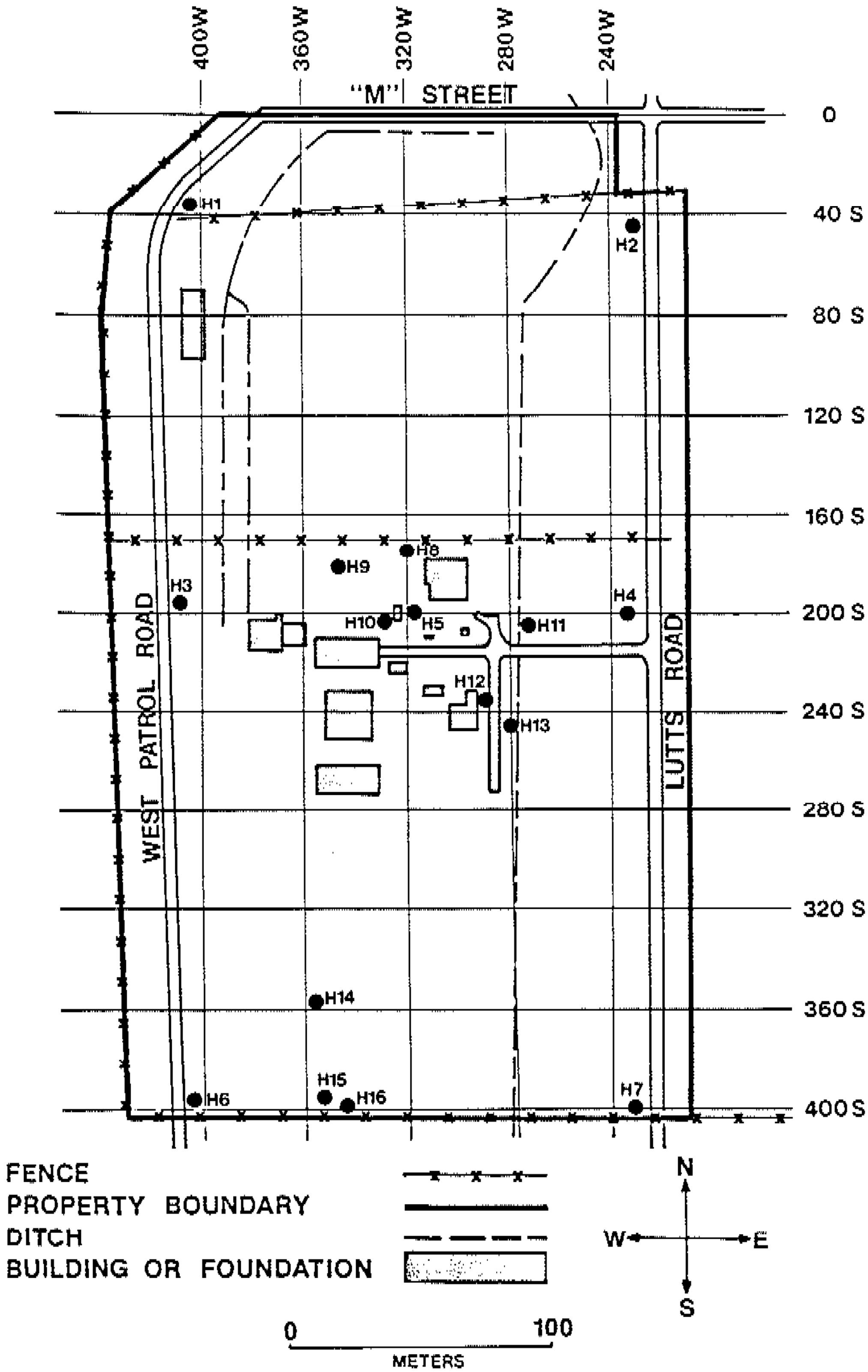

FIGURE 5. Locations of Boreholes for Subsurface Investigations.

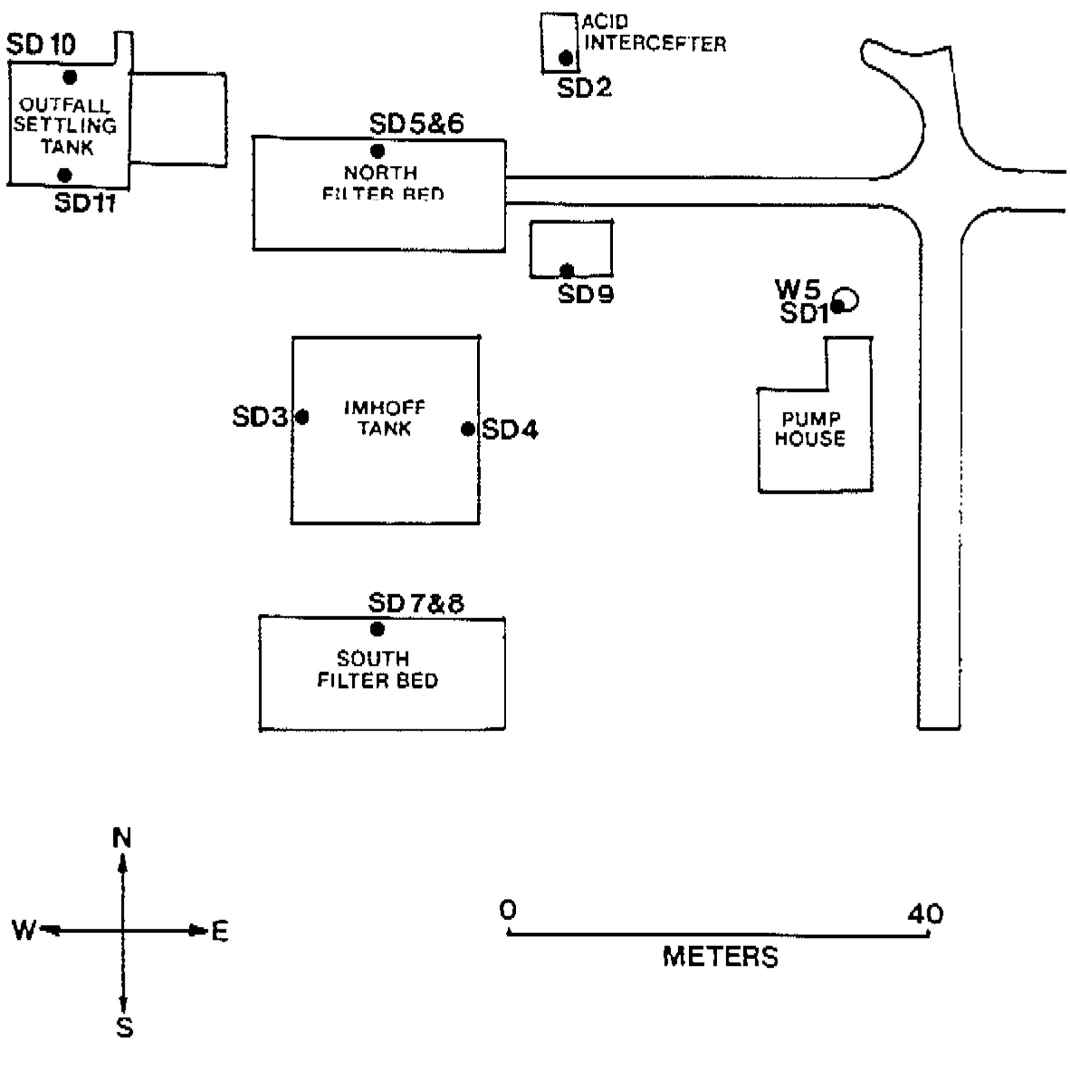

FIGURE 6. Sewage Treatment Facilities, Indicating Locations of Sediment and Water Samples.

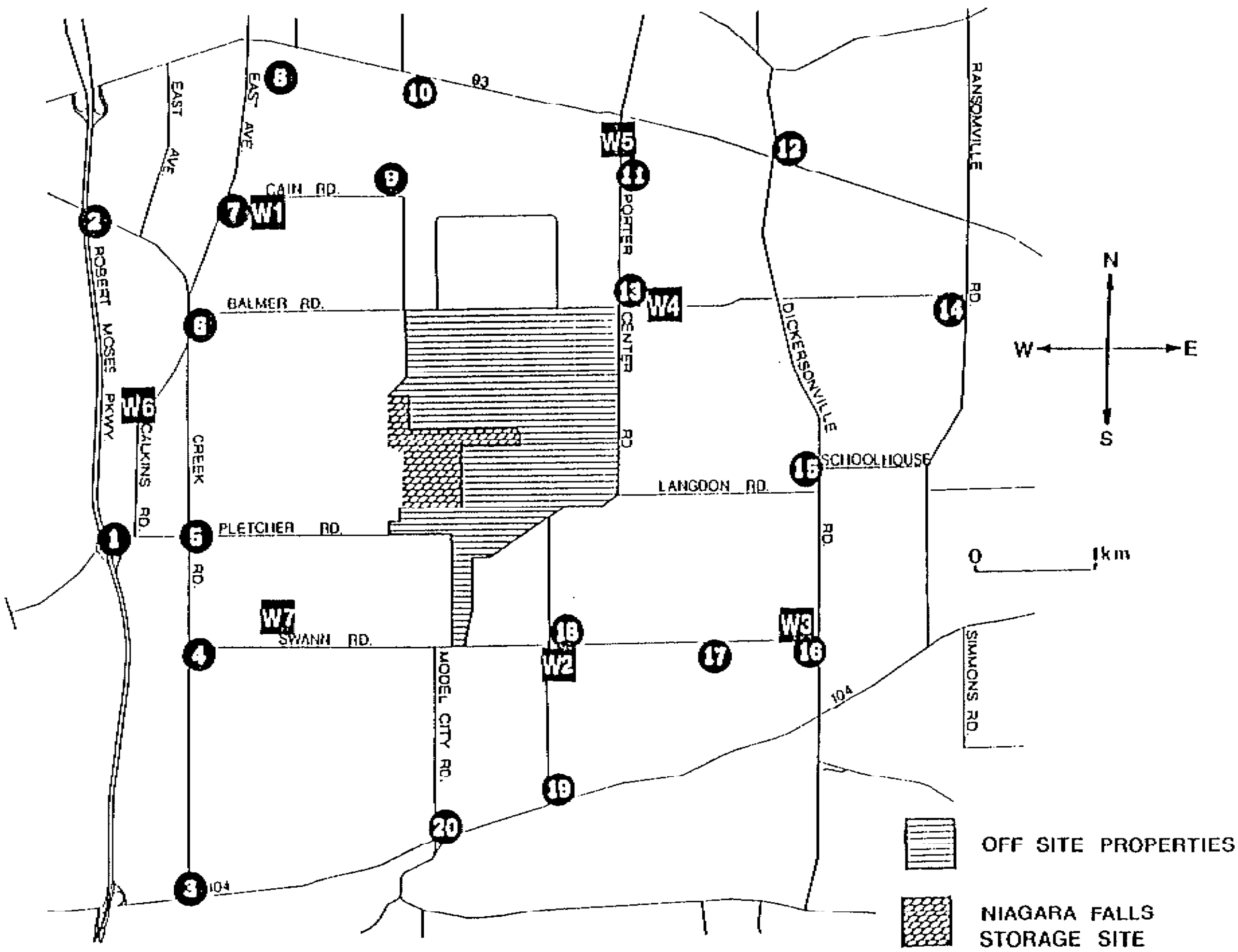

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FIGURE 7. Map of Northern Niagara County, New York, Showing Locations of Background Measurements and Baseline Samples. (#1-20: soil samples and direct measurements; W1-W7: water samples)

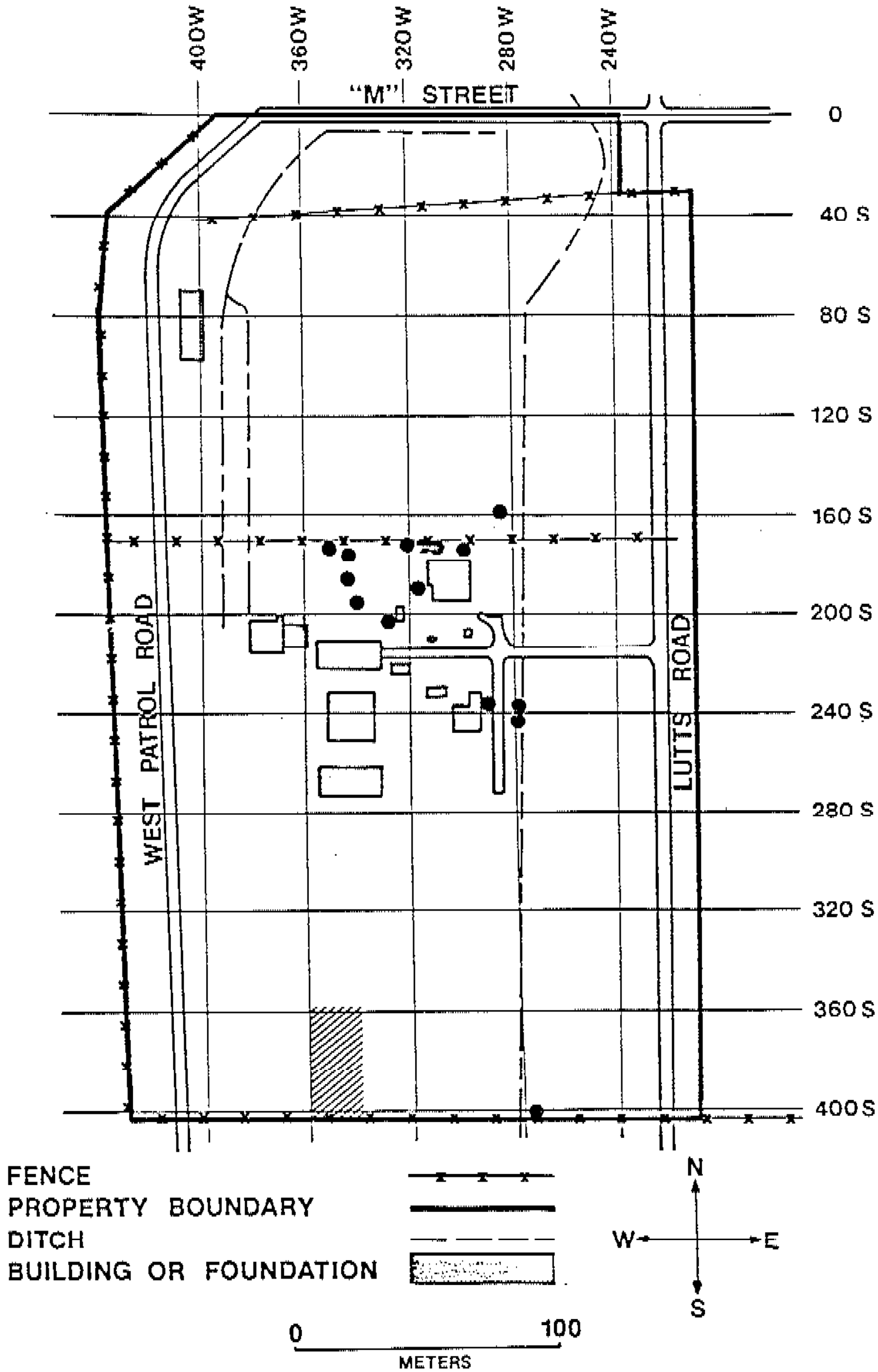

FIGURE 8. Map of NFSS Off-Site Property X Indicating Areas Where Radionuclide Concentrations in Soil Exceed Criteria. (Cross hatching indicates a large general area and dots indicate small isolated areas or "hot spots.")

TABLE 1-A

BACKGROUND EXPOSURE RATES AND BASELINE RADIONUCLIDE CONCENTRATIONS IN SOIL

Location[a]	Exposure Rate[b] (μR/h)	Radionuclide Concentrations (pCi/g)				
		Ra-226	U-235	U-238	Th-232	Cs-137
1	6.8	0.74 ± 0.16[c]	<0.19	<2.89	0.70 ± 0.46	0.29 ± 0.08
2	6.8	0.75 ± 0.19	<0.19	<3.35	<0.22	0.24 ± 0.08
3	8.3	0.71 ± 0.18	0.46 ± 0.41	<3.72	0.88 ± 0.33	0.34 ± 0.09
4	7.9	0.67 ± 0.18	<0.22	<4.10	1.18 ± 0.35	0.12 ± 0.07
5	7.3	0.70 ± 0.16	<0.17	<3.34	0.68 ± 0.24	0.14 ± 0.07
6	7.7	0.50 ± 0.15	<0.16	<2.33	0.52 ± 0.38	0.17 ± 0.09
7	7.7	0.63 ± 0.13	<0.17	<2.73	0.83 ± 0.24	0.35 ± 0.08
8	7.6	0.59 ± 0.12	<0.14	<2.20	0.54 ± 0.23	<0.02
9	7.1	0.63 ± 0.20	<0.23	<4.16	0.83 ± 0.38	0.69 ± 0.11
10	7.1	0.70 ± 0.16	<0.19	<2.98	<0.18	0.69 ± 0.10
11	6.7	<0.09	<0.19	<2.83	0.49 ± 0.31	0.48 ± 0.14
12	7.1	0.48 ± 0.13	<0.16	<2.84	0.65 ± 0.26	0.68 ± 0.10
13	6.7	0.57 ± 0.14	<0.17	<2.36	0.49 ± 0.26	0.41 ± 0.08
14	6.8	0.68 ± 0.17	<0.19	<3.24	0.67 ± 0.25	0.70 ± 0.10
15	8.2	0.65 ± 0.14	<0.17	<3.20	0.72 ± 0.35	0.23 ± 0.08
16	7.4	0.91 ± 0.17	<0.21	<3.58	0.83 ± 0.28	0.61 ± 0.09
17	7.0	0.48 ± 0.14	<0.16	<2.73	0.32 ± 0.22	0.38 ± 0.08
18	7.7	0.73 ± 0.16	<0.18	6.26 ± 9.23	<0.23	0.32 ± 0.12
19	8.8	1.22 ± 0.22	<0.23	<3.79	1.08 ± 0.49	1.05 ± 0.13
20	8.6	0.83 ± 0.17	<0.21	<3.59	0.84 ± 0.29	0.08 ± 0.07
Range	*6.8 to 8.8*	*<0.09 to 1.22*	*<0.14 to 0.46*	*<2.20 to 6.26*	*<0.18 to 1.18*	*<0.02 to 1.05*

[a] Refer to Figure 7.
[b] Measured at 1 m above the surface.
[c] Errors is 2σ based on counting statistics only.

TABLE 1-B

RADIONUCLIDE CONCENTRATIONS IN BASELINE WATER SAMPLES

Location[a]	Radionuclide Concentrations (pCi/l)	
	Gross Alpha	Gross Beta
W1	0.95 ± 0.93 [b]	4.79 ± 1.15
W2	0.95 ± 0.94	9.17 ± 1.31
W3	0.55 ± 0.78	2.73 ± 1.05
W4	0.63 ± 0.89	5.37 ± 1.17
W5	0.73 ± 0.68	<0.64
W6	1.87 ± 1.84	14.3 ± 2.4
W7	1.16 ± 0.66	<0.63
Range	0.55 to 1.87	<0.63 to 14.3

[a] Refer to Figure 7.
[b] Errors are 2σ based on counting statistics.

TABLE 2

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED
AT 40 M GRID INTERVALS

Grid Location S	Grid Location W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
0	240	6	6	7
0	280	6	6	6
0	320	6	6	6
0	360	6	6	6
0	380	7	7	30
40	212	8	9	19
40	240	9	9	24
40	280	9	10	37
40	320	7	7	30
40	360	8	8	38
40	400	8	9	12
40	435	8	8	21
80	212	8	9	25
80	240	8	8	32
80	280	10	11	29
80	320	8	8	21
80	360	8	8	9
80	400	8	8	9
80	435	7	8	14
120	212	8	8	8
120	240	7	8	17
120	280	9	9	13
120	320	8	9	12
120	360	8	8	8
120	400	8	8	21
120	438	7	8	19
160	212	8	8	10
160	240	7	8	8
160	280	9	9	17
160	320	8	9	28
160	360	8	9	24
160	400	8	8	19
160	436	8	8	16
200	212	7	8	16
200	240	8	9	13
200	280	8	8	8

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED
AT 40 M GRID INTERVALS

Grid Location S	Grid Location W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
200	320	7	7	7
200	360	9	9	28
200	400	7	7	11
200	440	7	8	9
240	212	8	8	8
240	240	8	9	9
240	280	10	10	47
240	320	6	6	6
240	360	8	9	9
240	400	7	8	26
240	438	8	8	21
280	212	8	8	21
280	240	8	8	24
280	280	9	8	24
280	320	7	7	13
280	360	7	7	11
280	400	8	7	32
280	432	8	8	12
320	212	8	9	9
320	240	8	8	23
320	280	10	10	23
320	320	8	8	8
320	360	8	8	27
320	400	9	9	22
320	432	7	7	13
360	212	8	8	16
360	240	8	8	22
360	280	12	12	24
360	320	10	10	24
360	360	12	13	29
360	400	9	9	29
360	428	8	8	8
400	212	8	9	9
400	240	8	9	23
400	280	11	11	24
400	320	8	9	9

TABLE 2, cont.

DIRECT RADIATION LEVELS SYSTEMATICALLY MEASURED
AT 40 M GRID INTERVALS

Grid Location S	Grid Location W	Gamma Exposure Rates at 1 m Above the Surface (μR/h)	Gamma Exposure Rates at the Surface (μR/h)	Beta-Gamma Dose Rates at 1 cm Above the Surface (μrad/h)
400	360	12	10	17
400	400	10	10	40
400	428	8	8	21
404	212	8	8	16
404	240	8	8	8
404	280	10	11	21
404	320	9	9	19
404	360	12	12	29
404	400	9	10	16
404	428	8	9	15

TABLE 3

DIRECT RADIATION LEVELS AT LOCATIONS IDENTIFIED
BY THE WALKOVER SURFACE SCAN

Grid Location		Exposure Rate (μR/h)		Surface Dose Rate (μrad/h)	Sample Identification[b]	Contact Exposure Rate After Sample Removal (μR/h)
S	W	Contact	1 m Above Surface			
160	290	18	10	20	B1	18
170	310	22	--[c]	--	--	--
170	315	25	--	--	--	--
170	320	68	20	240	B2	54
172	350	68	17	280	B3	59
175	305	53	--	--	--	--
175	345	40	--	--	--	--
181	345	46	25	100	B4	43
185	315	25	12	45	B5	25
194	342	35	--	--	--	--
203	330	34	17	41	B6	35
230-235	288-293	25-43	--	--	--	--
230	290	43	16	100	B7	40
234	291	39	--	--	--	--
239	280	22	--	--	--	--
242	280	27	13	--	B8	40
355-404	340-360	14-84	--	--	--	--
359	359	20	13	58	B9	18
380	350	16	--	--	--	--
392	352	84	26	220	B10	56
396	352	29	--	--	--	--
400	344	31	16	100	b11	29
404	276	25	14	46	B12	20

[a] Refer to Figure 4.
[b] Radionuclide concentrations are presented in Table 5.
[c] Dash indicates measurement or sampling not performed.

TABLE 4

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES FROM 40 M GRID INTERVALS

Grid Location S	Grid Location W	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137	Th-232
0	240	1.21 ± 0.28a	<0.22	<0.78	0.83 ± 0.14	0.41 ± 0.27
0	280	1.03 ± 0.23	<0.29	<0.86	1.33 ± 0.16	0.62 ± 0.24
0	320	0.88 ± 0.19	<0.29	<4.92	0.65 ± 0.14	0.71 ± 0.38
0	360	0.54 ± 0.19	0.33 ± 0.40	<0.63	0.81 ± 0.11	<0.12
0	380	1.00 ± 0.20	0.59 ± 0.47	<0.74	0.33 ± 0.10	0.71 ± 0.37
40	210	1.56 ± 0.31	<0.19	1.59 ± 0.88	0.65 ± 0.15	0.83 ± 0.42
40	240	0.95 ± 0.30	<0.25	<0.86	0.37 ± 0.11	0.92 ± 0.38
40	280	2.69 ± 0.41	<0.22	1.51 ± 0.73	1.00 ± 0.17	0.96 ± 0.34
40	320	0.68 ± 0.25	<0.32	<0.96	0.94 ± 0.15	0.93 ± 0.40
40	360	0.89 ± 0.20	<0.27	1.32 ± 1.19	<0.04	1.15 ± 0.35
40	400	0.98 ± 0.25	<0.29	<0.88	0.75 ± 0.16	0.90 ± 0.42
40	440	0.89 ± 0.26	<0.26	0.87 ± 1.59	0.68 ± 0.15	0.77 ± 0.50
80	210	0.89 ± 0.26	<0.16	1.63 ± 0.91	0.49 ± 0.13	0.86 ± 0.46
80	240	0.83 ± 0.19	<0.28	<0.89	0.26 ± 0.08	1.15 ± 0.28
80	280	2.33 ± 0.39	<0.39	1.69 ± 1.66	0.57 ± 0.15	1.20 ± 0.46
80	320	0.90 ± 0.21	<0.17	0.64 ± 0.97	0.13 ± 0.09	0.87 ± 0.27
80	360	0.83 ± 0.23	<0.19	2.00 ± 1.64	<0.04	0.87 ± 0.36
80	400	0.88 ± 0.38	<0.30	2.03 ± 3.28	0.10 ± 0.09	1.04 ± 0.39
80	440	0.80 ± 0.24	<0.19	<0.71	0.48 ± 0.12	0.85 ± 0.30
120	210	0.98 ± 0.33	<0.32	<1.02	0.71 ± 0.14	0.68 ± 0.50
120	240	0.73 ± 0.26	<0.30	<0.99	<0.04	0.79 ± 0.58
120	280	1.33 ± 0.35	<0.35	<1.02	0.56 ± 0.14	1.09 ± 0.33
120	320	0.73 ± 0.26	<0.22	1.04 ± 1.73	0.27 ± 0.08	1.35 ± 0.44
120	360	0.78 ± 0.19	<0.15	1.16 ± 0.77	0.35 ± 0.08	1.35 ± 0.44
120	400	0.98 ± 0.21	<0.16	1.07 ± 0.75	<0.04	0.78 ± 0.28
120	440	0.88 ± 0.35	<0.32	1.84 ± 1.15	0.16 ± 0.12	<0.30
160	210	0.93 ± 0.29	<0.33	<1.00	0.46 ± 0.12	0.83 ± 0.48
160	240	0.49 ± 0.19	<0.14	0.50 ± 0.70	<0.03	0.44 ± 0.25
160	280	0.89 ± 0.25	0.60 ± 0.62	1.13 ± 1.84	0.22 ± 0.15	0.58 ± 0.48
160	320	0.76 ± 0.28	<0.21	1.80 ± 1.86	0.64 ± 0.13	0.85 ± 0.36
160	360	1.34 ± 0.34	<0.37	<1.14	0.63 ± 0.14	1.68 ± 0.71
160	400	0.84 ± 0.24	<0.25	<0.80	0.47 ± 0.09	0.85 ± 0.30
160	440	1.16 ± 0.26	0.38 ± 0.23	0.86 ± 0.64	0.60 ± 0.11	0.94 ± 0.41
200	210	0.83 ± 0.41	<0.19	0.65 ± 1.87	0.56 ± 0.11	0.98 ± 0.36
200	240	0.81 ± 0.31	0.22 ± 0.46	1.33 ± 0.85	0.17 ± 0.08	1.24 ± 0.34

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES FROM 40 M GRID INTERVALS

Grid Location S	Grid Location W	Ra-226	U-235	U-238	Cs-137	Th-232
		Radionuclide Concentrations (pCi/g)				
200	280	0.56 ± 0.16	<0.14	0.63 ± 0.74	0.10 ± 0.07	0.41 ± 0.33
200	320	0.54 ± 0.18	0.24 ± 0.26	<0.49	0.08 ± 0.04	0.25 ± 0.30
200	360	1.28 ± 0.31	<0.32	1.93 ± 1.50	0.78 ± 0.14	1.13 ± 0.42
200	400	0.96 ± 0.25	<0.24	0.75 ± 1.73	0.98 ± 0.15	0.58 ± 0.32
200	440	0.81 ± 0.20	<0.21	1.22 ± 1.84	0.42 ± 0.11	0.98 ± 0.37
240	212	0.84 ± 0.23	<0.20	<0.78	0.39 ± 0.11	0.68 ± 0.31
240	240	0.69 ± 0.23	0.50 ± 0.58	<0.86	0.43 ± 0.11	0.78 ± 0.47
240	280	1.53 ± 0.25	<0.13	0.61 ± 0.56	0.07 ± 0.08	0.39 ± 0.22
240	320	1.88 ± 0.29	<0.23	2.28 ± 0.91	0.37 ± 0.09	1.25 ± 0.34
240	360	0.90 ± 0.30	<0.21	<0.75	0.39 ± 0.10	0.91 ± 0.48
240	400	0.48 ± 0.14	<0.23	2.20 ± 0.92	<0.04	1.14 ± 0.52
240	435	0.90 ± 0.21	<0.31	2.09 ± 1.27	0.65 ± 0.13	1.06 ± 0.43
280	210	0.73 ± 0.30	<0.34	1.99 ± 2.01	0.42 ± 0.14	1.14 ± 0.37
280	240	0.56 ± 0.28	<0.19	0.61 ± 0.49	0.11 ± 0.08	0.86 ± 0.36
280	280	0.68 ± 0.26	<0.33	1.64 ± 2.08	0.19 ± 0.11	0.93 ± 0.45
280	320	0.75 ± 0.30	<0.25	<0.83	0.76 ± 0.17	0.33 ± 0.30
280	360	0.43 ± 0.18	<0.13	0.55 ± 0.64	0.26 ± 0.08	0.41 ± 0.24
280	400	0.61 ± 0.26	<0.23	1.84 ± 1.49	<0.04	1.07 ± 0.47
280	436	0.76 ± 0.20	<0.14	0.50 ± 0.98	0.16 ± 0.09	0.85 ± 0.26
320	212	3.36 ± 0.40	<0.35	<1.19	0.60 ± 0.13	0.77 ± 0.93
320	240	0.89 ± 0.24	<0.15	0.70 ± 0.41	0.47 ± 0.08	0.94 ± 0.28
320	280	1.13 ± 0.28	<0.31	<1.08	<0.06	1.29 ± 0.45
320	320	0.79 ± 0.31	<0.32	1.39 ± 1.46	0.37 ± 0.13	0.98 ± 0.30
320	360	0.56 ± 0.30	<0.20	1.80 ± 1.06	0.87 ± 0.13	0.75 ± 0.35
320	400	0.78 ± 0.21	<0.21	1.38 ± 1.59	0.15 ± 0.07	0.93 ± 0.30
320	436	0.88 ± 0.29	<0.21	6.99 ± 1.44	0.56 ± 0.12	0.93 ± 0.35
360	212	0.55 ± 0.25	<0.17	1.52 ± 0.78	0.64 ± 0.15	0.76 ± 0.38
360	240	0.85 ± 0.28	<0.21	1.88 ± 1.82	0.48 ± 0.11	0.65 ± 0.46
360	280	1.20 ± 0.26	<0.20	<0.74	<0.04	0.88 ± 0.29
360	320	1.75 ± 0.31	<0.81	1.57 ± 1.03	0.56 ± 0.15	0.61 ± 0.34
360	360	3.06 ± 0.36	<0.38	4.97 ± 1.37	0.59 ± 0.11	1.10 ± 0.37
360	400	1.33 ± 0.28	<0.22	<0.72	0.84 ± 0.13	0.90 ± 0.40
360	435	0.69 ± 0.26	<0.29	1.48 ± 2.55	0.39 ± 0.10	1.00 ± 0.41
400	212	4.21 ± 0.61	<0.45	<1.25	0.62 ± 0.22	1.01 ± 0.49
400	240	0.59 ± 0.23	<0.22	1.26 ± 1.83	0.51 ± 0.15	1.04 ± 0.51

TABLE 4, cont.

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES
FROM 40 M GRID INTERVALS

Grid Location		Radionuclide Concentrations (pCi/g)				
S	W	Ra-226	U-235	U-238	Cs-137	Th-232
400	280	0.76 ± 0.25	<0.18	1.26 ± 1.16	0.15 ± 0.09	0.73 ± 0.49
400	320	0.41 ± 0.20	<0.20	0.58 ± 2.16	0.54 ± 0.13	0.65 ± 0.36
400	360	0.93 ± 0.19	<0.25	2.62 ± 1.33	0.38 ± 0.08	0.94 ± 0.29
400	400	1.01 ± 0.31	<0.24	6.92 ± 2.25	0.18 ± 0.12	1.11 ± 0.35
400	428	0.68 ± 0.21	0.36 ± 0.44	1.25 ± 1.05	1.13 ± 0.21	0.57 ± 0.57
404	212	1.04 ± 0.30	<0.24	1.26 ± 1.77	0.48 ± 0.16	1.15 ± 0.48
404	240	0.88 ± 0.21	<0.29	<0.89	0.55 ± 0.12	1.00 ± 0.32
404	280	0.88 ± 0.40	<0.18	0.70 ± 0.73	0.14 ± 0.11	0.72 ± 0.39
404	320	0.61 ± 0.23	<0.15	<0.37	1.36 ± 0.20	0.49 ± 0.36
404	360	2.29 ± 0.36	<0.22	1.79 ± 1.83	0.74 ± 0.15	0.47 ± 0.26
404	400	0.74 ± 0.43	<0.32	1.86 ± 2.11	0.36 ± 0.18	0.85 ± 0.46
404	428	0.76 ± 0.26	<0.30	1.48 ± 1.53	0.58 ± 0.12	0.88 ± 0.46

[a] Errors are 2σ based on counting statistics.

TABLE 5

RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL SAMPLES FROM SELECTED LOCATIONS IDENTIFIED BY THE WALKOVER SCAN

Sample Identification	Grid Location S	Grid Location W	Radionuclide Concentrations (pCi/g)[a] Ra-226	U-235	U-238	Cs-137	Th-232
B1	160	290	18.5 ± 0.9[b]	<0.77	1.14 ± 1.57	1.48 ± 0.20	<0.38
B2	170	320	73.6 ± 2.3	2.54 ± 2.58	9.15 ± 6.96	0.76 ± 0.22	<0.60
B3	172	350	349 ± 5	17.4 ± 5.0	23.9 ± 14.3	<0.40	<1.50
B4	181	345	43.4 ± 1.3	3.31 ± 1.38	29.7 ± 2.0	0.25 ± 0.10	<0.36
B5 (rocks)	185	315	9.29 ± 0.56	0.68 ± 1.08	9.45 ± 2.05	2.37 ± 0.21	<0.32
B6 (rocks)	203	330	7.55 ± 0.55	<0.34	4.15 ± 1.85	0.49 ± 0.11	0.64 ± 0.57
B7	230	290	83.6 ± 2.1	2.96 ± 2.40	19.9 ± 6.9	<0.16	<0.65
B8	242	280	67.1 ± 1.6	2.49 ± 2.21	<3.73	0.83 ± 0.18	<0.63
B9	359	359	14.8 ± 0.9	3.17 ± 1.34	4.13 ± 2.11	0.64 ± 0.13	0.88 ± 0.72
B10	392	352	84.0 ± 1.6	5.92 ± 2.22	13.2 ± 5.8	<0.16	1.67 ± 0.96
B11	400	344	22.2 ± 1.0	12.4 ± 1.8	26.0 ± 6.6	0.31 ± 0.11	0.27 ± 0.95
B12	404	276	9.99 ± 0.75	<0.66	4.57 ± 2.36	<0.09	1.03 ± 0.52

[a] Refer to Table 3 for direct radiation levels.
[b] Errors are 2σ based on counting statistics.

TABLE 6

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE SOIL SAMPLES

Borehole No.[a]	Grid Location S	Grid Location W	Depth (m)	Radionuclide Concentrations (pCi/g) Ra-226	U-235	U-238	Cs-137	Th-232
H1	34	403	Surface	1.16 ± 0.25[b]	<0.27	1.85 ± 1.59	0.60 ± 0.16	0.79 ± 0.52
			0.5	0.48 ± 0.34	<0.27	2.51 ± 1.53	<0.04	0.99 ± 0.43
			1.0	0.96 ± 0.30	<0.19	1.22 ± 0.94	<0.04	0.98 ± 0.58
			2.0	1.70 ± 0.45	<0.32	1.92 ± 1.17	<0.05	0.88 ± 0.43
H2	45	230	Surface	1.04 ± 0.29	<0.16	1.49 ± 0.58	0.55 ± 0.12	0.98 ± 0.28
			0.5	0.83 ± 0.23	<0.15	0.46 ± 1.16	<0.04	0.95 ± 0.33
			1.0	0.89 ± 0.20	<0.18	1.03 ± 1.40	<0.04	0.79 ± 0.43
H3	198	416	Surface	0.76 ± 0.28	<0.21	0.75 ± 1.12	0.56 ± 0.10	0.65 ± 0.29
			0.5	0.61 ± 0.21	<0.26	<0.76	<0.03	1.17 ± 0.35
			1.0	1.69 ± 0.30	<0.27	1.16 ± 1.55	0.09 ± 0.08	0.71 ± 0.39
			2.0	0.96 ± 0.20	<0.20	1.15 ± 0.93	<0.03	0.95 ± 0.41
H4	200	230	Surface	1.16 ± 0.31	<0.22	<0.69	0.15 ± 0.07	0.99 ± 0.29
			0.5	0.85 ± 0.21	<0.30	1.66 ± 1.84	<0.04	1.16 ± 0.35
			1.0	0.90 ± 0.25	<0.15	1.52 ± 0.57	<0.02	1.10 ± 0.34
			2.0	0.85 ± 0.30	<0.18	0.89 ± 1.41	<0.02	0.60 ± 0.39
H5	200	320	Surface	0.56 ± 0.18	<0.17	1.54 ± 0.95	0.69 ± 0.38	<0.09
			0.5	0.81 ± 0.20	<0.19	1.43 ± 1.46	<0.03	0.73 ± 0.39
			1.0	1.18 ± 0.33	<0.30	<1.01	<0.04	0.82 ± 0.39
			2.0	0.76 ± 0.31	<0.18	1.05 ± 0.83	<0.03	0.99 ± 0.32
H6	396	412	Surface	0.68 ± 0.29	<0.21	0.89 ± 1.95	0.86 ± 0.17	0.63 ± 0.37
			0.5	0.55 ± 0.33	<0.18	1.49 ± 1.39	<0.03	0.99 ± 0.30
			1.0	0.83 ± 0.19	<0.25	<0.78	<0.03	0.96 ± 0.35
			2.0	0.71 ± 0.30	<0.19	<0.68	<0.03	1.05 ± 0.32
H7	400	230	Surface	0.76 ± 0.18	<0.30	<0.94	0.29 ± 0.09	1.04 ± 0.42
			0.5	1.08 ± 0.29	<0.24	<0.73	<0.04	1.05 ± 0.43
			1.0	0.81 ± 0.18	<0.27	0.97 ± 1.53	<0.04	1.04 ± 0.46
			2.0	0.98 ± 0.33	<0.22	1.23 ± 0.96	<0.04	1.15 ± 0.37
H8	170	320	Surface	73.6 ± 2.3	2.54 ± 2.58	9.15 ± 6.96	0.76 ± 0.22	<0.06
			0.15	0.93 ± 0.28	<0.22	<0.74	0.28 ± 0.09	1.21 ± 0.36
H9	181	345	Surface	43.4 ± 1.3	3.31 ± 1.38	29.7 ± 2.0	0.25 ± 0.10	<0.36
			0.15	5.53 ± 0.45	0.58 ± 0.62	4.37 ± 2.26	<0.05	0.80 ± 0.29
			0.3	0.65 ± 0.25	<0.26	<0.84	<0.03	1.09 ± 0.32

TABLE 6, cont.

RADIONUCLIDE CONCENTRATIONS IN BOREHOLE SOIL SAMPLES

Borehole No	Grid Location[a] S	Grid Location[a] W	Depth (m)	Radionuclide Concentrations (pCi/g)[b] Ra-226	U-235	U-238	Cs-137	Th-232
H10	703	310	Surface	7.55 ± 0.55	<0.34	4.13 ± 1.85	0.49 ± 0.11	0.64 ± 0.57
			0.15	6.69 ± 0.58	<0.50	3.90 ± 2.28	0.36 ± 0.17	0.65 ± 0.41
			0.3	5.81 ± 0.45	<0.33	4.45 ± 1.51	0.16 ± 0.07	0.57 ± 0.28
H11	210	270	Surface	0.83 ± 0.21	<0.18	0.84 ± 0.79	0.30 ± 0.07	0.41 ± 0.41
			0.6	0.91 ± 0.26	<0.29	1.11 ± 1.53	<0.04	1.09 ± 0.59
H12	230	290	Surface	83.6 ± 2.1	2.90 ± 2.40	19.9 ± 6.9	<0.16	<0.65
			0.15	3.48 ± 0.40	<0.38	6.17 ± 1.82	<0.04	0.95 ± 0.53
			0.3	2.65 ± 0.34	<0.27	1.75 ± 1.76	<0.04	0.93 ± 0.50
H13	242	280	Surface	67.1 ± 1.6	2.49 ± 2.21	<3.73	0.83 ± 0.18	<0.63
			0.15	5.36 ± 0.46	<0.44	<1.27	0.22 ± 0.07	0.78 ± 0.49
H14	359	359	Surface	14.8 ± 0.9	3.17 ± 1.34	4.13 ± 2.11	0.64 ± 0.13	0.88 ± 0.72
			0.5	1.10 ± 0.21	<0.20	0.81 ± 1.39	0.05 ± 0.11	0.94 ± 0.34
H15	392	352	Surface	84.0 ± 1.6	5.92 ± 2.22	13.2 ± 5.8	<0.16	1.67 ± 0.96
			0.15	17.9 ± 0.9	1.09 ± 1.05	1.60 ± 3.23	<0.07	0.73 ± 0.53
			0.3	12.8 ± 0.8	1.39 ± 0.89	2.76 ± 3.17	<0.07	0.92 ± 0.69
H16	400	344	Surface	22.2 ± 1.0	12.4 ± 1.8	26.0 ± 6.6	0.31 ± 0.11	0.27 ± 0.95
			0.15	3.06 ± 0.31	1.38 ± 0.72	16.7 ± 2.7	<0.05	1.09 ± 0.42

[a] Refer to Figure 5.
[b] Errors are 2σ based on counting statistics.

TABLE 7

RADIONUCLIDE CONCENTRATIONS IN WATER SAMPLES

Sample No.	Sample Type	Grid Location		Radionuclide Concentrations (pCi/l)		
		S	W	Gross Alpha	Gross Beta	Ra-226
W1	Subsurface (Borehole H2)	45	230	1.21 ± 0.77[a]	1.98 ± 0.81	---
W2	Subsurface (Borehole H4)	200	230	1.43 ± 1.92	6.23 ± 2.11	---
W3	Subsurface (Borehole H6)	396	412	0.55 ± 0.74	1.25 ± 0.78	---
W4	Subsurface (Borehole H7)	400	230	4.54 ± 2.10	4.51 ± 2.17	---
W5	Manhole on sewer system	230	295	7.04 ± 1.33	16.0 ± 1.3	0.26 ± 0.26

[a] Errors are 2σ based on counting statistics.

TABLE 8

RADIONUCLIDE CONCENTRATIONS IN SAMPLES FROM SEWAGE TREATMENT FACILITIES

Sample ID[a]	Sample Location	Radionuclide Concentrations (pCi/g)				
		Ra-226	U-235	U-238	Cs-137	Th-232
SD1	Manhole (230S,295W)	1.56 ± 0.15	0.16 ± 0.23	3.11 ± 0.34	<0.02	0.37 ± 0.11
SD2	Acid Interceptor Tank	0.64 ± 0.21[b]	0.28 ± 0.58	6.51 ± 1.40	0.19 ± 0.09	0.66 ± 0.31
SD3	Imhoff Tank (West side)	0.71 ± 0.20	<0.26	4.72 ± 2.06	1.04 ± 0.14	<0.10
SD4	Imhoff Tank (East side)	1.24 ± 0.69	<0.37	7.05 ± 2.09	3.12 ± 0.28	<0.25
SD5	North Filter Bed (surf.)	0.39 ± 0.16	<0.12	0.63 ± 0.56	0.04 ± 0.05	0.65 ± 0.25
SD6	North Filter Bed (20 cm)	0.61 ± 0.14	<0.19	<0.58	<0.02	0.80 ± 0.25
SD7	South Filter Bed (surf.)	0.58 ± 0.18	<0.13	0.61 ± 0.92	0.06 ± 0.04	0.42 ± 0.27
SD8	South Filter Bed (20 cm)	1.10 ± 0.20	<0.12	0.87 ± 0.62	0.04 ± 0.06	0.33 ± 0.28
SD9	Chlorination Pit	3.44 ± 0.94	1.14 ± 1.25	8.09 ± 6.10	0.21 ± 0.13	<0.57
SD10	Outfall Settling Tank	3.70 ± 1.03	8.09 ± 2.38	75.3 ± 10.7	4.93 ± 0.68	1.73 ± 0.74
SD11	Outfall Settling Tank	2.25 ± 0.30	1.83 ± 0.50	32.5 ± 1.6	2.97 ± 0.19	1.49 ± 0.42

[a] Refer to Figure 6.
[b] Errors are 2σ based on counting statistics.

TABLE 9

LISTING OF AREAS ON PROPERTY X WHERE RADIONUCLIDE CONCENTRATIONS EXCEED GUIDELINES FOR FORMERLY USED MED/AEC SITES

Grid Location[a]		Principal Radionuclide(s)[b]	Estimated Quantities of Material Exceeding Guidelines			Remarks
S	W		Area (m^2)	Avg. Depth (m)	Volume (m^3)	
355-404	340-360	Ra-226	980	0.15	147	
230-235	288-293	Ra-226	25	0.15	3.8	
160	290	Ra-226	---[c]	---	---	Small isolated surface or near surface "hot spot." Each of these locations involves less than 1 m^3 in volume.
170	310	Ra-226	---	---	---	
170	315	Ra-226	---	---	---	
170	320	Ra-226	---	---	---	
172	350	Ra-226	---	---	---	
175	305	Ra-226	---	---	---	
175	345	Ra-226	---	---	---	
181	345	Ra-226	---	---	---	
185	315	Ra-226, U-238[d]	---	---	---	
194	342	Ra-226	---	---	---	
203	330	Ra-226, U-238[d]	---	---	---	
239	280	Ra-226	---	---	---	
242	280	Ra-226	---	---	---	
404	276	Ra-226	---	---	---	

[a] Refer to Figure 8.
[b] Based on locations, physical appearance, direct radiation levels, and laboratory analyses.
[c] Dash indicates determination was not made.
[d] Naturally occurring material in rock fill.

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Excavated Area

Excerpt from Post-Remedial Action Report for the Niagara Falls Storage Site Vicinity Properties 1983 and 1984

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DOE/OR/20722-84

Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-ACO5-810R20722

POST-REMEDIAL ACTION REPORT FOR THE NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES - 1983 AND 1984

Lewiston, New York

December 1986

Bechtel National, Inc.

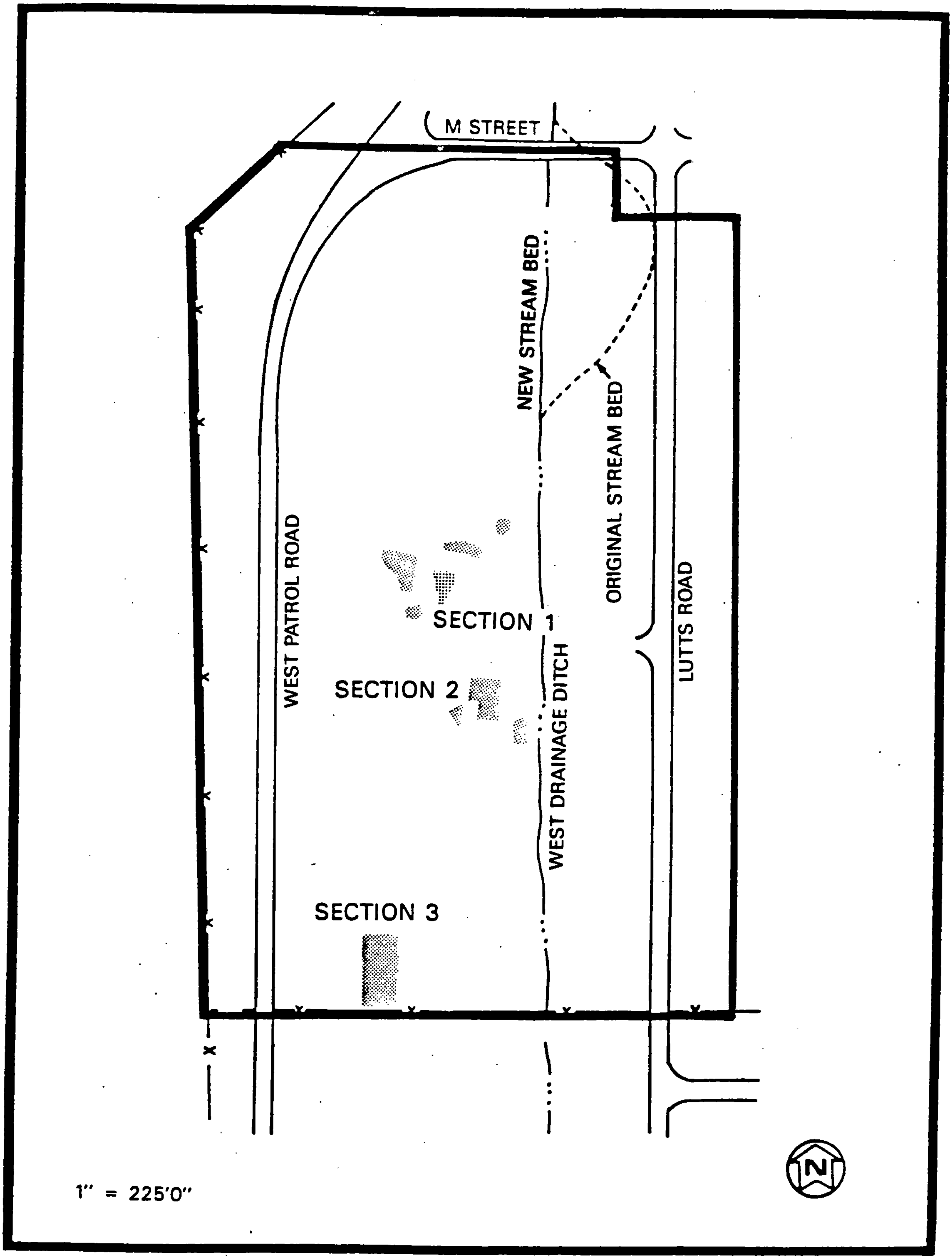

FIGURE 31 EXCAVATED AREAS ON PROPERTY X

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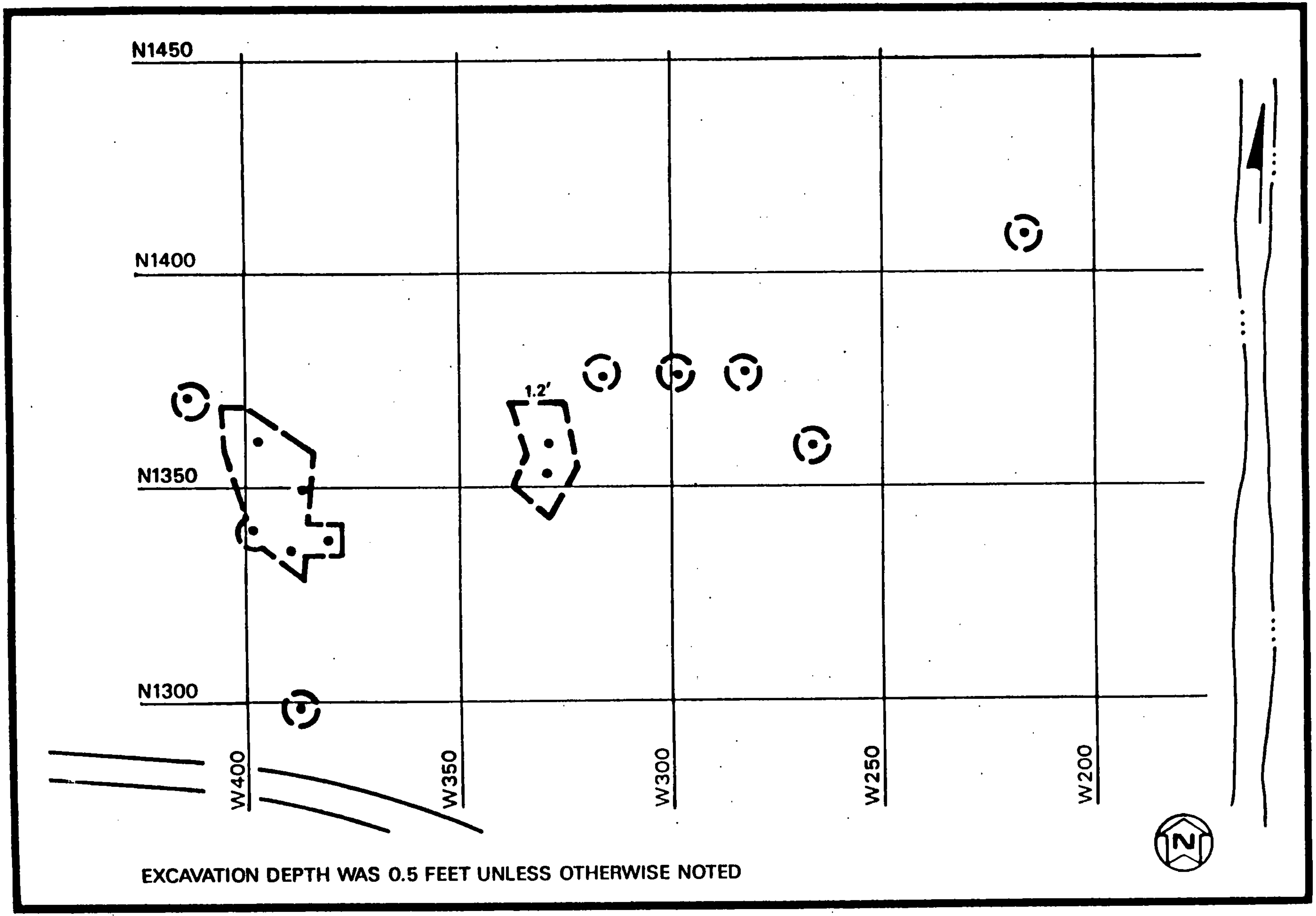

FIGURE 32 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY X - SECTION 1

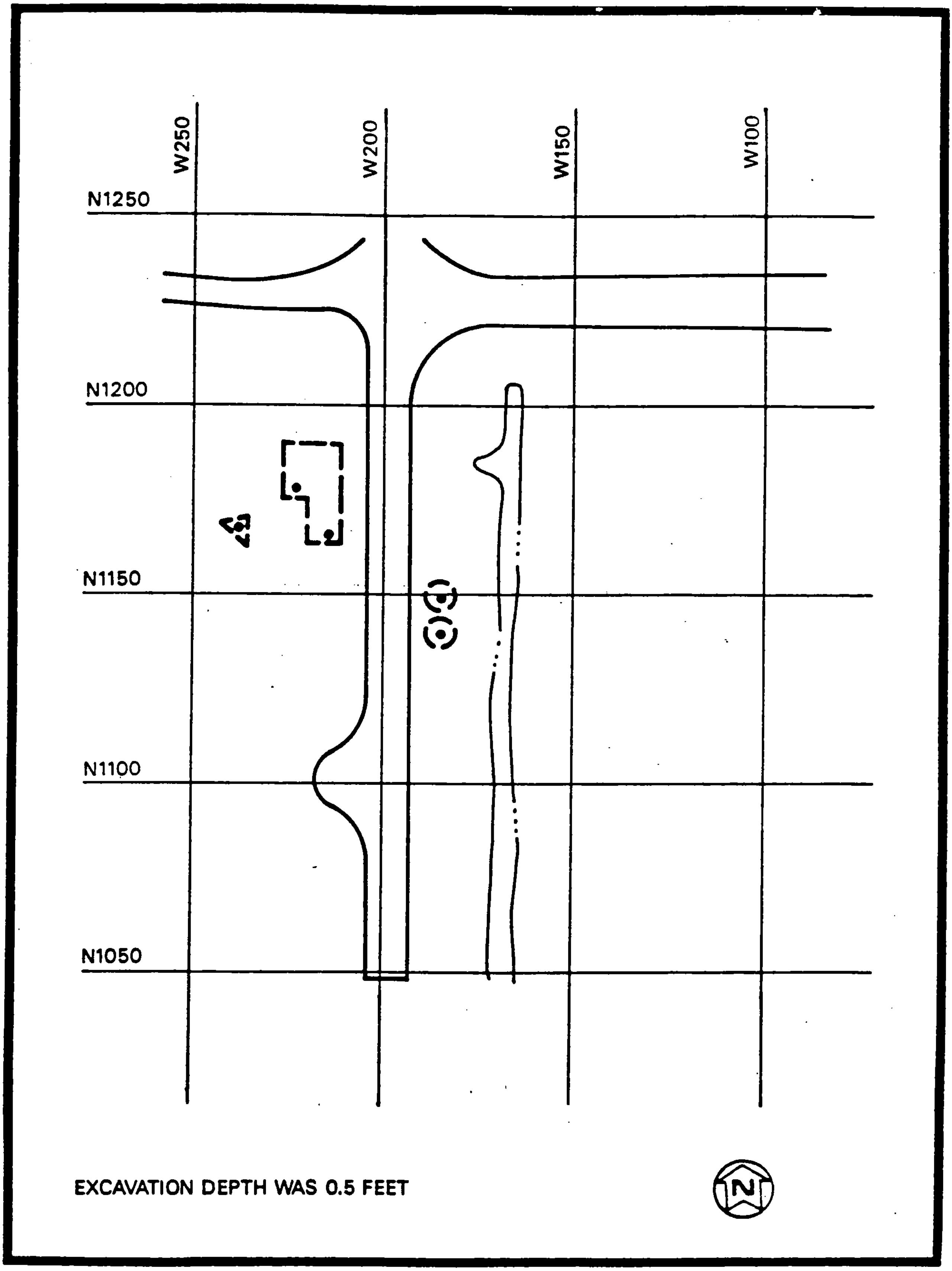

FIGURE 33 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY X - SECTION 2

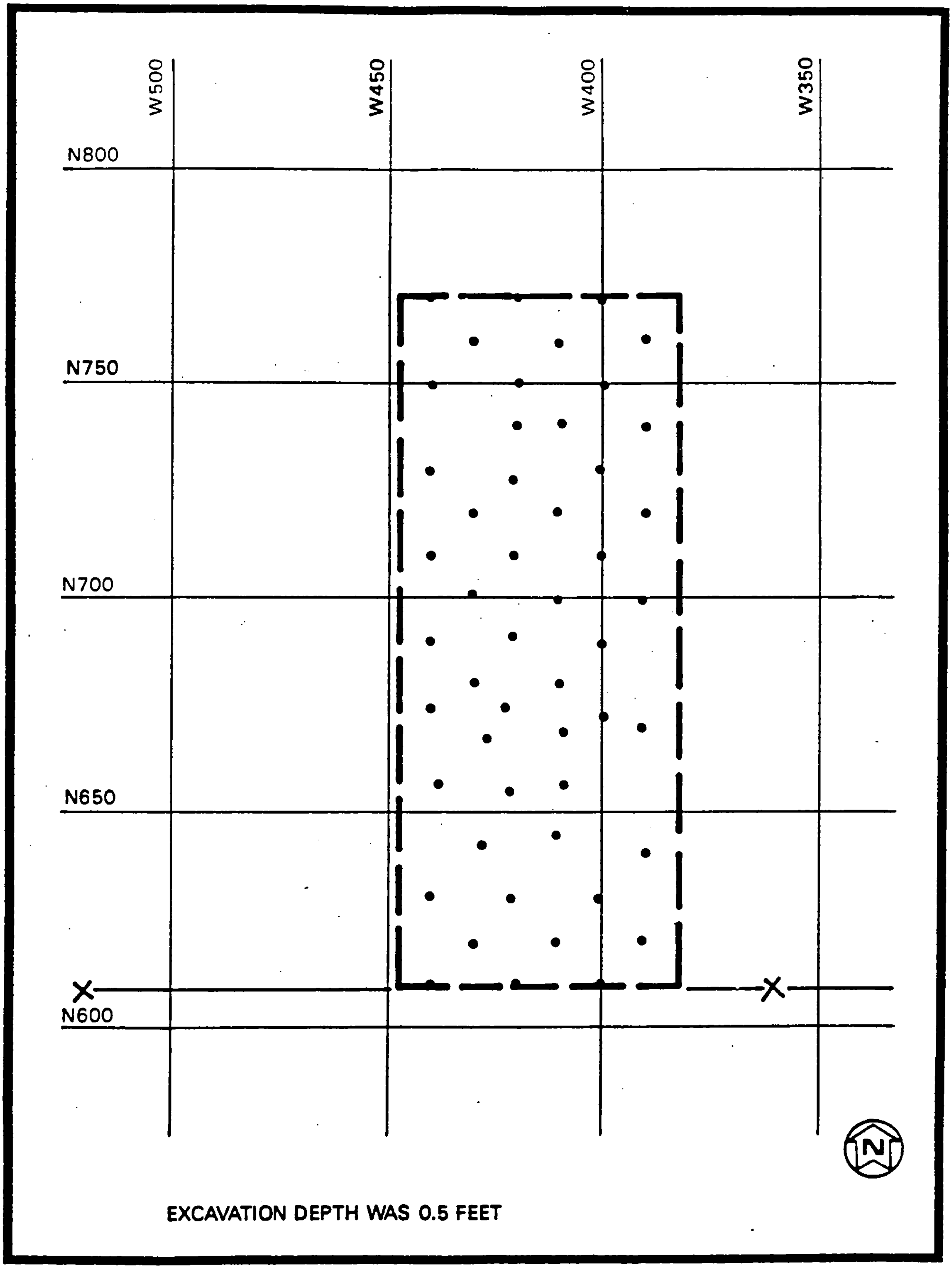

FIGURE 34 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON PROPERTY X - SECTION 3

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TABLE 11

POST-REMEDIAL ACTION SAMPLING RESULTS

FOR PROPERTY X

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W0185	N1140	A	1.1 ± 0.1	0.7 ± 0.2
W0185	N1150	A	1.0 ± 0.1	1.3 ± 0.2
W0215	N1165	A	1.6 ± 0.1	0.9±0.2
W0217	N1409	A	5.1 ± 0.2	1.0 ± 0.2
W0225	N1175	A	1.2 ± 0.1	1.0 ± 0.2
W0240	N1160	A	2.6 ± 0.2	0.8 ± 0.2
W0267	N1360	A	0.9 ± 0.1	1.1 ± 0.2
W0283	N1377	A	1.3 ± 0.1	0.9 ± 0.2
W0299	N1377	A	0.8 ± 0.1	1.1 ± 0.2
W0316	N1377	A	1.3 ± 0.1	0.7 ± 0.2
W0328	N1360	A	1.3 ± 0.4	1.4 ± 0.2
W0335	N1355	A	0.6 ± 0.4	1.0 ± 0.2
W0382	N1300	A	2.1 ± 0.1	1.0 ± 0.2
W0388	N1330	1.7 ± 1.3	1.1 ± 0.1	0.8 ± 0.2
W0388	N1350	A	0.8 ± 0.1	0.7 ± 0.2
W0390	N0620	A	1.1 ± 0.1	1.0 ± 0.2
W0390	N0640	A	0.7 ± 0.1	0.8±0.1
W0390	N0660	A	1.1 ± 0.1	0.5 ± 0.2
W0390	N0700	A	0.8 ± 0.1	A
W0390	N0720	A	1.2 ± 0.1	1.1 ± 0.2
W0390	N0740	A	0.7 ± 0.1	0.8 ± 0.2
W0390	N0760	A	0.8 ± 0.1	1.0 ± 0.1
W0398	N1340	A	1.0 ± 0.1	1.2±0.2
W0398	N1360	A	1.5 ± 0.1	0.9±0.2
W0400	N0610	A	1.2 ± 0.1	0.9 ± 0.2
W0400	N0630	2.1 ± 1.4	0.9 ± 0.1	1.1 ± 0.2
W0400	N0670	A	0.9 ± 0.1	1.3 ± 0.2
W0400	N0690	0.8 ± 1.1	0.6 ±0.1	0.9 0.2
W0400	N0710	A	1.1 ± 0.1	1.3 ± 0.2
W0400	N0730	A	1.3 ± 0.1	1.5 ± 0.2
W0400	N0750	A	0.8 ± 0.1	0.8 ± 0.2
W0400	N0770	A	1.0 ± 0.1	1.0 ± 0.2
W0410	N0620	4.0 ± 1.0	0.5 ± 0.1	0.6±0.1
W0410	N0640	1.3 ± 1.8	1.2 ± 0.1	0.8 ± 0.2
W0410	N0650	A	1.0 ± 0.1	0.5 ± 0.2
W0410	N0660	8.3 ± 1.6	1.1 ± 0.1	0.4 ± 0.2
W0410	N0680	A	2.7 ± 0.2	0.8 ± 0.2
W0410	N0700	3.3 ± 1.5	0.8 ± 0.1	0.7 ± 0.2
W0410	N0720	A	0.5 ± 0.1	0.8 ± 0.1
W0410	N0740	2.9 ± 1.1	1.1 ± 0.1	0.8 ± 0.2
W0410	N0760	A	1.2 ± 0.1	0.8 0.2
W0414	N1370	A	0.8 ± 0.1	0.9 ± 0.1
W0420	N0610	5.4 ± 1.4	0.8 ± 0.1	A

TABLE 11 (continued)

Page 2 of 2

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W0420	N0630	4.5±1.3	0.6 ± 0.1	0.7 ± 0.1
W0420	N0650	3.2 ± 1.2	0.9 ± 0.1	0.7 ± 0.1
W0420	N0670	A	0.6 ± 0.1	0.7 ± 0.1
W0420	N0690	A	1.0 ± 0.1	0.7 ± 0.1
W0420	N0710	A	0.5 ± 0.1	0.7 ± 0.2
W0420	N0730	A	0.7 ± 0.1	0.8 ± 0.2
W0420	N0740	A	0.7 ± 0.1	1.0 ± 0.2
W0420	N0750	A	0.6 ± 0.1	0.7 ± 0.1
W0420	N0770	A	0.8 ± 0.1	0.9 ± 0.2
W0430	N0620	9.2 ± 1.7	0.5 ± 0.1	0.9 ± 0.1
W0430	N0640	0.9 ± 2.0	0.8 ± 0.1	A
W0430	N0660	A	0.9 ± 0.1	0.7 ± 0.1
W0430	N0680	2.9 ± 1.4	0.8 ± 0.1	A
W0430	N0700	2.7 ± 1.6	0.7±0.1	0.7 ± 0.1
W0430	N0720	2.0 ± 1.1	0.6 ± 0.1	0.6 ± 0.1
W0430	N0760	7.0 ± 1.5	1.5 ± 0.1	1.2 ± 0.2
W0440	N0610	3.7 ± 1.2	0.9 ± 0.1	0.8 ± 0.1
W0440	N0630	A	0.5 ± 0.1	0.7 ± 0.1
W0440	N0670	1.4 ± 1.0	0.6 ± 0.1	0.7 ± 0.1
W0440	N0690	2.7 ± 1.2	0.6 ± 0.1	0.4 ± 0.1
W0440	N0710	A	0.7 ± 0.1	1.0 ± 0.2
W0440	N0730	2.4 ± 1.1	0.5 ± 0.1	0.6 ± 0.1
W0440	N0750	A	0.6 ± 0.1	0.7 ± 0.1
W0440	N0770	3.0 ± 1.4	0.6 ± 0.2	1.1 ± 0.2
W0490	N0650	A	0.6 ± 0.1	0.7 ± 0.1

‘A’ denotes less than detectable activity

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Verification Data

Excerpt from Verification of 1983 and 1984 Remedial Actions Niagara Falls Storage Site Vicinity Properties, Lewiston, New York, December 1989

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VERIFICATION OF 1983 AND 1984 REMEDIAL ACTIONS NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES LEWISTON, NEW YORK

Prepared by

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Prepared for

U.S. Department of Energy
as part of the
Formerly Utilized Sites - Remedial Action Program

FINAL REPORT

December 1989

This report is based on work performed under contract number DE-AC05-76OR00033 with the U.S. Department of Energy.

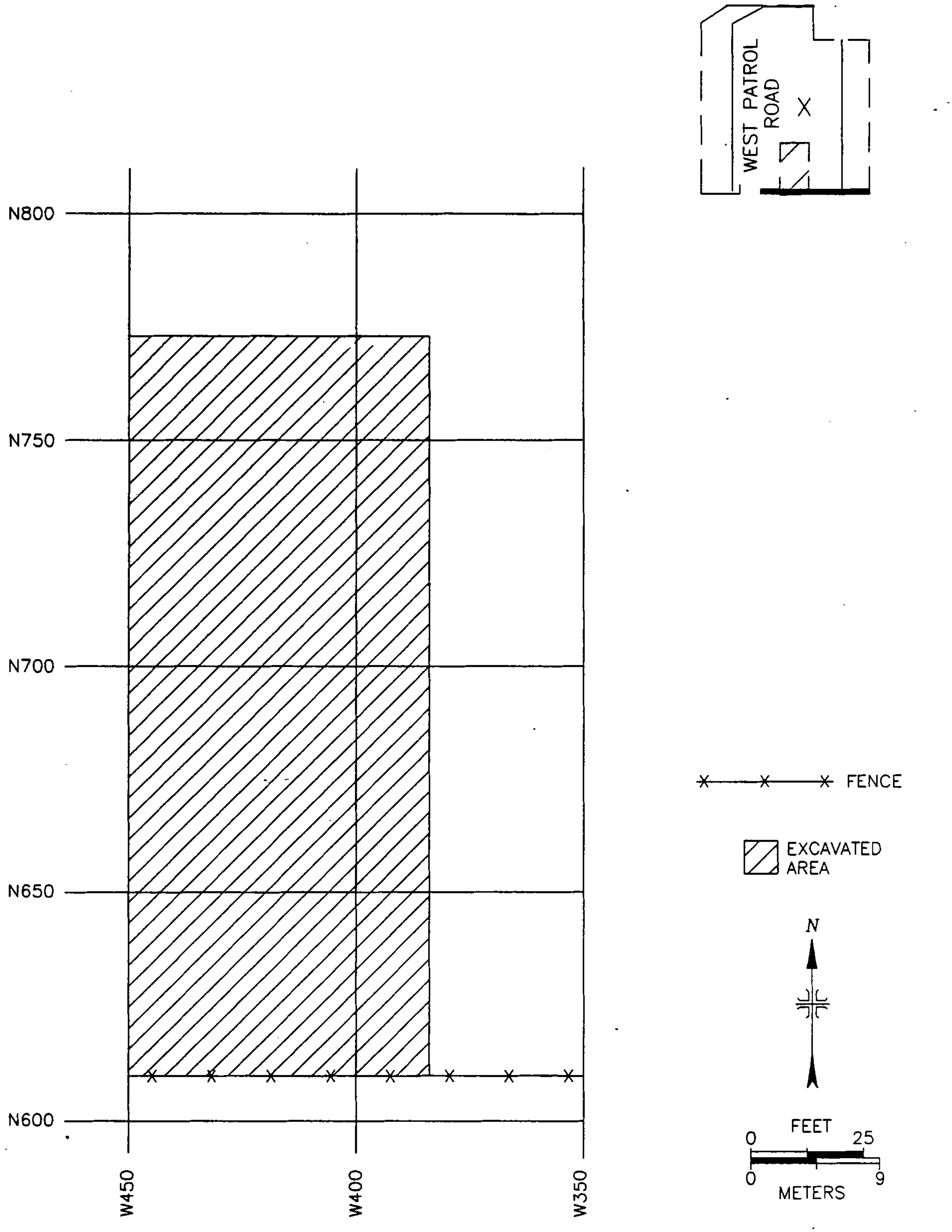

FIGURE 17: Plot Plan of Remediated Section of Vicinity Property X

TABLE 1 (continued)

RESULTS OF CONFIRMATORY ANALYSES ON SOIL SAMPLES
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Property	Sample ID[a]	Grid Location	Analysis By	Radionuclide Concentration(pCi/g)[b] Ra-226	U-238	Th-232
	63	S2320, E3660	BNI	0.6 ± 0.2	<MDA	0.7 ± 0.2
			ORAU	0.6 ± 0.2	1.1 ± 0.6	0.7 ± 0.4
	69	S2330, E3690	BNI	0.6 ± 0.2	<MDA	0.7 ± 0.2
			ORAU	0.6 ± 0.2	1.1 ± 0.6	0.7 ± 0.4
R	2	S3140, W 607	BNI	4.0 ± 0.4	<MDA	1.1 ± 0.6
			ORAU	3.8 ± 0.5	<0.8	0.5 ± 0.3
	6	S3140, W 527	BNI	1.3 ± 0.2	<MDA	<MDA
			ORAU	1.2 ± 0.3	<0.7	1.6 ± 0.5
S	3	N1305, E 885	BNI	2.8 ± 0.6	<MDA	0.9 ± 0.4
			ORAU	2.1 ± 0.3	1.5 ± 0.9	1.0 ± 0.4
V	2	N3709, E1138	BNI	0.8 ± 0.2	<MDA	1.1 ± 0.4
			ORAU	0.9 ± 0.3	6.9 ± 1.3	1.0 ± 0.5
X	312	N 640, W 410	BNI	1.2 ± 0.2	1.3 ± 3.6	0.8 ± 0.4
			ORAU	1.0 ± 0.3	4.3 ± 2.0	1.4 ± 0.4
	4	N 690, W 420	BNI	1.0 ± 0.2	<MDA	0.7 ± 0.2
			ORAU	0.9 ± 0.3	2.9 ± 1.4	0.7 ± 0.3
	9	N 710, W 400	BNI	1.1 ± 0.2	<MDA	1.3 ± 0.4
			ORAU	0.8 ± 0.2	2.1 ± 2.2	1.3 ± 0.3
West Ditch	67	N 820, W 170.5	BNI	0.9 ± 0.2	<MDA	1.2 ± 0.6
			ORAU	1.0 ± 0.2	0.3 ± 1.1	0.9 ± 0.4
	125	N1560, W 170	BNI	1.3 ± 0.4	<MDA	1.2 ± 0.6
			ORAU	1.5 ± 0.3	1.5 ± 1.3	1.0 ± 0.3
	128	N1600, W 160	BNI	<MDA	<MDA	0.9 ± 1.2
			ORAU	78.7 ± 1.8	9.3 ± 12.5	0.9 ± 1.1
	200	N2220, W 110	BNI	1.3 ± 0.4	<MDA	0.6 ± 0.4
			ORAU	1.4 ± 0.3	1.3 ± 1.1	1.1 ± 0.4
	252	W2500, E 090	BNI	1.0 ± 0.2	<MDA	0.8 ± 0.4
			ORAU	1.0 ± 0.3	2.2 ± 1.4	1.2 ± 0.4

TABLE 1 (continued)

RESULTS OF CONFIRMATORY ANALYSES ON SOIL SAMPLES
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Property	Sample ID[a]	Grid Location	Analysis By	Radionuclide Concentration(pCi/g)[b] Ra-226	U-238	Th-232
Central Ditch	142	N 660, E 480	BNI	1.3 ± 0.6	<15	1.2 ± 0.6
			ORAU	1.4 ± 0.3	<0.9	0.4 ± 0.2
	248	N1020, E 490	BNI	1.1 ± 0.2	0.8 ± 0.4	0.6 ± 0.2
			ORAU	1.1 ± 0.2	2.2 ± 0.8	0.8 ± 0.3
	469	N2160, E 461	BNI	1.0 ± 0.2	<MDA	1.0 ± 0.4
			ORAU	1.0 ± 0.2	0.7 ± 0.9	1.0 ± 0.3
	33	N5330, E 415	BNI	1.0 ± 0.2	<MDA	0.6 ± 0.2
			ORAU	0.9 ± 0.2	< 0.5	0.8 ± 0.4
	1302	N7590, E 410	BNI	0.9 ± 0.2	<MDA	1.0 ± 0.4
			ORAU	0.8 ± 0.2	2.1 ± 1.2	1.1 ± 0.3
	1761	N10190, W 650	BNI	0.8 ± 0.2	<MDA	0.9 ± 0.4
			ORAU	3.8 ± 0.5	1.8 ± 1.9	1.7 ± 0.8

[a]Sample Identification as presented in the BNI post-remedial action report.[14]
[b]Reported data includes background contributions from naturally occurring materials in soil.
[c]Uncertainties represent the 95% confidence levels, based only on counting statistics: systematic ORAU laboratory uncertainties, estimated at ± 6 to 10%, are not included in the reported values for the ORAU analyses.
[d]Reported as less than the minimum detectable activity (no values given).

TABLE 16

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM PROPERTY X
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a] N	Location[a] W	Depth (m)	Radionuclide Concentrations (pCi/g) Ra-226	U-238	Th-232
610	432	Surface	1.5 ± 0.3[b]	1.0 ± 2.6	0.8 ± 0.9
631	344	Surface	0.9 ± 0.2	0.9 ± 1.4	1.0 ± 0.5
658	409	Surface	1.0 ± 0.3	1.7 ± 1.3	0.9 ± 0.3
		0.2 - 0.4	0.7 ± 0.2	3.8 ± 0.8	1.0 ± 0.3
699	375	Surface	0.6 ± 0.3	1.5 ± 2.1	1.0 ± 0.4
729	459	Surface	0.6 ± 0.2	2.1 ± 1.0	0.7 ± 0.3
735	395	Surface	1.3 ± 0.3	4.1 ± 2.1	1.2 ± 0.4
		0.2 - 0.4	0.9 ± 0.2	1.4 ± 0.5	0.9 ± 0.5
759	368	Surface	1.4 ± 0.5	2.6 ± 1.8	0.7 ± 0.3

[a]Refer to Figure 17.
[b]Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

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Appendix G

Drainages

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Assessment Data

Excerpt from:

Background and Resurvey Recommendations for the Atomic Energy Commission Portion of the Lake Ontario Ordnance Works

and

A Comprehensive Characterization and Hazard Assessment of the DOE-Niagara Falls Storage Site

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NY.17 SHELF

Aerospace Report No.
ATR-82(7963-04)-1

Background and Resurvey Recommendations for the Atomic Energy Commission Portion of the Lake Ontario Ordnance Works

November 1982

Prepared for

Public Safety Division
Office of Operational Safety
Assistant Secretary for Environmental Protection,
Safety, and Energy Prepardness
U.S. DEPARTMENT OF ENERGY

Prepared by

Environment and Conservation Directorate
Eastern Technical Division
THE AEROSPACE CORPORATION
Washington, D.C.

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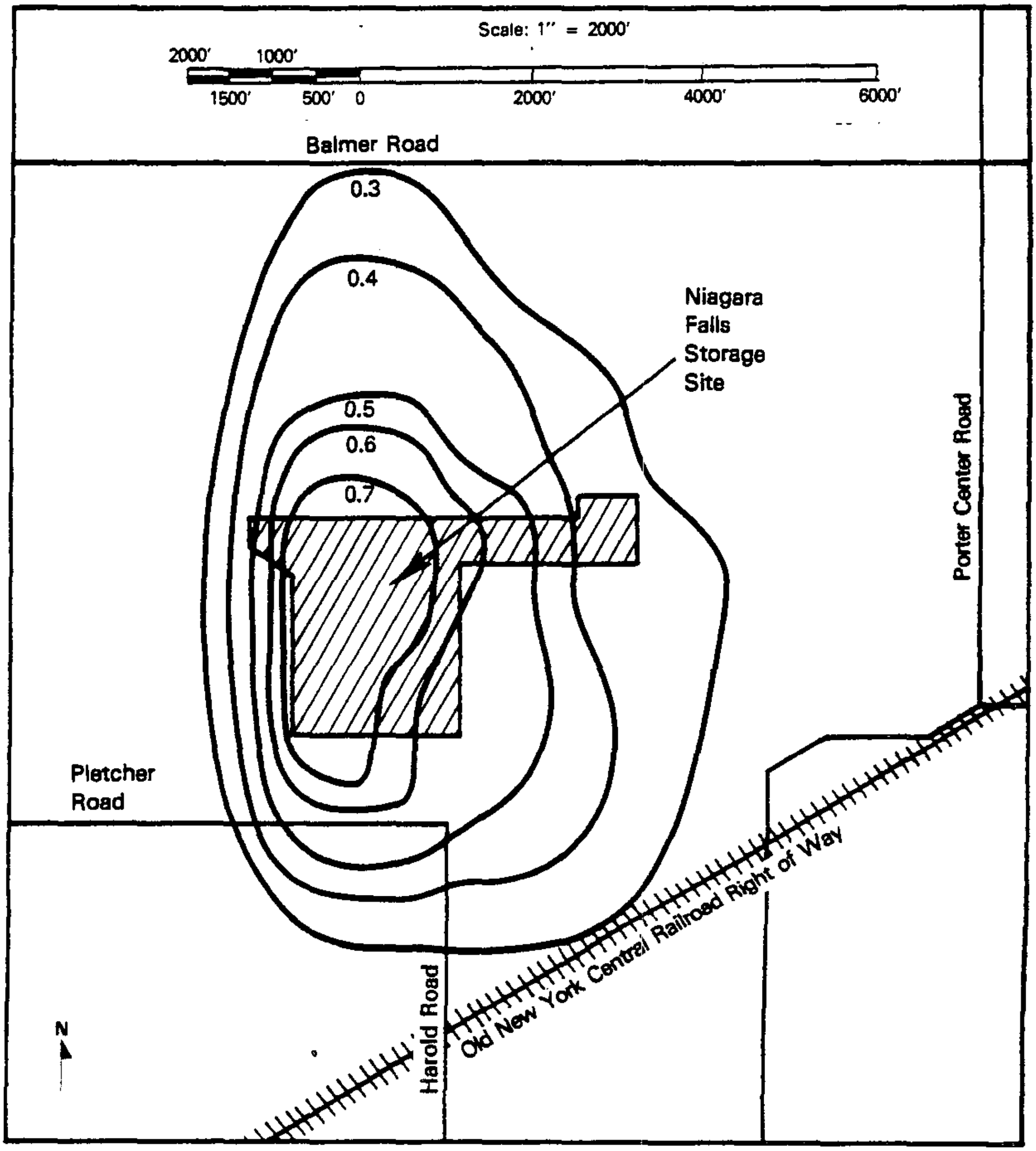

Figure 6. Contours of Equal Radon Concentration (picocuries/liter) for Niagara Falls Storage Site (October 1980 - March 1981) (Adapted from a Mound Facility report to the Department of Energy)

BMI-2074(Revised)
UC-11

FINAL REPORT

on

A COMPREHENSIVE CHARACTERIZATION AND HAZARD ASSESSMENT OF THE DOE-NIAGARA FALLS STORAGE SITE

prepared for

U.S. DEPARTMENT OF ENERGY
REMEDIAL ACTION PROGRAM

June 1981

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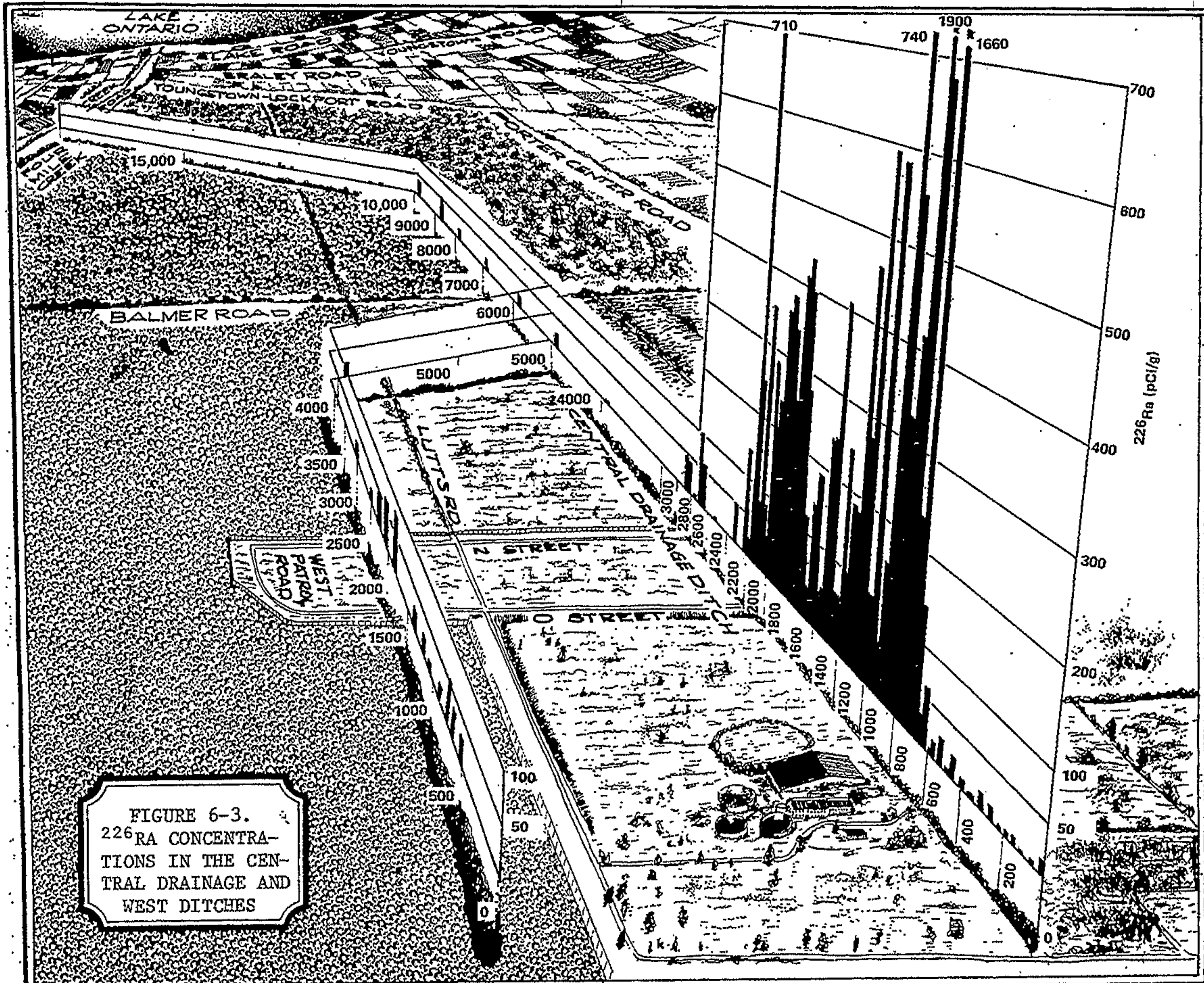

FIGURE 6-3. ^{226}RA CONCENTRATIONS IN THE CENTRAL DRAINAGE AND WEST DITCHES

APPENDIX I

CHARACTERIZATION OF DRAINAGES AND SATURATED ZONES

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LIST OF FIGURES

TABLE I-1. INSTRUMENTAL REA D ^{226}RA CONCENTRATIONS IN THE CENTRAL DF ICH

Distance from Ditch Origination, ft (m)	Instrument ...gs Gamma (1 m) (μR/hr)(a)	Instrument ...gs Bet... ...a (1 cm) (μR/hr)(b)	^{226}Ra Concentration (pCi/g) Screening(c)	^{226}Ra Concentration (pCi/g) Radiochemistry(d)	B... ...nce Code (Coord... ...es	B... ...nce Code ID
0	18	80		13	S41W8	MD1
25	20	60			S40.5W8	MD2
50	15	70		6.3	S40W8	MD3
25	16	100			S39.5W8	MD4
100(30.5)	15	90		7	S39W8	MD5
125	15	100			S38.5W8	MD6
150	17	80		12	S38W8	MD7
175	18	120			S37.5W8	MD8
200(61)	22	70		8.5	S37W8	MD9
225	20	70			S36.5W8	MD10
250	19	60		5.4	S36W8	MD11
275	16	70			S35.5W8	MD12
300	17	50		7.4	S35W8	MD13
325	15	60			S34.5W8	MD14
350	15	60		16	S34W8	MD15
325	15	60			S33.5W8	MD16
400(122)	15	50		12	S33W8	MD17
425	21	60			S32.5W8	MD18
500(152.5)	22	90		22	S32W8	MD19
525	20	80			S31.5W8(e)	MD20
550	25	130		30	S30W8	MD21
575	25	110			S29.5W8	MD22
600(183)	26	70		22	S29W8	MD23
625	40	200			S28.5W8	MD24
650(f)	60	120		54	S28W8	MD25
675(f)	110	330		28	S27.5W8	MD26
700(213.5)	211	120		140	S27W8(f)	MD27
725	500	140		1,660	S26.5W8	MD28
750	900	1,800		270	S26W8	MD29
775	1,000	2,000		670	S25.5W8	MD30
800(244)	900	2,200		1,900	S25W8	MD31
825	1,000	2,200		410	S24.5W8	MD32
850	600	800		320	S24W8	MD33
875	800	1,600		560	S23.5W8	MD34
900(274.5)	600	1,400		740	S23W8	MD35
925	500	1,200		150	S22.5W8	MD36

TABLE I-1. (Continued)

Distance from Ditch Origination, ft (m)	Instrumental Readings: Gamma (1 m) (μR/hr)(a)	Instrumental Readings: Beta-Gamma (1 cm) (μR/hr)(b)	^{226}Ra Concentration (pCi/g): Screening(c)	^{226}Ra Concentration (pCi/g): Radiochemistry(d)	BCD Reference Code: Grid Coordinates	BCD Reference Code: ID
950	400	1,400		40	S22W8	MD37
975	260	800		580	S21.5W8	MD38
1,000(305)	400	600		99	S21W8	MD39
1,025	400	900		600	S20.5W8	MD40
1,050	260	600		273	S20W8	MD41
1,075	280	700		470	S19.5W8	MD42
1,100(335.5)	300	800		170	S19W8	MD43
1,125	280	500		176	S18.5W8	MD44
1,150	140	600		91	S18W8	MD45
1,175	400	800		240	S17.5W8	MD46
1,200(366)	160	200		64	S17W8	MD47
1,225	200	320		64	S16.5W8	MD48
1,250	150	280		405	S16W8	MD49
1,275	40	150		22	S15.5W8	MD50
1,300(396.5)	90	260		225	S15W8	MD51
1,325	50	100		220	S14.5W8	MD52
1,350	70	240		50	S14W8	MD53
1,375	100	260		46	S13.5W8	MD54
1,400(427)	140	200		190	S13W8	MD55
1,425	130	240		140	S12.5W8	MD60
1,450	90	300		40	S12W8	MD61
1,475	140	260		120	S11.5W8	MD62
1,500(452.5)	90	160		270	S11W8	MD63
1,525	170	390		400	S10.5W8	MD64
1,550	270	600		440	S10W8	MD65
1,575	200	500		410	S9.5W8	MD66
1,600(488)	300	1,100		250	S9W8	MD67
1,625	220	600		340	S8.5W8	MD68
1,650	100	360		380	S8W8	MD69
1,675	200	600		360	S7.5W8	MD70
1,700(518.5)	230	900		240	S7W8	MD71
1,725	160	600		200	S6.5W8	MD72
1,750	200	360		41	S6W8	MD73
1,775	150	310		290	S5.5W8	MD74
1,800(549)	120	390		75	S5W8	MD75
1,825	100	360		350	S4.5W8	MD76
1,850	40	220		83	S4W8	MD77

TABLE I-1. (Continued)

Distance from Ditch Origination, ft (m)	Instrumental Readings Gamma (1 m) (μR/hr)[a]	Instrumental Readings Beta-Gamma (1 cm) (μR/hr)[b]	^{226}Ra Concentration (pCi/g) Screening[c]	^{226}Ra Concentration (pCi/g) Radiochemistry[d]	BCL Reference Code Grid Coordinates	BCL Reference Code ID
1,875	110	290		250	S3.5W8	MD78
1,900	120	420		90	S3W8	MD79
1,925	20	330		710	S2.5W8	MD80
1,950	16	100		24	S2W8	MD81
1,975	25	110			S1.5W8	MD82
2,000	40	130		140	S1W8	MD83
2,125	80	210			N1.5W8	MD84
2,150	50	160		50	N2W8	MD85
2,175	22	120			N2.5W8	MD86
2,200(671)	16	90		2.8	N3W8	MD87
2,225	14	130			N3.5W8	MD88
2,250	16	90		2.2	N4W8	MD89
2,275	19	80			N4.5W8	MD90
2,300(701.5)	26	70		3	N5W8	MD91
2,325	24	100			N5.5W8	MD92
2,350	26	60		8.5	N6W8	MD93
2,375	21	110			N6.5W8	MD94
2,400(732)	22	150		61	N7W8	MD95
2,425	40	120			N7.5W8	MD96
2,450	26	150		110	N8W8	MD97
2,475	20	100			N8.5W8	MD98
2,500	26	130		9	N9W8	MD99
2,525	40	300		7.5	N9.5W8	MD100
2,600	50	260		40	N11W8	MD101
2,625	28	150			N11.5W8	MD102
2,650[g]	29	60		50	N12W8	MD103
2,750(838.75)			>5	22(65)	off-site	MD105(200)
3,700	10-20		>5	7		MD210
3,850[h]	10-20		>4			211E
4,700(1,434)	10-20		>5	21.6		220
5,700(1,739)				21		230
5,850	10-15		>5			231
5,950	10-15		>5			232
6,700[i](2,044)	10-15		>5	9.7		240
6,750	10-15		>5	18.2		300
7,615(2,323)	10-15			22.8		310
8,540(2,605)	10-15			73.1		320
9,465(2,887)	10-15			55		330

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TABLE I-1. (Continued)

Distance from Ditch Origination, ft (m)	Instrumental Readings		^{226}Ra Concentration (pCi/g)		BCD Reference Code	
	Gamma (1 m) (μR/hr)(a)	Beta-Gamma (1 cm) (μR/hr)(b)	Screening(c)	Radiochemistry(d)	Grid Coordinates	ID
10,150(3,095.75)	10-15		>5		off-site	333
10,390(j)(3,334)	10-15		>4	7.5	↓	340
11,050	10-15		>4	4.4	↓	343
11,890(k)(3,626)	10-15		>4	5.1	↓	344
12,090	10-15		>4	0.75	↓	345
12,590(3,840)	10-15			10.4	↓	350
14,340(4,374)	10-15		>5	8.4	↓	357
17,650(5,383)	10-15		>4	2.6	↓	370

(a) Gamma readings taken at 1 m above sediment or surface; background 13 μR/hr.

(b) Beta-gamma readings taken at 1 cm above sediment or water surface, background 60 μR/hr.

(c) Measurement of ^{214}Bi as index of ^{226}Ra (see QA Document NS-NS-122).

(d) Gamma spectroscopy, background concentration average in sediment 0.5 pCi/g (±0.1) (see Appendix I, Table I-2, for complete listings of radionuclide composition of on-site sediments).

(e) Confluence with S31 Ditch (see Figure I-1).

(f) Water reservoir drain pipe (from recarbonation pit running north of Building 411).

(g) Sample taken at the north perimeter fence.

(h) Sample taken 50 ft into a tributary ditch.

(i) Sample 100 ft north of Balmer Road (see Figure I-1).

(j) Sample taken at Central Drainage Ditch and Magazine Drainage Ditch (see Figure I-1).

(k) Sample just east of Lutts Road (see Figure I-1).

TABLE I-2. DES IN ON-SITE SEDIMENT SAMPLES OF
AL DRAINAGE DITCH

DITCH COORDINATES (a)	U-235	PA-231	TH-227	R	TH-234	RA-226	PB-214	BI-214	PB-210	CS-137	TH-232	K-40
	ACTIVITY PCI/G											
MD1	<5.00E-1	<2.40E+0	<8.00E-1	[illegible]	1.10E+1	1.30E+1	4.70E+0	4.40E+0	2.00E+1	5.20E+0	1.20E+0	2.40E+1
MD3	<5.00E-1		3.00E-1	2.00E-1	8.80E+0	6.30E+0	4.60E+0	4.80E+0	2.00E+1	4.80E+0	1.50E+0	2.40E+1
MD5	<4.00E-1	<1.00E+0	<1.00E+0	<4.00E-1	<6.20E+0	7.00E+0	4.40E+0	4.40E+0	1.90E+1	4.10E+0	1.40E+0	2.50E+1
MD7	3.00E-1			<6.00E-1	1.10E+1	1.20E+1	5.60E+0	4.60E+0	2.20E+1	3.10E+0	1.40E+0	2.20E+1
MD9	<5.00E-1	<2.40E+0	<1.30E+0	5.00E-1	1.10E+1	8.50E+0	4.60E+0	4.50E+0	1.70E+1	3.50E+0	9.00E-1	2.40E+1
MD11	<4.00E-1	<5.00E-1	<5.00E-1	<8.00E-1	<5.50E+0	5.40E+0	2.70E+0	3.00E+0	1.30E+1	2.50E+0	9.00E-1	2.10E+1
MD13	<7.00E-1	<3.20E+0		2.10E-1	<1.10E+1	7.40E+0	4.50E+0	4.80E+0	1.10E+1	4.20E+0	1.30E+0	2.30E+1
MD15	5.00E-1	<3.30E+0		6.00E-1	2.40E+1	1.60E+1	6.40E+0	5.60E+0	1.90E+1	3.00E+0	1.10E+0	1.90E+1
MD17	8.00E-1	<3.00E+0	4.00E-1	5.00E-1	<1.30E+1	1.20E+1	6.70E+0	5.20E+0	3.10E+1	4.40E+0	1.70E+0	2.80E+1
MD19	[illegible]	<9.00E+0	<1.20E+0	1.00E+0	6.70E+2	2.20E+1	1.20E+1	1.20E+1	4.30E+1	4.10E+0	2.20E+0	2.30E+1
MD21	5.50E+0	<1.00E+1	<1.00E+0	<6.00E-1	1.50E+2	3.00E+1	1.40E+1	1.30E+1	2.00E+1	4.00E-1	1.20E+0	1.90E+1
MD23	4.70E+0	<3.30E+0		1.30E-1	1.50E+2	2.20E+1	7.50E+0	6.70E+0	1.00E+1	1.00E+0	1.00E+0	2.00E+1
MD25	<2.40E+0	4.40E+0		1.70E+0	5.40E+1	5.40E+1	1.40E+1	1.50E+1	4.70E+1	1.20E+0	1.60E+0	2.30E+1
MD26	4.80E+0	2.90E+0	8.00E-1	1.00E+0	1.27E+2	2.80E+1	1.50E+1	1.40E+1	4.10E+1	1.50E+0	1.20E+0	2.60E+1
MD27	7.90E+0	<2.00E+1	9.30E+0	9.10E+0	1.60E+2	1.40E+2	6.60E+1	7.90E+1	2.50E+2	9.00E-1	2.60E+0	2.60E+1
MD28	1.30E+1	1.10E+2	1.00E+2	8.00E+1	1.90E+2	1.66E+3	9.50E+2	9.10E+2	2.50E+3	<2.00E+0	<8.00E+0	3.00E+1
MD29	1.30E+0	<1.50E+1	1.60E+1	1.30E+1	<5.50E+1	2.70E+2	1.50E+2	1.30E+2	5.50E+2	1.40E+0	<3.20E+0	<5.00E+1
MD30	1.20E+1	3.50E+1	4.80E+1	3.60E+1		6.70E+2	4.00E+2	3.80E+2	1.06E+3	5.00E-1	<5.10E+0	2.20E+1
MD31	9.30E+0	1.30E+2	1.00E+2	9.10E+1	<2.00E+2	1.90E+3	1.22E+3	1.14E+3	2.20E+3	<3.00E+0		<3.80E+1
MD32	7.70E+0	3.60E+1	2.90E+1	2.50E+1	<7.70E+1	4.10E+2	3.10E+2	3.00E+2	7.50E+2	<1.00E+1	<8.00E+0	3.00E+1
MD33	6.30E+0	4.60E+1	2.90E+1	2.50E+1	<6.40E+1	3.20E+2	2.10E+2	1.90E+2	6.30E+2	6.00E-1	3.00E+0	3.70E+1
MD34	9.40E+0	4.80E+1	4.00E+1	3.70E+1	1.40E+2	5.60E+2	3.70E+2	3.60E+2	1.53E+3	7.00E-1	3.00E+0	4.30E+1
MD35	1.00E+1	7.10E+1	5.90E+1	4.30E+1	1.40E+2	7.40E+2	4.90E+2	4.70E+2	1.53E+3	<1.00E+1	<5.00E+0	2.60E+1

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TABLE I-2. (Continued).

DITCH COORDINATES (a)	ACTIVITY PCI/G											
	U-235	PA-231	TH-227	RA-223	TH-234	RA-226	PB-214	BI-214	PB-210	CS-137	TH-232	K-40
MD36	4.70E+0	<8.30E+0	9.90E+0	8.00E+0	7.80E+1	1.50E+2	9.30E+1	8.90E+1	2.60E+2	1.40E+0	2.00E+0	2.90E+1
MD37	3.60E+0	4.00E+1	2.60E+1	2.40E+1	1.00E+2	4.60E+2	2.60E+2	2.40E+2	7.00E+2	3.00E-1	<3.40E+0	2.50E+1
MD38	4.50E+0	4.70E+1	4.50E+1	2.90E+1	<1.10E+2	5.80E+2	3.80E+2	3.60E+2	7.20E+2	1.10E+0	3.70E+0	4.80E+1
MD39	7.00E-1	5.00E+0	3.70E+0	3.20E+0	<2.30E+1	9.90E+1	5.50E+1	5.60E+1	1.30E+2	1.10E+0	1.10E+0	3.10E+1
MD40	<2.00E+0	3.60E+1	3.70E+1	3.10E+1		6.00E+2	3.00E+2	2.80E+2	7.50E+2	<1.00E+0	<4.70E+0	3.50E+1
MD41	4.00E+0	1.50E+1	1.80E+1	1.60E+1	1.88E+2	2.73E+2	1.44E+2	1.29E+2	3.00E+3	<4.00E+0	<6.00E+0	3.50E+1
MD42	5.40E+0	2.30E+1	3.10E+1	2.80E+1	<7.80E+1	4.70E+2	2.28E+2	2.10E+2	6.00E+2	<1.00E+0	3.30E+0	2.80E+1
MD43	1.30E+0	1.20E+1	8.70E+0	9.40E+0	4.90E+1	1.70E+2	7.60E+1	7.40E+1	1.90E+2	1.40E-1	2.30E+0	1.90E+1
MD44	2.20E+0	9.80E+0	1.10E+1	1.10E+1	6.50E+1	1.76E+2	9.00E+1	8.00E+1	1.00E+3	2.10E+0	4.00E+0	2.80E+1
MD45	2.60E+0	5.70E+0	6.20E+0	4.60E+0	4.10E+1	9.10E+1	4.90E+1	4.60E+1	1.80E+2	3.00E-1	1.70E+0	2.50E+1
MD46	<3.00E+0	1.50E+1	1.30E+1	1.30E+1		2.40E+2	9.40E+1	9.00E+1	4.40E+2	1.10E+0	1.90E+0	3.70E+1
MD47	3.70E+0	<6.00E+0	3.20E+0	2.40E+0	6.70E+1	6.40E+1	3.50E+1	3.30E+1	9.50E+1	2.50E-1	1.50E+0	2.30E+1
MD48	4.20E+0	5.20E+0	3.90E+0	4.30E+0	1.00E+2	6.40E+1	4.20E+1	4.00E+1	8.60E+1	4.20E-1	1.20E+0	2.60E+1
MD49	<5.00E+0	1.60E+1	2.50E+1	2.00E+1	<8.10E+1	4.05E+2	2.07E+2	2.02E+2	5.20E+2	<4.00E+0	<5.00E+0	2.50E+1
MD50	<1.00E+0	<3.20E+0	9.00E-1	1.00E+0	6.00E+0	2.20E+1	1.20E+1	1.00E+1	2.60E+1	1.00E-1	1.50E+0	1.90E+1
MD51	1.20E+0	1.70E+1	1.30E+1	1.00E+1	<3.90E+1	2.25E+2	1.29E+2	1.19E+2	3.00E+2	7.00E-1		3.00E+1
MD52	1.00E+0	1.60E+1	1.70E+1	1.60E+1	6.90E+1	2.20E+2	1.05E+2	9.80E+1	3.60E+2	2.00E-1	<2.20E+0	1.80E+1
MD53	1.30E+0	2.40E+0	1.90E+0	2.60E+0	3.20E+1	5.00E+1	1.90E+1	1.80E+1	9.40E+1	3.00E-1	1.30E+0	2.40E+1
MD54	1.80E+0	<5.20E+0	3.10E+0	3.20E+0	3.30E+1	4.60E+1	2.10E+1	1.90E+1	4.70E+1	8.00E-1	1.60E+0	2.10E+1
MD55	<2.20E+0	8.70E+0	1.20E+1	9.30E+0	7.80E+1	1.90E+2	6.40E+1	5.80E+1	2.60E+2	9.00E-2	2.30E+0	2.30E+1
MD60	<2.00E+0	3.90E+0	6.10E+0	4.70E+0	<3.80E+1	1.40E+2	6.10E+1	5.50E+1	6.10E+2	6.00E-1	1.30E+0	2.40E+1
MD61	<1.00E+0	2.60E+0	2.40E+0	1.70E+0	<1.40E+1	4.00E+1	2.60E+1	2.40E+1	8.90E+1	3.00E-1	1.10E+0	2.20E+1
MD62	<1.60E+0		5.10E+0	5.90E+0	<3.00E+1	1.20E+2	1.04E+2	1.05E+2	1.48E+2	<3.00E-1	<1.90E+0	2.20E+1
MD63	<3.00E+0	1.40E+1	1.20E+1	1.40E+1	<5.30E+1	2.70E+2	2.20E+2	2.10E+2	3.00E+2	<1.00E+0		3.70E+1
MD64	4.00E+0	1.00E+1	2.40E+1	2.20E+1	<6.20E+1	4.00E+2	1.80E+2	1.70E+2	5.30E+2	<6.00E-1		3.50E+1
MD65	2.90E+0	1.90E+1	2.50E+1	2.10E+1	<1.00E+2	4.40E+2	2.20E+2	2.20E+2	7.60E+2	<1.00E+0	<5.00E+0	1.50E+1
[illegible]66	<2.00E+0	3.50E+1	2.40E+1	2.10E+1	<6.20E+1	4.10E+[illegible]	1.70E+2	1.70E+2	5.90E+2	<9.00E-1	2.20E+0	2.60E+1
[illegible]67	<3.00E+0	1.70E+1	1.40E+1	1.50E+1	<5.20E+1	2.50E[illegible]	2.00E+2	2.00E+2	2.70E+2	<5.00E-1	<3.00E+0	3.80E+1

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DITCH COORDINATES(a)	ACTIVITY PCI/G										
	U-235	PA-231	TH-227	RA-223	TH-234	RA-226	PB-214	BI-214	PB-210	C[illegible]	[illegible]232	K-40
MD68	1.20E+0	1.80E+1	1.90E+1	1.60E+1	<5.50E+1	3.40E+2	1.50E+2	1.40E+2	4.10E+2	<7.[illegible]	[illegible]0E+0	3.50E+1
MD69	<3.00E+0	<3.00E+1	1.60E+1	1.80E+1	<6.80E+1	3.80E+2	2.70E+2	2.60E+2	4.30E+2	<1.3[illegible]	<4.20E+0	2.40E+1
MD70	2.60E+0	1.50E+1	2.10E+1	1.80E+1	9.70E+1	3.60E+2	1.30E+2	1.20E+2	4.30E+2	<7.00E-1	<2.90E+0	2.30E+1
MD71	<3.00E+0	1.30E+1	1.20E+1	1.30E+1	<5.30E+1	2.40E+2	1.60E+2	1.50E+2	2.50E+2			2.30E+1
MD72	<2.00E+0	6.50E+0	9.00E+0	9.30E+0	<3.70E+1	2.00E+2	1.30[illegible]2	1.20E+2	2.00E+2	<4.00E-1	<1.00E+1	1.70E+1
MD73	<8.00E-1	2.50E+0	2.00E+0	1.50E+0	1.10E+1	4.10E+1	2.50E+1	2.40E+1	6.70E+1	<5.00E-1	1.20E+0	1.90E+1
MD74	<3.00E+0	<2.00E+1	1.50E+1	1.40E+1	<5.70E+1	2.90E+2	2.00E+2	1.90E+2	5.70E+2	<5.00E-1	3.00E+0	2.20E+1
MD75	<1.50E+0	<6.00E+0	3.20E+0	3.20E+0	1.90E+1	7.50E+1	6.10E+1	5.70E+1	1.45E+2	<1.50E+0	1.00E+0	2.90E+1
MD76	<4.00E+0	1.50E+1	2.20E+1	1.80E+1	<6.80E+1	3.50E+2	2.50E+2	2.50E+2	4.20E+2	<8.00E-1	<3.00E+0	4.10E+1
MD77	<2.00E+0		5.40E+0	4.80E+0	<2.20E+1	8.30E+1	5.50E+1	5.20E+1	1.50E+2			2.60E+1
MD78	<2.00E+0	1.70E+1	1.10E+1	1.00E+1	<5.00E+1	2.50E+2	1.20E+2	1.20E+2	2.50E+2	<6.00E-1	<3.00E+0	2.70E+1
MD79	<1.50E+0	<4.90E+0	3.00E+0	3.70E+0	<2.70E+1	9.00E+1	6.70E+1	6.40E+1	6.00E+1	<2.00E+0	1.50E+0	2.30E+1
MD80	<5.00E+0	3.00E+1	3.70E+1	3.40E+1	<9.00E+1	7.10E+2	3.10E+2	3.30E+2	6.10E+2	<8.00E-1		3.00E+1
MD81	9.00E-1	<6.00E+0	1.50E+0	1.10E+0	2.40E+1	2.40E+1	1.70E+1	1.50E+1	3.80E+1	<3.00E-1	1.10E+0	2.10E+1
MD83	4.90E+0	8.50E+0	8.60E+0	7.90E+0	9.90E+1	1.40E+2	1.50E+2	1.40E+2	1.90E+2	<5.00E-1	<3.00E+0	2.70E+1
MD85	2.90E+0	<1.50E+1	2.90E+0	3.00E+0	4.00E+1	5.00E+1	5.10E+1	5.20E+1	8.40E+1	<3.00E-1	1.00E+0	1.90E+1
MD87	<2.00E-1	<1.00E-1	<3.00E-1	<4.00E-1	4.20E+0	2.80E+0	2.20E+0	2.10E+0	6.10E+0	<1.00E-1	7.00E-1	2.20E+1
MD89	<4.00E-1	<8.00E-1	<4.00E-1	<4.00E-1	<6.50E+0	2.20E+0	1.90E+0	2.10E+0	4.80E+1	<2.00E-1	4.00E-1	2.10E+1
MD91	<4.00E-1	<1.80E+0	<1.10E+0	<6.00E-1	5.00E+0	3.00E+0	3.40E+0	3.10E+0	4.10E+0	<2.00E-1	1.10E+0	2.30E+1
MD93	<6.00E-1	<2.60E+0		3.00E-1	4.40E+0	8.50E+0	8.20E+0	7.80E+0	1.30E+1		1.00E+0	2.40E+1
MD95	<1.00E+0		3.10E+0	2.70E+0	<1.80E+1	6.10E+1	5.20E+1	4.90E+1	9.50E+1	<3.00E-1		2.30E+1
MD97	<1.70E+0	<7.70E+0	3.60E+0	4.00E+0	<2.80E+1	1.10E+2	9.40E+1	9.30E+1	1.10E+2			2.40E+1
MD99	<4.00E-1	<8.00E-1	<5.00E-1	<8.00E-1	<7.70E+0	9.00E+0	8.20E+0	6.40E+0	1.00E+1	<2.00E-1	8.00E-1	2.20E+1
MD100	<5.00E-1	<2.00E+0	<5.00E-1	<1.00E+0	<8.00E+0	7.50E+0	7.70E+0	7.40E+0	1.20E+1	<2.00E-1	9.00E-1	1.90E+1
MD101	1.30E+0	<1.00E+1	2.30E+0	2.00E+0	3.80E+1	4.00E+1	3.90E+1	3.90E+1	6.70E+1	<3.00E-1	1.10E+0	2.60E+1
MD103	<8.00E-1		1.90E+0	2.00E+0	<1.70E+1	5.00E+1	3.90E+1	3.80E+1	6.80E+1	<2.00E-1	<2.60E+0	2.10E+1
MD105	<7.00E-1	<3.50E+0	<1.00E+0	2.00E-1	1.40E+1	2.20E+1	2.80E+1	2.60E+1	2.50E+1	<2.00E-1	1.10E+0	2.30E+1
MD107	<1.40E+0	<6.50E+0	5.20E+0	5.40E+0	<2.30E+1	1.07E+2	1.05E+2	1.02E+2	1.07E+2	<4.00E-1	2.50E+0	2.40E+1

(a) Samples taken every 25 ft south to north (see Table I-1 for exact grid and distance location).

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TABLE I-3. INSTRUMENTAL READINGS AND ^{226}RA CONCENTRATIONS IN THE WEST DITCH

Distance from Initial Sampling Point,[a] ft (m)	Instrumental Readings: Gamma[b] (micro R/hr) at 1 m above Soil Surface	Instrumental Readings: Beta-Gamma[c] (milli R/hr) at 1 cm above Soil Surface	^{226}Ra Concentration (pCi/g): Screening[d]	^{226}Ra Concentration (pCi/g): Radiochemistry[e]	BCD Reference Code: Grid Coordinates	BCD Reference Code: ID
0				2.6		WD1
100(30.5)				4.2		WD2
500				23		WD6
700(213.5)				26		WD8
800				35		WD9
900				15		WD10
1,100(335.5)				6.7		WD12
1,200				11		WD13
1,300				3.6		WD14
1,400				18		WD15
1,500(452.5)				5		WD16
1,800				75		WD19
1,975[f]	180	3,000			S0.5W22	
2,000(610)	40	220			N1W22	WD21
2,025	100	300			N1.5W22	
2,050	120	360			N2W22	
2,075	50	150			N2.5W22	
2,100	40	120		59	N3W22	WD22
2,125	30	100			N3.5W22	
2,150	22	90			N4W22	
2,175	21	100			N4.5W22	
2,200	16	80			N5W22	WD23
2,225	28	110			N5.5W22	
2,250	40	120			N6W22	
2,275	26	100			N6.5W22	
2,300	26	60			N7W22	WD24
2,325	27	50			N7.5W22	
2,350	27	100			N8W22	
2,375	25	60			N8.5W22	
2,400	17	70		43	N9W22	WD25
2,425	14	80			N9.5W22	
2,450	13	50			N10W22	
2,475	16	70			N10.5W22	

TABLE I-3. (Continued)

Distance from Initial Sampling Point,[a] ft (m)	Instrumental Readings: Gamma[b] (micro R/hr) at 1 m above Soil Surface	Instrumental Readings: Beta-Gamma[c] (milli R/hr) at 1 cm above Soil Surface	^{226}Ra Concentration (pCi/g): Screening[d]	^{226}Ra Concentration (pCi/g): Radiochemistry[e]	BCD Coor[illegible]es	[illegible]ce Code ID
2,500[g] (762.5)	14	60			N11W22	WD26
2,525	19	90			N11.5W22	
2,550	18	70			N12W22	
2,660	10-20		<4	3.1		400
2,700	10-20			7.8		WD28
2,760	10-20					401
2,860	10-20					402
2,960	10-20					403
3,060 (933.3)	10-20					404
3,160	10-20			11.5		405
3,260	10-20		<4			406
3,360	10-20					407
3,460	10-20		<5			408
3,660	10-20?		<4	3.2		410
3,960	10-20		>5			413
4,160	10-20		>5			415
4,660	10-20			19.9		420
4,760	10-20		>5			421
4,860	10-20		>5			422
4,960	10-20		>5			423
5,060 (1543.3)	10-20		>5			424
5,160	10-20		<4			425
5,260	10-20		<4			426
5,360	10-20		<4			427
5,460	10-20		>5			428

(a) Sampling initiated off-site in ditch due west on grid point S36W18 (see Figure I-1).

(b) Gamma readings taken at 1 m above sediment or water surface; background 13 μR/hr.

(c) Beta-gamma readings taken at 1 cm above sediment or water surface; background 60 μR/hr.

(d) Measurement of ^{214}Bi as index of ^{226}Ra (see QA Document NS-NS-122).

(e) Gamma spectroscopy, background concentration average in sediment 0.5 pCi/g (±0.1) (Complete listings of radionuclide composition of on-site sediments on Table I-4).

(f) Sample just north of Site perimeter fence on south side of West Patrol Rd. (see Figure I-1).

(g) Sample 60 ft south of north perimeter fence which is at 2,560 ft (see Figure I-1).

TABLE I-4. RADIONUCLIDES IN ON-SITE SEDIMENT SAMPLES OF THE WEST DITCH

DITCH COORDINATES (a)	ACTIVITY PCI/G											
	U-235	PA-231	TH-227	RA-223	TH-234	RA-226	PB-214	BI-214	PB-210	CS-137	TH-232	K-40
WD1 (b)	4.00E-1	<2.70E+0	<5.00E-1	<8.00E-1	9.90E+0	2.60E+0	1.10E+0	1.10E+0	<1.00E+1	1.40E+0	9.50E-1	2.20E+1
WD2	1.90E+0	<2.00E+0	<7.00E-1	<6.00E-1	5.10E+1	4.20E+0	4.00E+0	3.90E+0	1.30E+1	3.20E+0	1.30E+0	2.30E+1
WD6	1.00E+0		1.00E+0	9.00E-1	2.00E+1	2.30E+1	1.60E+1	1.40E+1	2.00E+1	1.00E+0	1.50E+0	2.10E+1
WD8	8.00E-1	<3.00E+0	6.00E-1	8.00E-1	2.50E+1	2.60E+1	2.00E+1	1.90E+1	2.20E+1	1.20E+0	1.20E+0	1.90E+1
WD9	1.20E+0	<5.00E+0	7.00E-1	8.00E-1	3.40E+1	3.50E+1	3.60E+1	3.50E+1	3.70E+1	2.10E+0	1.90E+0	1.90E+1
WD10	1.90E+0	5.00E-1	5.00E-1	4.00E-1	4.10E+1	1.50E+1	9.60E+0	8.60E+0	1.50E+1	<2.00E+0	1.10E+0	2.00E+1
WD12	<5.00E-1	<2.10E+0	<1.00E+0	<1.10E+0	1.00E+1	6.70E+0	5.00E+0	4.50E+0	6.10E+0	7.00E-1	1.30E+0	2.10E+1
WD13	2.00E+0	<3.00E+0	<1.00E+0	4.00E-1	4.10E+1	1.10E+1	6.50E+0	6.70E+0	1.20E+1	1.70E+0	1.20E+0	1.70E+1
WD14	<3.00E-1	<1.80E+0	<7.00E-1	<5.00E-1		3.60E+0	3.50E+0	2.40E+0	3.60E+0	2.00E-1	8.00E-1	1.90E+1
WD15	1.40E+0	<6.00E+0	<1.20E+0	<1.00E+0	3.20E+1	1.80E+1	1.70E+1	1.60E+1	2.20E+1	2.40E+0	1.70E+0	2.10E+1
WD16	<3.00E-1	<1.60E+0		<8.00E-1	2.80E+1	5.00E+0	4.00E+0	4.60E+0	6.80E+0	7.00E-1	9.00E-1	2.20E+1
WD19	4.50E+0	<5.80E+0	2.20E+0	2.80E+0	9.00E+1	7.50E+1	3.30E+1	3.30E+1	5.50E+1	6.60E+0	2.90E+0	2.50E+1
WD22	<4.10E+0	1.20E+1	1.90E+1	1.60E+1	<6.50E+1	5.90E+2	2.00E+2	1.90E+2	6.90E+2	9.00E-1	2.00E+0	3.50E+1
WD25	1.10E+0	3.00E+0	1.70E+0	9.00E-1	<1.50E+1	4.30E+1	1.80E+1	1.70E+1	2.90E+1	2.40E+1	1.70E+0	2.30E+1
WD28	<7.00E-1		<9.00E-1	<8.00E-1	9.20E+0	7.80E+0	5.40E+0	4.80E+0	8.00E+0	2.20E+0	1.00E+0	2.40E+1

(a) Samples taken south to north off-site every 100 ft, on-site every 25 ft (see Table I-3 for exact grid and distance location).

(b) Sample starting point is off-site due west of residue storage buildings.

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TABLE I-5. INSTRUMENTAL SURVEY DATA FROM SOUTH 31 DITCH

Location (Grid Points)	Beta-Gamma[a] (mR/hr)	Gamma[b] (mR/hr)
S31W8	0.42	0.18
S31W7	0.30	0.15
S31W6	0.27	0.10
S31W5	0.20	0.06
S31W4	0.20	0.15
S31W3[c]	0.23	0.17
S31W2	0.16	0.10
S31W1	0.18	0.07
S31E1	0.12	0.08
S31E2	0.15	0.09
S31E3	0.15	0.10
S31E5	0.13	0.06
S31E6	0.19	0.04
S31E7	0.13	0.05
S31E8	0.07	0.04
S31E11	0.11	0.05
S31E12	0.07	0.05
S31E13[d]		

(a) Background, 0.06 mR/hr.

(b) Background, 0.01 mR/hr.

(c) Gamma spectroscopy analysis determined ^{226}Ra concentration to be 5.0 pCi/g.

(d) Sampling points S31E13 through S31E20 at background.

TABLE I-6. RADIONUCLIDES IN ON-SITE DRILL CORES FROM THE CENTRAL DRAINAGE DITCH

Grid Location	Depth (ft)	^{235}U	^{231}Pa	^{227}Th	^{223}Ra	^{219}Rn	^{234}Th	^{234}Pa	^{226}Ra	^{214}Pb	^{214}Bi	^{232}Th	^{137}Cs	^{40}K	^{210}Pb
S20W8	2	0.5	<2	0.2	<0.5	<0.5	11	<22	3.8	3.2	3.2	1.5	<0.2	23	<4
S20W8	4	<0.8	<1.5	0.2	<0.5	<0.5	5.4	<12	6.9	6.5	6.4	0.7	<0.1	20	6
S24W8	0	<1	<30	12	12	13	<9	<50	280	180	180	<5	<0.5	21	260
S24W8	2	0.4	<2	<0.3	<0.3	<0.3	8.5	<20	2.1	1.4	1.3	0.8	<0.07	21	<3
S24W8	6	<0.5	<2	<0.7	<0.6	<0.6	4.1	<24	1.6	1.3	1.4	1.1	<0.2	20	<3
S26W8	2	<0.9	<3.7	<1	0.7	0.8	<11	<30	19	13	13	0.8	<0.3	14	15
S26W8	4	<0.9	<5	<1.4	1.3	0.3	<15	<46	29	21	21	1.5	<0.3	19	27

TABLE I-7: RADIONUCLIDES SITE DRILL CORES FROM THE CENTRAL DRAINAGE DITCH

Sample Number[a]	Depth (ft)	pCi/g U235	Pa231	Th227	Ra223	Rn223	Th234	Pa234	Ra226	Pb214	Bi214	Th232	Cs137	Pb210
200	2	<0.4	<0.9	<0.5	<0.6	<0.6	--	--	1.3	0.9	1	0.7	<0.2	<2
	4	<0.3	<1.2	--	<0.4	<0.4	4.0	--	1.1	1	0.9	1	<0.1	<2
	6	<0.3	--	--	<0.7	<0.7	--	<33	1.1	0.8	0.9	1	<0.2	<2
203	2	--	<2.6	<0.8	<0.8	<0.8	<7	--	2	2	2.6	--	<0.3	
	4	0.3	<1.8	--	<0.5	<0.5	7.1	<22	0.8	0.5	0.7	0.7	<0.2	<2
207	2	<0.3	--	<0.4	<0.4	<0.4	--	--	1.1	0.9	1	0.5	<0.1	<2
211	2	<0.6	<1.1	--	<1	<1	--	--	1.5	1	1.7	1.4	<0.4	<2
	4	<0.5	--	--	<0.7	<0.7	5	<33	2.4	1.8	3.1	0.7	<0.2	
	6	<0.3	--	<0.5	<0.4	<0.4	<4.7	--	1.4	1	1.1	0.9	<0.1	<2
214	2	<0.4	--	<0.5	<0.5	<0.5	--	--	3.5	3.6	2.5	1.3	<0.2	
	4	<0.4	--	<0.6	<0.5	<0.5	<4.5	<25	1.7	1.5	1.3	1.2	<0.2	<2
222	2	<0.3	--	<0.9	<0.5	<0.5	<3.5	--	1.3	1.1	1.5	1	<0.2	<2
	4	<0.5	--	<0.6	<0.6	<0.6	--	<24	2.4	2	1.7	1.2	<0.3	
223.5	4	--	--	<0.8	<0.4	<0.4	--	--	0.9	0.6	0.8	0.7	<0.2	<2
224	2	<0.5	--	--	<0.6	<0.6	5	--	1.7	1.6	1.6	1.2	<0.1	
	4	<0.3	--	--	<0.4	<0.4	<3.4	--	1.8	0.8	1.4	0.8	<0.2	
229.5	2	<0.4	--	--	<0.5	<0.5	3.8	--	1.5	1.3	1.3	1	<0.1	<2
	4	<0.3	--	--	<0.5	<0.5	3.5	--	1.8	1.3	1.3	0.8	<0.1	
300	2	<0.5	<1.8	--	<0.6	<0.6	<7	--	1.4	1	1.2	0.7	<0.3	<2
	4	<0.3	<1.3	<0.5	<0.4	<0.4	<5.1	--	0.6	0.8	0.8	0.8	<0.1	<2
302	2	<0.4	--	<0.8	<0.5	<0.5	<5.2	--	1	0.7	0.9	0.4	<0.1	<2
	4	<0.3	<1.3	<0.5	<0.5	<0.5	<3.4	--	0.8	0.7	0.7	0.7	<0.1	<2
	6	<0.3	--	<0.5	<0.4	<0.4	--	<23	1.1	0.9	0.9	0.3	<0.1	<2
304	2	<0.3	<1.4	<0.4	<0.4	<0.4	<3.8	--	2.2	1.7	2	1	<0.2	
	4	<0.3	<1.3	<0.5	<0.4	<0.4	3.7	--	1.3	1.4	1.2	0.8	<0.1	<2
	6	<0.3	--	--	<0.5	<0.5	--	--	1.6	1.2	1.6	0.9	<0.1	
306	6	<0.4	--	<0.6	<0.5	<0.5	4.9	<19	0.9	0.7	1	0.6	<0.2	<2
308	2	<0.3	--	<0.9	<0.6	<0.6	<5	--	1.2	1.2	1.1	1	<0.1	<2
	4	<0.3	--	<0.4	<0.5	<0.5	<5	--	1	0.7	1	1.1	<0.1	<2
312	2	<0.3	<1.2	<0.6	<0.5	<0.5	<6	--	1.1	1	1.1	0.8	<0.2	<2
	4	<0.3	--	<0.4	0.3	0.3	5.9	<25	2	2.5	1.9	0.7	<0.2	
	6	<0.2	--	--	<0.3	<0.3	<7	<30	1.5	0.9	1.1	1.1	<0.1	<2
316	2	<0.3	<1.7	<0.5	<0.5	<0.5	3	<25	1.6	1.5	1.4	0.7	<0.3	
	4	<0.3	<1.4	--	<0.5	<0.5	<3.7	--	1.2	0.9	1.1	0.8	<0.2	<2

TABLE I-7. (Continued)

Sample Number(a)	Depth (ft)	pCi/g U235	Pa231	Th227	Ra223	Rn223	Th234	Pa234	Ra226	Pb214	Bi214	Th232	Cs137	Pb210
319	2	<0.3		<0.6	<0.4	<0.4	<5	--	1.4	0.9	0.9	1.2	<0.2	<2
	4	<0.3	--	<0.4	<0.4	<0.4	--	<28	1.3	1.1	1.1	0.8	<0.2	<2
320	2	<0.2	--	<0.4	<0.4	<0.4	<2.4	--	0.9	0.8	1	0.9	<0.1	<2
	4	--	--	<0.4	<0.6	<0.6	<4.2	--	1.3	1	1.4	0.7	<0.1	<2
324	2	<0.3	<1.3	<0.8	<0.4	<0.4	<4.7	<13	1	0.4	0.5	0.6	<0.1	<2
	4	<0.4	<1.5	--	<0.8	<0.8	2.4	--	1.2	0.6	0.9	1.3	<0.2	<2
326	2	<0.4	--	<0.9	<0.5	<0.5	<4.1	<20	1.6	1.4	1.2	0.8	<0.2	<2
328	2	<0.3	<1.5	<0.8	<0.5	<0.5	<4.5	--	1.2	0.9	1.1	0.9	<0.1	<2
	4	<0.4	--	<0.4	<0.4	<0.4	--	<30	2	1.8	1	0.9	<0.2	
330	2	<0.4	<1.8	<1.1	<0.6	<0.6	<6.4	<30	2.1	1.6	2.3	1	<0.2	
344	2	<0.5	<2.2	<0.8	<0.7	<0.7	<8	--	2.4	1.9	2.1	0.8	<0.3	
	4	<1.4	<5.6	<1.6	<1.3	<1.3	--	--	29	23	21	1.3	<0.4	
	6	<0.3	<0.6	<0.3	<0.4	<0.4	3.2	--	1	0.3	0.7	0.8	<0.1	<2
345	2	<0.4	<1.7	<0.5	<0.6	<0.6	--	<15	3	1.7	1.8	0.6	<0.3	
	4	<0.3	<1.4	--	<0.5	<0.5	5.5	--	0.9	0.6	0.6	1	<0.1	<2
	6	<0.4	<4.2	<1.2	<0.6	<0.6	<10	<30	1.4	1.1	1	0.5	<0.2	
348	2	<0.4	<1.5	<1.0	--	--	<4	<19	1.5	0.6	1	1.4	<0.2	<2
	4	<0.3	<1.3	<0.8	<0.6	<0.6	6.1	<17	<1	0.4	0.8	0.3	<0.1	<2
350	2	<0.4	<1.6	<0.6	--	--	7.4	--	1	0.6	0.8	0.6	<0.3	<2
	4	<0.4	<1.8	<0.6	<0.5	<0.5	<4.7	<40	1.4	1.1	0.9	0.9	<0.2	
	6	<0.3	--	<0.4	<0.4	<0.4	<4	<15	1.2	0.8	0.7	0.7	<0.1	<2
355		<0.4	<1.9	<0.4	0.2	<0.5	5.0	<13	7	5.2	5.0	1.0	0.8	5
356		<0.2	<2.0	<0.5	<0.6	<0.6	<5.6	<24	8.0	5.6	5.5	0.9	1.0	8
357		<0.2	<2.0	<0.5	<0.5	<0.5	<7.2	<26	8.4	6.5	6.5	1.0	0.8	8
359		<0.2	<2.3	<0.3	<0.3	<0.3	3.4	<10	3.7	3.3	3.1	[illegible]	0.1	<4
361		<0.4	<1.8	<0.4	<0.5	<0.5	<4.9	<29	4.5	3.7	3.8	0.8	0.8	4
368		<0.2	<2.2	<0.2	<0.3	<0.3	2.9	<8	4.2	3.0	2.8	0.5	0.2	<4
370		<0.4	<1.5	<1.0	<0.5	<0.5	<4.0	<22	2.6	1.9	1.8	0.8	<0.2	<4

(a) See Table I-1 for exact distance location and Figure I-1 for general location.

TABLE I-8. RADIONUCLIDES IN OFF-SITE DRILL CORES FROM THE WEST DITCH

Sample Number[a]	Depth (ft)	pCi/g												
		U235	Pa231	Th227	Ra223	Rn223	Th234	Pa234	Ra226	Pb214	Bi214	Th232	Cs137	Pb210
400	2	<0.3	<1.3	<0.5	<0.5	<0.5	4	--	1.1	0.9	1	0.7	<0.2	<2
	4	<0.3	<1.6	<0.9	<0.4	<0.4	<4	--	1	0.9	1	0.5	<0.1	<2
	6	--	--	<1.3	<0.8	<0.8	<5.6	--	1.8	1.2	0.7	1	<0.2	
402	2	<0.4	<1.3	--	<0.5	<0.5	<4	<17	2.2	1.8	2.2	1.1	<0.1	
	4	<0.3	<1.4	--	<0.4	<0.4	<3.4	<27	1.3	1.2	1	0.9	<0.2	<2
407	2	<0.4	--	<1	<0.4	<0.4	--	--	2.1	1.9	2.1	1	<0.2	
	4	<0.3	--	<0.4	<0.4	<0.4	<3.8	<32	1.8	1.3	1	--	<0.1	<2
409	2	<0.4	<1.4	<0.6	<0.5	<0.5	<4.2	--	1.2	1.1	1	0.4	<0.3	<2
	4	<0.3	--	--	<0.6	<0.6	<4.7	--	1.2	0.6	1	1	<0.2	<2
412	2	<0.2	<1.3	<0.5	<0.2	<0.2	<2.1	--	1.1	0.8	0.8	0.6	<0.1	<2
	4	<0.3	<0.9	<0.4	<0.4	<0.4	<3.5	--	1.3	0.8	1.1	1.5	<0.1	<2
416	2	<0.3	--	--	<0.4	<0.4	--	--	2	1.8	1.9	1.1	<0.2	
	4	<0.4	<1.2	<0.6	<0.5	<0.5	<4.2	--	1.2	0.7	1.1	1.2	<0.2	<2
420	2	<0.3	--	<0.9	<0.5	<0.5	<6.5	<14	1.2	1.2	0.9	1.3	<0.1	<2
	4	<0.4	--	<0.4	<0.5	<0.5	--	--	1.8	1.7	1.4	1.1	<0.1	
422	2	<0.4	--	<0.9	<0.4	<0.4	--	--	1.5	0.7	1.4	0.7	<0.2	<2
422.5	4	--	--	<0.6	<0.4	<0.5	--	<17	1.8	1.3	1.3	1	<0.2	
425	2	<0.4	--	<0.9	<0.5	<0.5	<3.8	--	2.9	2.8	2.7	1	<0.2	
	4	<0.2	--	<0.7	<0.5	<0.5	<3.6	--	1.2	0.9	1.1	1	<0.1	<2
427	2	<0.3	--	<0.6	<0.4	<0.4	<3.8	<21	1.3	1	1	1	<0.1	<2
	4	<0.3	<1.1	--	<0.5	<0.5	<3.5	--	1.4	1.1	1	1.2	<0.1	<2
429	2	<0.4	<1	--	<0.4	<0.4	5	--	1.3	1	1.2	1	<0.2	<2

(a) See Table I-3 for exact distance location and Figure I-1 for general location.

TABLE I-9. RADIOCHEMICAL SCREENING OF CORES IN THE SOUTH 31 DITCH

Location	Depth (ft)	^{226}Ra Concentration (pCi/g) Screening[a]
S31E18	2	<4
	4	<4
S31E15	2	<4
	4	<4
S31E4.5	2	>5
	4	<4
S31W5	2	<4
S31W7	2	<4
	4	<4
S31W8.5	2	<4
	4	<4

[a] Measurement of ^{214}Bi as index of ^{226}Ra (QA Document NS-NS-122).

TABLE I-10. ^{226}RADIUM IN SEDIMENTS OF TRIBUTARIES TO THE CENTRAL DRAINAGE DITCH OR FOURMILE CREEK

Location[a] (ID Code)	^{226}Ra Concentrations (pCi/g) Screening[b]	Radiochemistry[c]
500		
501	<4	1.3
502	<4	2.1
503	<4	
590	<4	
599	<4	
600	<4	
601	<4	1.2
602	<4	1.2
610	<4	
700		
701	<4	
702	<4	0.6
703	<4	
704	<4	
705	<4	0.7
R800	<4	
R801	<4	1.1
R802	<5	
R803	<4	
R804	<4	
R805	<4	
R806	<4	
R807	<4	4.5
903	<4	0.9
907		0.7
912	<4	
913	<4	
914	<4	
1100	<4	1
1102	<4	
1104	<4	0.3

(a) See Figure I-1.

(b) Measurement of ^{214}Bi as index of ^{226}Ra (see QA Document NS-NS-122).

(c) Gamma spectroscopy, background concentration average in sediment 0.5 pCi/g (±0.1).

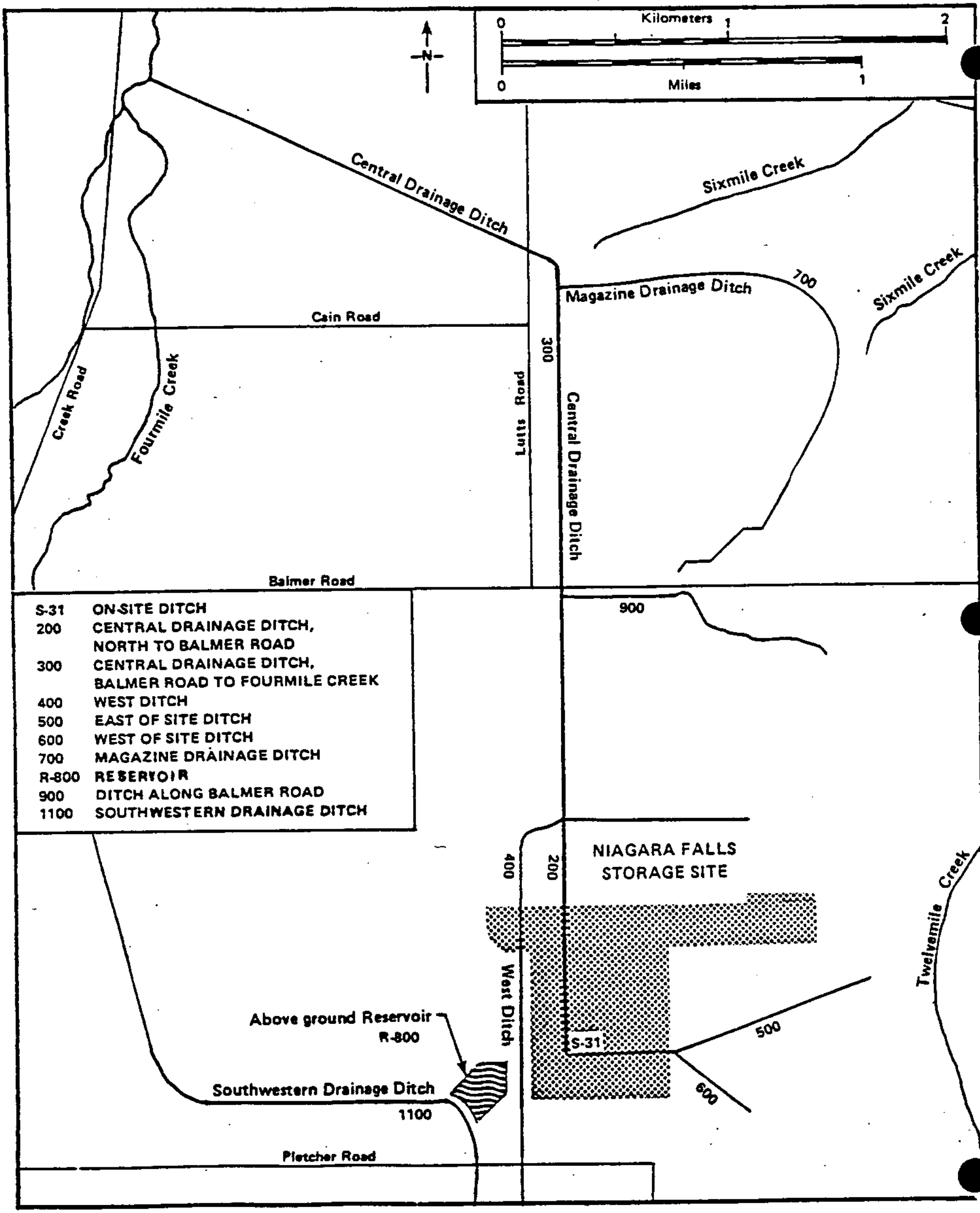

FIGURE I-1. OFF-SITE SAMPLING LOCATIONS IN THE DRAINAGES AND TRIBUTARIES OF THE DOE-NIAGARA FALLS STORAGE SITE

TABLE I-11. INSTRUMENTAL SURVEY DATA FROM BUILDING 434 DITCH

Location (Grid Points)	Beta-Gamma[a] (mR/hr)	Gamma[b] (mR/hr)
	NORTH BRANCH	
N9.2E37	0.05	0.05
[illegible].2E38	0.04	0.04
[illegible]39	0.05	0.04
[illegible]40	0.06	0.06
N9.2E41	0.06	0.06
N9.2E42	0.07	0.07
N9.2E43	0.07	0.07
N9.2E44	0.08	0.08
N9.2E45	0.08	0.10
N9.2E46	0.10	0.14
N9.2E47	0.13	0.14
N9.2E48	0.15	0.15
N9.2E49	0.25	0.25
N9.2E50	0.24	0.24
N9.2E51	0.30	0.40
	SOUTH BRANCH	
N8.7E37	0.05	0.05
N8.7E38	0.04	0.04
N8.7E39	0.05	0.05
N8.7E40	0.06	0.06
N8.7E41	0.06	0.06
N8.7E42	0.04	0.07
N8.7E43	0.07	0.07

(a) Background, 0.11 mR/hr.

(b) Background, 0.01 mR/hr.

TABLE I-12. INSTRUMENTAL SURVEY DATA FROM SOUTH 16 DITCH

Location (Grid Points)	Beta-Gamma[a] (mR/hr)	Gamma[b] (mR/hr)
S16W7	0.22	0.14
S16W6	0.22	0.20
S16W5	0.24	0.17
S16W4	0.23	0.18
S16W3	0.15	0.12
S16W2	0.15	0.10
S16W1	0.17	0.13
S16E1	0.15	0.08
S16E2	0.15	0.12
S16E3	0.13	0.08
S16E4	0.10	0.08
S16E5	0.12	0.07
S16E7	0.12	0.07
S16E8	0.20	0.10
S16E9	0.10	0.07
S16E10	0.10	0.10
S16E11	0.10	0.10
S16E12	0.10	0.06
S16E13	0.05	0.05
S16E14	0.05	0.05
S16E15	0.05	0.05
S16E16	0.05	0.05
S16E17	0.05	0.05
S16E18	0.02	0.02
S16E19	0.03	0.02

(a) Background, 0.11 mR/hr.

(b) Background, 0.01 mR/hr.

TABLE I-13. INSTRUMENTAL SURVEY DATA FROM LUTTS ROAD DITCH

Location (Grid Points)	Beta-Gamma[(a)] (mR/hr)	Gamma[(b)] (μR/hr)
S29W17	0.08	(c)
S28W17	0.11	(c)
S27W17	0.50	(c)
S26W17	3.50	(c)
S25W17	1.80	(c)
S24W17	0.60	(c)
S23W17	1.40	(c)
S22W17	1.50	(c)
S21W17	0.18	(c)
S20W17	0.70	1200
S19W17	0.06	450
S18W17	0.60	950
S17W17	0.25	600
S16W17	3.80	2500
S15W17	0.04	300
S14W17	0.06	200
S13W17	0.08	260
S12W17	0.13	160
S11W17	0.31	400
S10W17	0.24	230
S9W17	0.60	600
S8W17	0.06	120
S7W17	0.05	120
S6W17	0.04	60
S5W17	0.03	55
S4W17	0.06	40
S3W17	0.04	40
S2W17	0.06	25
S1W17	0.03	20
N0W17	0.10	11
N0W16	0.11	15
N0W15	0.10	13
N0W14	0.15	15
N0W13	0.13	11
N0W12	0.11	13
N0W11	0.10	11
N0W10	0.11	15
N0W9	0.11	12

(a) Background, 0.11 mR/hr.

(b) Background, 13 μR/hr.

(c) Meter readings inaccurate from S29W17 to S21W17.

TABLE I-14. ^{226}RADIUM IN SEDIMENTS OF NATURAL DRAINAGES

Location[a]	^{226}Ra Concentration (pCi/g)	
	Screening[b]	Radiochemistry[c]
	FOURMILE CREEK	
F1A	<4	
F1B		0.4
F2A	<4	
F2B	<4	0.7
F3A	<4	
F3B	<4	
F4A	<4	
F4B	<4	
F5A	<4	
	SIXMILE CREEK	
S1A	<4	0.4
S1B	<4	
S2A	<4	0.8
S3A	<4	
S3B	<4	
S4	<4	
S5	<5	
	TWELVEMILE CREEK	
T1A	<4	
T1B	<4	
T2	<4	
T3B	<4	
T4B	<4	
T5	<4	

(a) See Figure I-2.

(b) Measurement of ^{214}Bi as index of ^{226}Ra (see QA Document NS-NS-122).

(c) Gamma spectroscopy, background concentration average in sediment 0.5 pCi/g (±0.1). Determined from samples T10, T11, T12, taken from a branch of Twelvemile Creek.

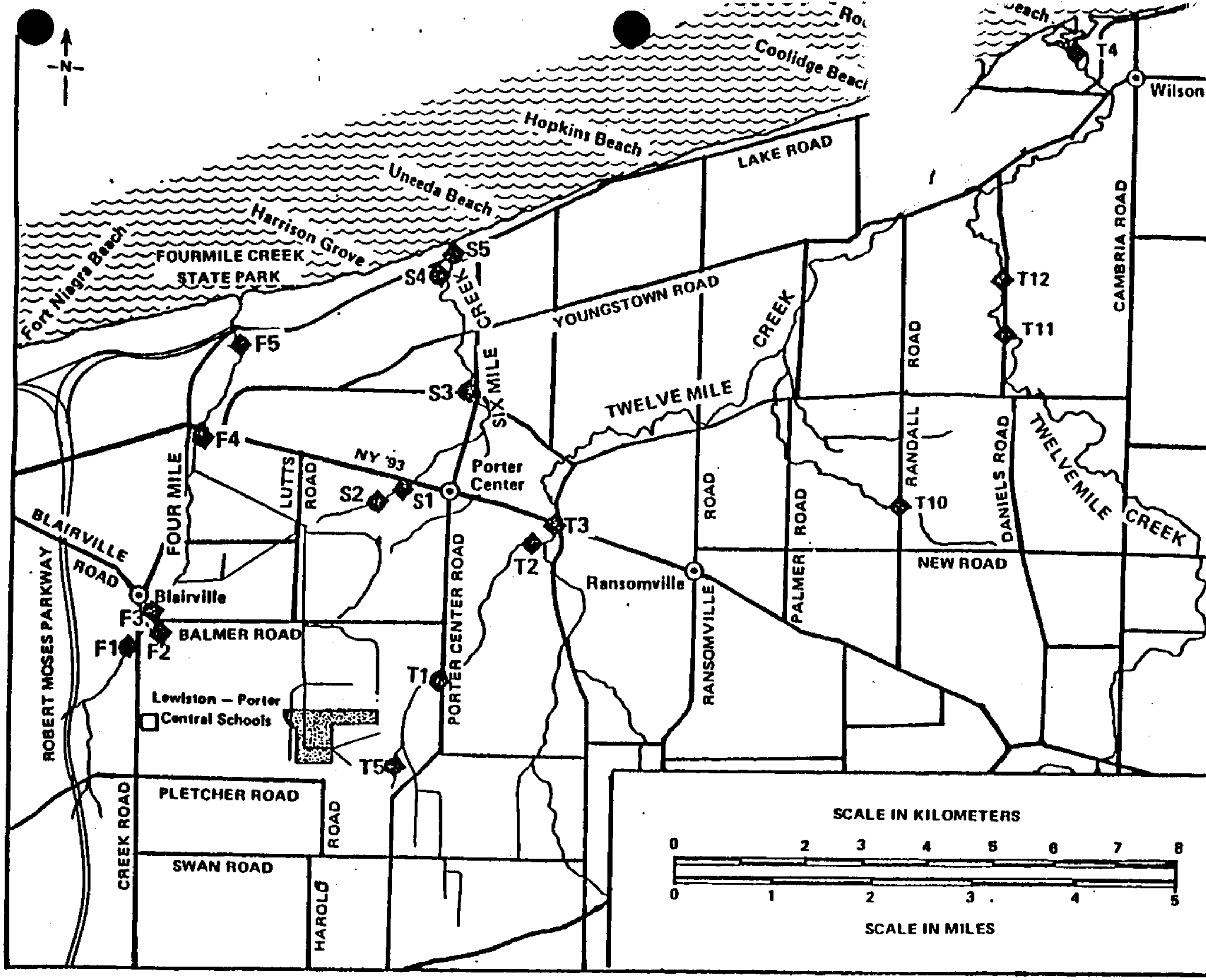

FIGURE I-2. OFF-SITE SAMPLING LOCATION IN THE NATURALLY OCCURRING CREEKS IN THE VICINITY OF THE NIAGARA FALLS STORAGE SITE

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TABLE I-15. MASS SPECTROGRAPHIC ANALYSES OF ON-SITE CENTRAL DRAINAGE DITCH SEDIMENTS IN PARTS PER MILLION (PPM)

Element	Location[a]									
	S26.5W8	411 Roof Pipe	S25W8	S20W8	S18.5W8	S16W8	S12.5W8	S5.5W8	N4W8	N12W8
Li	300	100	30	100	200	200	100	30	30	100
Be	0.2	0.5	0.3	0.2	0.5	0.1	0.2	0.2	0.3	0.2
B	200	30	50	50	50	30	20	10	50	30
F	100	10	30	200	2000	500	10	200	10	20
Na	~1%	3000	500	~1%	5000	~2%	5000	5000	2000	5000
Mg	~3%	~3%	~1%	~2%	~2%	~2%	~5%	~2%	~1%	~1%
Al	~20%	~20%	~20%	~20%	~20%	~20%	~20%	~20%	~20%	~20%
Si	~40%	~3%	~40%	~40%	~30%	~40%	~40%	~30%	~40%	~40%
P	300	2000	100	300	2000	200	300	300	200	200
S	200	200	200	300	1000	300	50	100	20	100
Cl	5	30	1	3	50	5	2	2	3	3
K	~2%	3000	3000	~2%	~1%	~1%	~1%	~1%	~1%	~2%
Ca	~1%	5000	3000	3000	~2%	~1%	~1%	5000	~1%	~2%
Sc	20	30	10	10	20	10	10	20	20	20
Ti	1000	2000	500	500	3000	1000	1000	1000	5000	~1%
V	50	1000	50	30	100	50	30	20	50	50
Cr	20	50	30	30	200	20	20	10	10	20
Mn	500	500	100	300	2000	200	1000	100	200	500
Fe	~1%	~2%	~1%	~2%	~5%	~1%	~1%	~1%	~1%	~1%
Co	300	5000	300	50	200	200	30	100	10	20
Ni	100	5000	1000	50	200	1000	50	50	10	50
Cu	50	1000	200	20	200	50	20	20	10	20
Zn	10	20	5	1	20	1	2	5	2	2
Ga	5	5	1	2	10	1	1	3	5	1
Ge	<0.3	<0.2	<0.2	<0.3	<0.2	<0.3	<0.3	<0.2	<0.3	<0.5
As	1	10	1	1	3	1	0.5	1	1	3
Se	<1	<0.5	<0.3	<0.5	<0.3	<0.5	<0.3	<0.3	<1	<1
Br	0.5	0.2	0.2	0.3	1	0.3	0.1	0.3	0.1	0.5
Rb	20	100	50	30	500	100	20	50	100	30
Sr	30	50	30	50	500	100	50	100	50	100

BLE I-15. (Continued)

Element	Location[a]									
	S26.5W8	411 Roof Pipe	S25W8	S20W8	S18.5W8	S16W8	S12.5W8	S5.5W8	N4W8	N12W8
Y	3	30	5	3	10	3	3	5	3	10
Zr	30	20	30	5	5	10	10	50	30	50
Nb	0.5	5	2	1	3	1	1	2	3	5
Mo	2	20	2	0.5	1	2	1	1	0.2	1
Ru	<0.2	<0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Rh	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pd	<0.3	<0.5	<0.2	<0.2	<0.3	<0.2	<0.3	<0.2	<0.3	<0.3
Ag	<0.1	<0.2	0.2	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1
Cd	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.2
In	<0.1	<0.1	<0.05	<0.1	<0.05	<0.05	<0.1	<0.05	<0.05	<0.2
Sn	3	20	20	2	2	3	1	0.2	0.2	1
Sb	0.1	<0.2	<0.1	0.1	<0.1	0.1	<0.1	<0.2	<0.1	0.1
Te	<0.3	<0.5	<0.2	<0.2	<0.3	<0.2	<0.2	<0.3	<0.3	<0.3
I	0.1	<0.2	<0.1	0.1	<0.1	0.05	0.05	<0.1	<0.05	0.05
Cs	2	1	0.1	1	10	0.5	1	2	5	5
Ba	50	1000	50	100	5000	100	100	100	100	200
La	10	500	10	2	50	2	1	10	5	5
Ce	10	500	20	10	100	10	2	100	10	20
Pr	5	300	10	1	10	1	1	10	5	10
Nd	5	500	10	5	20	5	2	10	10	20
Sm	0.5	50	0.5	0.5	1	0.5	0.5	1	0.5	10
Eu	0.2	10	0.3	0.2	0.5	0.2	0.2	0.5	0.3	2
Gd	0.3	30	0.3	0.5	5	0.3	0.3	2	0.5	3
Tb	0.1	1	0.1	0.1	0.3	0.1	0.1	0.3	0.1	0.3
Dy	0.3	5	0.3	0.3	0.5	0.3	0.3	0.5	0.5	5
Ho	<0.1	0.5	0.1	0.1	0.1	<0.1	0.1	0.1	0.1	1
Er	<0.2	2	0.2	0.2	0.2	<0.2	<0.2	0.2	0.2	2
Tm	<0.1	0.2	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.1	0.5
Yb	<0.3	<0.5	<0.3	<0.3	0.3	<0.3	<0.3	<0.3	0.3	5
Lu	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	1

TABLE I-15. (Continued)

Element	Location[a]									
	S26.5W8	411 Roof Pipe	S25W8	S20W8	S18.5W8	S16W8	S12.5W8	S5.5W8	N4W8	N12W8
Hf	<0.3	1	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.5	0.3
Ta	<0.2	<0.3	<0.2	<0.1	<0.2	<0.1	<0.2	<0.5	<0.2	<0.2
W	<0.3	<0.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Re	<0.2	<0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Os	<0.2	<0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ir	<0.2	<0.3	<0.2	<0.2	<0.2	<0.2	<0.3	<0.2	<0.2	<0.2
Pt	<0.3	<0.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Au	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hg	<0.3	<0.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tl	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bi	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Th	0.1	2	<0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2
U	200	20	10	10	10	10	1	2	0.3	1
^{204}Pb	0.1	0.1	<0.1	<0.2	0.1	<0.2	<0.1	<0.1	<0.1	<0.1
^{206}Pb	30	50(b)	50	5	10	20	5	2	0.1	1
^{207}Pb	1	2(b)	1	0.3	1	1	0.3	0.1	<0.1	0.2
^{208}Pb	1	0.2(b)	0.3	0.5	2	0.3	0.3	0.2	0.1	0.3

(a) These coordinates are approximate locations and do not exactly correspond to the grid coordinates.

(b) Inhomogeneous.

TABLE I-16. MASS SPECTROGRAPHIC ANALYSES (PPM) OF ON-SITE AND OFF-SITE WEST DITCH SEDIMENT SAMPLES

	Location (ppm)					
Element	S24W22[a] (WD6)	S2W22[a] (WD19)	S14W22[a] (WD15)	N3W22 (WD22)	N9W22 (WD25)	140' N of Site Boundary (WD28)
Li	100	100	200	50	300	50
Be	0.2	0.2	0.2	0.3	0.2	0.2
B	10	20	20	50	20	10
F	5	2	3	10	20	10
Na	~2%	~1%	5000	2000	5000	3000
Mg	~2%	~2%	~1%	~2%	~2%	~2%
Al	~20%	~20%	~20%	~20%	~20%	~20%
Si	~40%	~40%	~40%	~40%	~30%	~40%
P	300	500	300	500	100	300
S	200	500	200	100	100	100
Cl	3	2	0.5	5	2	2
K	~1%	5000	~1%	~3%	~1%	~2%
Ca	5000	3000	3000	~2%	5000	5000
Sc	10	10	10	30	20	20
Ti	1000	1000	1000	5000	1000	500
V	20	20	20	100	20	20
Cr	30	20	10	30	10	10
Mn	200	300	100	2000	200	300
Fe	5000	~2%	~1%	~3%	~1%	~1%
Co	10	10	5	300	5	10
Ni	20	20	10	100	10	20
Cu	10	20	5	50	10	5
Zn	1	10	1	5	10	1
Ga	1	1	1	3	5	5
Ge	<0.3	<0.3	<0.2	<0.5	<0.2	<0.2
As	0.5	1	0.5	1	0.5	1
Se	<0.5	<0.5	<0.3	<1	<0.3	<0.3
Br	0.3	0.3	0.1	0.5	0.1	0.2
Rb	50	30	50	100	50	100
Sr	50	30	100	300	30	50
Y	3	3	5	10	3	5
Zr	10	10	50	50	10	10
Nb	1	1	3	3	2	3
Mo	0.2	1	0.5	2	<0.2	0.2
Ru	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Rh	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pd	<0.2	<0.5	<0.2	<0.3	<0.2	<0.2
Ag	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cd	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
In	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05
Sn	0.3	2	0.5	3	<0.2	0.2
Sb	<0.1	0.1	<0.1	0.1	<0.2	<0.1
Te	<0.2	<0.2	<0.2	<0.3	<0.3	<0.2

TABLE I-16. (Continued)

Element	S24W22[a] (WD6)	S2W22[a] (WD19)	S14W22[a] (WD15)	N3W22 (WD22)	N9W22 (WD25)	140' N of Site Boundary (WD28)
	Location (ppm)					
I	<0.05	0.1	<0.1	0.1	<0.1	<0.1
Cs	1	1	0.1	5	1	0.1
Ba	50	50	200	1000	50	100
La	2	2	2	10	2	5
Ce	5	5	10	20	3	20
Pr	0.5	1	1	5	0.2	5
Nd	2	5	0.5	10	1	10
Sm	0.5	0.5	0.5	0.5	<0.3	1
Eu	0.2	0.2	0.2	0.3	<0.2	0.3
Gd	0.3	0.3	0.3	3	<0.3	0.3
Tb	<0.1	0.1	0.1	0.1	<0.1	0.1
Dy	0.3	0.3	0.3	0.5	<0.3	0.3
Ho	<0.1	0.1	0.1	0.1	<0.1	0.1
Er	<0.2	<0.2	0.2	0.2	<0.2	0.2
Tm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Yb	<0.3	<0.3	<0.3	0.3	<0.3	<0.3
Lu	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Hf	<0.3	0.3	<0.3	<0.3	<0.3	<0.3
Ta	<0.1	<0.1	<0.2	<0.2	<0.2	<0.2
W	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Re	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Os	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ir	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Pt	<0.5	<0.5	<0.3	<0.3	<0.3	<0.3
Au	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bi	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Th	0.1	0.1	<0.1	0.2	0.1	<0.1
U	1	5	2	10	0.1	0.3
^{204}Pb	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1
^{206}Pb	<0.1	1	<0.1	3	0.2	0.2
^{207}Pb	<0.1	0.5	<0.1	0.2	0.1	0.1
^{208}Pb	0.1	1	<0.1	0.3	0.1	0.1

(a)Approximately 150 ft west of the Site boundary at this south grid line.

TABLE I-14. ^{226}RADIUM IN SEDIMENTS OF NATURAL DRAINAGES

Location[a]	^{226}Ra Concentration (pCi/g) Screening[b]	Radiochemistry[c]
	FOURMILE CREEK	
F1A	<4	
F1B		0.4
F2A	<4	
F2B	<4	0.7
F3A	<4	
F3B	<4	
F4A	<4	
F4B	<4	
F5A	<4	
	SIXMILE CREEK	
S1A	<4	0.4
S1B	<4	
S2A	<4	0.8
S3A	<4	
S3B	<4	
S4	<4	
S5	<5	
	TWELVEMILE CREEK	
T1A	<4	
T1B	<4	
T2	<4	
T3B	<4	
T4B	<4	
T5	<4	

(a) See Figure I-2.

(b) Measurement of ^{214}Bi as index of ^{226}Ra (see QA Document NS-NS-122).

(c) Gamma spectroscopy, background concentration average in sediment 0.5 pCi/g (±0.1). Determined from samples T10, T11, T12, taken from a branch of Twelvemile Creek.

Excavated Area

Excerpt from Post-Remedial Action Report for the Niagara Falls Storage Site Vicinity Properties 1983 and 1984

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DOE/OR/20722-84

Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-ACO5-810R20722

POST-REMEDIAL ACTION REPORT FOR THE NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES - 1983 AND 1984

Lewiston, New York

December 1986

Bechtel National, Inc.

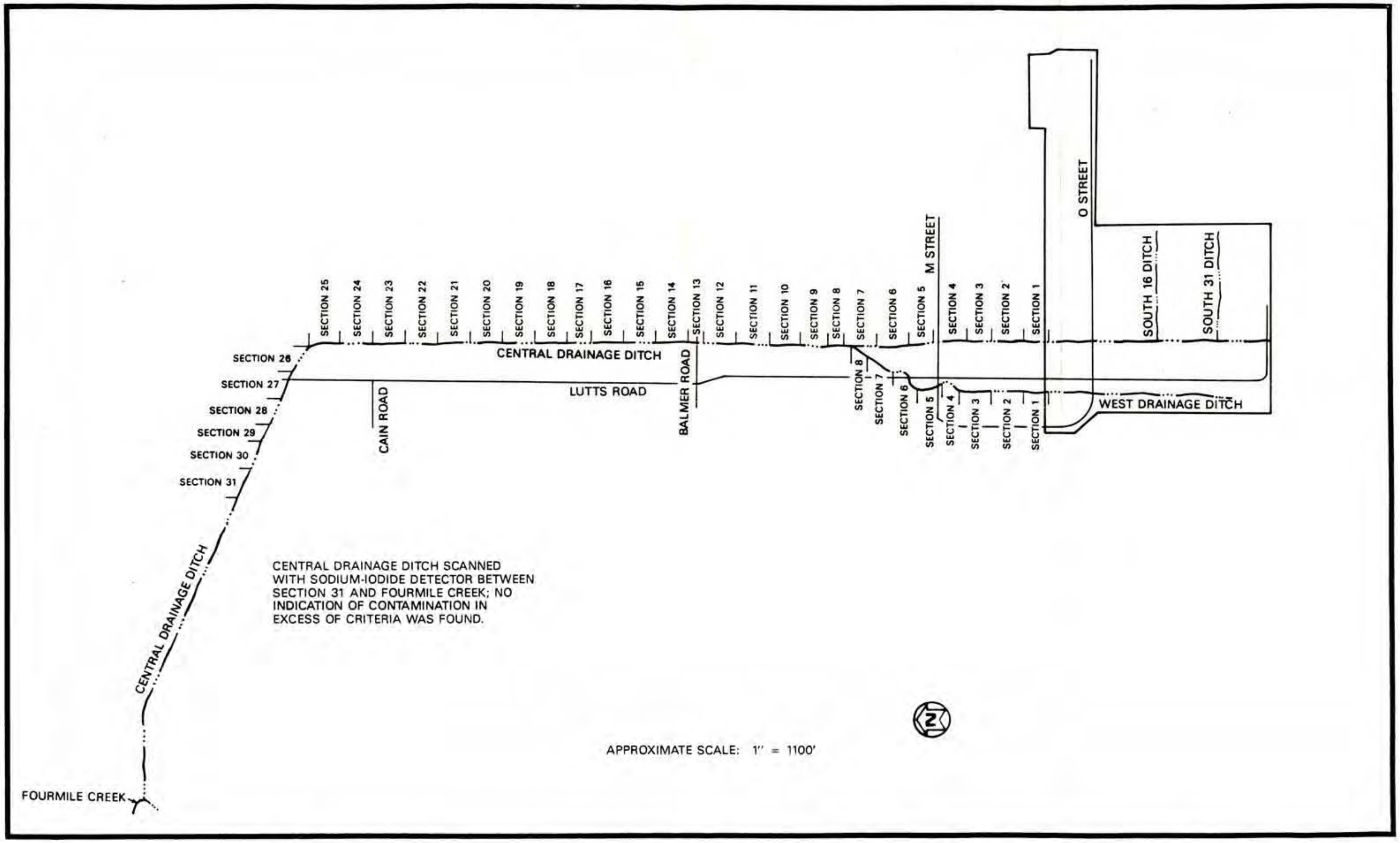

FIGURE 35 LOCATION AND REFERENCE DRAWING FOR THE WEST AND CENTRAL DRAINAGE DITCH EXCAVATIONS

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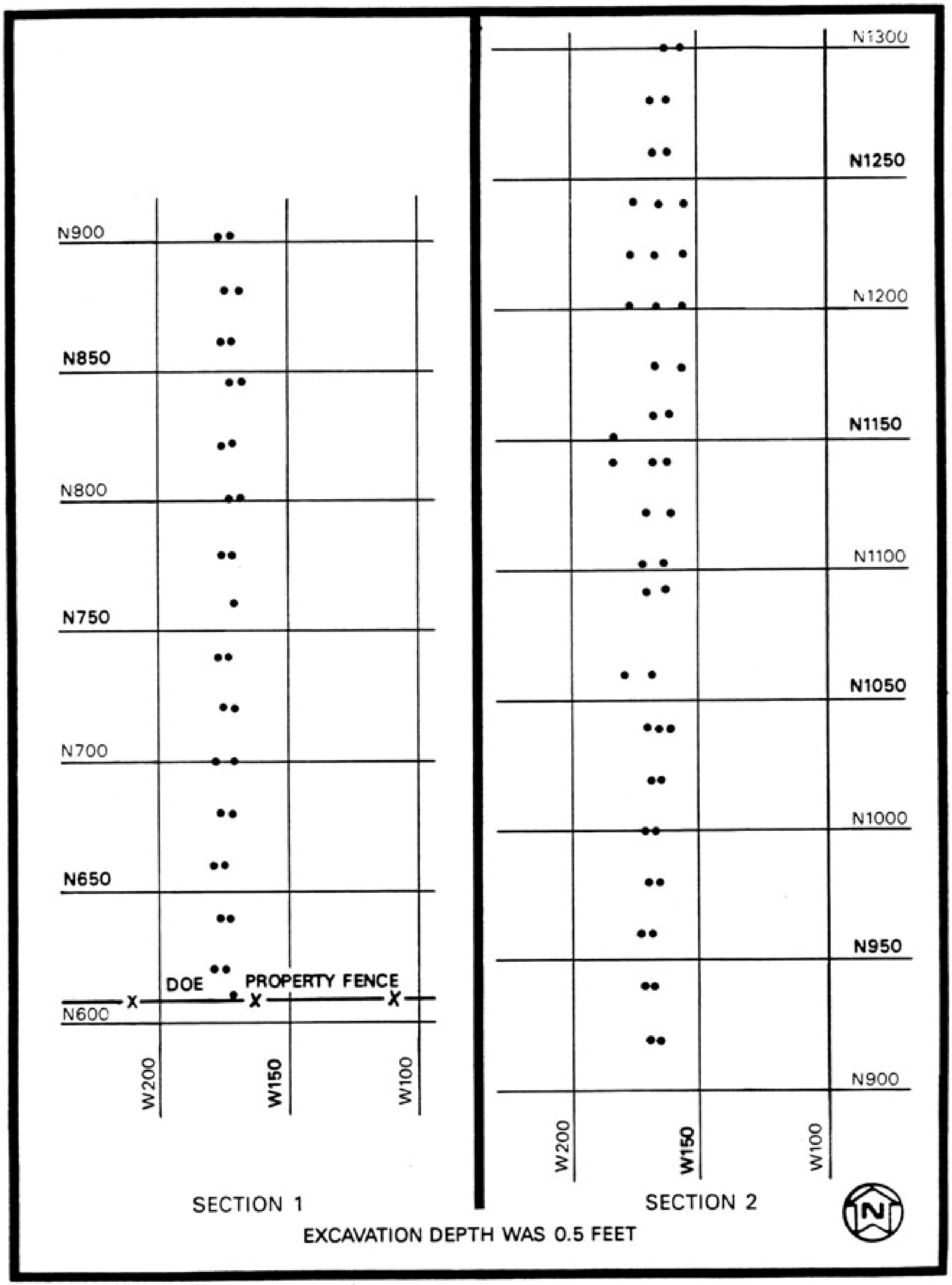

FIGURE 36 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE WEST DITCH - SECTIONS 1 AND 2

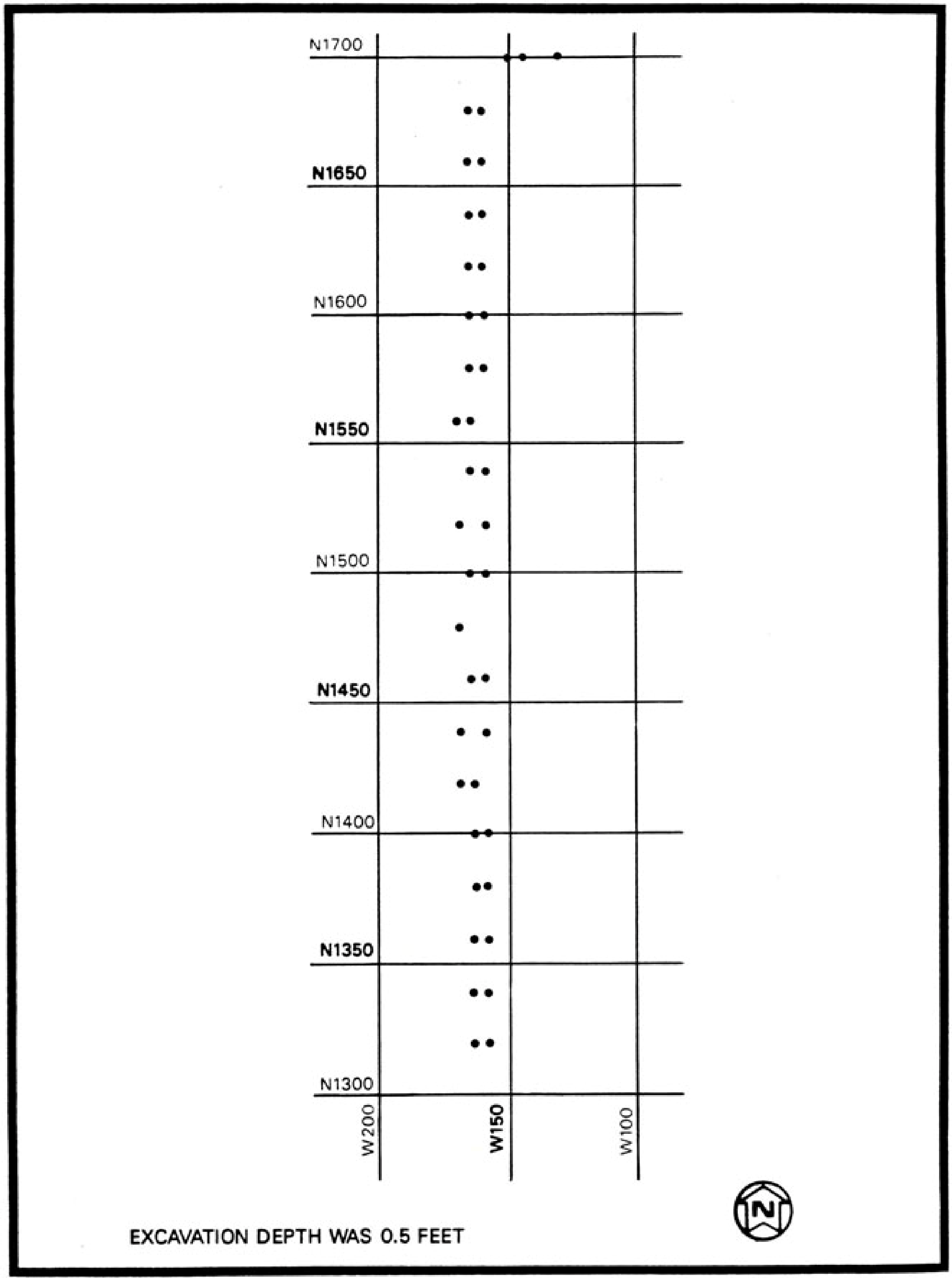

FIGURE 37 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE WEST DITCH - SECTION 3

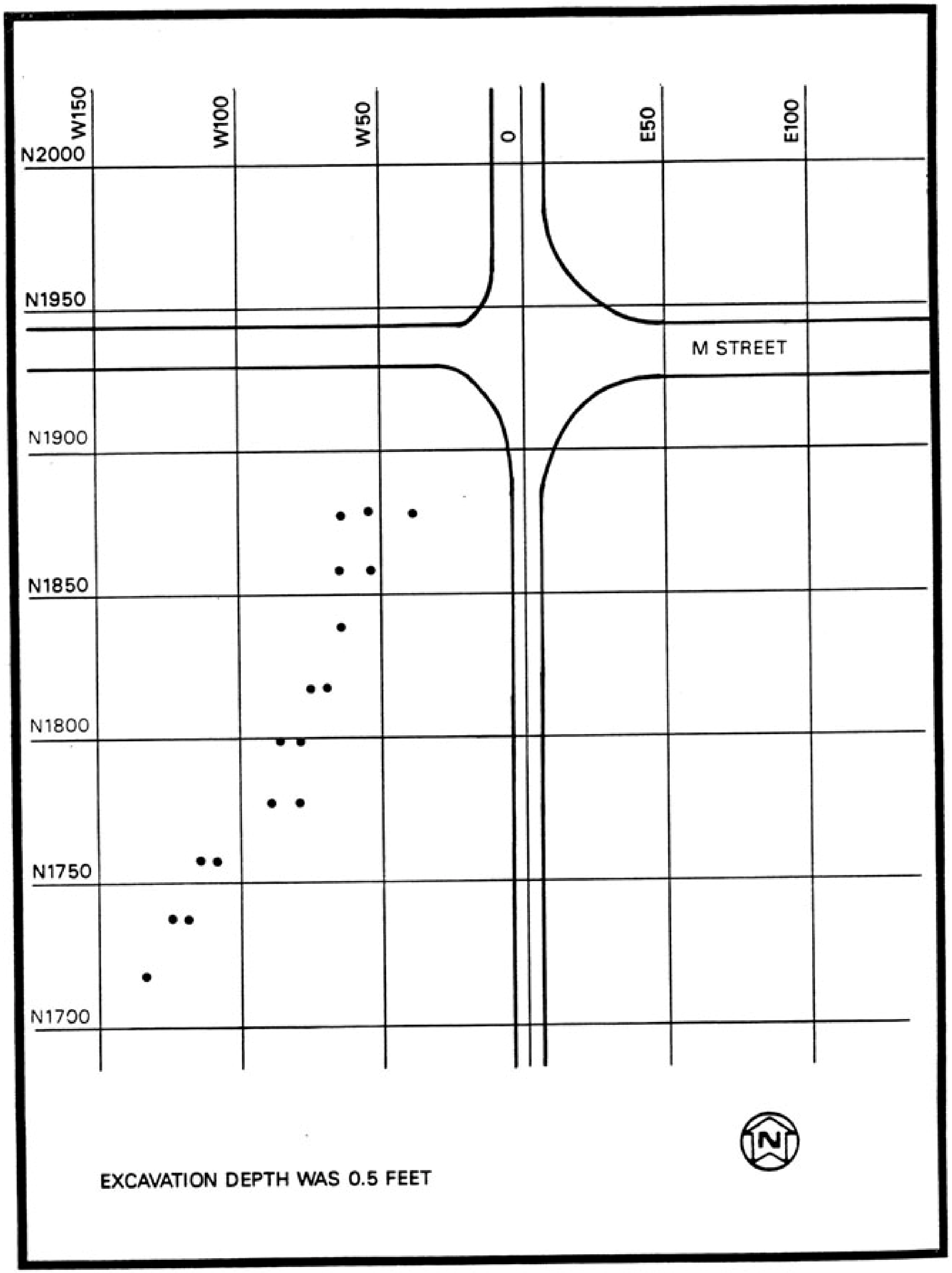

FIGURE 38 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE WEST DITCH - SECTION 4

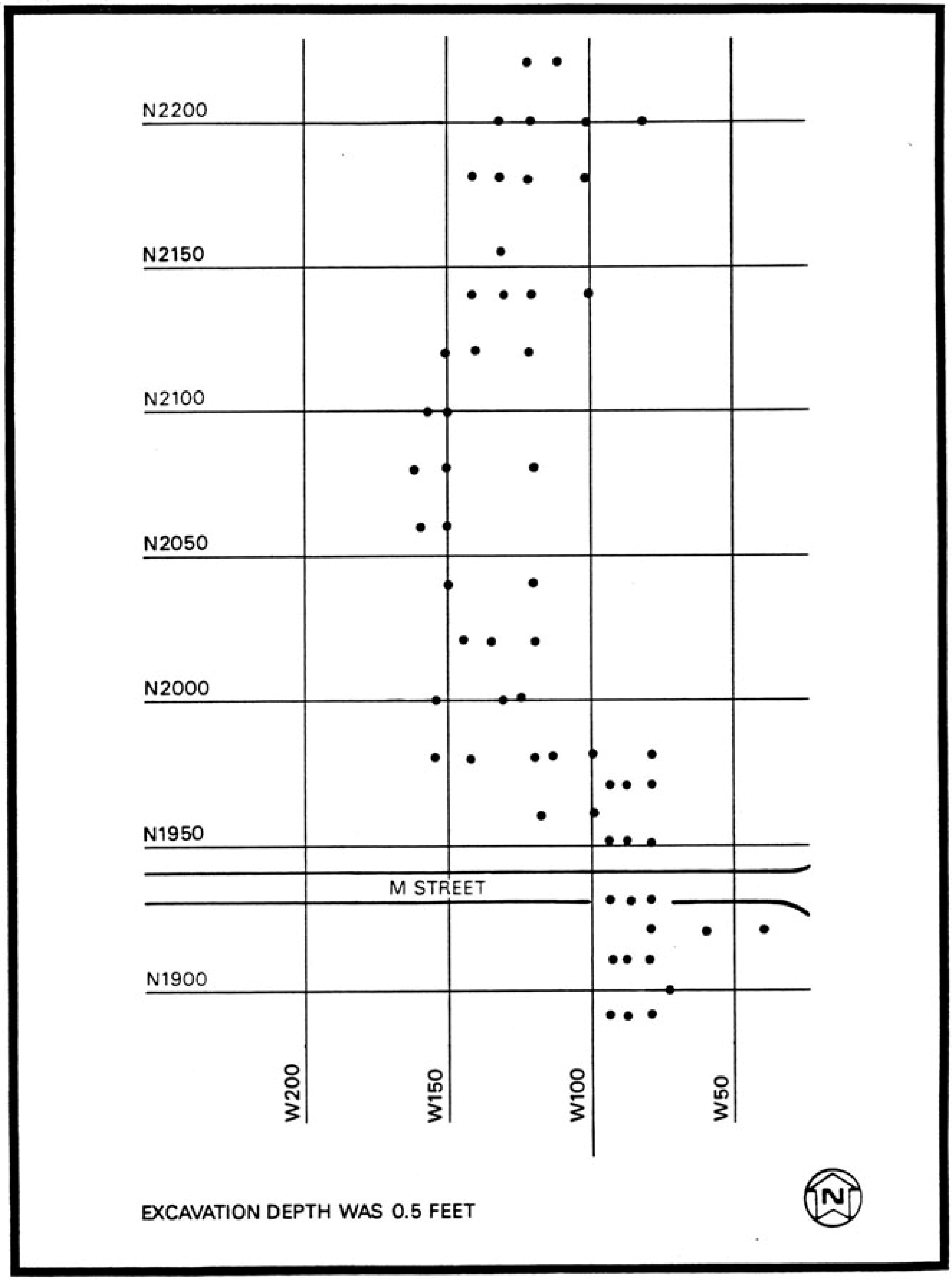

FIGURE 39 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE WEST DITCH - SECTION 5

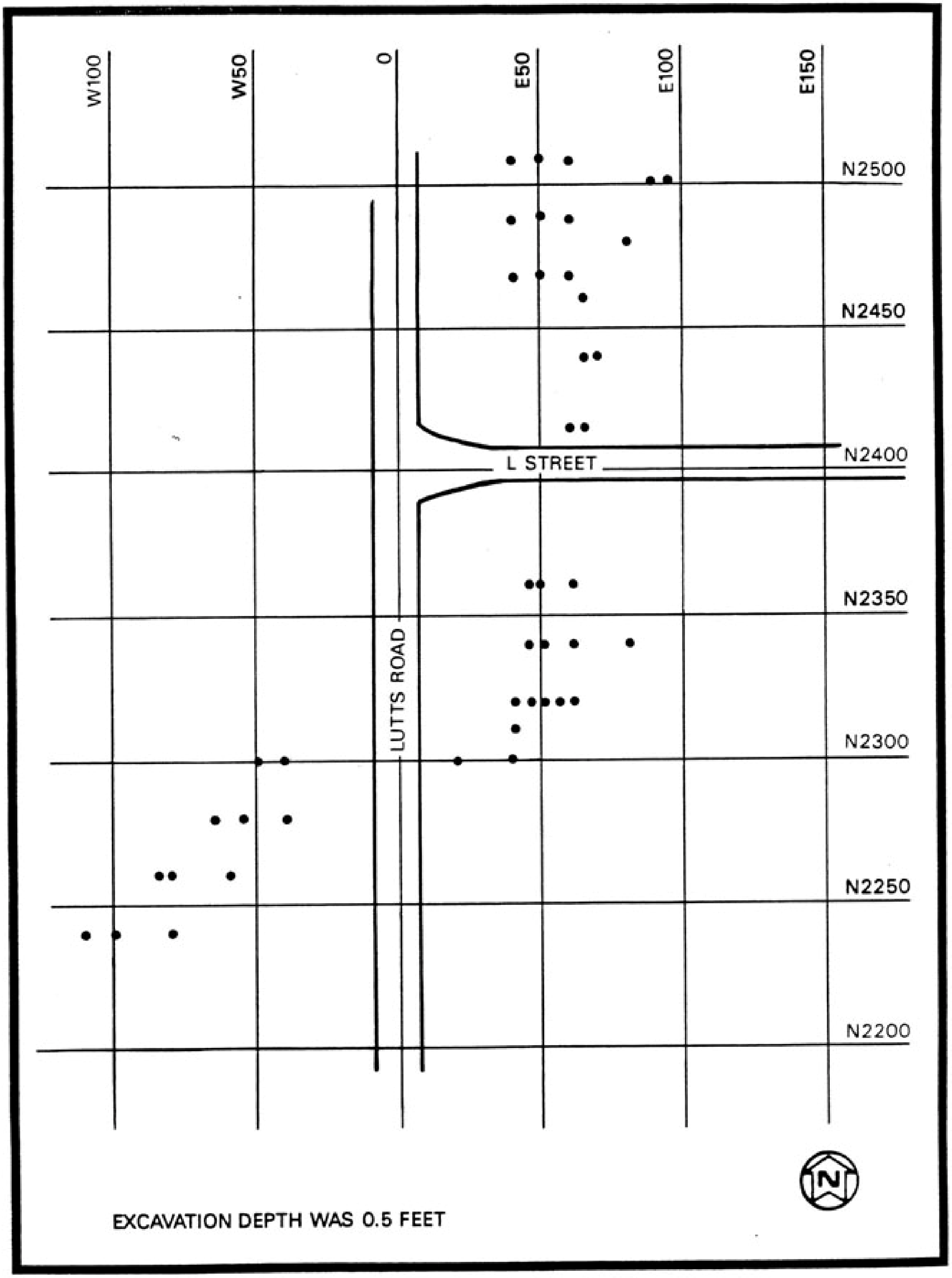

FIGURE 40 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE WEST DITCH - SECTION 6

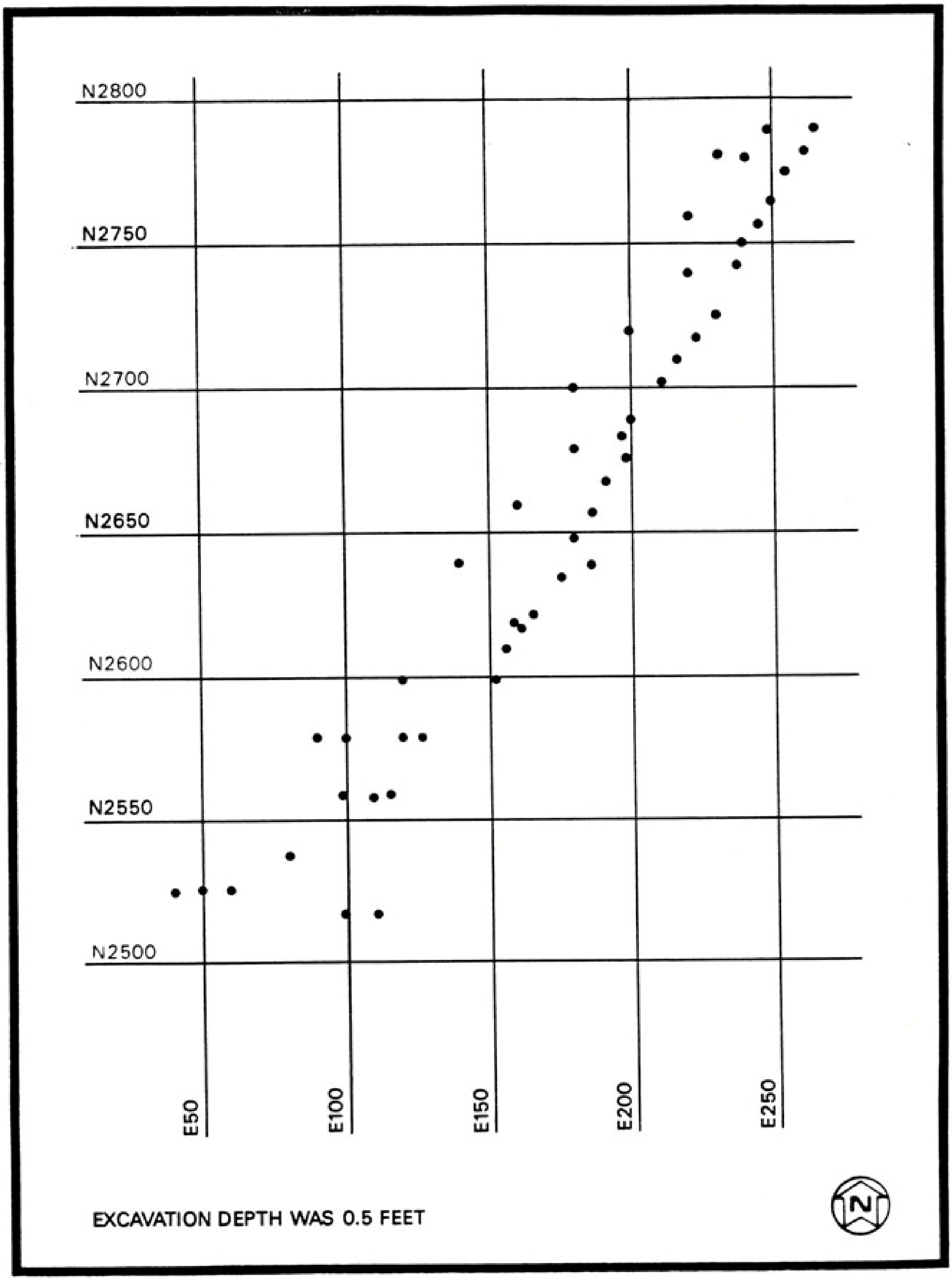

FIGURE 41 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE WEST DITCH - SECTION 7

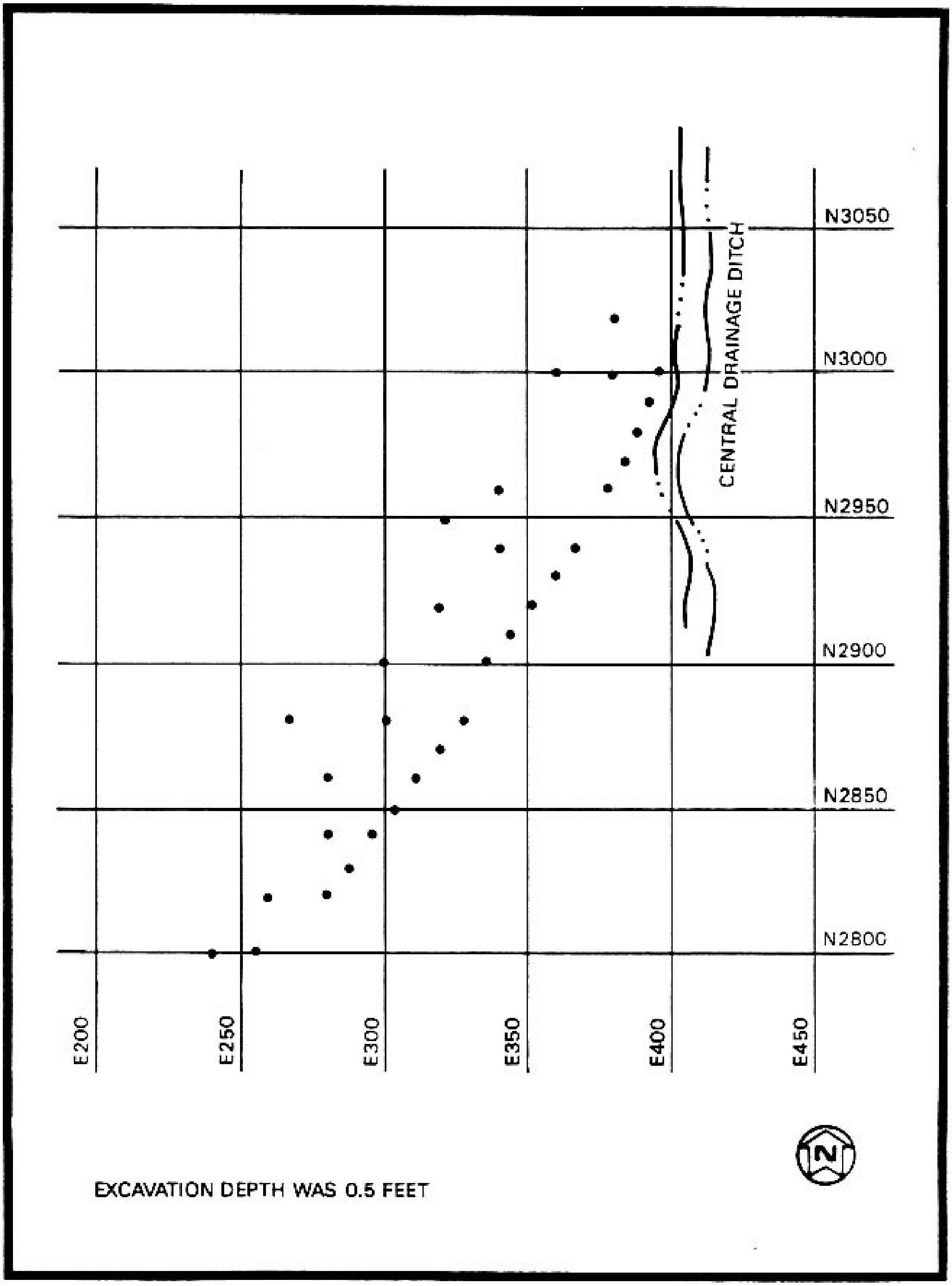

FIGURE 42 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE WEST DITCH - SECTION 8

TABLE 12

POST-REMEDIAL ACTION SAMPLING RESULTS

FOR THE WEST DRAINAGE DITCH

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E0020	N2300	A	3.6 ± 0.3	0.7 ± 0.3
E0040	N2300	A	1.8 ± 0.2	1.4 ± 0.2
E0040	N2310	A	1.3 ± 0.2	1.0 ± 0.2
E0040	N2320	A	0.9 ± 0.1	0.7 ± 0.1
E0040	N2468	1.4 ± 0.5	0.6 ± 0.1	0.6 ± 0.1
E0040	N2488	0.2 ± 0.2	0.7 ± 0.1	0.7 ± 0.1
E0040	N2508	0.1 ± 0.1	0.8 ± 0.1	0.8 ± 0.1
E0040	N2528	0.3 ± 0.2	2.0 ± 0.1	0.8 ± 0.1
E0045	N2320	A	0.9 ± 0.1	1.2 ± 0.3
E0045	N2340	A	0.8 ± 0.1	1.3 ± 0.2
E0045	N2360	A	3.6 ± 0.2	1.0 ± 0.3
E0050	N2320	A	1.0 ± 0.2	0.8 ± 0.2
E0050	N2340	A	1.1 ± 0.2	0.9 ± 0.2
E0050	N2360	A	1.1 ± 0.2	0.7 ± 0.2
E0050	N2468	0.1 ± 0.1	0.6 ± 0.1	0.6 ± 0.1
E0050	N2488	0.3 ± 0.2	0.8 ± 0.1	1.0 ± 0.1
E0050	N2508	0.5 ± 0.2	0.8 ± 0.1	1.0 ± 0.1
E0050	N2528	0.4 ± 0.2	0.9 ± 0.1	1.3 ± 0.1
E0055	N2320	A	1.6 ± 0.2	1.0 ± 0.2
E0060	N2320	A	1.2 ± 0.1	0.8 ± 0.2
E0060	N2340	A	0.8 ± 0.1	0.8 ± 0.2
E0060	N2360	A	0.8 ± 0.1	0.7 ± 0.2
E0060	N2420	A	1.6 ± 0.2	1.2 ± 0.2
E0060	N2468	A	4.7 ± 0.1	0.8 ± 0.1
E0060	N2488	0.1 ± 0.2	0.9 ± 0.1	0.8 ± 0.1
E0060	N2508	0.3 ± 0.1	0.7 ± 0.1	0.7 ± 0.1
E0060	N2528	0.3 ± 0.2	1.1 ± 0.1	1.1 ± 0.1
E0065	N2420	A	0.9 ± 0.1	0.8 ± 0.2
E0065	N2440	A	1.8 ± 0.2	0.6 ± 0.2
E0065	N2460	A	2.8 ± 0.2	1.4 ± 0.3
E0070	N2440	A	1.3 ± 0.2	0.8 ± 0.2
E0080	N2340	A	1.5 ± 0.2	1.1 ± 0.2
E0080	N2480	7.2 ± 2.3	1.2 ± 0.2	1.4 ± 0.2
E0080	N2540	A	0.8 ± 0.1	0.7 ± 0.2
E0090	N2500	A	1.0 ± 0.1	0.8 ± 0.2
E0090	N2580	A	1.4 ± 0.2	1.1 ± 0.2
E0095	N2500	A	1.7 ± 0.2	0.9 ± 0.2
E0100	N2520	A	0.8 ± 0.1	0.4 ± 0.2
E0100	N2560	A	0.8 ± 0.1	0.6 ± 0.2
E0100	N2580	A	1.0 ± 0.1	0.6 ± 0.2
E0110	N2520	A	1.4 ± 0.2	1.1 ± 0.2
E0110	N2560	A	0.8 ± 0.1	1.1 ± 0.3
E0115	N2560	A	1.9 ± 0.2	0.9 ± 0.2

Grid Coordinates E, W	N, S	Concentrations (pCi/g ±/- 1 sigma) Uranium-238	Radium-226	Thorium-232
E0120	N2580	A	1.0 ± 0.1	0.9 ± 0.2
E0120	N2600	A	1.1 ± 0.1	0.9 ± 0.2
E0126	N2580	A	1.0 ± 0.1	0.6 ± 0.2
E0140	N2640	A	1.0 ± 0.1	1.2 ± 0.2
E0152	N2600	4.5 ± 3.2	1.9 ± 0.2	0.5 ± 0.2
E0156	N2610	A	0.9 ± 0.1	1.2 ± 0.3
E0160	N2620	A	0.8 ± 0.1	1.0 ± 0.2
E0160	N2660	A	0.9 ± 0.1	1.1 ± 0.3
E0161	N2618	A	1.1 ± 0.1	1.0 ± 0.2
E0164	N2623	A	1.0 ± 0.1	1.3 ± 0.2
E0176	N2636	A	0.9 ± 0.2	1.2 ± 0.2
E0178	N2642	A	0.9 ± 0.1	0.8 ± 0.3
E0180	N2648	A	0.8 ± 0.1	0.9 ± 0.2
E0180	N2680	4.9 ± 2.0	0.9 ± 0.1	1.1 ± 0.2
E0180	N2700	A	1.1 ± 0.1	0.8 ± 0.2
E0188	N2657	A	0.7 ± 0.1	A
E0191	N2668	A	0.9 ± 0.2	1.0 ± 0.2
E0197	N2685	A	1.0 ± 0.2	0.7 ± 0.2
E0198	N2675	A	1.1 ± 0.1	0.8 ± 0.2
E0200	N2690	A	2.6 ± 0.2	1.2 ± 0.2
E0200	N2720	A	1.0 ± 0.2	0.8 ± 0.2
E0212	N2702	A	0.8 ± 0.1	0.8±0.2
E0216	N2710	5.4 ± 2.4	1.0 ± 0.1	1.1 ± 0.2
E0220	N2740	A	1.1 ± 0.1	1.1 ± 0.2
E0220	N2760	A	0.8 ± 0.1	0.8 ± 0.2
E0222	N2717	A	0.9 ± 0.2	0.7 ± 0.2
E0230	N2724	2.1 ± 2.2	1.2 ± 0.2	0.9 ± 0.2
E0231	N2781	A	0.9 ± 0.2	0.8 ± 0.2
E0237	N2742	A	1.3 ± 0.1	0.7 ± 0.2
E0239	N2750	0.7 ± 0.4	0.8 ± 0.1	0.6 ± 0.2
E0240	42780	A	1.2 ± 0.2	0.9 ± 0.2
E0240	N2800	A	0.9 ± 0.2	0.8 ± 0.2
E0245	N2757	1.0±0.1	0.8 ± 0.1	0.9 ± 0.2
E0248	N2790	A	0.9 ± 0.1	0.4 ± 0.3
E0250	42765	A	0.9 ± 0.1	1.2 ± 0.2
E0254	N2775	1.4 ± 0.6	1.0 ± 0.1	0.9 ± 0.1
E0256	N2800	A	0.9 ± 0.1	0.9 ± 0.2
E0260	N2820	A	0.8 ± 0.1	1.0 ± 0.2
E0262	N2782	1.4 ± 0.1	0.9 ± 0.1	1.0 ± 0.1
E0262	N2880	A	1.3 ± 0.2	0.5 ± 0.2
E0265	N2790	A	1.2 ± 0.1	0.5 ± 0.1
E0280	N2820	11.9 ± 3.3	1.0 ± 0.1	0.8 ± 0.2
E0280	N2840	A	1.0 ± 0.1	1.4 ± 0.4

TABLE 12 (continued)

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E0280	N2860	A	1.0 ± 0.1	1.0 ± 0.2
E0288	N2830	A	0.9 ± 0.1	1.0 ± 0.2
E0296	N2840	A	1.0 ± 0.1	0.9 ± 0.2
E0300	N2880	A	1.0 ± 0.1	0.8 ± 0.2
E0300	N2900	A	0.9 ± 0.1	1.1 ± 0.2
E0304	N2850	A	1.3 ± 0.2	0.9 ± 0.2
E0312	N2860	A	1.4 ± 0.2	0.8 ± 0.2
E0320	N2870	A	1.1 ± 0.1	0.8 ± 0.2
E0320	N2920	A	1.2 ± 0.1	1.1 ± 0.3
E0322	N2950	A	1.1 ± 0.1	1.0 ± 0.2
E0328	N2880	A	0.9 ± 0.1	1.0 ± 0.2
E0336	N2900	A	1.1 ± 0.1	0.8 ± 0.3
E0340	N2940	A	6.8 ± 0.3	0.6 ± 0.2
E0340	N2960	A	0.9 ± 0.1	0.7 ± 0.2
E0344	N2910	A	1.4 ± 0.2	1.3 ± 0.3
E0352	N2920	A	1.2 ± 0.1	0.8 ± 0.3
E0360	N2930	A	1.1 ± 0.1	1.0 ± 0.2
E0360	N3000	A	1.2 ± 0.1	0.9 ± 0.2
E0366	N2940	2.8 ± 2.0	1.1 ± 0.1	0.8 ± 0.2
E0378	N2960	A	1.3 ± 0.1	1.2 ± 0.3
E0380	N3000	5.9 ± 2.5	1.4 ± 0.2	1.0 ± 0.3
E0380	N3020	A	1.1 ± 0.1	0.6 ± 0.2
E0384	N2970	A	0.9 ± 0.1	0.9 ± 0.2
E0388	N2980	7.6 ± 2.5	0.9 ± 0.1	0.7 ± 0.2
E0392	N2990	A	2.6 ± 0.2	0.8 ± 0.3
E0396	N3000	A	0.8 ± 0.1	1.2 ± 0.2
W0040	N1880	A	2.8 ± 0.2	0.8 ± 0.2
W0040	N1920	A	1.3 ± 0.2	0.8 ± 0.2
W0040	N2280	A	1.5 ± 0.2	0.4 ± 0.2
W0040	N2300	A	1.3 ± 0.1	0.9 ± 0.2
W0050	N2300	A	0.9 ± 0.1	0.5 ± 0.2
W0055	N1860	A	1.0 ± 0.1	0.8 ± 0.2
W0055	N1880	2.0 ± 2.3	1.3 ± 0.1	0.8 ± 0.2
W0055	N2280	A	1.1 ± 0.2	1.0 ± 0.2
W0060	N1920	A	1.4 ± 0.2	0.9 ± 0.2
W0060	N2260	A	1.5 ± 0.2	1.1 ± 0.3
W0065	N1840	A	1.5 ± 0.2	1.0 ± 0.3
W0065	N1860	A	1.9 ± 0.2	0.6 ± 0.3
W0065	N1880	A	1.0 ± 0.1	0.9 ± 0.2
W0065	N2280	A	1.4 ± 0.2	0.8 ± 0.2
W0070	N1820	2.2 ± 2.4	1.0 ± 0.1	0.9 ± 0.2
W0070	N1900	A	1.4 ± 0.2	0.9 ± 0.2
W0075	N1820	A	0.9 ± 0.1	1.1 ± 0.2

TABLE 12 (continued)

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W0080	N1780	A	1.2 ± 0.2	1.0 ± 0.2
W0080	N1800	A	1.5 ± 0.2	1.1 ± 0.3
W0080	N1890	A	0.8 ± 0.1	0.9 ± 0.3
W0080	N1910	A	0.8 ± 0.1	0.8 ± 0.2
W0080	N1920	A	2.2 ± 0.3	0.3 ± 0.1
W0080	N1930	A	0.7 ± 0.1	1.0 ± 0.2
W0080	N1950	A	0.7 ± 0.1	0.7 ± 0.2
W0080	N1970	A	0.6 ± 0.2	0.8 ± 0.2
W0080	N1980	A	1.2 ± 0.2	0.6 ± 0.2
W0080	N2200	A	1.0 ± 0.2	0.9 ± 0.3
W0080	N2240	A	1.7 ± 0.2	1.2 ± 0.3
W0080	N2260	A	12.0 ± 0.5	0.9 ± 0.3
W0085	N1800	A	2.4 ± 0.2	0.9 ± 0.3
W0085	N2260	A	5.0 ± 0.3	1.5 ± 0.2
W0087	N1890	A	0.8 ± 0.1	1.1 ± 0.2
W0087	N1910	A	1.0 ± 0.1	1.9 ± 0.3
W0087	N1930	1.3 ± 2.7	0.6 ± 0.1	0.7 ± 0.2
W0087	N1950	A	0.7 ± 0.1	0.9 ± 0.2
W0087	N1970	A	0.8 ± 0.1	A
W0090	N1780	A	0.9 ± 0.1	0.9 ± 0.2
W0094	N1890	4.4 ± 2.8	0.7 ± 0.2	0.6 ± 0.2
W0094	N1910	A	1.1 ± 0.2	0.7 ± 0.2
W0094	N1930	A	0.8 ± 0.1	0.6 ± 0.2
W0094	N1950	A	0.7 ± 0.1	0.5 ± 0.2
W0094	N1970	A	0.9 ± 0.1	0.9 ± 0.2
W0100	N1960	A	0.9 ± 0.2	1.1 ± 0.3
W0100	N1980	A	1.5 ± 0.2	0.9 ± 0.2
W0100	N2140	2.6 ± 2.4	1.2 ± 0.2	0.8 ± 0.2
W0100	N2180	A	1.4 ± 0.2	1.5 ± 0.2
W0100	N2200	A	2.6 ± 0.2	0.8 ± 0.2
W0100	N2240	A	1.0 ± 0.2	0.7 ± 0.2
w0110	N1760	A	1.2 ± 0.2	1.0 ± 0.3
W0110	N2220	A	1.3 ± 0.2	0.6 ± 0.2
W0110	N2240	A	1.0 ± 0.1	0.7 ± 0.2
W0115	N1760	A	0.9 ± 0.1	0.9 ± 0.3
W0115	N1980	A	1.6 ± 0.2	0.7 ± 0.2
W0120	N1740	A	1.3 ± 0.2	0.7 ± 0.2
W0120	N1960	A	1.3 ± 0.2	1.1 ± 0.2
W0120	N1980	A	1.6 ± 0.2	1.2 ± 0.3
W0120	N2020	A	2.0 ± 0.2	1.1 ± 0.2
W0120	N2040	A	3.7 ± 0.3	1.0 ± 0.2
W0120	N2080	A	1.6 ± 0.2	0.7 ± 0.2
W0120	N2120	A	1.5 ± 0.1	0.5 ± 0.2

TABLE 12 (continued)

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W0120	N2140	A	8.6 ± 0.4	0.8 ± 0.3
W0120	N2180	A	0.9 ± 0.2	1.0 ± 0.2
W0120	N2200	A	1.1 ± 0.1	1.3 ± 0.2
W0120	N2220	A	1.8 ± 0.2	1.4 ± 0.3
W0125	N1740	A	1.2 ± 0.2	0.6 ± 0.2
W0125	N2000	A	14.4 ± 0.5	0.6 ± 0.3
W0130	N1700	3.8 ± 3.3	2.0 ± 0.2	1.0 ± 0.3
W0130	N2000	A	2.2 ± 0.2	1.2 ± 0.2
W0130	N2140	A	1.5 ± 0.2	0.7 ± 0.2
W0130	N2160	A	1.4 ± 0.1	1.1 ± 0.2
W0130	N2180	A	1.2 ± 0.1	0.6 ± 0.2
W0130	N2200	A	1.1 ± 0.2	1.0 ± 0.3
W0135	N1720	A	1.3 ± 0.2	1.4 ± 0.2
W0135	N2020	A	1.0 ± 0.1	0.5 ± 0.2
W0140	N1980	A	1.2 ± 0.2	0.8 ± 0.3
W0140	N2120	A	1.8 ± 0.2	0.8 ± 0.2
W0140	N2140	A	3.4 ± 0.3	0.9 ± 0.4
W0140	N2180	5.5 ± 2.0	1.4 ± 0.2	0.6 ± 0.2
W0145	N1700	A	1.4 ± 0.1	1.4 ± 0.3
W0145	N2020	A	0.9 ± 0.2	1.0 ± 0.2
W0150	N1700	3.1 ± 2.3	1.4 ± 0.1	0.7 ± 0.2
W0150	N2040	A	1.5 ± 0.2	1.5 ± 0.2
W0150	N2060	A	12.3 ± 0.7	A
W0150	N2080	A	1.9 ± 0.3	A
W0150	N2100	A	1.6 ± 0.2	0.6 ± 0.3
W0150	N2120	A	1.0 ± 0.1	1.0 ± 0.2
W0155	N1980	A	1.2 ± 0.1	0.9 ± 0.2
W0155	N2000	A	1.0 ± 0.1	0.8 ± 0.2
W0155	N2100	A	1.1 ± 0.2	1.3 ± 0.3
W0158	N1200	A	0.8 ± 0.1	0.7 ± 0.2
W0158	N1220	0.1 ± 0.1	0.7 ± 0.1	0.9 ± 0.1
W0158	N1240	A	0.5 ± 0.1	0.8 ± 0.2
W0160	N1040	A	1.7 ± 0.2	0.9 ± 0.2
W0160	N1300	A	0.9 ± 0.1	0.7 ± 0.2
W0160	N1320	A	1.1 ± 0.2	0.9 ± 0.3
W0160	N1340	A	1.1 ± 0.2	0.8 ± 0.2
W0160	N1360	A	1.1 ± 0.1	1.6 ± 0.2
W0160	N1380	A	1.1 ± 0.1	1.1 ± 0.3
W0160	N1400	A	0.9 ± 0.1	0.9 ± 0.2
W0160	N1440	8.4 ± 2.5	0.1 ± 0.1	0.8 ± 0.2
W0160	N1460	4.5 ± 2.6	1.3 ± 0.2	1.4 ± 0.4
W0160	N1500	A	1.3 ± 0.1	0.9 ± 0.2
W0160	N1520	A	1.1 ± 0.1	1.0 ± 0.2

TABLE 12 (continued)

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W0160	NI540	A	0.9 ± 0.1	1.2 ± 0.2
W0160	N1580	A	1.3 ± 0.1	1.0 ± 0.2
W0160	N1600	A	A	0.9 ± 0.6
W0160	N1620	A	1.4 ± 0.1	1.4 ± 0.2
W0160	N1640	A	0.9 ± 0.1	0.9 ± 0.2
W0160	N1660	A	0.1 ± 0.2	1.4 ± 0.3
W0160	N1680	A	1.0 ± 0.1	0.9 ± 0.2
W0160	N2060	A	5.9 ± 0.6	A
W0160	N2080	7.5 ± 2.9	1.2 ± 0.2	1.0 ± 0.2
W0164	N1090	A	0.9 ± 0.1	1.4±0.2
W0164	N1120	3.3 ± 0.9	1.6 ± 0.2	1.0 ± 0.3
W0164	N1180	A	1.0 ± 0.1	1.0 ± 0.2
W0165	N1100	2.5 ± 2.0	1.3 ± 0.2	0.7 ± 0.2
W0165	N1140	A	1.5 ± 0.1	1.0 ± 0.2
W0165	N1160	A	1.3 ± 0.1	1.3 ± 0.1
W0165	N1260	A	0.8 ± 0.1	1.4 ± 0.2
W0165	N1280	A	1.1 ± 0.1	0.6 ± 0.2
W0165	N1300	A	1.1 ± 0.1	1.3 ± 0.2
W0165	N1320	A	1.2 ± 0.2	1.0 ± 0.3
W0165	N1340	A	1.2 ± 0.1	1.1 ± 0.2
W0165	N1360	A	1.1 ± 0.1	0.9 ± 0.2
W0165	N1380	A	1.1 ± 0.1	0.7±0.2
W0165	N1400	A	1.0 ± 0.1	1.2 ± 0.3
W0165	N1420	A	1.0 ± 0.2	1.4 ± 0.2
W0165	N1460	A	0.9 ± 0.1	0.9 ± 0.2
W0165	N1500	A	0.9 ± 0.1	1.0 ± 0.2
W0165	N1540	A	1.0 ± 0.1	1.4 ± 0.2
W0165	N1560	A	1.4 ± 0.1	0.9 ± 0.2
W0165	N1580	2.9 ± 2.2	1.4 ± 0.2	1.2 ± 0.2
W0165	N1600	A	1.3 ± 0.1	1.3 ± 0.2
W0165	N1620	6.0 ± 3.4	1.3 ± 0.2	0.9 ± 0.3
W0165	N1640	A	3.0 ± 0.2	1.1 ± 0.3
W0165	N1660	3.1 ± 2.2	1.7 ± 0.2	1.3 ± 0.2
W0165	N1680	A	1.9 ± 0.2	1.0 ± 0.2
W0166	N1020	A	1.0 ± 0.1	1.1 ± 0.2
W0167	N0920	A	0.7 ± 0.1	0.6 ± 0.2
W0167	N0980	A	14.3 ± 0.5	0.8 ± 0.3
W0168	N0840	3.5 ± 1.6	1.8 ± 0.1	0.9 ± 0.2
W0168	N0880	A	0.9 ± 0.2	1.6 ± 0.2
W0168	N1020	A	1.2 ± 0.2	1.1 ± 0.2
W0168	N1040	A	1.1 ± 0.1	0.9 ± 0.2
W0168	N1060	A	1.0±0.1	0.7 ± 0.2
W0168	N1200	0.7 ± 0.4	0.7 ± 0.1	0.7 ± 0.3

TABLE 12 (continued)

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W0168	N1220	0.4 ± 0.2	0.9 ± 0.1	1.1 ± 0.1
W0168	N1240	A	1.0 ± 0.1	0.9 ± 0.2
W0169	N0800	9.2 ± 3.5	1.1 ± 0.2	0.9 ± 0.2
W0169	N0940	A	0.9 ± 0.1	1.0 ± 0.1
W0169	N0960	A	0.8 ± 0.1	0.6 ± 0.2
W0169	N0980	A	1.3±0.1	0.8 ± 0.2
W0169	N1000	3.6 ± 1.8	0.9 ± 0.1	0.7 ± 0.3
W0170	N0760	2.1 ± 2.3	0.9 ± 0.2	1.2 ± 0.3
W0170	N0840	A	1.4 ± 0.2	1.3 ± 0.3
W0170	N0860	A	0.9 ± 0.1	1.5 ± 0.3
W0170	N0880	A	1.0 ± 0.1	1.2 ± 0.3
W0170	N0900	A	1.2 ± 0.1	1.2 ± 0.2
W0170	N0920	A	0.7 ± 0.1	76.0 ± 0.2
W0170	N1040	A	0.9 ± 0.1	0.9 ± 0.2
W0170	N1140	A	2.9 ± 0.2	0.8 ± 0.2
W0170	N1160	A	14.0 ± 0.4	2.2 ± 0.3
W0170	N1260	A	0.7 ± 0.1	1.5 ± 0.3
W0170	N1280	A	1.0 ± 0.1	1.0 ± 0.2
W0170	N1420	A	1.0 ± 0.2	0.8 ± 0.3
W0170	N1440	A	1.3 ± 0.1	0.9 ± 0.2
W0170	N1480	A	0.8 ± 0.1	0.4 ± 0.2
W0170	N1520	A	1.2 ± 0.2	1.1 ± 0.2
W0170	N1560	A	1.3 ± 0.2	1.2 ± 0.3
W0171	N0720	A	1.4 ± 2.0	0.8 ± 0.2
W0171	N0820	A	0.9 ± 0.1	1.2 ± 0.3
W0171	N0940	A	0.8 ± 0.1	1.0 ± 0.2
W0171	N0960	A	0.8 ± 0.1	0.7 ± 0.2
W0171	N1000	A	1.2 ± 0.2	0.9 ± 0.2
W0171	N1120	A	1.3 ± 0.2	1.1 ± 0.3
W0172	N0780	3.3 ± 2.2	1.3 ± 0.2	1.1 ± 0.2
W0172	N0800	4.7 ± 2.6	1.1 ± 0.1	1.0 ± 0.3
W0172	N0900	A	0.9 ± 0.1	1.3 ± 0.3
W0172	N1180	A	1.3 ± 0.1	1.1 ± 0.2
W0173	N0610	A	1.0 ± 0.1	1.0 ± 0.2
W0173	N0640	A	1.2 ± 0.1	1.2 ± 0.2
W0173	N0680	A	1.0 ± 0.1	1.2 ± 0.2
W0173	N0720	A	0.9 ± 0.1	0.8 ± 0.2
W0173	N0820	A	0.9 ± 0.1	1.2 ± 0.2
W0173	N0860	A	0.9 ± 0.2	0.9 ± 0.2
W0173	N1090	A	1.4 ± 0.2	1.0 ± 0.2
W0173	N1100	A	1.1 ± 0.1	1.3 ± 0.2
W0174	N0700	A	0.9 ± 0.1	1.1 ± 0.3
W0174	N0740	A	0.9 ± 0.1	1.2 ± 0.2

TABLE 12 (continued)

Grid Coordinates		Concentrations (pCi/g ±/- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W0174	N0780	9.0 ± 3.4	0.9 ± 0.1	1.1 ± 0.2
W0175	N0640	1.1 ± 0.5	0.7 0.1	1.3 ± 0.3
W0175	N0660	A	0.8 ± 0.1	0.7±0.2
W0175	N0680	A	1.1 ± 0.2	0.8 ± 0.2
W0175	N0740	A	0.8 ± 0.1	0.9 ± 0.2
W0176	N0620	A	1.0 ± 0.1	0.8 ± 0.3
W0176	N0700	A	0.9 ± 0.1	0.9 ± 0.2
W0178	N0620	A	0.9 ± 0.1	0.9 ± 0.2
W0178	N0660	A	0.9 ± 0.1	0.8 ± 0.2
W0178	N1200	A	0.7±0.1	0.8 ± 0.2
W0178	N1220	0.1 ± 0.2	0.8 ± 0.1	1.0 ± 0.1
W0178	N1240	0.7 ± 0.1	0.8 ± 0.1	0.8 ± 0.1
W0180	N1060	A	0.9 ± 0.1	0.7 ± 0.2
W0187	N1140	A	1.1 ± 0.1	0.7 ± 0.2
W0187	N1150	A	1.0 ± 0.1	1.3 ± 0.2

‘A’ denotes less than detectable activity

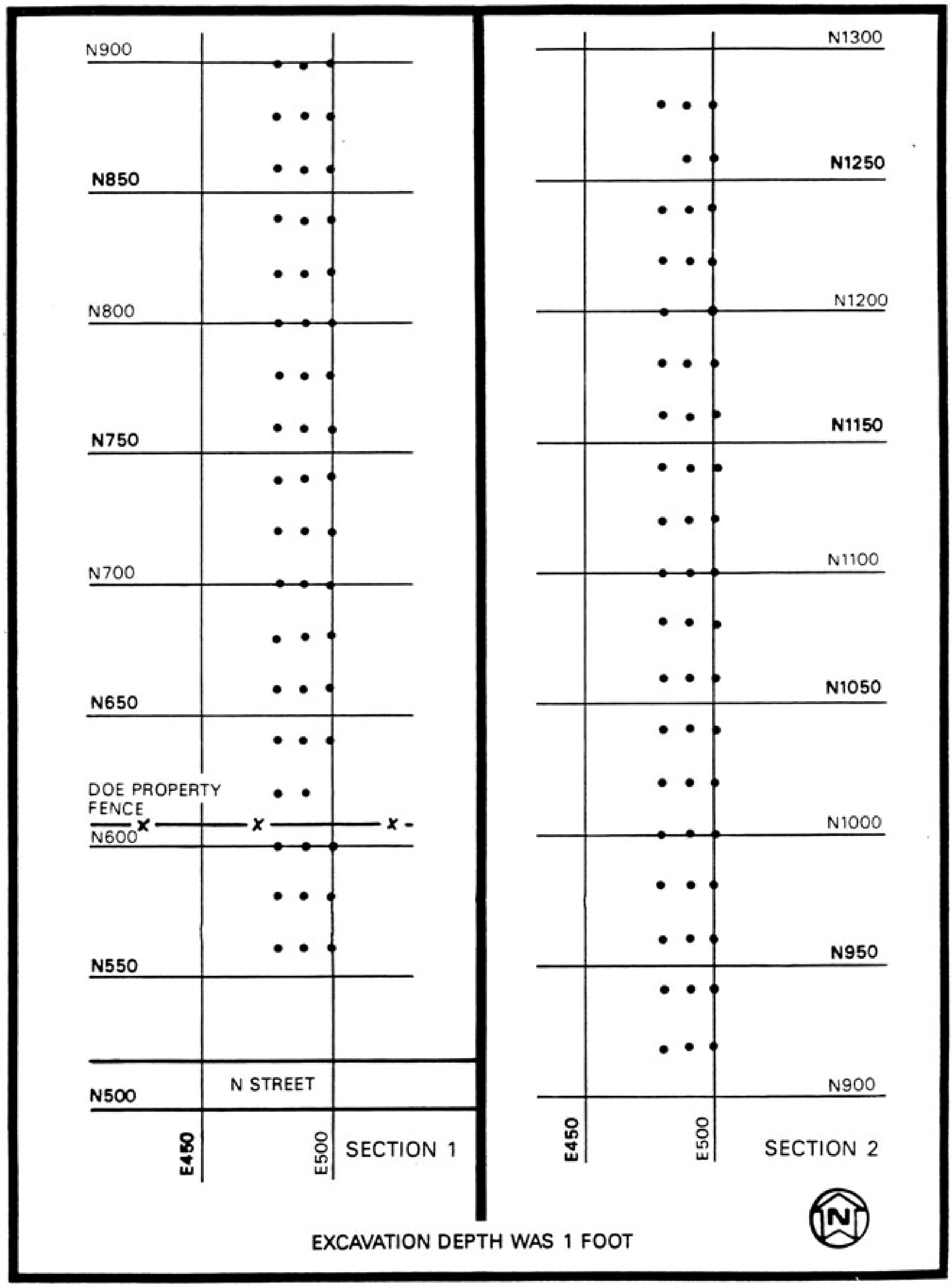

FIGURE 43 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTIONS 1 AND 2

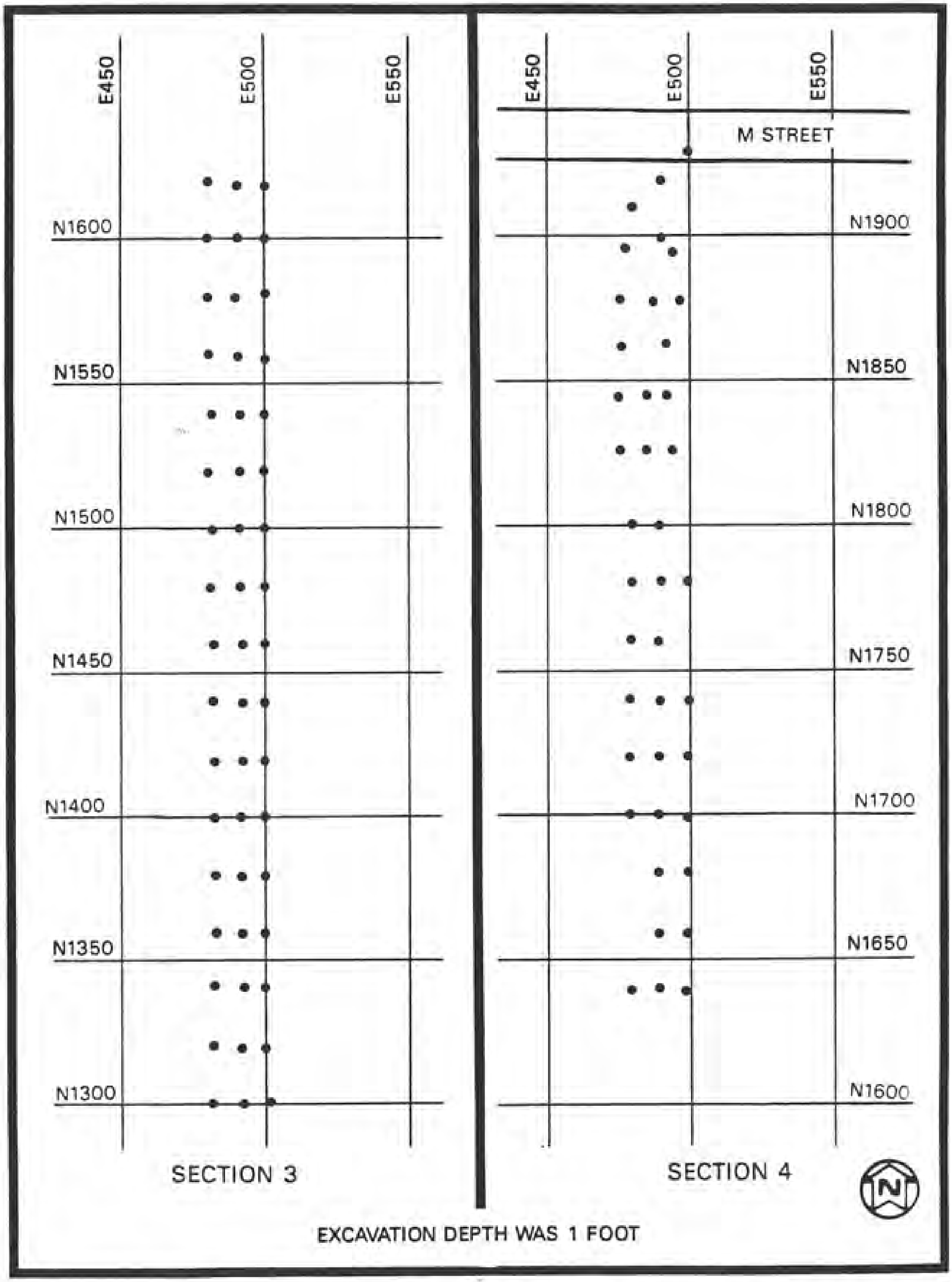

FIGURE 44 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTIONS 3 AND 4

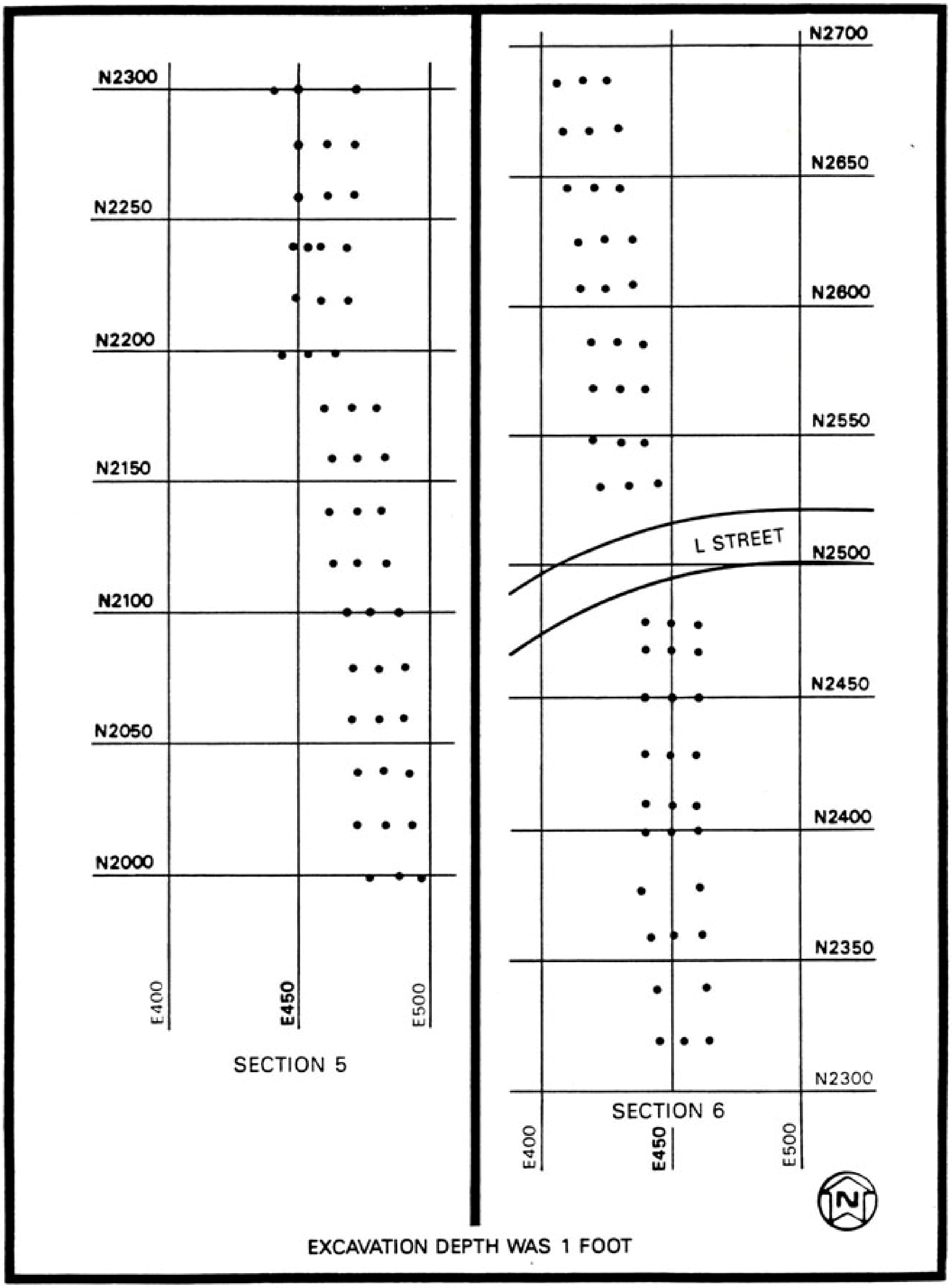

FIGURE 45 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTIONS 5 AND 6

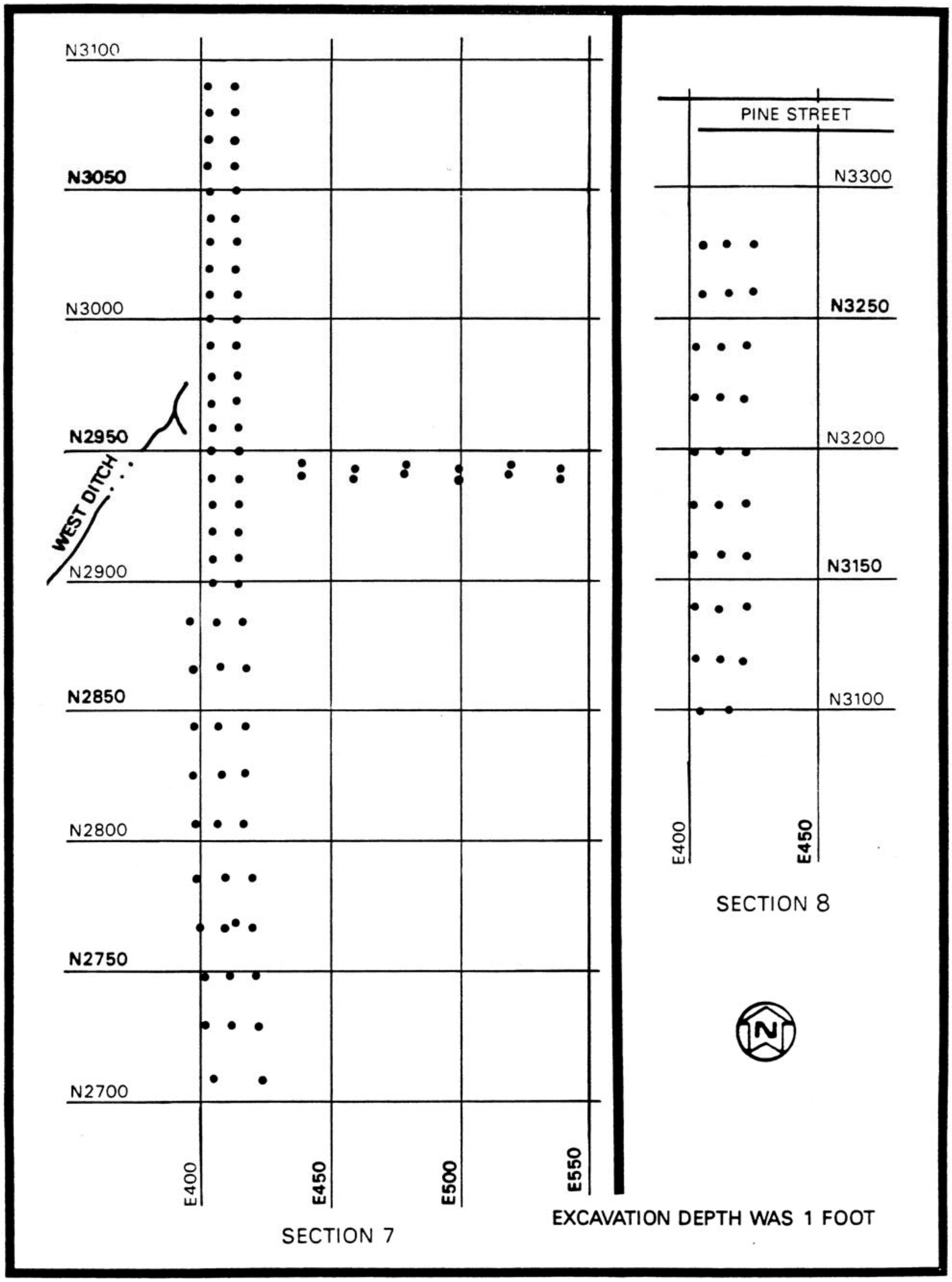

FIGURE 46 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTIONS 7 AND 8

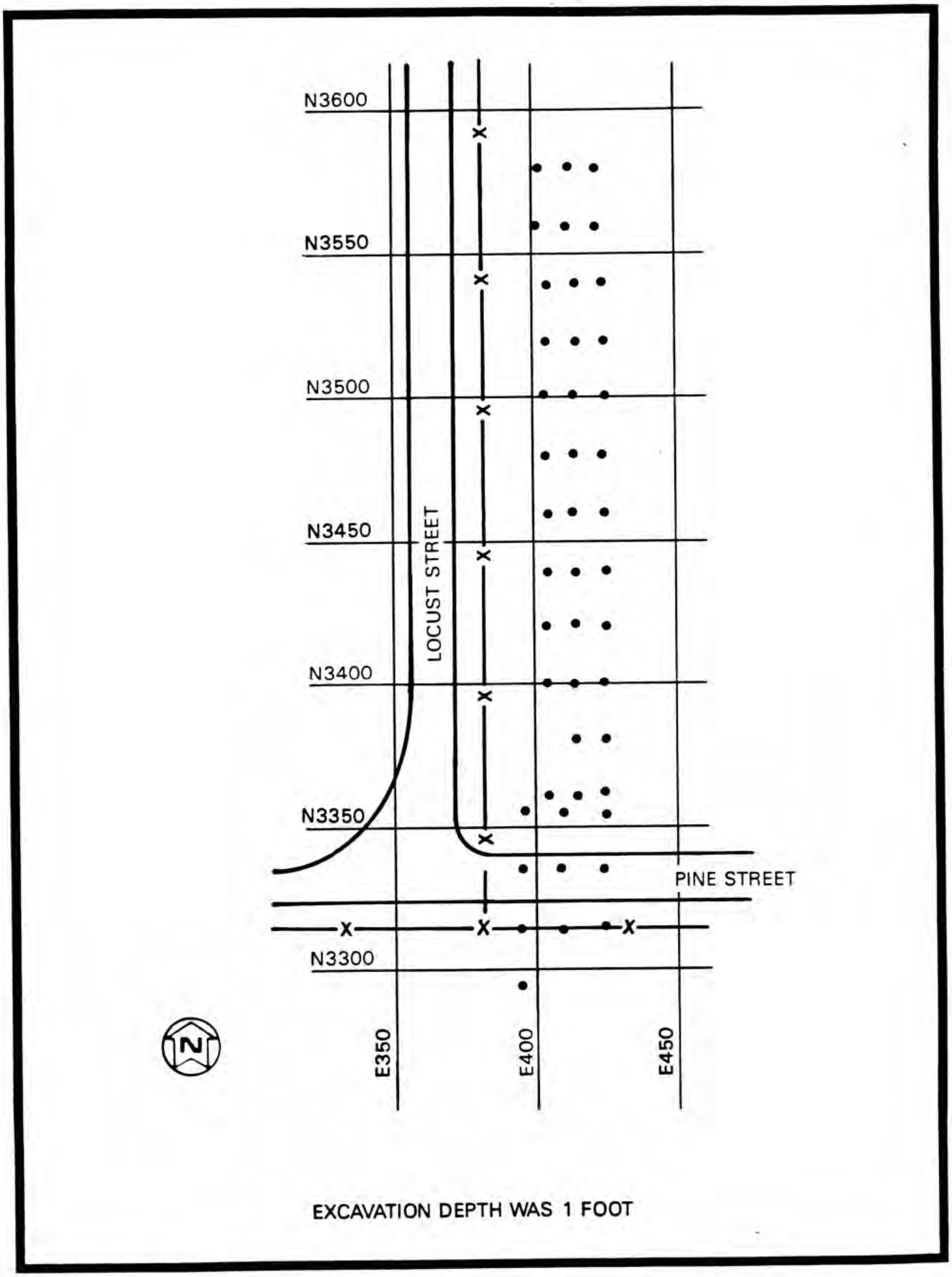

FIGURE 47 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTION 9

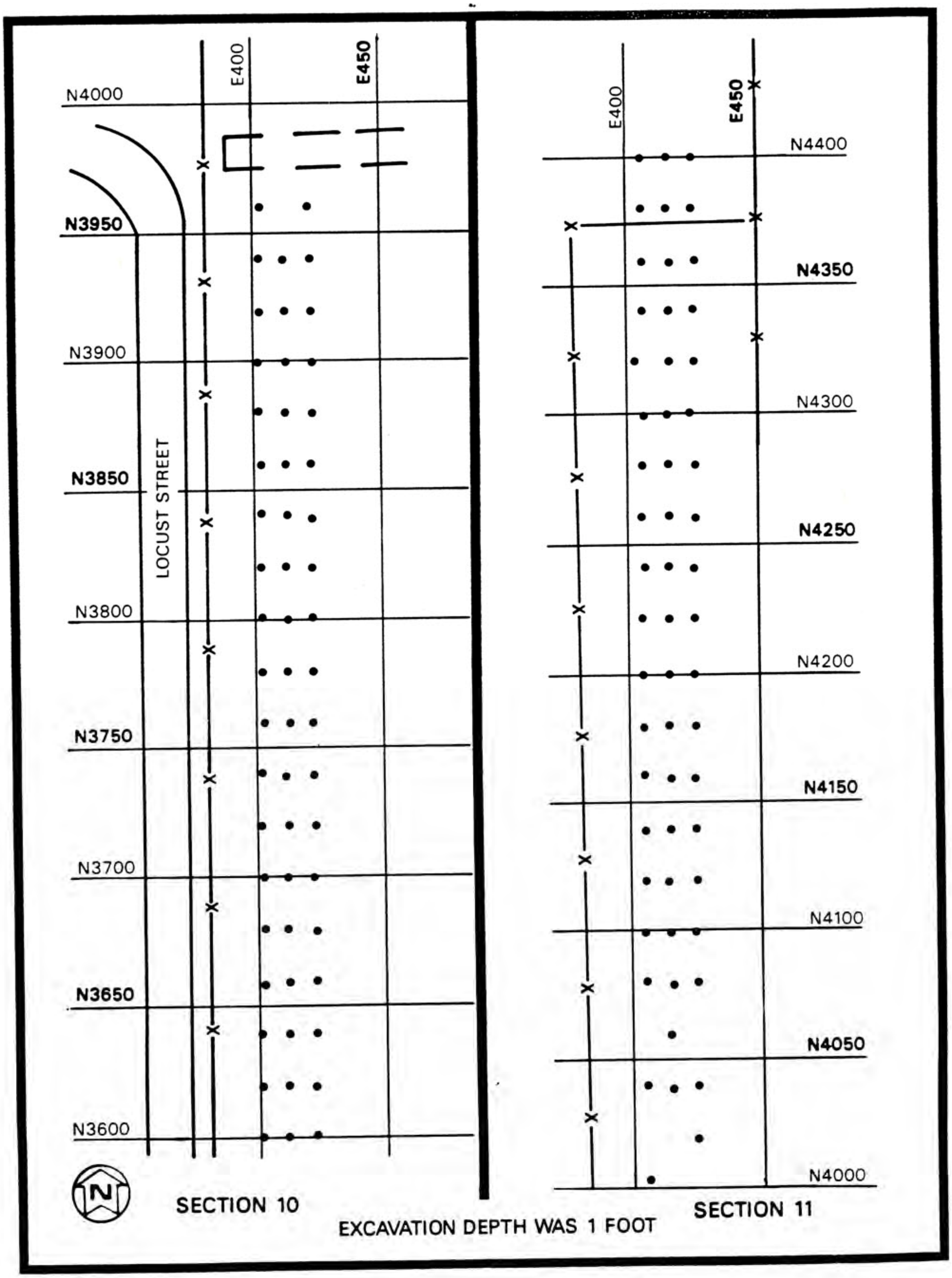

FIGURE 48 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTIONS 10 AND 11

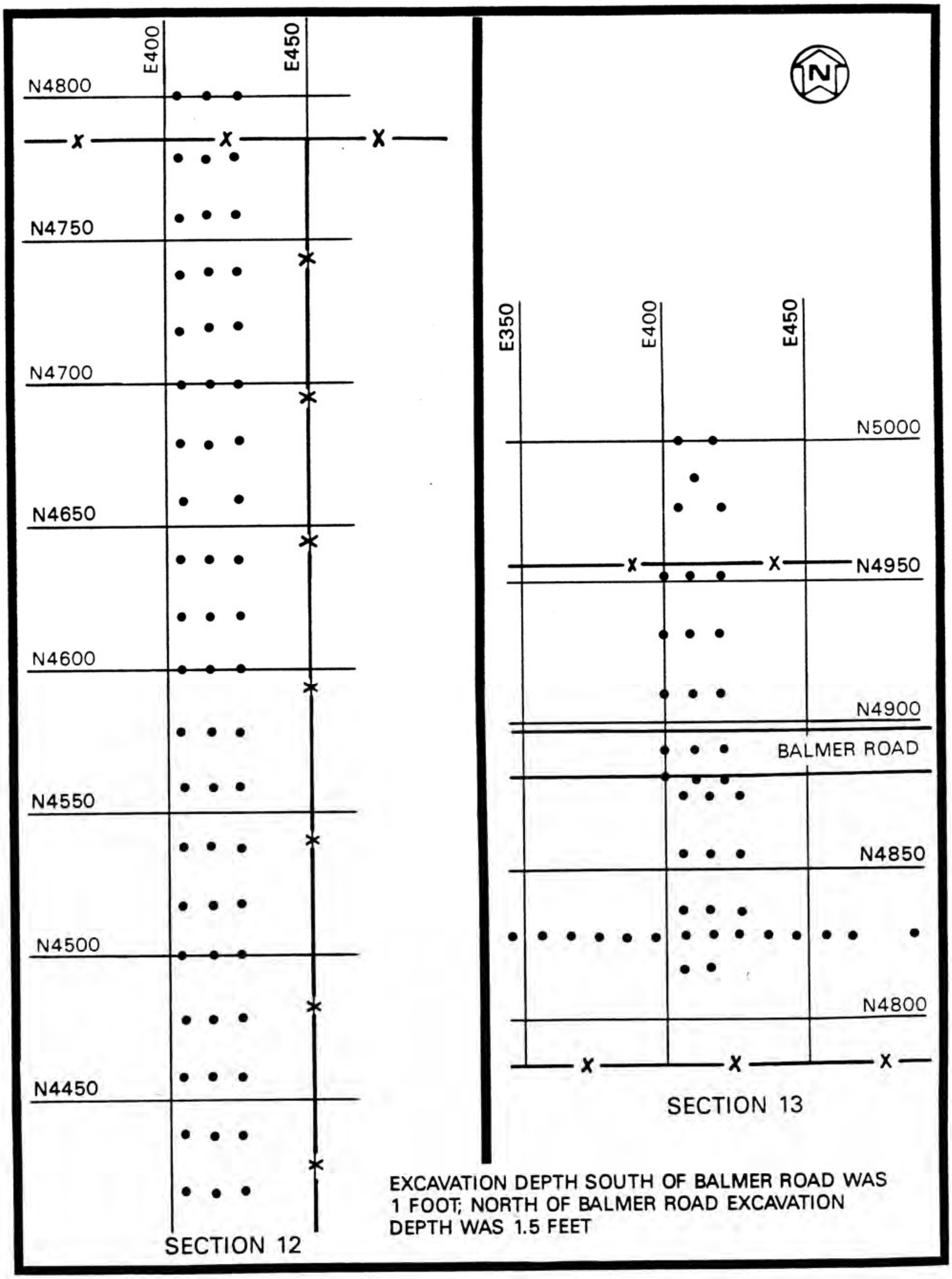

FIGURE 49 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTIONS 12 AND 13

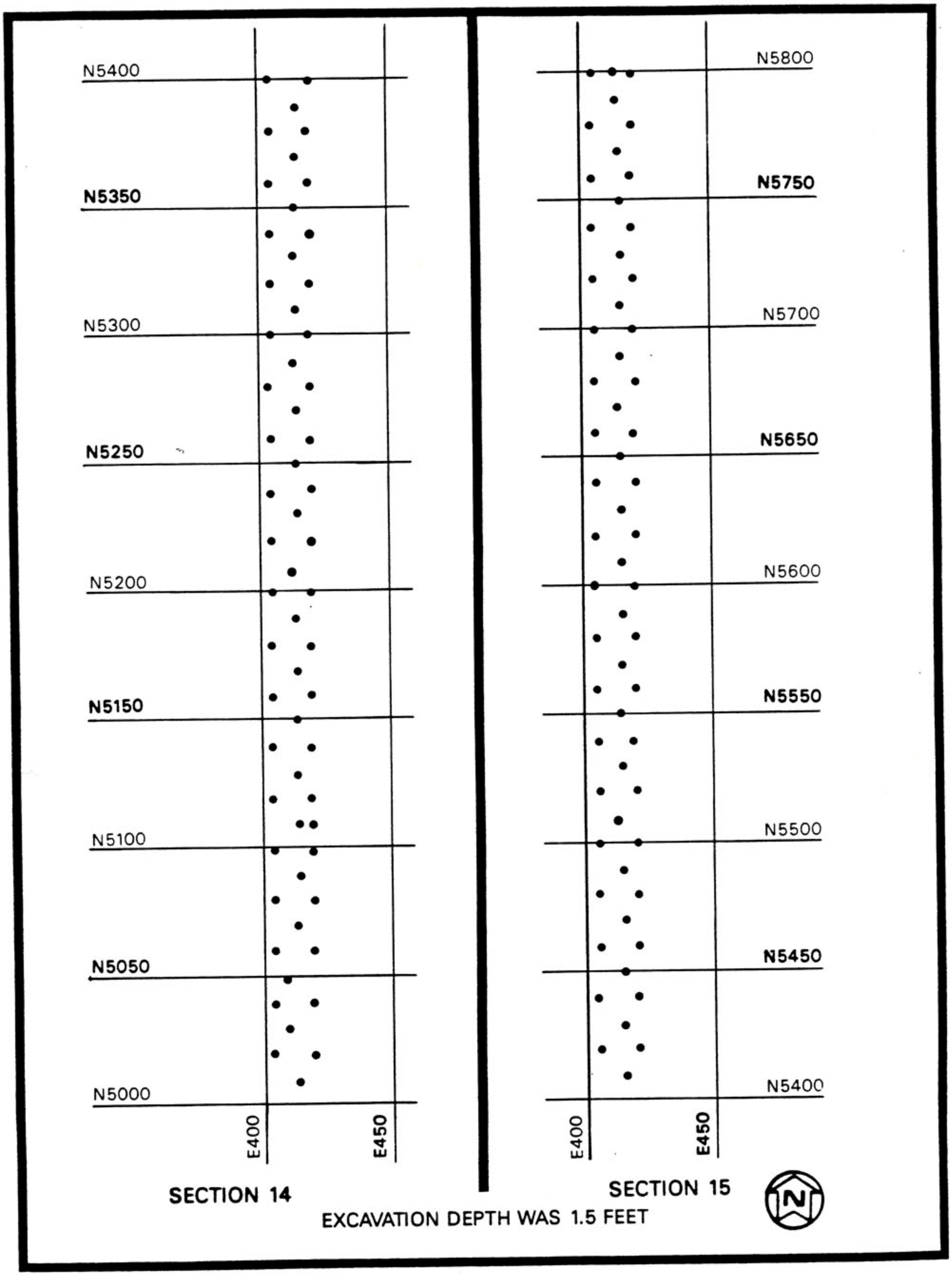

FIGURE 50 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTIONS 14 AND 15

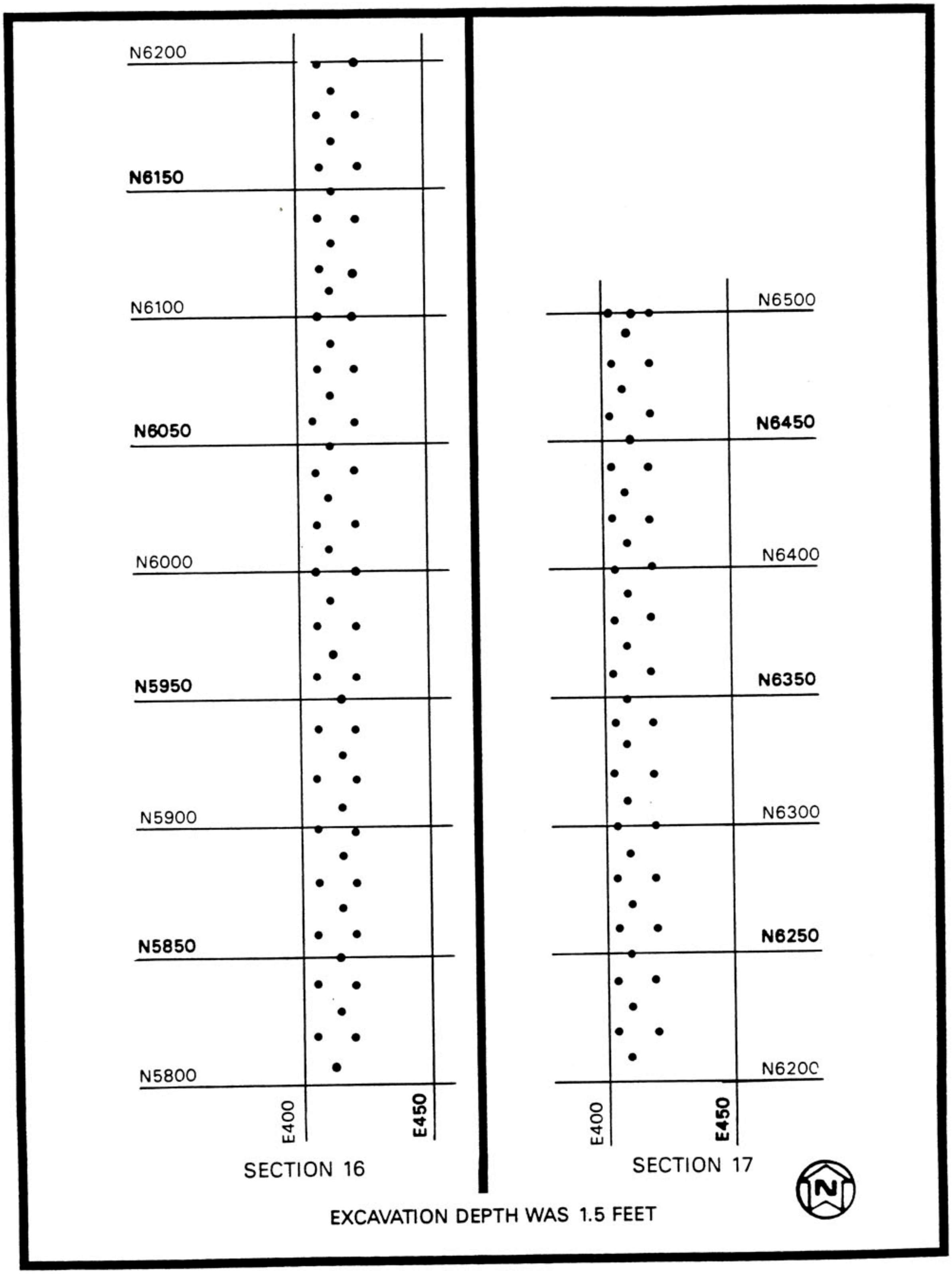

FIGURE 51 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTIONS 16 AND 17

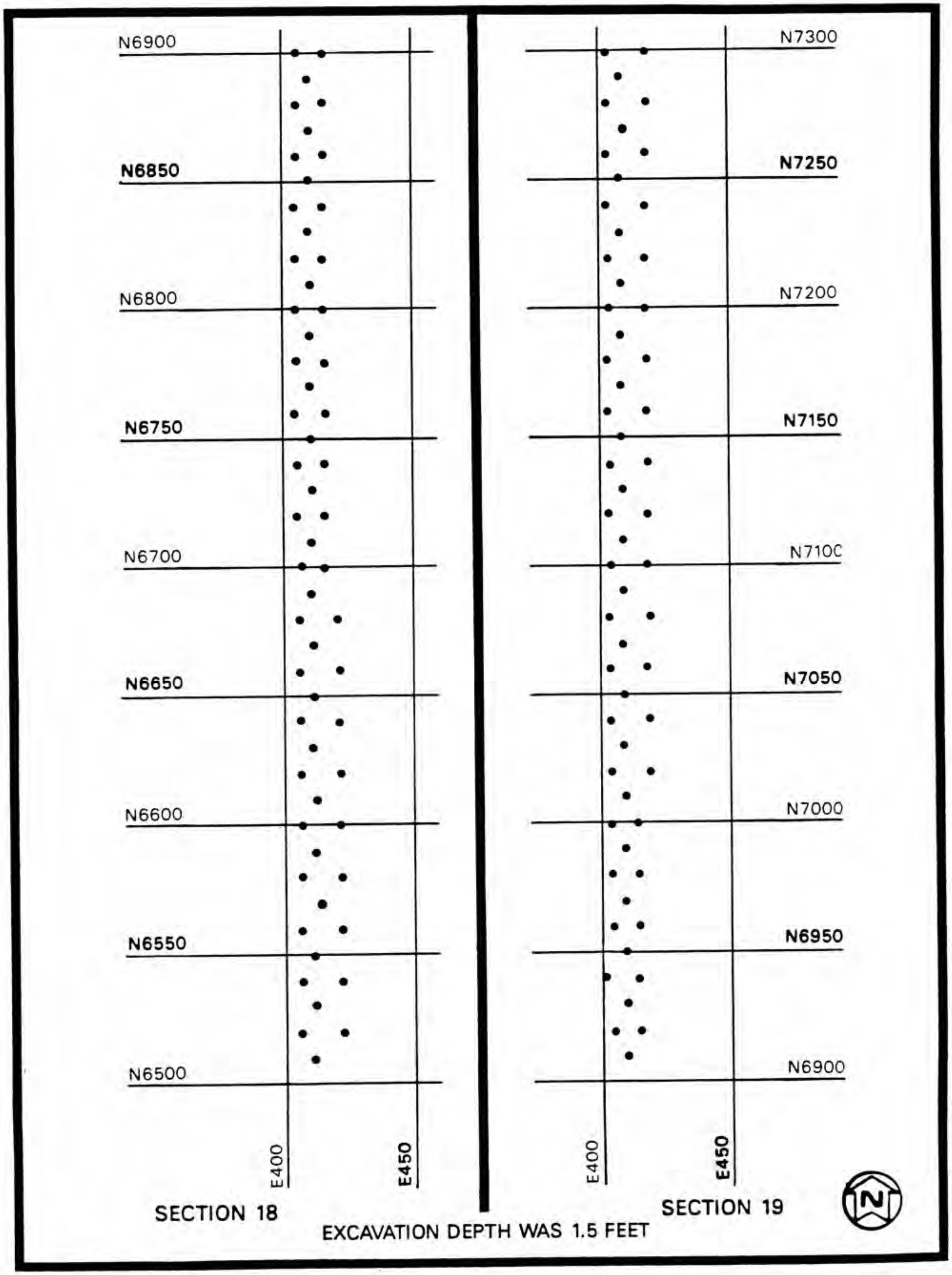

FIGURE 52 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTIONS 18 AND 19

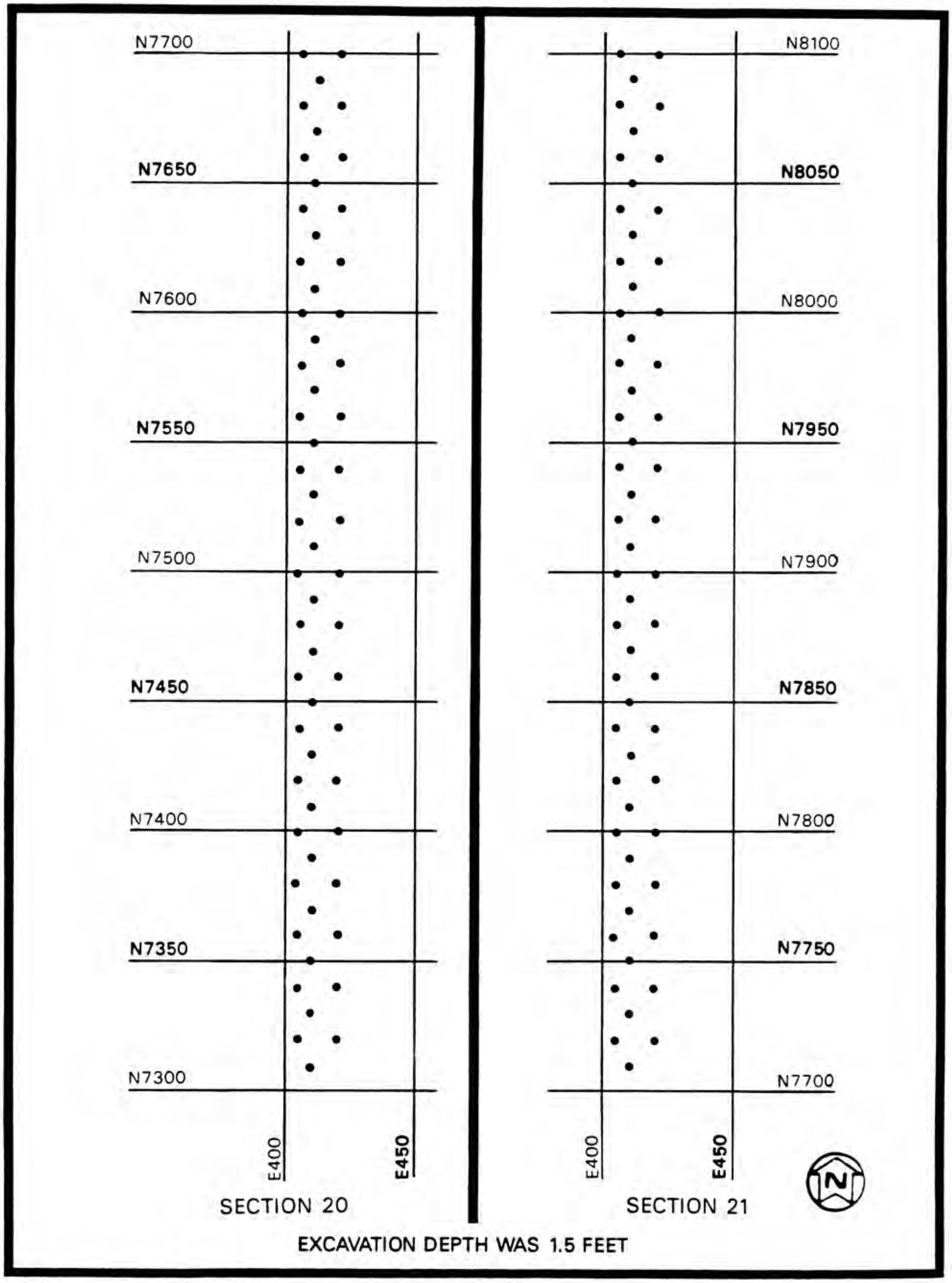

FIGURE 53 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTIONS 20 AND 21

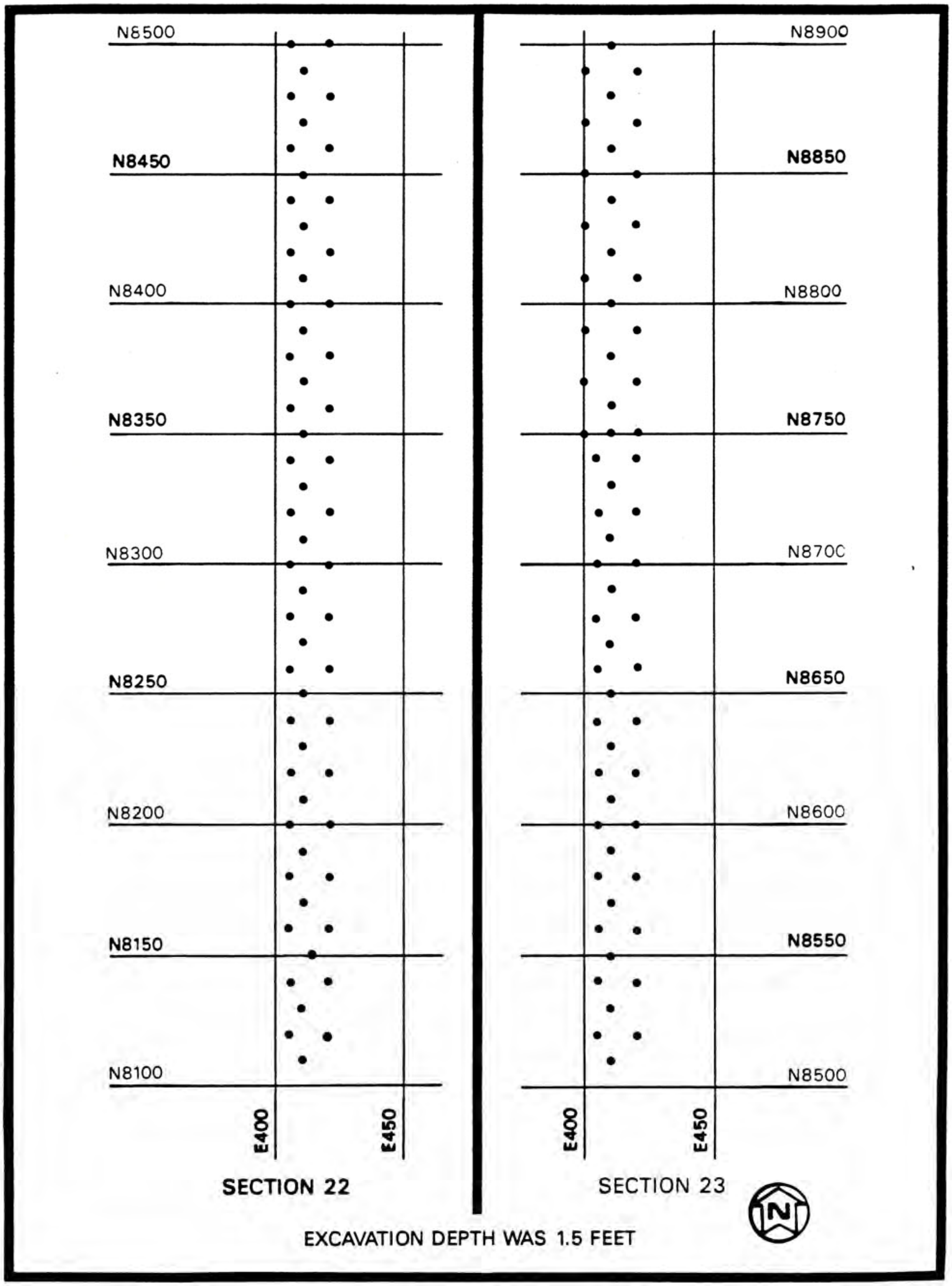

FIGURE 54 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTIONS 22 AND 23

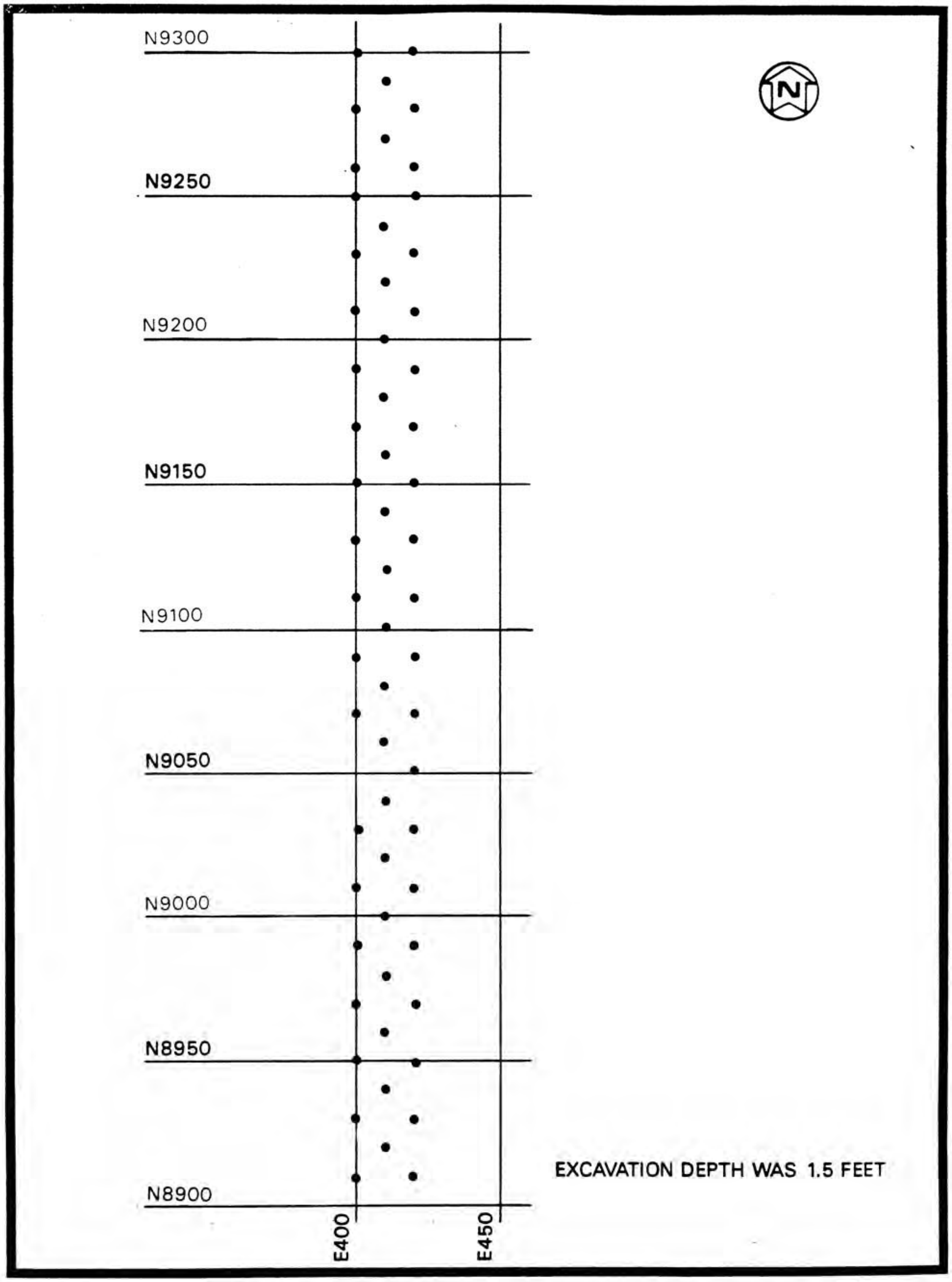

FIGURE 55 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTION 24

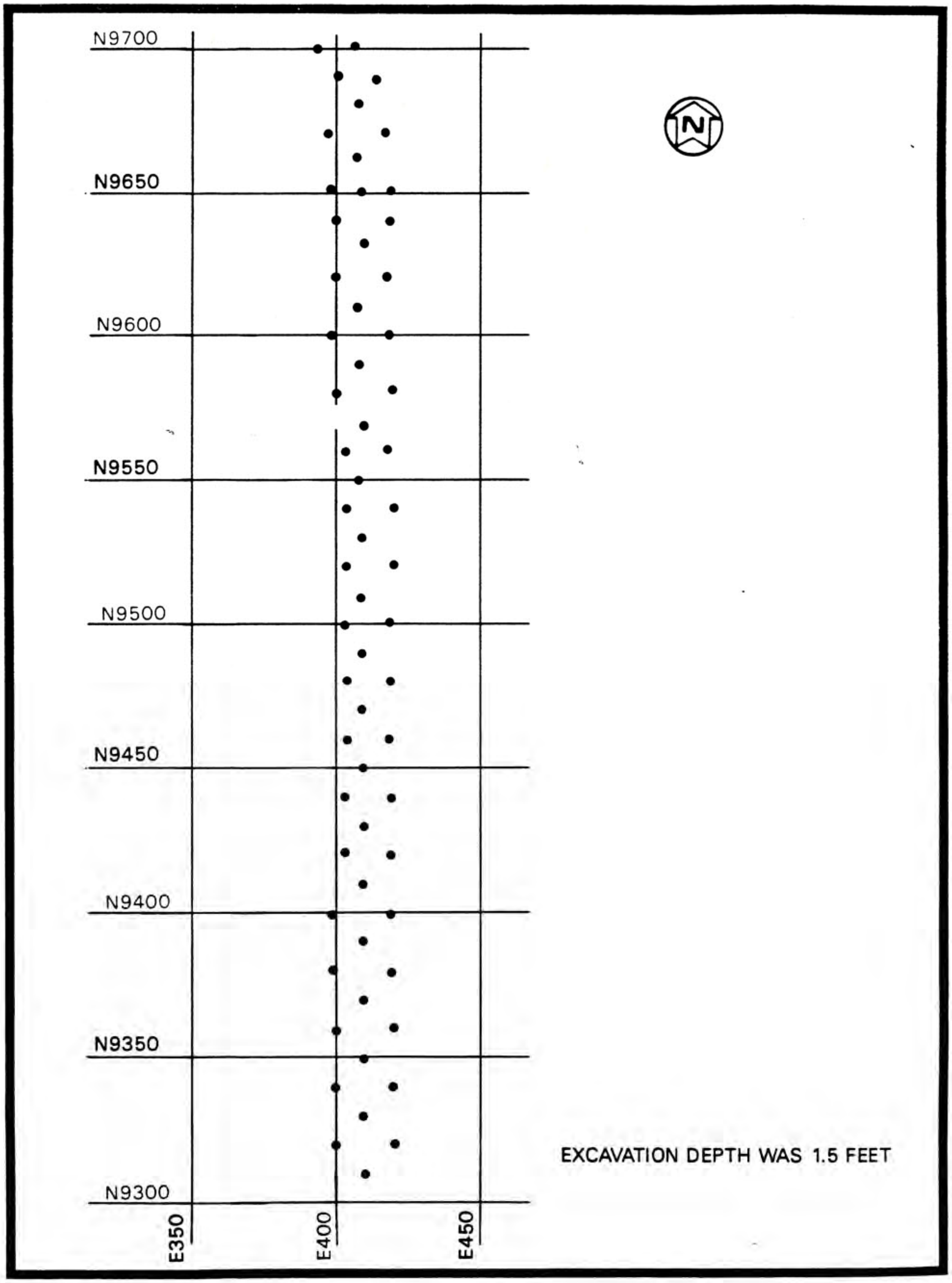

FIGURE 56 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTION 25

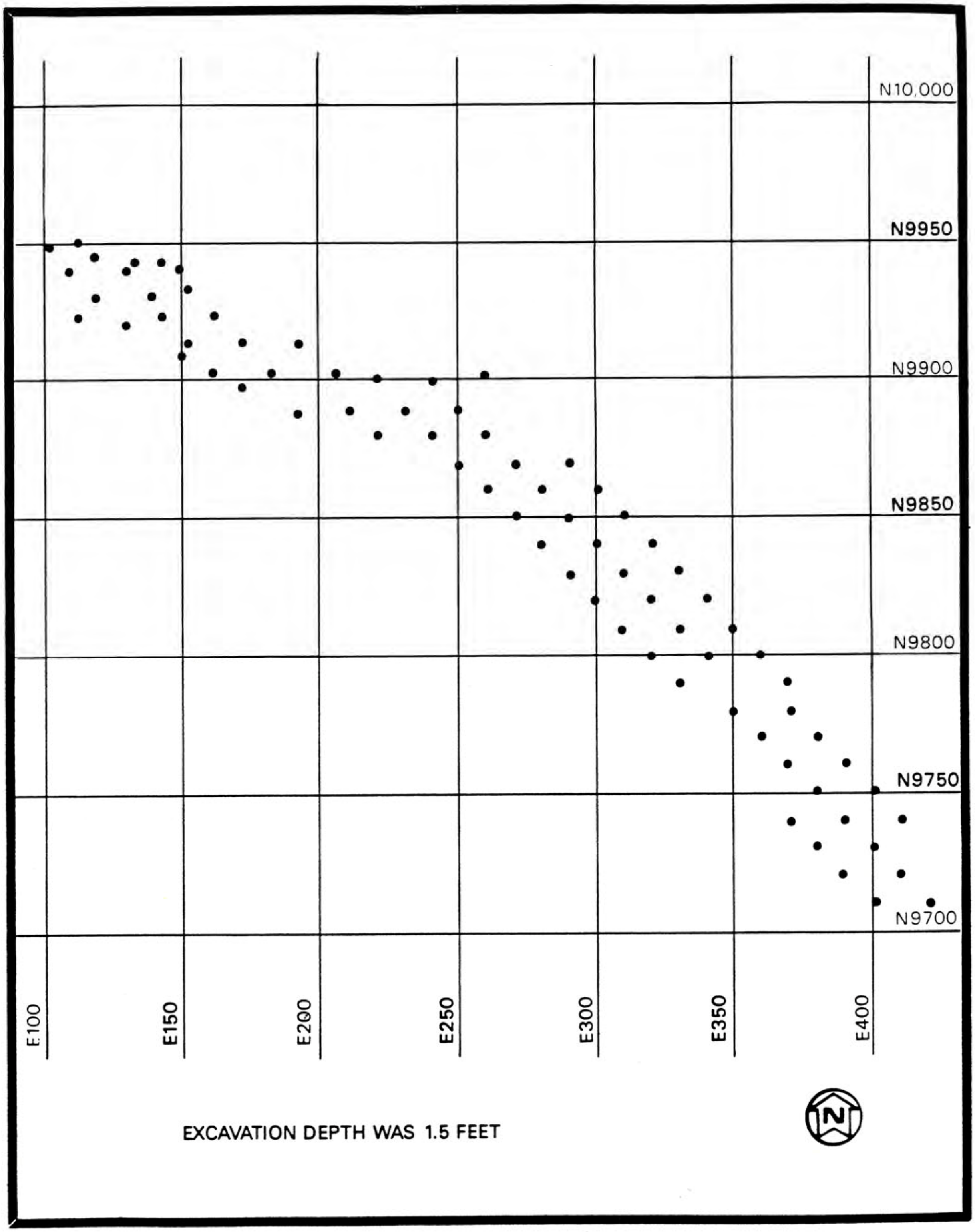

FIGURE 57 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTION 26

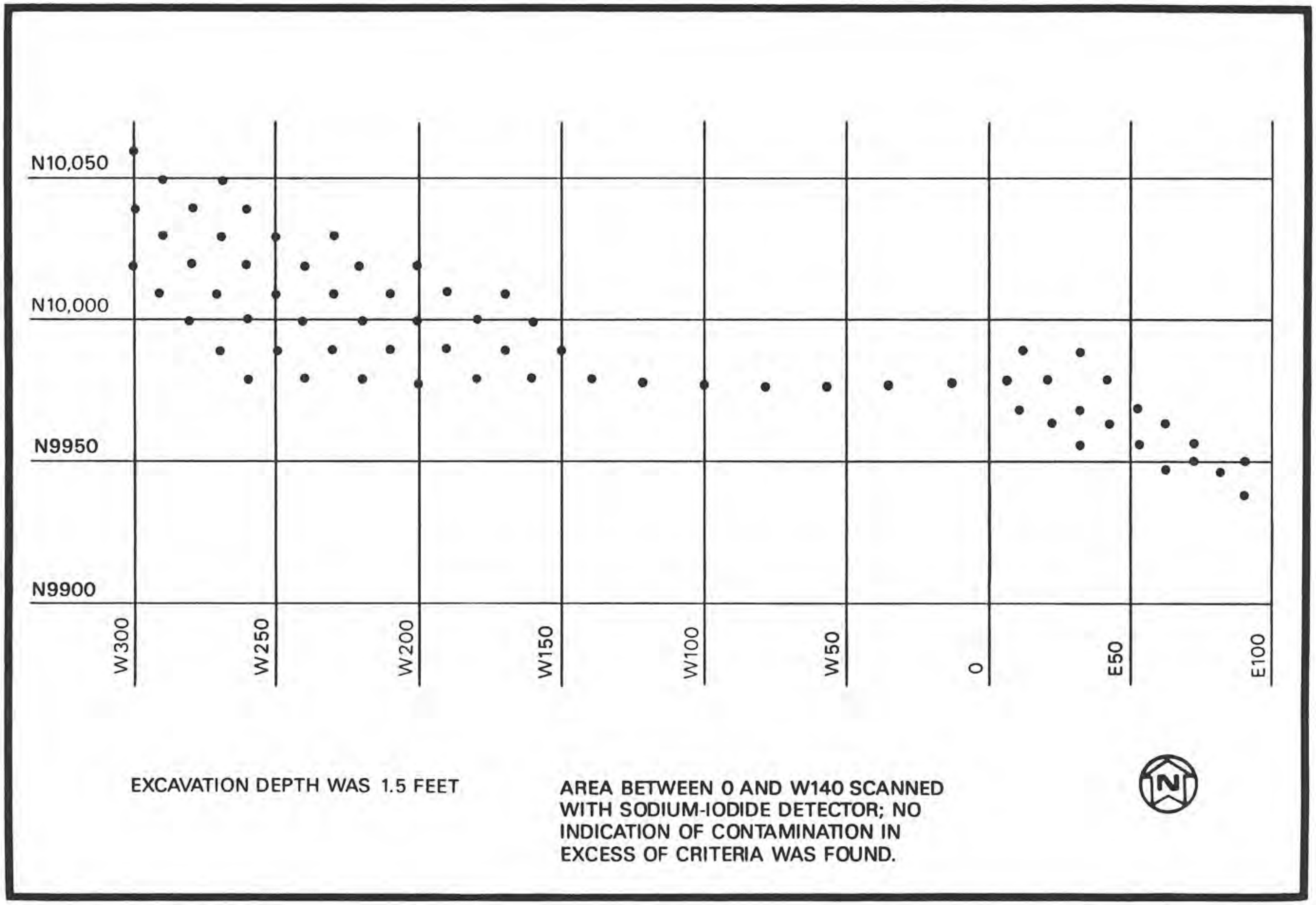

FIGURE 58 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTION 27

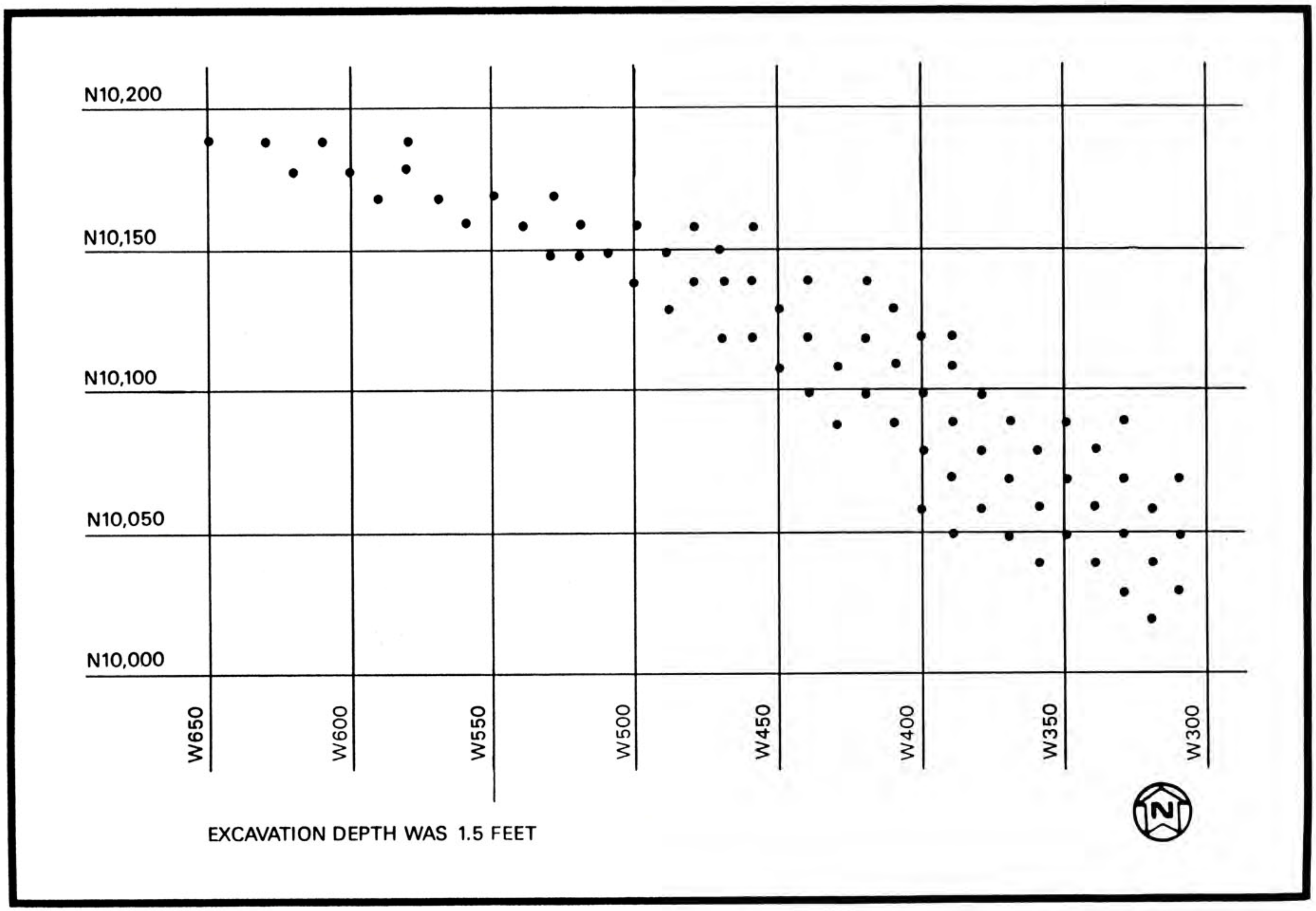

FIGURE 59 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTION 28

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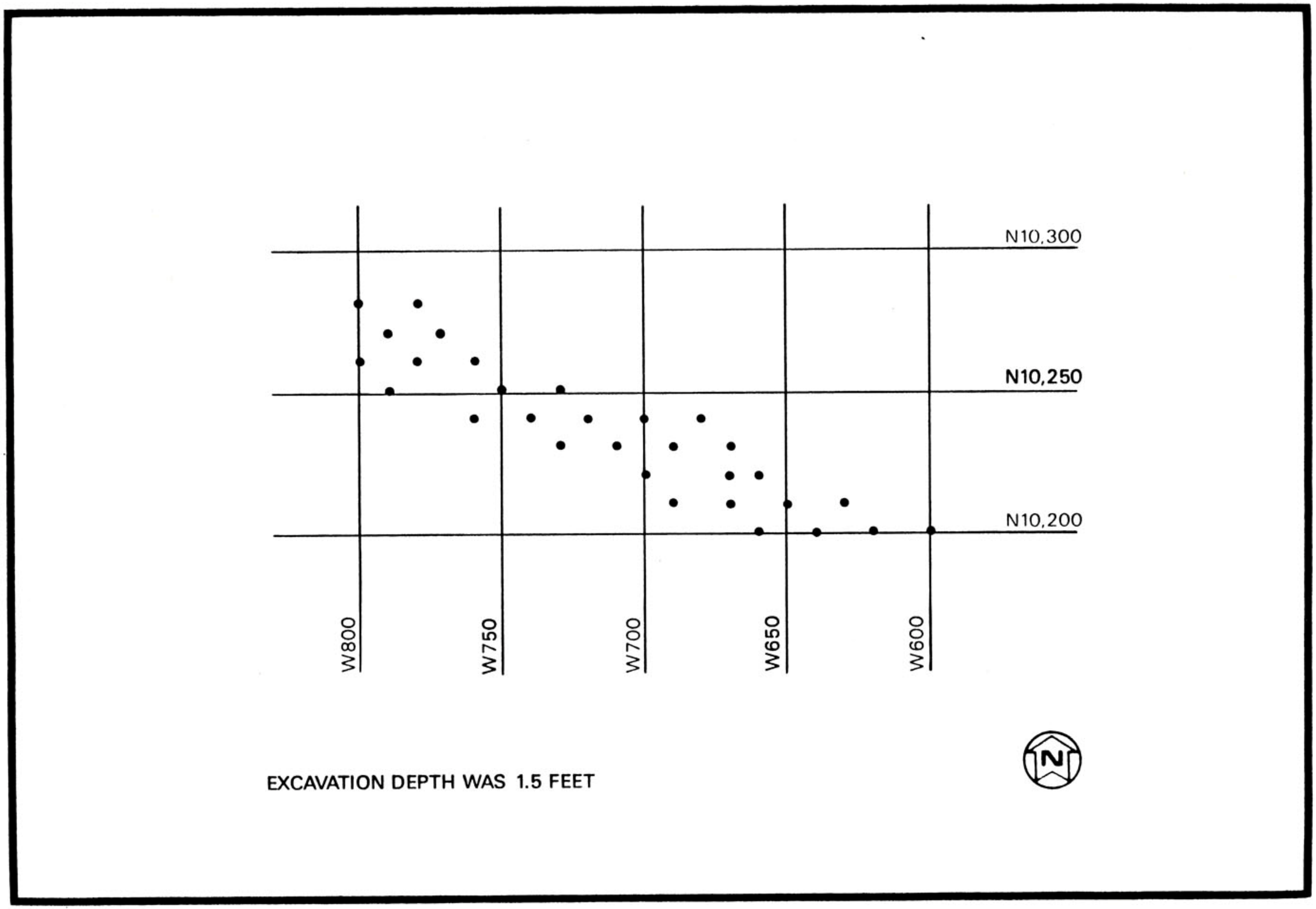

FIGURE 60 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTION 29

107

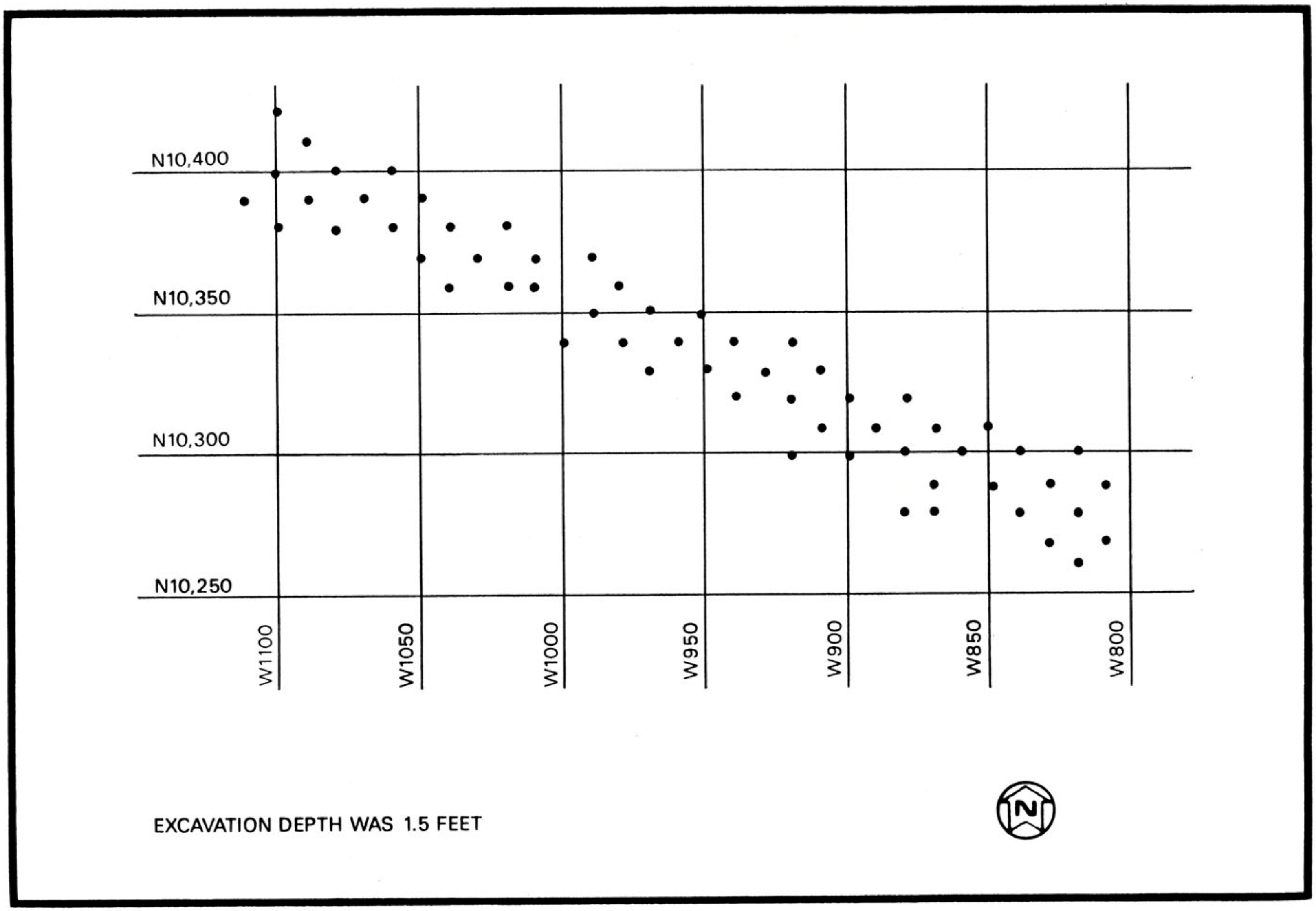

FIGURE 61 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTION 30

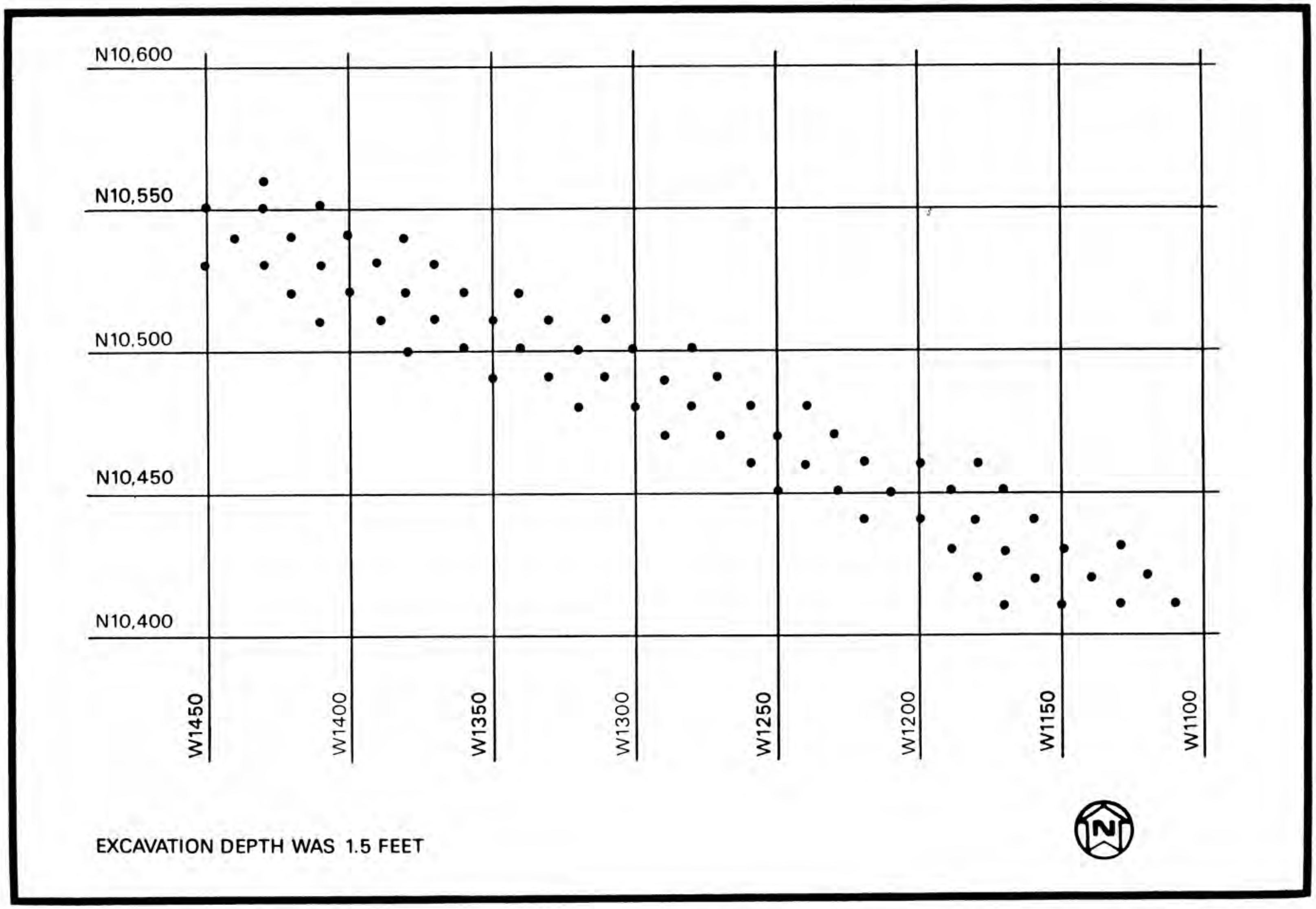

FIGURE 62 POST-REMEDIAL ACTION SAMPLING LOCATIONS ON THE CENTRAL DRAINAGE DITCH - SECTION 31

TABLE 13

POST-REMEDIAL ACTION SAMPLING RESULTS FOR THE CENTRAL DRAINAGE DITCH

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00005	N09980	2.8 ± 2.0	2.7 ± 0.2	1.4 ± 0.3
E00013	N09970	A	3.9 ± 0.2	A
E00013	N09990	A	1.2 ± 0.1	1.7 ± 0.3
E00020	N09980	A	1.2 ± 0.1	0.8 ± 0.2
E00023	N09965	A	1.9 ± 0.1	1.1 ± 0.2
E00033	N09958	A	1.0 ± 0.1	0.7 ± 0.1
E00033	N09970	A	2.6 ± 0.2	0.9 ± 0.2
E00033	N09990	A	1.4 ± 0.2	1.8 ± 0.2
E00043	N09965	A	6.1 ± 0.2	A
E00043	N09980	A	2.9 ± 0.2	1.5 ± 0.3
E00053	N09958	A	1.0 ± 0.2	A
E00053	N09970	0.6 ± 0.1	1.1 ± 0.1	1.2 ± 0.2
E00063	N09949	A	1.8 ± 0.2	A
E00063	N09965	A	8.0 ± 0.3	1.0 ± 0.3
E00073	N09950	A	1.3 ± 0.1	1.1 ± 0.2
E00073	N09958	A	1.3 ± 0.1	1.2 ± 0.2
E00083	N09949	6.6 ± 2.6	1.5 ± 0.2	1.4 ± 0.3
E00090	N09940	A	1.9 ± 0.2	0.9 ± 0.3
E00093	N09950	A	2.4 ± 0.2	0.5 ± 0.2
E00103	N09949	A	1.1 ± 0.1	1.6 ± 0.2
E00110	N09940	A	1.6 ± 0.1	0.9 ± 0.2
E00113	N09950	A	1.3 ± 0.2	0.9 ± 0.2
E00120	N09930	A	1.0 ± 0.1	1.2 ± 0.2
E00123	N09923	A	1.8 ± 0.3	A
E00130	N09920	A	1.4 ± 0.1	1.1 ± 0.2
E00130	N09940	A	1.2 ± 0.1	1.2 ± 0.2
E00132	N09942	0.7 ± 1.4	1.4 ± 0.2	0.9 ± 0.2
E00140	N09930	A	0.7 ± 0.1	0.9 ± 0.2
E00143	N09923	A	6.2 ± 0.3	0.6 ± 0.3
E00143	N09942	A	1.7 ± 0.1	1.1 ± 0.2
E00150	N09910	A	2.3 ± 0.2	0.5 ± 0.3
E00150	N09940	A	1.3 ± 0.2	0.9 ± 0.3
E00153	N09913	A	7.2 ± 0.3	0.9 ± 0.2
E00153	N09933	0.9 ± 0.6	1.0 ± 0.1	1.3 ± 0.2
E00163	N09903	A	3.0 ± 0.5	1.1 ± 0.4
E00163	N09923	A	4.1 ± 0.3	0.7 ± 0.3
E00173	N09897	A	1.5 ± 0.2	0.8 ± 0.2
E00173	N09913	5.5 ± 2.0	4.4 ± 0.2	1.1 ± 0.2
E00183	N09903	A	3.6 ± 0.2	1.4 ± 0.2
E00193	N09887	A	7.0 ± 0.3	1.1 ± 0.3
E00193	N09913	A	1.9 ± 0.2	1.6 ± 0.3
E00207	N09903	A	5.6 ± 0.4	0.4 ± 0.2

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00210	N09890	A	1.0 ± 0.1	1.1 ± 0.2
E00220	N09880	A	1.0 ± 0.1	1.1 ± 0.2
E00220	N09900	A	9.0 ± 0.3	A
E00230	N09890	A	4.7 ± 0.2	1.1 ± 0.2
E00240	N09880	A	5.1 ± 0.2	1.2 ± 0.2
E00240	N09900	A	1.3 ± 0.1	1.3 ± 0.3
E00250	N09870	1.5 ± 1.5	1.8 ± 0.1	1.2 ± 0.2
E00250	N09890	A	2.0 ± 0.2	1.4 ± 0.3
E00260	N09860	A	1.2 ± 0.1	1.1 ± 0.2
E00260	N09880	A	1.9 ± 0.2	1.5 ± 0.2
E00260	N09903	A	2.5 ± 0.2	1.4 ± 0.2
E00270	N09850	A	1.3 ± 0.3	0.4 ± 0.2
E00270	N09870	A	1.2 ± 0.2	A
E00280	N09840	A	1.1 ± 0.1	A
E00280	N09860	7.2 ± 0.2	4.6 ± 0.2	1.0 ± 0.2
E00290	N09830	A	1.0 ± 0.1	1.5 ± 0.2
E00290	N09850	A	5.7 ± 0.2	1.1 ± 0.2
E00290	N09870	A	1.1 ± 0.1	0.8 ± 0.2
E00300	N09820	A	1.1 ± 0.1	1.0 ± 0.2
E00300	N09840	A	3.2 ± 0.2	A
E00300	N09860	A	1.2 ± 0.1	1.2 ± 0.3
E00310	N09810	A	1.4 ± 0.2	1.8 ± 0.3
E00310	N09830	A	3.2 ± 0.2	A
E00310	N09850	A	1.0 ± 0.2	1.6 ± 0.3
E00320	N09800	A	4.0 ± 0.3	0.7 ± 0.2
E00320	N09820	A	2.3 ± 0.2	0.6 ± 0.2
E00320	N09840	A	2.8 ± 0.2	1.2 ± 0.2
E00330	N09790	A	0.7 ± 0.1	1.0 ± 0.2
E00330	N09810	13.0 ± 3.8	12.6 ± 0.4	0.9 ± 0.4
E00330	N09830	2.6 ± 0.7	1.8 ± 0.2	0.8 ± 0.2
E00340	N09800	A	5.0 ± 0.2	0.8 ± 0.2
E00340	N09820	A	1.3 ± 0.1	1.1 ± 0.2
E00345	N04832	A	0.9 ± 0.1	0.8 ± 0.2
E00350	N09780	A	4.4 ± 0.3	1.0 ± 0.3
E00350	N09810	A	2.4 ± 0.2	1.0 ± 0.2
E00355	N04832	A	1.0 ± 0.1	0.9 ± 0.2
E00360	N09770	A	2.7 ± 0.2	1.0 ± 0.2
E00360	N09800	A	1.3 ± 0.1	1.0 ± 0.2
E00365	N04832	A	0.9 ± 0.1	0.9 ± 0.2
E00370	N09740	A	1.0 ± 0.1	1.1 ± 0.2
E00370	N09760	A	1.6 ± 0.1	1.3 ± 0.2
E00370	N09780	A	4.3 ± 0.3	1.5 ± 0.2
E00370	N09790	A	1.3 ± 0.1	1.3 ± 0.2
E00375	N04832	A	0.9 ± 0.2	0.9 ± 0.3

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00380	N09730	A	3.1 0.2	0.6 0.2
E00380	N09750	2.3 ± 1.0	6.2 ± 0.3	1.0 ± 0.3
E00380	N09770	3.2 ± 2.1	5.7 ± 0.3	0.7 ± 0.3
E00385	N04832	A	5.5 ± 0.3	0.8 ± 0.2
E00390	N09700	A	5.1 ± 0.3	1.1 ± 0.2
E00390	N09720	A	4.6 ± 0.2	A
E00390	N09740	A	9.1 ± 0.4	1.0 ± 0.4
E00390	N09760	A	6.4 ± 0.3	1.4 0.3
E00395	N04832	A	2.7 ± 0.3	0.7 ± 0.2
E00396	N02885	A	1.3 ± 0.2	1.2 ± 0.3
E00396	N03295	A	0.8 ± 0.1	0.9 ± 0.3
E00396	N03315	A	1.2 ± 0.2	0.9 ± 0.3
E00396	N03335	6.3 ± 2.1	1.1 ± 0.2	0.8 ± 0.2
E00396	N03355	A	1.0 ± 0.1	1.0 ± 0.2
E00398	N02808	A	0.8 ± 0.1	1.1 ± 0.2
E00398	N02826	A	1.2 ± 0.1	0.9 ± 0.2
E00398	N02845	A	0.8 ± 0.1	0.5 ± 0.2
E00398	N02867	A	0.9 ± 0.2	1.0 ± 0.3
E00399	N02786	A	1.2 ± 0.2	1.2 ± 0.2
E00400	N02767	A	1.1 ± 0.1	1.1 ± 0.3
E00400	N04886	0.7 ± 0.2	0.8 ± 0.1	1.0 ± 0.1
E00400	N04896	0.4 ± 0.2	1.4 ± 0.1	0.7 ± 0.1
E00400	N04916	0.2 ± 0.2	4.2 ± 0.1	0.7 ± 0.1
E00400	N04936	0.5 ± 0.2	1.0 ± 0.1	0.8 ± 0.1
E00400	N04956	0.3 ± 0.2	0.9 ± 0.1	0.9 ± 0.1
E00400	N08750	A	0.9 ± 0.1	1.0 ± 0.2
E00400	N08770	A	0.8 ± 0.1	0.6 ± 0.2
E00400	N08790	4.2 ± 1.4	1.3 ± 0.1	0.7 ± 0.1
E00400	N08810	A	1.2 ± 0.1	1.1 ± 0.2
E00400	N08830	A	1.3 ± 0.1	1.1 ± 0.2
E00400	N08850	A	0.8 ± 0.3	1.3 ± 0.7
E00400	N08870	A	2.6 ± 0.2	0.9 ± 0.2
E00400	N08890	A	1.3 ± 0.1	1.1 ± 0.2
E00400	N08910	A	1.1 ± 0.1	0.9 ± 0.1
E00400	N08930	A	2.2 ± 0.1	0.9 ± 0.2
E00400	N08950	A	0.9 ± 0.1	1.7 ± 0.2
E00400	N08970	A	1.7 ± 0.1	1.1 ± 0.2
E00400	N08990	A	1.1 ± 0.1	0.9 ± 0.1
E00400	N09010	A	7.5 ± 0.3	1.2 ± 0.3
E00400	N09030	A	5.2 ± 0.3	0.6 ± 0.2
E00400	N09070	A	1.6 ± 0.2	1.7 ± 0.1
E00400	N09090	A	1.2 ± 0.1	1.4 ± 0.2
E00400	N09110	A	1.6 ± 0.1	1.4 ± 0.2

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00400	N09130	A	1.0 ± 0.1	1.0 ± 0.2
E00400	N09150	A	1.5 ± 0.1	0.9 ± 0.2
E00400	N09170	A	1.0 ± 0.1	1.4 ± 0.2
E00400	N09190	A	1.4 ± 0.1	1.5 ± 0.2
E00400	N09210	A	10.8 ± 0.3	0.8 ± 0.3
E00400	N09230	3.6 ± 1.7	2.1 ± 0.2	0.9 ± 0.2
E00400	N09250	A	1.3 ± 0.1	1.0 ± 0.2
E00400	N09260	A	1.1 ± 0.1	1.7 ± 0.2
E00400	N09280	A	1.6 ± 0.1	0.9 ± 0.2
E00400	N09300	A	7.6 ± 0.3	1.6 ± 0.3
E00400	N09320	A	1.3 ± 0.1	0.9 ± 0.2
E00400	N09340	A	2.1 ± 0.2	0.6 ± 0.2
E00400	N09360	A	1.4 ± 0.1	1.1 ± 0.2
E00400	N09380	A	2.5 ± 0.2	0.9 ± 0.2
E00400	N09400	A	2.2 ± 0.2	1.0 ± 0.2
E00400	N09580	A	1.7 ± 0.1	1.4 ± 0.2
E00400	N09600	3.7 ± 3.3	11.9 ± 0.4	1.6 ± 0.3
E00400	N09620	A	5.1 ± 0.3	A
E00400	N09640	3.5 ± 2.7	9.1 ± 0.4	1.2 ± 0.3
E00400	N09650	A	1.1 ± 0.2	1.1 ± 0.2
E00400	N09670	A	2.3 ± 0.2	1.3 ± 0.2
E00400	N09690	A	5.1 ± 0.3	0.9 ± 0.3
E00400	N09710	A	3.9 ± 0.2	0.9 ± 0.2
E00400	N09730	A	1.9 ± 0.2	0.8 ± 0.3
E00400	N09750	A	2.3 ± 0.2	1.4 ± 0.2
E00402	N02729	A	0.8 ± 0.2	0.9 ± 0.2
E00402	N02748	A	1.8 ± 0.2	1.4 ± 0.2
E00402	N03120	A	0.8 ± 0.1	0.6 ± 0.2
E00402	N03140	1.4 ± 0.5	0.9 ± 0.1	1.3 ± 0.1
E00402	N03160	A	0.7 ± 0.1	0.8 ± 0.1
E00402	N03180	A	1.0 ± 0.1	0.6 ± 0.2
E00402	N03200	A	0.9 ± 0.2	0.7 ± 0.2
E00402	N03220	A	0.9 ± 0.2	1.0 ± 0.2
E00402	N03240	A	1.1 ± 0.1	0.8 ± 0.2
E00402	N03560	A	1.0 ± 0.1	0.7 ± 0.3
E00402	N03580	A	0.6 ± 0.2	1.0 ± 0.2
E00402	N03600	A	0.8 ± 0.2	0.8 ± 0.2
E00402	N03620	A	0.8 ± 0.1	0.9 ± 0.1
E00402	N03640	A	1.3 ± 0.2	1.3 ± 0.3
E00402	N03660	2.2 ± 3.0	1.0 ± 0.1	1.0 ± 0.2
E00402	N03680	A	0.9 ± 0.2	0.8 ± 0.2
E00402	N03700	A	0.7 ± 0.1	0.8 ± 0.2
E00402	N03720	A	0.9 ± 0.2	0.6 ± 0.2

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00402	N03740	A	0.7 ± 0.1	0.8 ± 0.2
E00402	N03760	A	1.1 ± 0.1	0.9 ± 0.2
E00402	N03780	A	0.9 ± 0.1	1.2 ± 0.2
E00402	N03800	A	0.8 ± 0.1	0.8 ± 0.1
E00402	N03820	A	0.9 ± 0.2	0.6 ± 0.3
E00402	N03840	A	2.6 ± 0.2	0.4 ± 0.2
E00402	N03860	A	0.7 ± 0.1	0.7 ± 0.2
E00402	N03880	A	0.8 ± 0.1	0.9 ± 0.2
E00402	N03900	A	1.0 ± 0.1	0.8 ± 0.2
E00402	N03920	A	1.8 ± 0.1	0.5 ± 0.1
E00402	N03940	A	1.0 ± 0.1	1.2 ± 0.2
E00402	N03960	A	0.8 ± 0.1	1.1 ± 0.2
E00402	N04320	A	0.9 ± 0.1	0.7 ± 0.2
E00402	N06940	A	1.3 ± 0.1	1.0 ± 0.2
E00405	N02686	A	0.9 ± 0.2	0.9 ± 0.3
E00405	N02709	A	0.5 ± 0.2	1.1 ± 0.3
E00405	N02900	A	1.3 ± 0.2	0.4 ± 0.2
E00405	N02910	A	0.9 ± 0.1	0.7 ± 0.2
E00405	N02920	A	1.4 ± 0.2	0.9 ± 0.2
E00405	N02930	A	2.7 ± 0.2	1.1 ± 0.2
E00405	N02940	A	1.7 ± 0.2	1.0 ± 0.2
E00405	N02950	A	1.7 ± 0.2	1.4 ± 0.2
E00405	N02960	A	2.2 ± 0.2	0.6 ± 0.2
E00405	N02970	A	1.2 ± 0.2	0.6 ± 0.2
E00405	N02980	A	1.2 ± 0.2	0.6 ± 0.2
E00405	N02990	A	1.0 ± 0.1	0.9 ± 0.3
E00405	N03000	A	1.0 ± 0.1	1.1 ± 0.2
E00405	N03010	A	0.9 ± 0.1	0.8 ± 0.2
E00405	N03020	A	1.3 ± 0.2	1.1 ± 0.2
E00405	N03030	A	1.0 ± 0.1	0.2 ± 0.2
E00405	N03040	A	0.8 ± 0.1	1.2 ± 0.3
E00405	N03050	3.7 ± 2.2	0.8 ± 0.1	0.8 ± 0.3
E00405	N03060	A	1.0 ± 0.1	1.0 ± 0.2
E00405	N03070	A	1.8 ± 0.2	0.8 ± 0.2
E00405	N03080	1.8 ± 2.4	1.1 ± 0.2	0.8 ± 0.2
E00405	N03090	A	1.1 ± 0.1	0.7 ± 0.3
E00405	N03100	A	0.5 ± 0.2	0.6 ± 0.3
E00405	N03260	A	0.8 ± 0.1	1.0 ± 0.3
E00405	N03280	A	0.8 ± 0.1	0.6 ± 0.2
E00405	N03360	A	1.1 ± 0.2	1.2 ± 0.3
E00405	N03400	A	0.8 ± 0.1	1.2 ± 0.2
E00405	N03420	A	0.9 ± 0.2	1.0 ± 0.2
E00405	N03440	0.7 ± 0.4	0.7 ± 0.1	1.3 ± 0.2

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00405	N03460	A	0.8 ± 0.2	1.3 ± 0.2
E00405	N03480	A	1.4 ± 0.2	0.8 ± 0.3
E00405	N03500	A	0.9 ± 0.1	0.8 ± 0.2
E00405	N03520	2.4 ± 1.3	2.9 ± 0.3	1.4 ± 0.7
E00405	N03540	A	2.2 ± 0.2	1.0 ± 0.2
E00405	N04040	A	0.9 ± 0.2	0.9 ± 0.3
E00405	N04080	A	0.8 ± 0.1	0.8 ± 0.2
E00405	N04100	A	1.0 ± 0.1	0.5 ± 0.2
E00405	N04120	A	1.0 ± 0.1	0.8 ± 0.3
E00405	N04140	A	0.9 ± 0.1	0.9 ± 0.1
E00405	N04160	A	1.3 ± 0.1	1.3 ± 0.2
E00405	N04180	A	0.7 ± 0.1	0.6 ± 0.2
E00405	N04200	A	0.6 ± 0.1	0.5 ± 0.2
E00405	N04220	A	1.0 ± 0.1	0.7 ± 0.2
E00405	N04240	A	1.2 ± 0.2	0.5 ± 0.2
E00405	N04260	A	0.9 ± 0.1	1.0 ± 0.2
E00405	N04280	A	0.7 ± 0.2	0.4 ± 0.3
E00405	N04300	A	0.8 ± 0.1	0.8 ± 0.2
E00405	N04340	A	2.1 ± 0.1	0.9 ± 0.1
E00405	N04360	1.6 ± 0.7	0.9 ± 0.1	0.9 ± 0.1
E00405	N04380	A	0.8 ± 0.1	0.6 ± 0.3
E00405	N04400	A	1.0 ± 0.1	0.8 ± 0.2
E00405	N04420	A	0.8 ± 0.1	0.9 ± 0.2
E00405	N04440	A	1.1 ± 0.2	1.1 ± 0.2
E00405	N04460	A	1.1 ± 0.1	0.6 ± 0.2
E00405	N04480	A	0.6 ± 0.1	0.7 ± 0.2
E00405	N04500	A	0.7 ± 0.1	1.2 ± 0.2
E00405	N04520	A	1.1 ± 0.1	1.0 ± 0.2
E00405	N04540	A	0.5 ± 0.2	1.2 ± 0.3
E00405	N04560	A	0.7 ± 0.1	1.2 ± 0.2
E00405	N04580	A	0.9 ± 0.1	1.3 ± 0.2
E00405	N04600	A	0.7 ± 0.1	0.7 ± 0.3
E00405	N04620	A	0.1 ± 0.1	0.8 ± 0.2
E00405	N04640	A	1.1 ± 0.1	0.6 ± 0.2
E00405	N04660	A	0.9 ± 0.1	1.2 ± 0.2
E00405	N04680	A	0.8 ± 0.1	0.9 ± 0.3
E00405	N04700	A	0.8 ± 0.1	0.7 ± 0.2
E00405	N04720	A	1.0 ± 0.1	0.3 ± 0.2
E00405	N04740	A	0.7 ± 0.2	0.6 ± 0.2
E00405	N04760	0.4 ± 0.3	0.6 ± 0.1	0.5 ± 0.2
E00405	N04780	0.4 ± 0.4	0.8 ± 0.1	0.9 ± 0.2
E00405	N04800	A	1.4 ± 0.2	0.7 ± 0.2
E00405	N04820	A	4.2 ± 0.2	0.7 ± 0.2

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00405	N04832	A	2.2 ± 0.2	0.8 ± 0.2
E00405	N04840	A	6.7 ± 0.4	0.8 ± 0.3
E00405	N04860	A	2.2 ± 0.2	1.0 ± 0.3
E00405	N04880	A	1.0 ± 0.1	0.8 ± 0.2
E00405	N04980	A	0.8 ± 0.1	0.4 ± 0.1
E00405	N05000	A	0.8 ± 0.1	1.0 ± 0.2
E00405	N05020	A	1.2 ± 0.1	0.5 ± 0.2
E00405	N05040	A	1.0 ± 0.1	A
E00405	N05060	A	1.1 ± 0.1	1.5 ± 0.2
E00405	N05080	A	0.9 ± 0.1	0.9 ± 0.1
E00405	N05100	A	2.7 ± 0.1	0.9 ± 0.1
E00405	N05120	A	1.1 ± 0.1	1.0 ± 0.2
E00405	N05140	A	1.1 ± 0.1	1.0 ± 0.2
E00405	N05160	A	4.0 ± 0.2	0.8 ± 0.2
E00405	N05180	A	0.8 ± 0.2	0.8 ± 0.4
E00405	N05200	A	1.0 ± 0.1	0.6 ± 0.1
E00405	N05220	A	0.8 ± 0.2	1.0 ± 0.1
E00405	N05240	A	1.2 ± 0.1	1.6 ± 0.2
E00405	N05260	A	0.8 ± 0.1	0.9 ± 0.2
E00405	N05280	A	0.7 ± 0.1	0.2 ± 0.1
E00405	N05300	A	0.9 ± 0.1	0.6 ± 0.1
E00405	N05320	A	0.9 ± 0.1	0.9 ± 0.2
E00405	N05340	A	2.3 ± 0.1	0.6 ± 0.2
E00405	N05360	A	0.7 ± 0.1	A
E00405	N05380	A	0.9 ± 0.1	0.7 ± 0.1
E00405	N05400	A	0.9 ± 0.1	1.8 ± 0.3
E00405	N05420	A	0.8 ± 0.1	0.7 ± 0.2
E00405	N05440	A	0.9 ± 0.1	1.4 ± 0.2
E00405	N05460	A	0.7 ± 0.1	0.8 ± 0.2
E00405	N05480	0.7 ± 0.5	0.8 ± 0.1	1.1 ± 0.2
E00405	N05500	A	0.9 ± 0.1	0.6 ± 0.2
E00405	N05520	A	0.7 ± 0.1	0.5 ± 0.2
E00405	N05540	A	1.4 ± 0.1	A
E00405	N05560	A	1.0 ± 0.1	0.9 ± 0.2
E00405	N05580	A	0.9 ± 0.1	1.0 ± 0.2
E00405	N05600	A	1.1 ± 0.1	0.9 ± 0.2
E00405	N05620	A	0.6 ± 0.1	A
E00405	N05640	A	1.3 ± 0.1	0.9 ± 0.2
E00405	N05660	A	1.1 ± 0.1	0.9 ± 0.2
E00405	N05680	A	1.1 ± 0.1	0.5 ± 0.2
E00405	N05700	A	0.8 ± 0.1	1.1 ± 0.2
E00405	N05720	A	6.9 ± 0.3	0.9 ± 0.3
E00405	N05740	A	13.6 ± 0.4	1.1 ± 0.2

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00405	N05760	A	6.4 ± 0.3	0.4 ± 0.2
E00405	N05780	A	1.1 ± 0.1	0.9 ± 0.1
E00405	N05800	A	1.2 ± 0.1	0.9 ± 0.1
E00405	N05820	A	1.2 ± 0.1	1.3 ± 0.2
E00405	N05840	A	1.9 ± 0.1	0.5 ± 0.2
E00405	N05860	A	2.7 ± 0.2	1.0 ± 0.2
E00405	N05880	A	A	1.2 ± 0.7
E00405	N05900	A	1.2 ± 0.1	1.1 ± 0.2
E00405	N05920	1.8 ± 1.3	1.0 ± 0.1	1.0 ± 0.2
E00405	N05940	A	1.1 ± 0.1	1.3 ± 0.2
E00405	N05960	A	0.8 ± 0.1	0.9 ± 0.2
E00405	N05980	A	4.7 ± 0.2	0.7 ± 0.2
E00405	N06000	A	0.9 ± 0.1	0.9 ± 0.2
E00405	N06020	A	1.2 ± 0.1	0.7 ± 0.2
E00405	N06040	A	0.3 ± 0.1	A
E00405	N06060	A	0.8 ± 0.1	0.5 ± 0.2
E00405	N06080	A	0.2 ± 0.1	0.3 ± 0.1
E00405	N06100	A	1.0 ± 0.1	1.0 ± 0.2
E00405	N06120	A	0.5 ± 0.1	0.8 ± 0.2
E00405	N06140	A	1.2 ± 0.1	1.1 ± 0.2
E00405	N06160	A	1.1 ± 0.1	0.6 ± 0.1
E00405	N06180	A	0.9 ± 0.1	0.9 ± 0.2
E00405	N06200	A	1.3 ± 0.2	1.4 ± 0.3
E00405	N06220	A	0.7 ± 0.1	0.9 ± 0.2
E00405	N06240	A	0.8 ± 0.1	0.6 ± 0.2
E00405	N06260	A	0.9 ± 0.1	0.5 ± 0.1
E00405	N06280	A	1.0 ± 0.1	0.9 ± 0.2
E00405	N06300	1.7 ± 1.4	1.0 ± 0.1	1.6 ± 0.2
E00405	N06320	A	1.1 ± 0.1	1.1 ± 0.2
E00405	N06340	A	5.1 ± 0.3	1.0 ± 0.3
E00405	N06360	A	0.9 ± 0.1	A
E00405	N06380	A	1.7 ± 0.1	1.0 ± 0.2
E00405	N06400	A	11.4 ± 0.4	A
E00405	N06420	A	1.0 ± 0.1	0.4 ± 0.2
E00405	N06440	A	0.8 ± 0.1	0.5 ± 0.1
E00405	N06460	A	0.8 ± 0.1	0.5 ± 0.1
E00405	N06480	A	0.9 ± 0.1	1.2 ± 0.2
E00405	N06500	A	1.4 ± 0.2	A
E00405	N06520	A	2.0 ± 0.1	1.1 ± 0.2
E00405	N06540	A	1.0 ± 0.1	1.1 ± 0.2
E00405	N06560	A	8.5 ± 1.0	7.0 ± 1.4
E00405	N06580	A	0.9 ± 0.1	1.4 ± 0.2
E00405	N06600	A	0.7 ± 0.1	0.4 ± 0.2

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00405	N06620	A	A	1.1 ± 0.1
E00405	N06640	A	0.8 ± 0.1	0.6 ± 0.1
E00405	N06660	A	0.8 ± 0.1	0.9 ± 0.2
E00405	N06680	A	0.7 ± 0.1	0.6 ± 0.1
E00405	N06700	A	1.0 ± 0.1	1.2 ± 0.2
E00405	N06720	A	1.0 ± 0.1	1.0 ± 0.1
E00405	N06740	A	0.8 ± 0.1	0.9 ± 0.2
E00405	N06760	A	3.0 ± 0.2	A
E00405	N06780	A	1.0 ± 0.1	1.1 ± 0.2
E00405	N06800	A	1.0 ± 0.1	1.2 ± 0.2
E00405	N06820	A	0.6 ± 0.1	1.0 ± 0.1
E00405	N06840	A	1.1 ± 0.1	1.1 ± 0.2
E00405	N06860	A	7.9 ± 0.3	1.0 ± 0.2
E00405	N06880	A	1.9 ± 0.1	1.1 ± 0.2
E00405	N06900	A	1.5 ± 0.1	1.1 ± 0.2
E00405	N06920	A	1.6 ± 0.2	1.4 ± 0.2
E00405	N06960	A	0.7 ± 0.1	0.2 ± 0.2
E00405	N06980	A	0.9 ± 0.1	0.7 ± 0.2
E00405	N07000	A	1.3 ± 0.2	0.9 ± 0.2
E00405	N07020	A	1.1 ± 0.1	1.1 ± 0.2
E00405	N07040	A	1.1 ± 0.1	0.9 ± 0.2
E00405	N07060	A	1.3 ± 0.1	1.1 ± 0.2
E00405	N07080	A	0.8 ± 0.1	0.9 ± 0.1
E00405	N07100	A	0.5 ± 0.1	0.6 ± 0.1
E00405	N07120	A	1.4 ± 0.2	1.4 ± 0.2
E00405	N07140	A	4.7 ± 0.2	1.1 ± 0.2
E00405	N07160	1.4 ± 1.1	1.3 ± 0.1	0.7 ± 0.1
E00405	N07180	A	1.0 ± 0.1	0.7 ± 0.2
E00405	N07200	A	1.0 ± 0.1	1.4 ± 0.2
E00405	N07220	A	3.5 ± 0.2	0.8 ± 0.2
E00405	N07240	A	1.3 ± 0.1	1.4 ± 0.2
E00405	N07260	A	0.8 ± 0.1	1.0 ± 0.2
E00405	N07280	A	1.1 ± 0.1	1.0 ± 0.2
E00405	N07300	A	1.3 ± 0.1	1.5 ± 0.2
E00405	N07320	A	0.7 ± 0.1	0.6 ± 0.2
E00405	N07340	0.8 ± 0.8	0.9 ± 0.1	0.8 ± 0.2
E00405	N07360	A	0.2 ± 0.2	0.5 ± 0.4
E00405	N07380	A	1.2 ± 0.1	1.5 ± 0.2
E00405	N07400	A	0.8 ± 0.1	0.9 ± 0.1
E00405	N07420	A	1.3 ± 0.1	1.8 ± 0.2
E00405	N07440	A	0.9 ± 0.1	0.8 ± 0.1
E00405	N07460	A	0.9 ± 0.1	1.0 ± 0.2
E00405	N07480	A	0.9 ± 0.1	1.2 ± 0.1

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00405	N07500	A	0.8 ± 0.1	0.8 ± 0.2
E00405	N07520	A	1.0 ± 0.1	1.1 ± 0.2
E00405	N07540	A	0.8 ± 0.1	0.8 ± 0.1
E00405	N07560	A	0.9 ± 0.1	1.3 ± 0.2
E00405	N07580	A	0.8 ± 0.1	1.0 ± 0.1
E00405	N07600	A	4.3 ± 0.2	1.3 ± 0.2
E00405	N07620	A	1.0 ± 0.1	A
E00405	N07640	A	1.1 ± 0.1	1.1 ± 0.2
E00405	N07660	5.7 ± 1.6	0.6 ± 0.1	1.1 ± 0.2
E00405	N07680	A	0.8 ± 0.1	0.6 ± 0.1
E00405	N07700	A	1.7 ± 0.1	0.8 ± 0.2
E00405	N07720	A	0.7 ± 0.1	0.8 ± 0.2
E00405	N07740	A	0.9 ± 0.1	0.8 ± 0.1
E00405	N07760	2.3 ± 1.2	1.1 ± 0.1	1.5 ± 0.2
E00405	N07780	2.2 ± 1.1	0.6 ± 0.1	0.8 ± 0.2
E00405	N07800	3.9 ± 1.3	A	0.9 ± 0.2
E00405	N07820	A	1.0 ± 0.1	1.0 ± 0.2
E00405	N07840	A	1.0 ± 0.1	0.6 ± 0.1
E00405	N07860	A	2.3 ± 0.2	0.8 ± 0.2
E00405	N07880	A	0.7 ± 0.1	0.9 ± 0.1
E00405	N07900	A	0.9 ± 0.1	1.0 ± 0.1
E00405	N07920	A	0.9 ± 0.1	0.8 ± 0.1
E00405	N07940	A	1.2 ± 0.1	0.7 ± 0.2
E00405	N07960	A	0.7 ± 0.1	0.5 ± 0.1
E00405	N07980	A	1.0 ± 0.1	0.4 ± 0.2
E00405	N08000	A	1.3 ± 0.1	1.4 ± 0.2
E00405	N08020	A	1.0 ± 0.1	0.7 ± 0.2
E00405	N08040	A	0.8 ± 0.1	0.4 ± 0.1
E00405	N08060	A	1.6 ± 0.1	0.7 ± 0.2
E00405	N08080	A	1.2 ± 0.1	1.1 ± 0.2
E00405	N08100	A	2.4 ± 0.2	1.0 ± 0.2
E00405	N08120	A	4.5 ± 0.2	1.7 ± 0.2
E00405	N08140	A	3.9 ± 0.2	A
E00405	N08160	A	0.7 ± 0.1	1.0 ± 0.2
E00405	N08180	A	3.7 ± 0.2	1.0 ± 0.2
E00405	N08200	A	1.2 ± 0.1	0.9 ± 0.1
E00405	N08220	A	0.8 ± 0.1	0.8 ± 0.2
E00405	N08240	5.0 ± 1.3	0.9 ± 0.1	0.7 ± 0.2
E00405	N08260	A	3.4 ± 0.2	0.7 ± 0.2
E00405	N08280	A	1.1 ± 0.1	0.8 ± 0.1
E00405	N08300	A	0.8 ± 0.1	1.0 ± 0.2
E00405	N08320	A	1.5 ± 0.1	0.9 ± 0.1
E00405	N08340	A	1.1 ± 0.1	0.8 ± 0.1

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00405	N08360	A	2.4 ± 0.2	0.8 ± 0.2
E00405	N08380	A	1.8 ± 0.1	1.2 ± 0.2
E00405	N08400	A	1.3 ± 0.1	0.8 ± 0.2
E00405	N08420	A	5.1 ± 0.2	1.2 ± 0.2
E00405	N08440	A	11.8 ± 0.4	1.0 ± 0.2
E00405	N08460	A	0.8 ± 0.1	0.6 ± 0.2
E00405	N08480	A	2.2 ± 0.1	0.5 ± 0.2
E00405	N08500	A	0.9 ± 0.1	0.6 ± 0.1
E00405	N08520	A	1.0 ± 0.1	0.7 ± 0.2
E00405	N08540	A	0.7 ± 0.1	0.7 ± 0.2
E00405	N08560	A	0.9 ± 0.1	0.9 ± 0.2
E00405	N08580	A	0.9 ± 0.1	A
E00405	N08600	7.7 ± 1.6	0.9 ± 0.1	0.7 ± 0.1
E00405	N08620	A	1.0 ± 0.1	1.5 ± 0.2
E00405	N08640	A	0.7 ± 0.1	1.2 ± 0.2
E00405	N08660	A	1.0 ± 0.1	0.9 ± 0.2
E00405	N08680	A	1.2 ± 0.1	0.8 ± 0.2
E00405	N08700	A	2.7 ± 0.2	0.6 ± 0.2
E00405	N08720	3.1 ± 1.6	1.1 ± 0.1	0.9 ± 0.3
E00405	N08740	A	3.7 ± 0.2	0.9 ± 0.3
E00405	N09420	A	1.0 ± 0.1	1.3 ± 0.2
E00405	N09440	A	7.5 ± 0.3	1.4 ± 0.3
E00405	N09460	A	1.2 ± 0.1	1.2 ± 0.2
E00405	N09480	A	1.3 ± 0.1	1.0 ± 0.2
E00405	N09500	A	2.0 ± 0.2	1.2 ± 0.2
E00405	N09520	A	1.0 ± 0.1	1.1 ± 0.2
E00405	N09540	A	2.4 ± 0.2	1.1 ± 0.3
E00405	N09560	A	1.7 ± 0.2	1.4 ± 0.2
E00406	N02885	A	2.0 ± 0.2	0.9 ± 0.2
E00406	N04005	A	0.9 ± 0.1	1.0 ± 0.2
E00408	N02668	A	1.0 ± 0.1	0.7 ± 0.2
E00408	N02808	A	1.1 ± 0.2	0.4 ± 0.2
E00408	N02826	A	0.8 ± 0.2	1.2 ± 0.4
E00408	N02845	3.1 ± 0.6	1.0 ± 0.1	1.3 ± 0.1
E00408	N02867	A	1.0 ± 0.1	0.9 ± 0.2
E00409	N02786	A	1.6 ± 0.1	A
E00410	N02645	A	1.5 ± 0.2	1.4 ± 0.3
E00410	N02767	A	0.9 ± 0.1	0.8 ± 0.2
E00410	N03315	A	A	0.6 ± 0.2
E00410	N03335	A	A	1.1 ± 0.2
E00410	N03355	A	A	0.9 ± 0.2
E00410	N04886	0.7 ± 0.2	1.2 ± 0.1	1.3 ± 0.1
E00410	N04896	0.9 ± 0.1	0.9 ± 0.1	1.0 ± 0.1

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00410	N04916	0.8 ± 0.2	1.3 ± 0.1	0.9 ± 0.1
E00410	N04936	1.3 ± 0.2	1.4 ± 0.1	0.9 ± 0.1
E00410	N04956	1.6 ± 0.2	1.8 ± 0.1	0.8 ± 0.1
E00410	N05990	A	1.2 ± 0.1	0.7 ± 0.2
E00410	N06010	A	1.1 ± 0.1	1.0 ± 0.1
E00410	N06030	A	1.0 ± 0.1	0.9 ± 0.2
E00410	N06050	A	0.8 ± 0.1	0.8 ± 0.2
E00410	N06070	A	0.7 ± 0.1	0.2 ± 0.1
E00410	N06090	A	1.0 ± 0.1	0.9 ± 0.1
E00410	N06110	A	2.0 ± 0.1	1.1 ± 0.2
E00410	N06130	A	2.3 ± 0.2	0.9 ± 0.2
E00410	N06150	A	1.1 ± 0.1	8.0 ± 0.1
E00410	N06170	A	1.4 0.2	1.4 ± 0.5
E00410	N06190	A	0.9 ± 0.1	0.7 ± 0.1
E00410	N06210	A	0.9 ± 0.1	0.7 ± 0.2
E00410	N06230	A	0.6 ± 0.1	0.6 ± 0.2
E00410	N06250	A	1.2 ± 0.1	0.9 ± 0.2
E00410	N06270	2.0 ± 1.0	0.7 ± 0.3	A
E00410	N06290	A	1.0 ± 0.1	A
E00410	N06310	A	0.6 ± 0.2	0.6 ± 0.3
E00410	N06330	A	0.6 ± 0.1	1.0 ± 0.2
E00410	N06350	A	0.7 ± 0.2	0.9 ± 0.3
E00410	N06370	A	0.9 ± 0.1	0.9 ± 0.1
E00410	N06390	A	1.3 ± 0.1	0.6 ± 0.1
E00410	N06410	A	1.8 ± 0.1	A
E00410	N06430	A	1.4 ± 0.1	0.5 ± 0.2
E00410	N06450	A	1.0 ± 0.1	1.2 ± 0.2
E00410	N06470	A	1.3 ± 0.1	0.9 ± 0.2
E00410	N06490	A	7.0 ± 0.2	A
E00410	N06500	A	1.1 ± 0.1	0.7 ± 0.1
E00410	N06510	A	1.1 ± 0.1	A
E00410	N06530	A	1.3 ± 0.1	1.1 ± 0.1
E00410	N06550	A	0.9 ± 0.1	1.1 ± 0.2
E00410	N06570	A	1.3 ± 0.4	A
E00410	N06590	A	0.8 ± 0.1	0.7 ± 0.2
E00410	N06610	A	1.2 ± 0.1	0.8 ± 0.2
E00410	N06630	1.7 ± 0.8	0.6 ± 0.1	0.8 ± 0.1
E00410	N06650	A	0.8 ± 0.1	1.0 ± 0.2
E00410	N06670	A	0.9 ± 0.1	1.5 ± 0.2
E00410	N06690	A	0.9 ± 0.1	0.4 ± 0.2
E00410	N06710	A	0.8 ± 0.2	0.6 ± 0.3
E00410	N06730	A	1.4 ± 0.1	1.0 ± 0.1
E00410	N06750	A	0.9 ± 0.1	0.8 ± 0.2

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00410	N06770	A	1.2 ± 0.1	1.0 ± 0.2
E00410	N06790	A	0.9 ± 0.1	1.0 ± 0.2
E00410	N06810	A	0.9 ± 0.1	0.7 ± 0.2
E00410	N06830	A	6.5 ± 0.3	0.6 ± 0.3
E00410	N06850	A	1.0 ± 0.1	0.9 ± 0.2
E00410	N06870	A	1.3 ± 0.1	0.5 ± 0.1
E00410	N06890	A	2.6 ± 0.2	0.9 ± 0.2
E00410	N06910	A	1.0 ± 0.1	1.0 ± 0.2
E00410	N06930	A	0.7 ± 0.1	1.5 ± 0.3
E00410	N06950	A	0.6 ± 0.1	0.9 ± 0.1
E00410	N06970	A	1.1 ± 0.1	0.9 ± 0.1
E00410	N06990	A	1.1 ± 0.1	1.4 ± 0.2
E00410	N07010	A	0.9 ± 0.1	1.0 ± 0.2
E00410	N07030	A	0.8 ± 0.1	A
E00410	N07050	A	1.0 ± 0.1	0.9 ± 0.2
E00410	N07070	A	0.4 ± 0.1	1.5 ± 0.2
E00410	N07090	A	0.7 ± 0.1	0.6 ± 0.1
E00410	N07110	A	1.0 ± 0.1	0.8 ± 0.2
E00410	N07130	A	0.7 ± 0.1	0.7 ± 0.2
E00410	N07150	1.9 ± 1.3	1.0 ± 0.1	1.6 ± 0.2
E00410	N07170	A	1.0 ± 0.1	0.5 ± 0.1
E00410	N07190	A	0.8 ± 0.1	0.8 ± 0.1
E00410	N07210	A	0.7 ± 0.1	0.8 ± 0.2
E00410	N07230	A	1.3 ± 0.1	1.5 ± 0.2
E00410	N07250	A	1.5 ± 0.1	1.0 ± 0.2
E00410	N07270	A	2.5 ± 0.2	1.2 ± 0.2
E00410	N07290	A	1.4 ± 0.2	0.9 ± 0.2
E00410	N07310	A	0.7 ± 0.1	1.1 ± 0.3
E00410	N07330	A	0.8 ± 0.1	0.9 ± 0.2
E00410	N07350	A	1.4 ± 0.1	1.0 ± 0.2
E00410	N07370	A	0.9 ± 0.3	1.1 ± 0.5
E00410	N07390	3.5 ± 1.4	0.8 ± 0.1	1.0 ± 0.2
E00410	N07410	A	0.9 ± 0.1	1.1 ± 0.2
E00410	N07430	A	0.8 ± 0.1	1.0 ± 0.2
E00410	N07450	A	0.8 ± 0.1	0.8 ± 0.2
E00410	N07470	A	1.1 ± 0.1	1.1 ± 0.2
E00410	N07490	A	4.7 ± 0.2	0.8 ± 0.2
E00410	N07510	A	10.2 ± 0.4	1.1 ± 0.2
E00410	N07530	A	1.0 ± 0.1	0.7 ± 0.1
E00410	N07550	A	0.9 ± 0.1	1.1 ± 0.2
E00410	N07570	A	1.4 ± 0.2	1.3 ± 0.3
E00410	N07590	A	0.9 0.1	1.0 ± 0.2
E00410	N07610	A	1.6 ± 0.1	1.0 ± 0.1

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00410	N07630	A	0.9 ± 0.1	1.2 ± 0.2
E00410	N07650	A	1.3 ± 0.1	1.5 ± 0.3
E00410	N07670	A	0.7 ± 0.1	0.8 ± 0.1
E00410	N07690	A	1.0 ± 0.1	1.2 ± 0.2
E00410	N07710	A	1.4 ± 0.1	1.1 ± 0.1
E00410	N07730	A	1.0 ± 0.1	0.7 ± 0.2
E00410	N07750	A	0.6 ± 0.1	0.5 ± 0.1
E00410	N07770	A	1.1 ± 0.1	1.5 ± 0.2
E00410	N07790	2.7 ± 1.1	1.0 ± 0.1	1.6 ± 0.2
E00410	N07810	A	1.0 ± 0.1	1.5 ± 0.2
E00410	N07830	A	0.9 ± 0.1	0.9 ± 0.2
E00410	N07850	A	1.1 ± 0.1	1.3 ± 0.2
E00410	N07870	A	0.9 ± 0.1	1.1 ± 0.2
E00410	N07890	A	0.8 ± 0.1	0.8 ± 0.2
E00410	N07910	A	0.8 ± 0.1	0.9 ± 0.2
E00410	N07930	A	1.0 ± 0.2	0.8 ± 0.3
E00410	N07950	A	0.8 ± 0.1	0.8 ± 0.2
E00410	N07970	2.8 ± 1.2	0.9 ± 0.1	0.7 ± 0.1
E00410	N07990	A	1.4 ± 0.1	0.7 ± 0.2
E00410	N08010	A	3.9 ± 0.3	1.0 ± 0.2
E00410	N08030	A	3.5 ± 0.2	1.0 ± 02
E00410	N08050	A	0.9 ± 0.1	0.9 ± 0.2
E00410	N08070	A	0.9 ± 0.1	0.9 ± 0.1
E00410	N08090	3.6 ± 1.9	1.2 ± 0.1	1.5 ± 0.3
E00410	N08110	A	1.0 ± 0.1	0.7 ± 0.1
E00410	N08130	A	11.6 ± 0.4	A
E00410	N08150	2.1 ± 2.2	4.2 ± 0.2	0.9 ± 0.2
E00410	N08170	A	0.8 ± 0.1	0.5 ± 0.2
E00410	N08190	A	1.0 ± 0.1	1.0 ± 0.2
E00410	N08210	A	0.9 ± 0.1	1.1 ± 0.1
E00410	N08230	A	1.1 ± 0.1	1.0 ± 0.3
E00410	N08250	A	1.0 ± 0.1	0.9 ± 0.1
E00410	N08270	A	1.2 ± 0.1	1.1 ± 0.2
E00410	N08290	A	8.7 ± 0.3	1.0 ± 0.3
E00410	N08310	A	1.1 ± 0.1	1.1 ± 0.1
E00410	N08330	A	1.1 ± 0.1	0.7 ± 0.1
E00410	N08350	A	0.8 ± 0.1	1.2 ± 0.2
E00410	N08370	A	1.0 ± 0.1	0.9 ± 0.2
E00410	N08390	A	1.3 ± 0.1	0.6 ± 0.1
E00410	N08410	A	3.4 ± 0.1	1.0 ± 0.2
E00410	N08430	A	6.9 ± 0.3	1.3 ± 0.2
E00410	N08450	A	4.3 ± 0.2	1.3 ± 0.2
E00410	N08470	1.5 ± 1.1	1.1 ± 0.1	0.6 ± 0.2

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00410	N08490	A	2.0 ± 0.1	0.7 ± 0.1
E00410	N08510	A	1.2 ± 0.1	1.1 ± 0.3
E00410	N08530	A	0.7 ± 0.1	1.1 ± 0.2
E00410	N08550	A	0.8 ± 0.1	0.7 ± 0.1
E00410	N08570	3.0 ± 1.8	4.6 ± 0.2	0.7 ± 0.2
E00410	N08590	A	7.2 ± 0.2	1.0 ± 0.2
E00410	N08610	A	3.0 ± 0.2	0.8 ± 0.2
E00410	N08630	A	1.3 ± 0.1	1.1 ± 0.2
E00410	N08650	A	14.3 ± 0.4	1.3 ± 0.3
E00410	N08670	A	0.9 ± 0.1	1.4 ± 0.2
E00410	N08690	A	9.1 ± 0.3	0.5 ± 0.3
E00410	N08710	A	6.5 ± 0.2	0.9 ± 0.3
E00410	N08730	A	1.2 ± 0.1	1.0 ± 0.2
E00410	N08750	A	2.9 ± 0.2	0.7 ± 0.2
E00410	N08760	2.6 ± 1.1	2.1 ± 0.1	0.8 ± 0.2
E00410	N08780	A	3.2 ± 0.2	0.7 ± 0.2
E00410	N08800	A	0.6 ± 0.1	0.5 ± 0.1
E00410	N08820	3.0 ± 1.2	1.2 ± 0.1	1.5 ± 0.2
E00410	N08840	A	1.0 ± 0.1	1.7 ± 0.2
E00410	N08860	2.9 ± 1.5	1.5 ± 0.1	1.0 ± 0.2
E00410	N08880	A	2.6 ± 0.2	1.3 ± 0.2
E00410	N08900	A	1.4 ± 0.1	1.0 ± 0.2
E00410	N08920	4.0 ± 1.6	4.1 ± 0.2	1.0 ± 0.2
E00410	N08940	A	5.8 ± 0.3	1.3 ± 0.3
E00410	N08960	A	11.2 ± 0.4	1.0 ± 0.3
E00410	N08980	A	2.9 ± 0.2	0.7 ± 0.2
E00410	N09000	A	2.4 ± 0.2	0.9 ± 0.2
E00410	N09020	3.1 ± 4.0	11.8 ± 0.4	1.7 ± 0.4
E00410	N09040	A	16.2 ± 0.5	A
E00410	N09060	A	3.5 ± 0.2	0.9 ± 0.2
E00410	N09080	A	4.9 ± 0.2	0.9 ± 0.3
E00410	N09100	A	8.4 ± 0.3	1.2 ± 0.3
E00410	N09120	1.1 ± 1.3	3.4 ± 0.2	0.8 ± 0.2
E00410	N09140	A	3.5 ± 0.2	0.6 ± 0.2
E00410	N09160	A	4.0 ± 0.3	0.9 ± 0.2
E00410	N09180	A	4.4 ± 0.2	1.0 ± 0.2
E00410	N09200	A	3.7 ± 0.2	A
E00410	N09220	A	1.5 ± 0.1	A
E00410	N09240	A	5.5 ± 0.2	0.5 ± 0.3
E00410	N09270	A	3.0 ± 0.1	0.9 ± 0.1
E00410	N09290	A	2.5 ± 0.2	1.2 ± 0.2
E00410	N09310	A	2.2 ± 0.1	0.4 ± 0.1
E00410	N09330	A	0.9 ± 0.1	0.8 ± 0.1

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00410	N09350	A	1.3 ± 0.1	1.0 ± 0.2
E00410	N09370	A	1.2 ± 0.1	1.0 ± 0.1
E00410	N09390	A	5.1 ± 0.2	0.8 ± 0.2
E00410	N09410	A	1.5 ± 0.1	0.4 ± 0.2
E00410	N09430	A	1.0 ± 0.1	0.6 ± 0.1
E00410	N09450	2.8 ± 1.4	3.0 ± 0.2	0.9 ± 0.1
E00410	N09470	5.0 ± 1.2	0.9 ± 0.1	1.0 ± 0.1
E00410	N09490	A	1.3 ± 0.1	0.8 ± 0.2
E00410	N09510	2.1 ± 0.2	3.4 ± 0.2	0.7 ± 0.2
E00410	N09530	2.5 ± 1.5	1.4 ± 0.1	1.2 ± 0.2
E00410	N09550	A	1.2 ± 0.2	1.4 ± 0.2
E00410	N09570	A	2.1 ± 0.2	1.0 ± 0.2
E00410	N09590	2.2 ± 1.4	1.5 ± 0.1	1.1 ± 0.2
E00410	N09610	A	3.1 ± 0.2	1.3 ± 0.2
E00410	N09630	A	1.1 ± 0.1	0.8 ± 0.2
E00410	N09650	A	7.5 ± 0.3	1.1 ± 0.2
E00410	N09660	A	5.2 ± 0.2	0.5 ± 0.2
E00410	N09680	A	6.1 ± 0.3	1.0 ± 0.3
E00410	N09700	A	4.2 ± 0.3	1.2 ± 0.3
E00410	N09720	A	2.0 ± 0.1	0.8 ± 0.3
E00410	N09740	A	1.9 ± 0.2	1.4 ± 0.2
E00411	N02748	A	1.0 ± 0.1	1.0 ± 0.2
E00412	N02729	A	0.7 ± 0.2	0.8 ± 0.2
E00412	N03120	A	0.8 ± 0.2	0.5 ± 0.2
E00412	N03140	A	0.9 ± 0.1	0.2 ± 0.1
E00412	N03160	A	0.9 ± 0.2	0.9 ± 0.4
E00412	N03180	A	0.9 ± 0.2	0.7 ± 0.2
E00412	N03200	A	1.1 ± 0.2	0.7 ± 0.3
E00412	N03220	A	0.7 ± 0.2	1.5 ± 0.4
E00412	N03240	A	1.1 ± 0.1	1.4 ± 0.2
E00412	N03560	A	1.0 ± 0.1	0.9 ± 0.2
E00412	N03600	A	0.6 ± 0.1	0.4 ± 0.2
E00412	N03620	A	0.7 ± 0.2	0.7 ± 0.2
E00412	N03640	A	1.8 ± 0.2	1.1 ± 0.2
E00412	N03680	5.5 ± 2.2	0.9 ± 0.1	0.8 ± 0.2
E00412	N03700	5.1 ± 1.9	1.2 ± 0.1	1.3 ± 0.2
E00412	N03720	1.4 ± 0.8	0.8 ± 0.1	0.6 ± 0.2
E00412	N03740	A	0.9 ± 0.1	1.2 ± 0.2
E00412	N03760	A	0.9 ± 0.1	0.9 ± 0.2
E00412	N03780	A	0.6 ± 0.1	0.9 ± 0.2
E00412	N03800	A	0.9 ± 0.1	1.2 ± 0.2
E00412	N03820	A	0.8 ± 0.2	0.9 ± 0.2
E00412	N03840	A	0.8 ± 0.1	1.2 ± 0.2

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00412	N03860	A	0.8 ± 0.2	0.8 ± 0.2
E00412	N03880	0.4 ± 0.4	0.6 ± 0.1	0.9 ± 0.3
E00412	N03900	A	0.8 ± 0.1	0.9 ± 0.2
E00412	N03920	A	0.8 ± 0.1	0.8 ± 0.1
E00412	N03940	0.5 ± 0.2	0.7 ± 0.1	0.8 ± 0.1
E00413	N03660	A	1.2 ± 0.1	0.8 ± 0.2
E00414	N02607	A	0.6 ± 0.1	0.9 ± 0.2
E00414	N02625	A	0.7 ± 0.1	1.2 ± 0.2
E00414	N02769	A	0.8 ± 0.2	0.9 ± 0.3
E00414	N03580	A	1.3 ± 0.2	1.0 ± 0.2
E00415	N02686	A	1.0 ± 0.1	0.9 ± 0.2
E00415	N02900	A	1.0 ± 0.1	0.7 ± 0.2
E00415	N02910	A	1.7 ± 0.2	0.8 ± 0.3
E00415	N02920	A	1.1 ± 0.1	1.4 ± 0.2
E00415	N02930	A	0.9 ± 0.1	A
E00415	N02940	A	1.0 ± 0.1	1.2 ± 0.2
E00415	N02950	3.9 ± 2.5	1.2 ± 0.2	0.7 ± 0.3
E00415	N02960	A	1.1 ± 0.2	1.2 ± 0.2
E00415	N02970	A	1.0 ± 0.1	0.6 ± 0.2
E00415	N02980	A	0.6 ± 0.1	1.0 ± 0.2
E00415	N02990	A	1.7 ± 0.2	0.8 ± 0.2
E00415	N03000	A	0.9 ± 0.1	0.8 ± 0.2
E00415	N03010	A	1.6 ± 0.2	1.4 ± 0.3
E00415	N03020	A	1.3 ± 0.1	1.3 ± 0.3
E00415	N03030	A	1.7 ± 0.2	1.0 ± 0.2
E00415	N03040	A	1.4 ± 0.2	0.5 ± 0.3
E00415	N03050	A	1.6 ± 0.1	1.4 ± 0.2
E00415	N03060	A	1.5 ± 0.1	0.5 ± 0.2
E00415	N03070	A	0.9 ± 0.1	1.2 ± 0.2
E00415	N03080	A	1.2 ± 0.1	0.6 ± 0.3
E00415	N03090	A	2.3 ± 0.2	0.8 ± 0.2
E00415	N03100	2.2 ± 2.2	1.8 ± 0.2	1.1 ± 0.2
E00415	N03260	A	0.8 ± 0.1	1.1 ± 0.2
E00415	N03280	A	0.9 ± 0.1	0.5 ± 0.2
E00415	N03360	A	1.0 ± 0.1	A
E00415	N03380	0.3 ± 0.4	0.8 ± 0.1	1.1 ± 0.1
E00415	N03400	A	5.1 ± 0.3	0.4 ± 0.3
E00415	N03420	2.9 ± 0.7	1.0 ± 0.1	0.9 ± 0.1
E00415	N03440	A	1.0 ± 0.1	0.8 ± 0.2
E00415	N03460	A	3.6 ± 0.2	0.4 ± 0.4
E00415	N03480	A	1.2 ± 0.1	0.4 ± 0.2
E00415	N03500	A	1.0 ± 0.2	0.7 ± 0.3
E00415	N03520	A	1.0 ± 0.2	1.2 ± 0.3

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00415	N03540	A	1.0 ± 0.1	1.1 ± 0.2
E00415	N04040	A	1.4 ± 0.2	0.6 ± 0.2
E00415	N04060	A	1.1 ± 0.1	1.2 ± 0.2
E00415	N04080	0.5 ± 1.2	0.7 ± 0.1	0.5 ± 0.1
E00415	N04100	A	0.8 ± 0.1	0.9 ± 0.2
E00415	N04120	A	3.2 ± 0.2	1.1 ± 0.2
E00415	N04140	A	0.9 ± 0.1	1.3 ± 0.2
E00415	N04160	A	0.9 ± 0.1	1.3 ± 0.2
E00415	N04180	5.4 ± 2.6	1.7 ± 0.2	0.9 ± 0.2
E00415	N04200	2.4 ± 2.1	1.0 ± 0.1	0.8 ± 0.2
E00415	N04220	A	1.1 ± 0.1	0.8 ± 0.2
E00415	N04240	4.7 ± 1.9	0.7 ± 0.1	0.9 ± 0.3
E00415	N04260	A	1.0 ± 0.2	1.1 ± 0.2
E00415	N04280	A	0.9 ± 0.1	1.0 ± 0.2
E00415	N04300	A	1.4 ± 0.2	0.7 ± 0.2
E00415	N04320	0.7 ± 0.4	1.2 ± 0.1	0.8 ± 0.1
E00415	N04340	A	1.0 ± 0.1	1.2 ± 0.3
E00415	N04360	0.9 ± 0.1	1.3 ± 0.1	1.0 ± 0.1
E00415	N04380	A	1.2 ± 0.1	0.5 ± 0.2
E00415	N04400	A	4.2 ± 0.3	0.6 ± 0.2
E00415	N04420	A	6.4 ± 0.2	0.4 ± 0.1
E00415	N04440	0.8 ± 0.2	0.6 ± 0.1	0.7 ± 0.1
E00415	N04460	A	0.7 ± 0.1	0.7 ± 0.2
E00415	N04480	A	1.1 ± 0.1	1.1 ± 0.2
E00415	N04500	A	1.8 ± 0.2	0.9 ± 0.2
E00415	N04520	A	1.0 ± 0.1	0.6 ± 0.2
E00415	N04540	3.0 ± 2.3	1.0 ± 0.1	0.8 ± 0.2
E00415	N04560	A	0.7 ± 0.1	0.6 ± 0.3
E00415	N04580	4.0 ± 2.6	1.0 ± 0.2	0.9 ± 0.2
E00415	N04600	A	1.7 ± 0.1	1.2 ± 0.2
E00415	N04620	A	0.9 ± 0.1	0.5 ± 0.2
E00415	N04640	A	0.9 ± 0.1	1.1 ± 0.2
E00415	N04680	A	0.8 ± 0.1	0.7 ± 0.2
E00415	N04700	0.8 ± 0.1	0.8 ± 0.1	0.7 ± 0.1
E00415	N04720	0.2 ± 0.4	0.7 ± 0.1	0.7 ± 0.2
E00415	N04740	2.2 ± 0.6	1.1 ± 0.1	1.0 ± 0.1
E00415	N04760	1.3 ± 1.2	0.9 ± 0.1	1.9 ± 0.2
E00415	N04780	A	0.9 ± 0.1	0.7 ± 0.2
E00415	N04800	A	0.8 ± 0.1	0.9 ± 0.2
E00415	N04820	A	0.8 ± 0.1	0.8 ± 0.2
E00415	N04832	A	3.1 ± 0.2	0.8 ± 0.2
E00415	N04840	0.4 ± 0.4	0.9 ± 0.1	1.2 ± 0.2
E00415	N04860	0.7 ± 0.4	0.8 ± 0.1	0.6 ± 0.3

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00415	N04880	0.6 ± 0.5	1.4 ± 0.1	0.6 ± 0.3
E00415	N04990	A	3.9 ± 0.2	A
E00415	N05010	A	1.8 ± 0.2	A
E00415	N05030	A	4.2 ± 0.3	1.2 ± 0.3
E00415	N05050	A	4.6 ± 0.2	0.7 ± 0.2
E00415	N05070	A	2.3 ± 0.2	1.1 ± 0.2
E00415	N05090	A	8.8 ± 0.3	1.0 ± 0.2
E00415	N05110	A	0.7 ± 0.1	0.6 ± 0.1
E00415	N05130	A	1.3 ± 0.1	0.5 ± 0.2
E00415	N05150	A	1.2 ± 0.1	0.6 ± 0.2
E00415	N05170	A	2.8 ± 0.2	1.1 ± 0.2
E00415	N05190	A	5.7 ± 0.2	A
E00415	N05210	A	3.8 ± 0.4	A
E00415	N05230	A	1.6 ± 0.1	0.9 ± 0.2
E00415	N05250	A	1.9 ± 0.1	0.9 ± 0.2
E00415	N05270	A	1.6 ± 0.2	0.9 ± 0.2
E00415	N05290	A	1.1 ± 0.1	1.4 ± 0.2
E00415	N05310	A	1.7 ± 0.3	1.0 ± 0.3
E00415	N05330	A	1.0 ± 0.1	0.6 ± 0.1
E00415	N05350	A	1.5 ± 0.1	1.3 ± 0.2
E00415	N05370	A	1.7 ± 0.1	0.6 ± 0.2
E00415	N05390	A	1.4 ± 0.1	0.6 ± 0.1
E00415	N05410	A	0.9 ± 0.1	0.6 ± 0.2
E00415	N05430	A	0.9 ± 0.1	0.7 ± 0.2
E00415	N05450	A	0.7 ± 0.1	0.8 ± 0.2
E00415	N05470	A	1.3 ± 0.1	1.5 ± 0.1
E00415	N05490	A	0.8 ± 0.1	1.1 ± 0.2
E00415	N05510	A	0.7 ± 0.1	A
E00415	N05530	A	0.6 ± 0.1	0.5 ± 0.2
E00415	N05550	A	1.2 ± 0.1	0.4 ± 0.1
E00415	N05570	A	1.9 ± 0.2	0.8 ± 0.3
E00415	N05590	A	0.7 ± 0.1	0.7 ± 0.1
E00415	N05610	A	1.3 ± 0.1	0.7 ± 0.2
E00415	N05630	A	1.0 ± 0.1	0.7 ± 0.2
E00415	N05650	A	5.8 ± 0.3	0.9 ± 0.3
E00415	N05670	A	2.8 ± 0.2	1.1 ± 0.2
E00415	N05690	A	0.9 ± 0.1	1.1 ± 0.2
E00415	N05710	A	1.4 ± 0.2	0.7 ± 0.1
E00415	N05730	A	0.8 ± 0.1	1.0 ± 0.2
E00415	N05750	A	0.9 ± 0.1	0.6 ± 0.2
E00415	N05770	A	9.3 ± 0.3	0.9 ± 0.2
E00415	N05790	A	0.9 ± 0.1	A
E00415	N05800	A	1.2 ± 0.1	0.9 ± 0.1

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00415	N05810	A	1.4 ± 0.1	0.9 ± 0.2
E00415	N05830	A	1.6 ± 0.1	1.0 ± 0.2
E00415	N05850	A	1.6 ± 0.2	0.9 ± 0.2
E00415	N05870	A	5.2 ± 0.3	0.6 ± 0.3
E00415	N05890	A	2.5 ± 0.2	1.4 ± 0.2
E00415	N05910	A	0.9 ± 0.1	0.9 ± 0.2
E00415	N05930	1.3 ± 1.1	3.5 ± 0.2	0.7 ± 0.2
E00415	N05950	A	1.1 ± 0.1	1.3 ± 0.2
E00415	N05970	A	0.9 ± 0.1	1.1 ± 0.1
E00415	N06700	A	2.2 ± 0.1	1.2 ± 0.2
E00415	N06720	A	1.0 ± 0.1	1.2 ± 0.2
E00415	N06740	A	0.5 ± 0.1	1.0 ± 0.2
E00415	N06760	A	1.1 ± 0.1	0.9 ± 0.2
E00415	N06780	A	1.0 ± 0.1	0.5 ± 0.1
E00415	N06800	A	0.9 ± 0.1	1.3 ± 0.2
E00415	N06820	A	1.1 ± 0.1	0.9 ± 0.2
E00415	N06840	A	1.0 ± 0.1	0.8 ± 0.1
E00415	N06860	A	1.0 ± 0.1	0.8 ± 0.2
E00415	N06880	A	0.8 ± 0.1	0.8 ± 0.2
E00415	N06900	A	0.8 ± 0.1	0.5 ± 0.1
E00415	N06920	A	0.8 ± 0.1	0.9 ± 0.2
E00415	N06940	A	1.4 ± 0.1	1.1 ± 0.2
E00415	N06960	A	0.7 ± 0.1	0.8 ± 0.2
E00415	N06980	A	3.1 ± 0.2	0.8 ± 0.3
E00415	N07000	A	0.6 ± 0.1	1.3 ± 0.2
E00416	N02885	A	1.2 ± 0.1	1.1 ± 0.2
E00418	N02585	A	0.6 ± 0.1	0.5 ± 0.2
E00418	N02668	A	1.0 ± 0.1	1.5 ± 0.3
E00418	N02808	2.1 ± 2.1	0.9 ± 0.1	1.1 ± 0.2
E00418	N02826	A	0.6 ± 0.2	0.4 ± 0.2
E00418	N02845	A	0.6 ± 0.1	1.2 ± 0.2
E00418	N02867	1.1 ± 0.5	0.8 ± 0.1	0.8 ± 0.1
E00419	N02568	A	0.7 ± 0.1	0.8 ± 0.2
E00419	N02786	A	0.8 ± 0.2	A
E00420	N02645	A	0.9 ± 0.1	0.9 ± 0.1
E00420	N02767	A	0.9 ± 0.1	0.6 ± 0.2
E00420	N04886	0.6 ± 0.1	0.8 ± 0.1	0.7 ± 0.1
E00420	N04896	0.3 ± 0.2	0.8 ± 0.1	0.7 ± 0.1
E00420	N04916	0.4 ± 0.2	0.9 ± 0.1	0.8 ± 0.1
E00420	N04936	0.4 ± 0.1	0.6 ± 0.1	0.8 ± 0.1
E00420	N04956	1.4 ± 0.1	0.9 ± 0.1	0.9 ± 0.1
E00420	N04980	A	0.9 ± 0.1	0.8 ± 0.2
E00420	N05000	A	1.9 ± 0.2	0.9 ± 0.2

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00420	N05020	A	1.1 ± 0.1	A
E00420	N05040	A	23.5 ± 0.5	0.5 ± 0.4
E00420	N05060	A	3.2 ± 0.2	1.1 ± 0.2
E00420	N05080	A	5.5 ± 0.3	1.1 ± 0.2
E00420	N05100	A	5.9 ± 0.2	0.7 ± 0.2
E00420	N05110	A	1.6 ± 0.3	A
E00420	N05120	A	1.1 ± 0.1	0.7 ± 0.2
E00420	N05140	A	1.8 ± 0.1	0.8 ± 0.1
E00420	N05160	A	3.1 ± 0.2	0.6 ± 0.2
E00420	N05180	A	5.0 ± 0.2	1.1 ± 0.2
E00420	N05200	A	2.5 ± 0.1	0.9 ± 0.1
E00420	N05220	A	4.0 ± 0.4	0.3 ± 0.4
E00420	N05240	A	9.4 ± 0.3	1.0 ± 0.3
E00420	N05260	A	8.8 ± 0.3	A
E00420	N05280	A	3.6 ± 0.2	1.1 ± 0.2
E00420	N05300	A	0.7 ± 0.1	0.6 ± 0.2
E00420	N05320	A	1.3 ± 0.2	0.6 ± 0.2
E00420	N05340	A	2.3 ± 0.1	0.6 ± 0.2
E00420	N05360	A	4.0 ± 0.2	0.9 ± 0.2
E00420	N05380	A	2.0 ± 0.2	0.9 ± 0.2
E00420	N05400	A	10.0 ± 0.3	0.4 ± 0.2
E00420	N05420	A	2.2 ± 0.2	1.4 ± 0.2
E00420	N05440	A	3.9 ± 0.2	0.8 ± 0.2
E00420	N05460	A	5.4 ± 0.3	1.3 ± 0.2
E00420	N05480	A	2.7 ± 0.2	1.2 ± 0.2
E00420	N05500	A	8.8 ± 0.3	0.9 ± 0.2
E00420	N05520	A	2.2 ± 0.2	0.8 ± 0.2
E00420	N05540	A	4.2 ± 0.2	1.2 ± 0.3
E00420	N05560	A	1.1 ± 0.1	1.3 ± 0.2
E00420	N05580	A	8.7 ± 0.3	0.7 ± 0.2
E00420	N05600	A	4.9 ± 0.3	1.0 ± 0.2
E00420	N05620	A	10.0 ± 0.3	0.9 ± 0.2
E00420	N05640	A	1.2 ± 0.1	0.9 ± 0.3
E00420	N05660	A	2.6 ± 0.2	1.1 ± 0.2
E00420	N05680	A	3.8 ± 0.2	0.6 ± 0.2
E00420	N05700	A	3.8 ± 0.2	0.4 ± 0.2
E00420	N05720	A	2.0 ± 0.1	A
E00420	N05740	A	3.3 ± 0.2	A
E00420	N05760	A	1.6 ± 0.2	1.1 ± 0.2
E00420	N05780	A	2.4 ± 0.2	0.9 ± 0.2
E00420	N05800	1.9 ± 2.4	8.2 ± 0.3	1.5 ± 0.3
E00420	N05820	A	8.3 ± 0.3	A
E00420	N05840	A	6.5 ± 0.3	0.9 ± 0.2

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00420	N05860	A	9.3 ± 0.3	0.4 ± 0.2
E00420	N05880	A	2.5 ± 0.2	1.1 ± 0.2
E00420	N05900	A	16.4 ± 0.5	A
E00420	N05920	A	11.5 ± 0.3	A
E00420	N05940	A	1.8 ± 0.1	1.1 ± 0.2
E00420	N05960	1.3 ± 1.2	3.6 ± 0.2	0.9 ± 0.2
E00420	N05980	A	7.9 ± 0.3	0.7 ± 0.2
E00420	N06000	A	8.5 ± 0.3	0.8 ± 0.2
E00420	N06020	2.4 ± 1.4	3.4 ± 0.2	1.2 ± 0.2
E00420	N06040	A	4.5 ± 0.3	1.1 ± 0.2
E00420	N06060	A	2.5 ± 0.2	A
E00420	N06080	A	2.3 ± 0.1	0.7 ± 0.2
E00420	N06100	A	0.8 ± 0.1	0.8 ± 0.2
E00420	N06120	A	6.0 ± 0.3	0.9 ± 0.2
E00420	N06140	A	1.7 ± 0.1	1.0 ± 0.2
E00420	N06160	A	1.0 ± 0.1	0.6 ± 0.1
E00420	N06180	2.5 ± 1.5	0.9 ± 0.2	1.1 ± 0.2
E00420	N06200	A	1.0 ± 0.1	1.0 ± 0.2
E00420	N06220	A	2.1 ± 0.2	0.5 ± 0.2
E00420	N06240	A	2.1 ± 0.1	0.9 ± 0.1
E00420	N06260	A	3.1 ± 0.2	A
E00420	N06280	A	3.9 ± 0.2	0.9 ± 0.2
E00420	N06300	A	0.9 ± 0.1	0.9 ± 0.2
E00420	N06320	A	8.7 ± 0.3	0.7 ± 0.3
E00420	N06340	A	0.8 ± 0.1	0.6 ± 0.1
E00420	N06360	A	1.3 ± 0.1	0.9 ± 0.1
E00420	N06380	A	3.2 ± 0.2	0.8 ± 0.2
E00420	N06400	A	1.1 ± 0.1	0.8 ± 0.2
E00420	N06420	A	13.8 ± 0.4	1.2 ± 0.2
E00420	N06440	A	12.4 ± 0.4	1.4 ± 0.3
E00420	N06460	A	2.1 ± 0.1	A
E00420	N06480	1.5 ± 1.8	1.0 ± 0.1	1.1 ± 0.2
E00420	N06500	A	1.2 ± 0.1	1.0 ± 0.2
E00420	N06520	A	8.9 ± 0.3	1.1 ± 0.2
E00420	N06540	A	3.8 ± 0.5	A
E00420	N06560	A	2.3 ± 0.2	0.8 ± 0.2
E00420	N06580	A	3.3 ± 0.2	0.8 ± 0.2
E00420	N06600	A	3.5 ± 0.2	0.7 ± 0.2
E00420	N06620	A	3.0 ± 0.2	0.7 ± 0.1
E00420	N06640	A	1.8 ± 0.1	0.5 ± 0.2
E00420	N06660	A	5.2 ± 0.2	1.3 ± 0.3
E00420	N06680	A	0.8 ± 0.1	0.4 ± 0.2
E00420	N07020	A	1.2 ± 0.1	0.7 ± 0.2

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00420	N07040	A	3.1 ± 0.2	0.5 ± 0.2
E00420	N07060	A	1.1 ± 0.1	0.9 ± 0.2
E00420	N07080	A	0.8 ± 0.1	1.3 ± 0.2
E00420	N07100	A	0.9 ± 0.1	1.1 ± 0.2
E00420	N07120	A	1.0 ± 0.1	0.8 ± 0.1
E00420	N07140	A	1.5 ± 0.2	1.0 ± 0.2
E00420	N07160	A	1.6 ± 0.2	1.42 ± 0.3
E00420	N07180	A	1.2 ± 0.1	0.9 ± 0.2
E00420	N07200	A	0.9 ± 0.1	1.5 ± 0.2
E00420	N07220	A	0.8 ± 0.1	0.8 ± 0.2
E00420	N07240	A	1.1 ± 0.1	1.1 ± 0.2
E00420	N07260	A	2.1 ± 0.1	0.8 ± 0.2
E00420	N07280	A	1.3 ± 0.1	1.2 ± 0.2
E00420	N07300	A	2.2 ± 0.2	0.7 ± 0.1
E00420	N07320	A	1.1 ± 0.1	0.8 ± 0.2
E00420	N07340	1.6 ± 1.1	1.9 ± 0.1	1.0 ± 0.2
E00420	N07360	A	0.7 ± 0.1	0.3 ± 0.1
E00420	N07380	A	2.0 ± 0.1	0.8 ± 0.2
E00420	N07400	A	3.1 ± 0.2	A
E00420	N07420	A	0.8 ± 0.1	1.0 ± 0.2
E00420	N07440	A	2.0 ± 0.2	0.8 ± 0.2
E00420	N07460	A	0.7 ± 0.1	0.7 ± 0.1
E00420	N07480	A	0.8 ± 0.1	0.9 ± 0.1
E00420	N07500	A	4.9 ± 0.2	1.1 ± 0.2
E00420	N07520	A	1.1 ± 0.1	0.8 ± 0.2
E00420	N07540	A	1.0 ± 0.1	0.6 ± 0.2
E00420	N07560	A	0.9 ± 0.1	0.4 ± 0.1
E00420	N07580	A	1.6 ± 0.1	0.7 ± 0.2
E00420	N07600	A	4.6 ± 0.2	0.6 ± 0.2
E00420	N07620	A	1.0 ± 0.1	0.7 ± 0.2
E00420	N07640	A	0.8 ± 0.1	0.8 ± 0.2
E00420	N07660	A	1.1 ± 0.1	0.7 ± 0.1
E00420	N07680	A	0.9 ± 0.1	1.0 ± 0.1
E00420	N07700	A	1.0 ± 0.1	0.9 ± 0.1
E00420	N07720	A	1.0 ± 0.1	0.8 ± 0.1
E00420	N07740	A	1.3 ± 0.1	0.7 ± 0.2
E00420	N07760	A	1.9 ± 0.1	A
E00420	N07780	A	1.3 ± 0.1	1.6 ± 0.2
E00420	N07800	A	0.8 ± 0.1	0.9 ± 0.2
E00420	N07820	A	0.9 ± 0.1	0.8 ± 0.2
E00420	N07840	A	0.8 ± 0.1	0.8 ± 0.2
E00420	N07860	A	2.5 ± 0.2	1.1 ± 0.2
E00420	N07880	A	0.2 ± 0.1	A

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00420	N07900	A	0.8 ± 0.1	0.8 ± 0.2
E00420	N07920	A	2.6 ± 0.2	1.1 ± 0.2
E00420	N07940	A	4.1 ± 0.2	0.9 ± 0.2
E00420	N07960	A	2.0 ± 0.2	0.7 ± 0.2
E00420	N07980	A	4.2 ± 0.2	0.8 ± 0.2
E00420	N08000	A	3.1 ± 0.2	0.7 ± 0.2
E00420	N08020	A	5.4 ± 0.2	1.2 ± 0.2
E00420	N08040	1.6 ± 1.6	1.2 ± 0.1	0.7 ± 0.2
E00420	N08060	A	0.7 ± 0.3	1.3 ± 0.3
E00420	N08080	A	1.6 ± 0.1	1.2 ± 0.2
E00420	N08100	A	2.5 ± 0.7	1.7 ± 0.2
E00420	N08120	A	9.4 ± 0.4	A
E00420	N08140	A	23.6 ± 0.5	0.9 ± 0.3
E00420	N08160	A	2.6 ± 0.6	1.6 ± 0.4
E00420	N08180	A	22.8 ± 0.5	1.5 ± 0.4
E00420	N08200	A	12.9 ± 0.4	1.6 ± 0.4
E00420	N08220	A	3.0 ± 0.2	0.8 ± 0.2
E00420	N08240	A	2.9 ± 0.2	0.7 ± 0.2
E00420	N08260	A	2.3 ± 0.1	1.0 ± 0.2
E00420	N08280	A	0.9 ± 0.1	0.9 ± 0.2
E00420	N08300	34.6 ± 2.7	1.9 ± 0.1	1.0 ± 0.2
E00420	N08320	A	3.4 ± 0.2	1.4 ± 0.2
E00420	N08340	A	3.3 ± 0.2	1.0 ± 0.2
E00420	N08360	A	1.8 ± 0.1	1.3 ± 0.2
E00420	N08380	A	2.5 ± 0.1	1.1 ± 0.2
E00420	N08400	A	2.2 ± 0.2	1.0 ± 0.2
E00420	N08420	A	2.1 ± 0.1	0.8 ± 0.2
E00420	N08440	A	1.2 ± 0.1	1.2 ± 0.1
E00420	N08460	A	1.7 ± 0.1	0.9 ± 0.2
E00420	N08480	3.3 ± 1.8	2.9 ± 0.2	1.0 ± 0.2
E00420	N08500	A	8.6 ± 0.3	A
E00420	N08520	A	2.5 ± 0.2	0.8 ± 0.4
E00420	N08540	A	1.4 ± 0.1	0.7 ± 0.2
E00420	N08560	4.1 ± 1.6	0.9 ± 0.1	0.9 ± 0.2
E00420	N08580	2.5 ± 1.0	1.5 ± 0.1	0.7 ± 0.1
E00420	N08600	A	1.1 ± 0.1	0.7 ± 0.2
E00420	N08620	A	1.1 ± 0.1	0.8 ± 0.2
E00420	N08640	A	1.0 ± 0.1	0.8 ± 0.2
E00420	N08660	A	1.3 ± 0.1	1.3 ± 0.2
E00420	N08680	2.2 ± 1.4	1.1 ± 0.1	1.2 ± 0.2
E00420	N08700	A	15.0 ± 0.4	1.2 ± 0.3
E00420	N08720	A	0.9 ± 0.1	1.2 ± 0.2
E00420	N08740	A	1.8 ± 0.1	0.5 ± 0.2

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00420	N08750	A	6.7 ± 0.3	0.8 ± 0.2
E00420	N08770	A	4.5 ± 0.3	1.5 ± 0.3
E00420	N08790	A	1.5 ± 0.1	0.5 ± 0.2
E00420	N08810	A	1.5 ± 0.1	1.0 ± 0.2
E00420	N08830	A	0.7 ± 0.1	0.5 ± 0.1
E00420	N08850	A	1.3 ± 0.1	1.4 ± 0.2
E00420	N08870	A	1.4 ± 0.1	1.2 ± 0.2
E00420	N08890	A	1.6 ± 0.1	0.9 ± 0.2
E00420	N08910	A	3.7 ± 0.2	0.9 ± 0.2
E00420	N08930	A	2.1 ± 0.2	1.0 ± 0.2
E00420	N08950	A	4.3 ± 0.2	0.8 ± 0.2
E00420	N08970	A	1.9 ± 0.2	1.4 ± 0.2
E00420	N08990	A	1.1 ± 0.1	1.1 ± 0.2
E00420	N09010	A	1.2 ± 0.1	0.8 ± 0.2
E00420	N09030	A	1.2 ± 0.2	1.1 ± 0.2
E00420	N09050	A	6.2 ± 0.3	1.3 ± 0.2
E00420	N09070	A	1.2 ± 0.1	1.6 ± 0.2
E00420	N09090	A	2.1 ± 0.2	1.2 ± 0.2
E00420	N09110	A	4.6 ± 0.2	0.5 ± 0.2
E00420	N09130	A	1.5 ± 0.1	0.9 ± 0.2
E00420	N09150	A	1.6 ± 0.1	1.0 ± 0.2
E00420	N09170	A	1.5 ± 0.1	1.5 ± 0.2
E00420	N09190	A	1.1 ± 0.1	1.2 ± 0.2
E00420	N09210	A	1.0 ± 0.1	0.9 ± 0.2
E00420	N09230	A	2.4 ± 0.2	A
E00420	N09250	A	1.1 ± 0.1	1.3 ± 0.2
E00420	N09260	A	1.6 ± 0.1	0.5 ± 0.2
E00420	N09280	A	1.1 ± 0.1	1.3 ± 0.2
E00420	N09300	A	1.1 ± 0.1	1.0 ± 0.2
E00420	N09320	A	3.4 ± 0.2	0.7 ± 0.2
E00420	N09340	A	2.0 ± 0.2	1.3 ± 0.2
E00420	N09360	A	1.7 ± 0.1	0.9 ± 0.2
E00420	N09380	A	3.0 ± 0.2	1.0 ± 0.2
E00420	N09400	A	3.0 ± 0.2	0.8 ± 0.2
E00420	N09420	A	1.2 ± 0.2	1.2 ± 0.2
E00420	N09440	A	1.8 ± 0.1	1.3 ± 0.1
E00420	N09460	A	0.9 ± 0.1	1.1 ± 0.2
E00420	N09480	A	1.5 ± 0.1	1.0 ± 0.1
E00420	N09500	A	1.4 ± 0.1	0.8 ± 0.2
E00420	N09560	A	1.5 ± 0.1	1.3 ± 0.2
E00420	N09620	A	5.1 ± 0.3	1.4 ± 0.3
E00420	N09640	A	5.2 ± 0.2	1.4 ± 0.2
E00420	N09650	A	2.1 ± 0.2	1.2 ± 0.3

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00420	N09670	A	8.5 ± 0.3	0.8 ± 0.2
E00420	N09690	A	6.3 ± 0.5	0.6 ± 0.2
E00420	N09710	A	1.5 ± 0.1	0.9 ± 0.2
E00421	N02548	0.6 ± 0.3	0.8 ± 0.1	1.2 ± 0.2
E00421	N02748	A	0.8 ± 0.1	1.0 ± 0.2
E00422	N02729	A	1.1 ± 0.2	1.2 ± 0.2
E00422	N03120	A	1.1 ± 0.1	1.0 ± 0.1
E00422	N03140	A	1.2 ± 0.2	1.2 ± 0.3
E00422	N03160	A	0.8 ± 0.1	1.2 ± 0.2
E00422	N03180	A	1.1 ± 0.2	1.0 ± 0.2
E00422	N03200	1.7 ± 0.6	0.9 ± 0.1	0.9 ± 0.1
E00422	N03220	A	0.7 ± 0.1	0.8 ± 0.2
E00422	N03240	A	0.7 ± 0.1	A
E00422	N03560	A	0.7 ± 0.1	0.7 ± 0.2
E00422	N03580	A	0.9 ± 0.1	0.6 ± 0.2
E00422	N03600	A	2.7 ± 0.3	0.8 ± 0.2
E00422	N03620	A	0.6 ± 0.2	1.0 ± 0.2
E00422	N03640	2.7 ± 1.2	0.6 ± 0.1	0.7 ± 0.1
E00422	N03660	0.6 ± 0.3	0.7 ± 0.1	0.5 ± 0.2
E00422	N03680	2.3 ± 2.3	0.7 ± 0.2	0.9 ± 0.3
E00422	N03700	A	0.8 ± 0.1	1.8 ± 0.3
E00422	N03720	A	0.6 ± 0.1	0.6 ± 0.2
E00422	N03740	A	1.1 ± 0.1	0.7 ± 0.2
E00422	N03760	A	0.8 ± 0.1	1.1 ± 0.2
E00422	N03780	A	1.0 ± 0.2	0.7 ± 0.2
E00422	N03800	A	1.5 ± 0.2	0.7 ± 0.2
E00422	N03820	A	1.1 ± 0.2	1.1 ± 0.2
E00422	N03840	A	0.9 ± 0.1	0.6 ± 0.2
E00422	N03860	A	0.6 ± 0.1	0.8 ± 0.1
E00422	N03880	A	0.6 ± 0.1	0.5 ± 0.2
E00422	N03900	A	1.0 ± 0.2	0.6 ± 0.3
E00422	N03920	A	0.7 ± 0.1	0.4 ± 0.1
E00422	N03940	A	1.1 ± 0.2	0.4 ± 0.2
E00422	N03960	1.5 ± 0.1	0.7 ± 0.1	1.1 ± 0.1
E00422	N09520	A	1.4 ± 0.1	1.1 ± 0.2
E00422	N09540	3.6 ± 1.8	1.6 ± 0.1	0.9 ± 0.2
E00422	N09580	A	2.4 ± 0.2	1.3 ± 0.2
E00422	N09600	A	2.1 ± 0.2	1.2 ± 0.2
E00423	N02530	A	9.9 ± 0.1	1.2 ± 0.2
E00424	N02607	A	0.9 ± 0.1	0.9 ± 0.2
E00424	N02625	A	0.9 ± 9.1	1.0 ± 0.3
E00424	N02709	A	1.0 ± 0.1	0.9 ± 0.2
E00424	N03315	A	1.1 ± 0.2	0.7 ± 0.3

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00424	N03335	3.2 ± 2.2	1.2 ± 0.1	0.7 ± 0.2
E00424	N03355	A	1.0 ± 0.1	0.7 ± 0.3
E00425	N02686	A	0.9 ± 0.1	0.9 ± 0.2
E00425	N03260	A	0.9 ± 0.1	0.9 ± 0.1
E00425	N03280	A	0.7 ± 0.1	0.6 ± 0.2
E00425	N03360	A	0.8 ± 0.2	0.6 ± 0.3
E00425	N03380	A	0.9 ± 0.1	1.1 ± 0.2
E00425	N03400	A	0.9 ± 0.1	1.1 ± 0.3
E00425	N03420	A	1.0 ± 0.1	0.8 ± 0.2
E00425	N03440	0.7 ± 0.1	0.9 ± 0.1	0.9 ± 0.1
E00425	N03460	A	0.9 ± 0.2	0.5 ± 0.3
E00425	N03480	1.4 ± 0.1	0.8 ± 0.1	1.1 ± 0.1
E00425	N03500	A	0.9 ± 0.1	1.1 ± 0.2
E00425	N03520	A	0.6 ± 0.1	0.4 ± 0.3
E00425	N03540	0.5 ± 0.1	0.7 ± 0.1	0.8 ± 0.1
E00425	N04020	A	1.0 ± 0.1	1.2 ± 0.2
E00425	N04040	A	4.7 ± 0.3	1.2 ± 0.2
E00425	N04080	A	0.9 ± 0.1	0.7 ± 0.2
E00425	N04100	A	0.8 ± 0.1	1.0 ± 0.2
E00425	N04120	1.1 ± 0.4	0.9 ± 0.1	0.8 ± 0.1
E00425	N04140	A	0.9 ± 0.1	1.2 ± 0.2
E00425	N04160	A	0.9 ± 0.1	0.7 ± 0.2
E00425	N04180	A	0.5 ± 0.1	0.9 ± 0.2
E00425	N04200	A	0.7 ± 0.1	0.8 ± 0.2
E00425	N04220	A	0.9 ± 0.1	1.4 ± 0.2
E00425	N04240	A	0.7 ± 0.1	0.6 ± 0.2
E00425	N04260	A	0.9 ± 0.1	0.8 ± 0.1
E00425	N04280	A	0.8 ± 0.1	0.9 ± 0.2
E00425	N04300	A	1.0 ± 0.1	1.2 ± 0.2
E00425	N04320	A	0.8 ± 0.1	1.0 ± 0.2
E00425	N04340	A	0.7 ± 0.2	0.6 ± 0.2
E00425	N04360	2.2 ± 1.2	0.8 ± 0.1	0.9 ± 0.2
E00425	N04380	A	0.6 ± 0.1	1.1 ± 0.1
E00425	N04400	A	0.7 ± 0.1	0.5 ± 0.2
E00425	N04420	2.3 ± 1.8	1.0 ± 0.2	0.7 ± 0.2
E00425	N04440	A	1.1 ± 0.1	1.0 ± 0.2
E00425	N04460	A	0.9 ± 0.1	1.2 ± 0.2
E00425	N04480	A	0.8 ± 0.1	1.0 ± 0.2
E00425	N04500	A	0.9 ± 0.1	0.7 ± 0.2
E00425	N04520	A	0.8 ± 0.2	1.2 ± 0.2
E00425	N04540	A	0.9 ± 0.1	0.8 ± 0.2
E00425	N04560	A	0.9 ± 0.1	0.8 ± 0.2
E00425	N04580	A	0.7 ± 0.1	0.7 ± 0.2

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00425	N04600	A	1.4 ± 0.2	0.8 ± 0.3
E00425	N04620	A	1.2 ± 0.2	0.9 ± 0.4
E00425	N04640	A	0.7 ± 0.1	0.5 ± 0.2
E00425	N04660	A	1.0 ± 0.1	0.9 ± 0.2
E00425	N04680	0.6 ± 0.3	0.6 ± 0.1	0.7 ± 0.2
E00425	N04700	A	1.0 ± 0.1	1.1 ± 0.2
E00425	N04720	3.6 ± 0.8	2.6 ± 0.1	2.6 ± 0.2
E00425	N04740	A	0.5 ± 0.1	0.7 ± 0.3
E00425	N04760	A	0.7 ± 0.1	0.7 ± 0.2
E00425	N04780	A	0.8 ± 0.1	0.8 ± 0.2
E00425	N04800	0.3 ± 0.1	1.2 ± 0.1	0.8 ± 0.2
E00425	N04832	A	1.0 ± 0.1	1.0 ± 0.2
E00425	N04840	A	0.8 ± 0.1	0.5 ± 0.3
E00425	N04860	0.5 ± 0.2	1.2 ± 0.1	0.8 ± 0.1
E00425	N04880	A	1.0 ± 0.1	0.7 ± 0.2
E00428	N02585	A	0.7 ± 0.2	A
E00428	N02668	A	1.1 ± 0.1	1.0 ± 0.3
E00429	N02568	0.7 ± 1.1	1.1 ± 0.1	0.9 ± 0.2
E00430	N02645	A	0.7 ± 0.1	0.6 ± 0.1
E00431	N02548	A	0.8 ± 0.1	1.0 ± 0.2
E00433	N02530	A	0.8 ± 0.1	1.0 ± 0.2
E00434	N02607	A	0.8 ± 0.1	1.1 ± 0.2
E00434	N02625	A	0.9 ± 0.1	1.0 ± 0.1
E00435	N04832	A	1.1 ± 0.2	0.9 ± 0.2
E00438	N02585	3.0 ± 1.9	0.8 ± 0.1	0.9 ± 0.2
E00439	N02568	A	0.6 ± 0.1	0.8 ± 0.2
E00440	N02300	4.7 ± 2.7	1.9 ± 0.2	1.1 ± 0.2
E00440	N02380	A	1.8 ± 0.1	0.9 ± 0.1
E00440	N02400	A	0.8 ± 0.1	1.0 ± 0.1
E00440	N02410	1.5 ± 0.9	1.0 ± 0.1	1.0 ± 0.2
E00440	N02430	A	1.1 ± 0.1	0.9 ± 0.1
E00440	N02450	A	0.8 ± 0.1	0.9 ± 0.2
E00440	N02470	A	0.6 ± 0.1	A
E00440	N02480	A	0.9 ± 0.1	1.3 ± 0.2
E00440	N02942	A	2.6 ± 0.2	0.5 ± 0.2
E00440	N02945	0.7 ± 0.1	1.1 ± 0.1	A
E00441	N02360	A	1.2 ± 0.2	1.7 ± 0.3
E00441	N02548	0.5 ± 0.5	0.7 ± 0.1	1.0 ± 0.2
E00443	N02200	A	1.9 ± 0.2	1.0 ± 0.2
E00443	N02340	A	1.2 ± 0.2	0.9 ± 0.3
E00445	N02320	A	5.1 ± 0.3	1.2 ± 0.2
E00445	N02530	0.9 ± 0.1	0.9 ± 0.1	1.0 ± 0.1
E00445	N04832	2.2 ± 0.1	0.9 ± 0.1	0.9 ± 0.1

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00448	N02220	A	2.9 ± 0.2	0.9 ± 0.2
E00448	N02240	A	0.9 ± 0.1	1.0 ± 0.7
E00450	N02260	A	0.9 ± 0.1	0.9 ± 0.2
E00450	N02280	A	2.1 ± 0.2	0.7 ± 0.3
E00450	N02300	A	0.5 ± 0.1	0.8 ± 0.2
E00450	N02400	A	1.0 ± 0.1	0.8 ± 0.1
E00450	N02410	A	1.0 ± 0.1	1.1 ± 0.2
E00450	N02430	A	0.8 ± 0.1	0.6 ± 0.1
E00450	N02450	A	0.8 ± 0.1	0.7 ± 0.2
E00450	N02470	1.7 ± 1.8	0.5 ± 0.1	A
E00450	N02480	A	1.0 ± 0.1	1.8 ± 0.3
E00451	N02360	1.2 ± 0.8	0.8 ± 0.1	0.5 ± 0.1
E00453	N02200	A	1.1 ± 0.2	1.0 ± 0.2
E00453	N02240	A	1.0 ± 0.1	0.7 ± 0.2
E00455	N02320	A	0.7 ± 0.2	0.5 ± 0.2
E00455	N04832	A	0.8 ± 0.1	0.6 ± 0.2
E00458	N02220	A	0.8 ± 0.1	0.8 ± 0.2
E00458	N02240	1.3 ± 0.1	1.0 ± 0.1	0.9 ± 0.1
E00459	N02180	A	1.1 ± 0.1	1.2 ± 0.3
E00460	N02260	A	1.1 ± 0.2	1.2 ± 0.2
E00460	N02280	4.8 ± 0.6	1.0 ± 0.1	0.9 ± 0.1
E00460	N02380	A	1.6 ± 0.2	0.9 ± 0.2
E00460	N02400	A	1.1 ± 0.1	1.0 ± 0.1
E00460	N02410	A	1.0 ± 0.1	1.2 ± 0.2
E00460	N02430	A	0.8 ± 0.1	0.9 ± 0.2
E00460	N02450	A	1.1 ± 0.1	1.0 ± 0.3
E00460	N02470	A	0.7 ± 0.1	0.6 ± 0.1
E00460	N02480	A	0.9 ± 0.1	0.7 ± 0.2
E00460	N02940	A	0.5 ± 0.1	0.8 ± 0.1
E00460	N02943	0.7 ± 0.3	0.6 ± 0.1	0.5 ± 0.1
E00461	N02140	A	0.9 ± 0.2	0.6 ± 0.2
E00461	N02160	A	1.0 ± 0.1	1.0 ± 0.2
E00461	N02360	A	1.0 ± 0.1	0.9 ± 0.2
E00463	N02120	0.8 ± 0.4	1.2 ± 0.1	0.8 ± 0.1
E00463	N02200	A	1.1 ± 0.1	1.3 ± 0.2
E00463	N02340	A	0.9 ± 0.1	1.1 ± 0.2
E00465	N02320	A	0.7 ± 0.1	1.0 ± 0.3
E00465	N04832	A	0.7 ± 0.1	0.4 ± 0.2
E00466	N02100	A	0.9 ± 0.1	0.7 ± 0.1
E00468	N02220	A	1.0 ± 0.1	0.7 ± 0.2
E00468	N02240	A	1.0 ± 0.1	0.5 ± 0.2
E00469	N02180	1.7 ± 0.5	1.1 ± 0.1	1.0 ± 0.2
E00470	N02060	A	2.4 ± 0.2	1.4 ± 0.3

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00470	N02080	A	0.8 ± 0.1	0.5 ± 0.2
E00470	N02260	A	2.0 ± 0.2	0.5 ± 0.2
E00470	N02280	A	0.9 ± 0.2	0.6 ± 0.2
E00470	N02300	A	3.0 ± 0.2	0.7 ± 0.3
E00471	N02140	A	1.1 ± 0.2	0.9 ± 0.2
E00471	N02160	A	1.0 ± 0.2	1.0 ± 0.2
E00472	N02040	A	1.3 ± 0.2	1.0 ± 0.2
E00473	N02020	2.2 ± 1.7	1.6 ± 0.1	1.0 ± 0.2
E00473	N02120	A	1.4 ± 0.2	0.7 ± 0.2
E00476	N02000	A	1.4 ± 0.2	0.3 ± 0.5
E00476	N02100	6.6 ± 2.5	1.2 ± 0.2	0.8 ± 0.2
E00478	N01820	A	1.1 ± 0.1	0.9 ± 0.1
E00478	N01840	A	1.4 ± 0.1	0.8 ± 0.1
E00479	N02180	A	1.0 ± 0.1	1.1 ± 0.2
E00480	N00560	0.6 ± 0.4	0.7 ± 0.1	1.1 ± 0.2
E00480	N00580	1.3 ± 0.1	0.7 ± 0.1	0.7 ± 0.1
E00480	N00600	A	1.2 ± 0.1	0.7 ± 0.2
E00480	N00620	0.3 ± 0.2	1.4 ± 0.1	1.0 ± 0.1
E00480	N00640	1.8 ± 1.1	0.8 ± 0.1	0.8 ± 0.1
E00480	N00660	A	1.3 ± 0.3	1.2 ± 0.3
E00480	N00680	A	0.8 ± 0.1	1.3 ± 0.2
E00480	N00700	2.1 ± 0.7	1.4 ± 0.1	1.1 ± 0.1
E00480	N00720	0.7 ± 0.1	1.0 ± 0.1	0.9 ± 0.1
E00480	N00740	A	0.9 ± 0.1	0.7 ± 0.2
E00480	N00760	0.4 ± 0.1	0.9 ± 0.1	0.9 ± 0.1
E00480	N00780	0.3 ± 0.5	0.9 ± 0.1	2.1 ± 0.2
E00480	N00800	0.3 ± 0.2	1.2 ± 0.1	1.2 ± 0.1
E00480	N00820	A	4.0 ± 0.2	0.6 ± 0.5
E00480	N00840	2.3 ± 0.6	1.8 ± 0.2	1.2 ± 0.2
E00480	N00860	2.8 ± 0.7	0.9 ± 0.1	0.7 ± 0.2
E00480	N00880	0.7 ± 0.2	1.1 ± 0.1	1.1 ± 0.1
E00480	N00900	0.3 ± 0.2	1.0 ± 0.1	1.0 ± 0.1
E00480	N00920	A	0.9 ± 0.2	1.3 ± 0.2
E00480	N00940	A	1.1 ± 0.1	1.3 ± 0.2
E00480	N00960	0.4 ± 0.2	0.9 ± 0.1	0.9 ± 0.1
E00480	N00980	0.6 ± 0.2	0.8 ± 0.1	0.8 ± 0.1
E00480	N01000	0.2 ± 0.2	1.0 ± 0.1	0.8 ± 0.1
E00480	N01020	0.1 ± 0.2	2.4 ± 0.1	0.8 ± 0.1
E00480	N01040	0.9 ± 0.7	1.2 ± 0.1	1.5 ± 0.2
E00480	N01060	A	0.7 ± 0.1	0.4 ± 0.3
E00480	N01080	A	0.7 ± 0.1	0.7 ± 0.1
E00480	N01100	A	1.1 ± 0.1	0.8 ± 0.2
E00480	N01120	0.7 ± 0.2	1.4 ± 0.1	1.0 ± 0.1

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00480	N01140	A	0.9 ± 0.1	1.0 ± 0.2
E00480	N01160	1.2 ± 0.4	0.7 ± 0.1	0.4 ± 0.1
E00480	N01180	A	0.9 ± 0.1	1.2 ± 0.3
E00480	N01200	A	1.1 ± 0.1	0.7 ± 0.2
E00480	N01220	0.4 ± 0.1	0.7 ± 0.1	0.7 ± 0.1
E00480	N01240	0.3 ± 0.5	1.2 ± 0.1	0.6 ± 0.3
E00480	N01280	1.3 ± 0.2	1.1 ± 0.1	1.2 ± 0.1
E00480	N01300	A	0.6 ± 0.2	0.7 ± 0.3
E00480	N01320	0.3 ± 0.3	0.8 ± 0.1	1.0 ± 0.1
E00480	N01340	A	1.2 ± 0.1	0.9 ± 0.2
E00480	N01360	0.3 ± 0.4	0.5 ± 0.1	0.5 ± 0.2
E00480	N01380	A	7.0 ± 0.3	1.0 ± 0.3
E00480	N01400	A	0.8 ± 0.1	0.7 ± 0.1
E00480	N01420	1.7 ± 0.2	1.0 ± 0.1	0.8 ± 0.1
E00480	N01440	0.9 ± 0.1	0.8 ± 0.1	0.8 ± 0.1
E00480	N01460	A	0.9 ± 0.1	0.6 ± 0.2
E00480	N01480	A	0.7 ± 0.1	1.3 ± 0.2
E00480	N01500	2.9 ± 1.3	2.2 ± 0.1	0.9 ± 0.1
E00480	N01520	5.1 ± 0.8	1.2 ± 0.1	1.3 ± 0.2
E00480	N01540	A	1.2 ± 0.1	0.8 ± 0.2
E00480	N01560	A	0.8 ± 0.1	0.8 ± 0.2
E00480	N01580	0.2 ± 0.2	1.1 ± 0.1	1.1 ± 0.1
E00480	N01600	0.6 ± 0.2	0.8 ± 0.1	0.7 ± 0.1
E00480	N01620	0.8 ± 0.5	0.9 ± 0.2	1.5 ± 0.4
E00480	N01640	0.1 ± 0.2	1.1 ± 0.1	1.4 ± 0.2
E00480	N01700	3.3 ± 0.6	0.8 ± 0.1	1.1 ± 0.1
E00480	N01720	A	0.7 ± 0.1	0.9 ± 0.2
E00480	N01740	0.2 ± 0.5	0.6 ± 0.1	A
E00480	N01760	1.8 ± 0.2	0.9 ± 0.1	1.1 ± 0.1
E00480	N01780	A	1.3 ± 0.1	1.0 ± 0.2
E00480	N01800	0.1 ± 0.2	0.8 ± 0.1	0.7 ± 0.1
E00480	N01860	A	2.3 ± 0.1	0.6 ± 0.3
E00480	N01880	A	1.2 ± 0.1	1.1 ± 0.2
E00480	N01910	A	2.3 ± 0.3	1.2 ± 0.3
E00480	N02060	6.0 ± 0.1	2.3 ± 0.2	0.9 ± 0.2
E00480	N02080	6.6 ± 3.6	2.0 ± 0.3	A
E00480	N02942	A	0.8 ± 0.1	0.5 ± 0.1
E00480	N02945	A	0.7 ± 0.1	0.7 ± 0.2
E00481	N01895	A	1.1 ± 0.1	0.9 ± 0.2
E00481	N02140	0.1 ± 0.1	1.0 ± 0.1	1.0 ± 0.1
E00481	N02160	A	1.1 ± 0.2	0.2 ± 0.4
E00482	N02040	A	0.9 ± 0.1	1.1 ± 0.2
E00483	N02020	A	1.0 ± 0.1	1.2 ± 0.2

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00483	N02120	A	1.0 ± 0.1	0.8 ± 0.2
E00485	N04832	A	0.7 ± 0.1	0.7 ± 0.2
E00486	N02000	A	1.1 ± 0.1	1.5 ± 0.2
E00486	N02100	A	0.9 ± 0.1	0.4 ± 0.2
E00488	N01820	A	1.5 ± 0.1	1.0 ± 0.2
E00488	N01840	A	1.3 ± 0.1	1.0 ± 0.1
E00490	N00560	0.7 ± 0.2	0.9 ± 0.1	1.0 ± 0.1
E00490	N00580	1.7 ± 0.4	0.7 ± 0.1	0.7 ± 0.2
E00490	N00600	0.7 ± 0.6	0.8 ± 0.1	1.0 ± 0.2
E00490	N00620	A	1.9 ± 0.1	0.8 ± 0.2
E00490	N00640	3.0 ± 2.2	0.9 ± 0.1	1.0 ± 0.2
E00490	N00660	A	2.4 ± 0.2	1.1 ± 0.2
E00490	N00680	1.4 ± 0.4	2.0 ± 0.2	0.6 ± 0.2
E00490	N00700	2.4 ± 0.2	1.2 ± 0.1	1.0 ± 0.1
E00490	N00720	0.1 ± 0.2	1.9 ± 0.1	0.9 ± 0.1
E00490	N00740	0.6 ± 0.5	1.3 ± 0.1	0.8 ± 0.2
E00490	N00760	1.7 ± 0.2	1.3 ± 0.1	0.8 ± 0.1
E00490	N00780	1.4 ± 0.7	4.0 ± 0.2	0.4 ± 0.4
E00490	N00800	1.9 ± 0.2	1.0 ± 0.1	1.0 ± 0.1
E00490	N00820	1.5 ± 0.3	6.0 ± 0.1	0.9 ± 0.1
E00490	N00840	0.2 ± 0.4	0.4 ± 0.1	0.9 ± 0.2
E00490	N00860	1.7 ± 0.3	0.9 ± 0.1	1.4 ± 0.3
E00490	N00880	1.1 ± 0.4	1.1 ± 0.1	0.1 ± 0.2
E00490	N00900	A	4.9 ± 0.2	0.6 ± 0.3
E00490	N00920	0.1 ± 0.4	5.9 ± 0.1	0.8 ± 0.1
E00490	N00940	0.6 ± 0.2	0.8 ± 0.1	0.8 ± 0.1
E00490	N00960	0.9 ± 0.1	0.8 ± 0.1	0.8 ± 0.1
E00490	N00980	A	1.1 ± 0.1	0.9 ± 0.3
E00490	N01000	1.9 ± 0.4	0.8 ± 0.1	1.0 ± 0.2
E00490	N01020	0.8 ± 0.2	1.1 ± 0.1	0.6 ± 0.1
E00490	N01040	A	1.3 ± 0.1	0.6 ± 0.2
E00490	N01060	1.9 ± 0.4	0.7 ± 0.1	0.8 ± 0.2
E00490	N01080	0.9 ± 0.8	9.6 ± 0.3	0.7 ± 0.2
E00490	N01100	0.6 ± 0.9	24.3 ± 0.5	A
E00490	N01120	0.8 ± 0.3	9.4 ± 0.1	0.8 ± 0.1
E00490	N01140	A	1.6 ± 0.2	1.6 ± 0.3
E00490	N01160	A	1.4 ± 0.1	0.9 ± 0.2
E00490	N01180	4.1 ± 0.2	3.2 ± 0.1	0.8 ± 0.1
E00490	N01220	2.5 ± 0.2	1.9 ± 0.1	0.8 ± 0.1
E00490	N01240	1.6 ± 0.2	0.6 ± 0.1	0.5 ± 0.2
E00490	N01260	A	17.1 ± 0.6	0.9 ± 0.5
E00490	N01280	0.7 ± 0.3	0.7 ± 0.1	0.9 ± 0.2
E00490	N01300	0.4 ± 0.5	1.1 ± 0.1	1.6 ± 0.2

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00490	N01320	A	0.9 ± 0.2	1.5 ± 0.2
E00490	N01340	0.3 ± 0.2	0.9 ± 0.1	1.0 ± 0.1
E00490	N01360	0.5 ± 0.2	0.8 ± 0.1	0.9 ± 0.1
E00490	N01380	A	0.8 ± 0.1	0.7 ± 0.2
E00490	N01400	0.6 ± 0.3	0.7 ± 0.1	0.8 ± 0.2
E00490	N01420	2.8 ± 0.5	0.9 ± 0.1	0.9 ± 0.1
E00490	N01440	A	1.0 ± 0.1	0.8 ± 0.2
E00490	N01460	1.5 ± 0.2	0.9 ± 0.1	0.9 ± 0.1
E00490	N01480	1.3 ± 0.1	0.7 ± 0.1	0.7 ± 0.1
E00490	N01500	A	0.5 ± 0.1	0.7 ± 0.2
E00490	N01520	0.1 ± 0.1	0.8 ± 0.1	0.7 ± 0.1
E00490	N01540	0.7 ± 0.2	1.0 ± 0.1	1.1 ± 0.1
E00490	N01560	A	1.0 ± 0.1	1.2 ± 0.2
E00490	N01580	A	1.2 ± 0.1	0.7 ± 0.1
E00490	N01600	0.8 ± 0.1	0.8 ± 0.1	0.7 ± 0.1
E00490	N01620	1.9 ± 0.4	0.6 ± 0.2	1.3 ± 0.2
E00490	N01640	A	0.7 ± 0.1	1.5 ± 0.2
E00490	N01660	A	0.8 ± 0.2	0.9 ± 0.2
E00490	N01680	A	1.0 ± 0.1	0.9 ± 0.2
E00490	N01700	0.4 ± 0.2	0.6 ± 0.1	0.7 ± 0.1
E00490	N01720	0.2 ± 0.6	0.8 ± 0.1	0.9 ± 0.2
E00490	N01740	1.8 ± 0.5	1.0 ± 0.1	1.3 ± 0.2
E00490	N01760	A	1.1 ± 0.1	0.5 ± 0.1
E00490	N01780	4.3 ± 0.8	2.2 ± 0.1	1.2 ± 0.1
E00490	N01800	0.4 ± 0.6	0.7 ± 0.1	0.3 ± 0.2
E00490	N01880	A	1.7 ± 0.2	0.9 ± 0.2
E00490	N01900	A	1.0 ± 0.1	1.1 ± 0.2
E00490	N01920	2.5 ± 2.2	0.9 ± 0.2	A
E00490	N02060	A	1.3 ± 0.2	1.1 ± 0.3
E00490	N02080	A	0.9 ± 0.1	0.8 ± 0.2
E00492	N02040	A	0.8 ± 0.1	1.3 ± 0.2
E00493	N02020	A	3.2 ± 0.2	0.9 ± 0.2
E00495	N01895	A	1.2 ± 0.1	1.6 ± 0.3
E00496	N01860	A	2.2 ± 0.2	1.3 ± 0.3
E00496	N01880	A	2.4 ± 0.1	0.8 ± 0.1
E00496	N02000	5.3 ± 3.1	1.0 ± 0.2	1.3 ± 0.3
E00497	N01840	A	0.6 ± 0.1	0.8 ± 0.1
E00500	N00560	1.7 ± 0.5	2.4 ± 0.2	1.1 ± 0.3
E00500	N00580	0.6 ± 0.2	1.7 ± 0.1	1.0 ± 0.1
E00500	N00600	3.3 ± 0.4	1.5 ± 0.1	1.0 ± 0.1
E00500	N00640	A	A	0.8 ± 0.4
E00500	N00660	0.1 ± 0.3	6.5 ± 0.1	0.9 ± 0.1
E00500	N00680	0.2 ± 0.1	3.5 ± 0.1	1.1 ± 0.1

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00500	N00700	0.1 ± 0.1	4.4 ± 0.1	1.2 ± 0.1
E00500	N00720	A	5.5 ± 0.2	0.6 ± 0.5
E00500	N00740	0.1 ± 0.3	1.0 ± 0.1	1.0 ± 0.1
E00500	N00760	0.7 ± 0.1	1.1 ± 0.1	0.8 ± 0.1
E00500	N00780	0.2 ± 0.6	1.8 ± 0.1	0.8 ± 0.2
E00500	N00800	A	1.4 ± 0.1	A
E00500	N00820	0.2 ± 0.6	2.5 ± 0.2	1.1 ± 0.2
E00500	N00840	A	6.6 ± 0.3	0.6 ± 0.3
E00500	N00860	1.1 ± 0.2	1.9 ± 0.1	1.0 ± 0.9
E00500	N00880	0.1 ± 0.3	1.8 ± 1.0	1.1 ± 0.1
E00500	N00900	2.3 ± 0.7	2.6 ± 0.1	1.0 ± 0.1
E00500	N00920	A	3.9 ± 0.2	1.0 ± 0.2
E00500	N00940	A	8.7 ± 0.3	0.7 ± 0.2
E00500	N00960	1.6 ± 0.6	1.7 ± 0.1	0.7 ± 0.1
E00500	N00980	A	1.8 ± 0.2	0.7 ± 0.2
E00500	N01000	0.3 ± 0.2	2.0 ± 0.1	1.0 ± 0.1
E00500	N01020	A	4.4 ± 0.2	1.3 ± 0.2
E00500	N01040	A	4.9 ± 0.2	0.5 ± 0.3
E00500	N01060	2.2 ± 0.3	7.0 ± 0.1	1.1 ± 0.1
E00500	N01080	0.1 ± 0.2	2.6 ± 0.1	1.0 ± 0.1
E00500	N01100	A	3.3 ± 0.2	1.4 ± 0.3
E00500	N01120	0.1 ± 0.2	1.5 ± 0.1	0.9 ± 0.1
E00500	N01140	A	1.7 ± 0.1	1.0 ± 0.1
E00500	N01160	2.8 ± 0.7	2.5 ± 0.1	1.1 ± 0.1
E00500	N01180	A	2.6 ± 0.2	1.0 ± 0.3
E00500	N01200	0.6 ± 0.1	6.4 ± 0.1	1.1 ± 0.1
E00500	N01220	1.2 ± 0.1	2.7 ± 0.1	0.9 ± 0.1
E00500	N01240	2.0 ± 0.1	2.4 ± 0.1	1.0 ± 0.1
E00500	N01260	0.3 ± 0.4	0.8 ± 0.1	0.7 ± 0.2
E00500	N01280	A	6.0 ± 0.3	0.7 ± 0.3
E00500	N01300	2.9 ± 0.6	3.4 ± 0.2	0.9 ± 0.2
E00500	N01320	A	3.4 ± 0.2	0.8 ± 0.3
E00500	N01340	0.2 ± 0.2	3.6 ± 0.1	1.0 ± 0.1
E00500	N01360	0.4 ± 0.2	1.0 ± 0.1	1.0 ± 0.1
E00500	N01380	A	1.2 ± 0.2	1.6 ± 0.4
E00500	N01400	A	2.8 ± 0.1	1.1 ± 0.1
E00500	N01420	A	11.9 ± 0.4	0.8 ± 0.2
E00500	N01440	A	4.9 ± 0.2	0.5 ± 0.3
E00500	N01460	0.5 ± 0.4	1.8 ± 0.1	A
E00500	N01480	A	4.7 ± 0.2	0.9 ± 0.3
E00500	N01500	0.2 ± 0.3	11.9 ± 0.1	0.9 ± 0.1
E00500	N01520	1.1 ± 0.3	3.5 ± 0.1	0.9 ± 0.1
E00500	N01540	A	2.3 ± 0.2	1.1 ± 0.3

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
E00500	N01560	0.2 ± 0.3	16.5 ± 0.2	0.8 ± 0.1
E00500	N01580	A	16.8 ± 0.2	1.1 ± 0.1
E00500	N01600	1.2 ± 0.3	19.5 ± 0.2	0.9 ± 0.2
E00500	N01620	0.1 ± 0.3	2.4 ± 0.1	1.0 ± 0.1
E00500	N01640	A	1.1 ± 0.1	1.5 ± 0.2
E00500	N01660	A	0.8 ± 0.1	0.7 ± 0.2
E00500	N01680	0.5 ± 0.2	0.7 ± 0.1	0.8 ± 0.2
E00500	N01700	A	2.2 ± 0.2	1.5 ± 0.3
E00500	N01720	A	1.1 ± 0.2	1.0 ± 0.2
E00500	N01740	A	1.6 ± 0.1	0.3 ± 0.2
E00500	N01780	A	1.3 ± 0.1	0.7 ± 0.2
E00500	N01820	A	14.0 ± 1.2	15.4 ± 2.0
E00500	N01930	A	3.8 ± 0.4	A
E00500	N02940	0.8 ± 0.4	0.8 ± 0.1	0.9 ± 0.2
E00500	N02943	A	0.9 ± 0.1	0.7 ± 0.1
E00520	N02942	3.1 ± 2.2	1.0 ± 0.2	0.8 ± 0.2
E00520	N02945	A	0.8 ± 0.1	0.7 ± 0.1
E00540	N02940	A	0.8 ± 0.1	0.9 ± 0.6
E00540	N02943	A	1.0 ± 0.1	0.6 ± 0.2
W00010	N09980	A	1.5 ± 0.1	1.0 ± 0.3
W00040	N09980	A	1.1 ± 0.1	1.4 ± 0.2
W00055	N09980	A	0.9 ± 0.1	1.0 ± 0.2
W00080	N09980	A	0.9 ± 0.1	1.2 ± 0.3
W00100	N09980	A	1.6 ± 0.1	1.1 ± 0.2
W00120	N09980	A	10.1 ± 0.3	1.1 ± 0.3
W00140	N09980	A	1.1 ± 0.1	0.8 ± 0.2
W00150	N09990	A	1.5 ± 0.2	0.5 ± 0.2
W00160	N09980	A	1.2 ± 0.1	0.8 ± 0.2
W00160	N10000	A	2.0 ± 0.2	1.0 ± 0.2
W00170	N09990	A	1.5 ± 0.2	1.2 ± 02
W00170	N10010	A	2.4 ± 0.2	1.0 ± 0.1
W00180	N09980	A	0.8 ± 0.1	0.9 ± 0.2
W00180	N10000	A	2.2 ± 0.2	A
W00190	N09990	A	2.2 ± 0.2	0.8 ± 0.2
W00190	N10010	A	1.3 ± 0.1	0.8 ± 0.2
W00200	N09980	A	1.7 ± 0.1	1.2 ± 0.2
W00200	N10000	A	1.7 ± 0.2	1.4 ± 0.2
W00200	N10020	2.3 ± 1.8	2.0 ± 0.1	0.8 ± 0.2
W00210	N09990	A	1.0 ± 0.1	1.0 ± 0.2
W00210	N10010	A	1.9 ± 0.2	0.5 ± 0.2
W00220	N09980	10.4 ± 2.4	1.0 ± 0.1	1.0 ± 0.2
W00220	N10000	A	4.1 ± 0.2	0.9 ± 0.2
W00220	N10020	A	2.7 ± 0.2	1.1 ± 0.2

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W00230	N09990	A	1.4 ± 0.1	0.8 ± 0.2
W00230	N10010	A	1.6 ± 0.1	1.1 ± 0.2
W00230	N10030	A	1.9 ± 0.2	1.0 ± 0.2
W00240	N09980	2.7 ± 2.7	0.9 ± 0.1	0.5 ± 0.2
W00240	N10000	A	1.9 ± 0.2	1.0 ± 0.2
W00240	N10020	A	2.4 ± 0.2	1.2 ± 0.2
W00250	N09990	A	1.6 ± 0.1	1.1 ± 0.2
W00250	N10010	A	1.8 ± 0.1	0.6 ± 0.2
W00250	N10030	A	2.1 ± 0.1	1.3 ± 0.2
W00260	N09980	A	2.0 ± 1.6	1.4 ± 0.3
W00260	N10000	A	1.5 ± 0.1	0.8 ± 0.3
W00260	N10020	3.0 ± 1.6	1.6 ± 0.1	1.3 ± 0.2
W00260	N10040	A	1.9 ± 0.2	1.3 ± 0.2
W00270	N09990	A	1.5 ± 0.2	1.2 ± 0.2
W00270	N10010	A	2.4 ± 0.2	1.1 ± 0.2
W00270	N10030	A	2.2 ± 0.1	0.7 ± 0.2
W00270	N10050	A	2.3 ± 0.2	0.7 ± 0.3
W00280	N10000	A	2.2 ± 0.2	1.2 ± 0.2
W00280	N10020	A	2.2 ± 0.1	1.0 ± 0.2
W00280	N10040	A	2.1 ± 0.2	1.4 ± 0.2
W00290	N10010	A	1.5 ± 0.1	1.4 ± 0.2
W00290	N10030	A	3.5 ± 0.2	1.2 ± 0.3
W00290	N10050	A	2.1 ± 0.2	0.6 ± 0.2
W00300	N10020	A	1.9 ± 0.1	1.1 ± 0.2
W00300	N10040	A	2.4 ± 0.2	1.2 ± 0.2
W00300	N10060	2.1 ± 1.1	3.0 ± 0.2	0.9 ± 0.2
W00310	N10030	A	1.0 ± 0.1	0.5 ± 0.2
W00310	N10050	A	1.5 ± 0.4	0.8 ± 0.4
W00310	N10070	A	6.0 ± 0.3	0.3 ± 0.2
W00320	N10020	2.1 ± 1.7	2.0 ± 0.1	0.6 ± 0.1
W00320	N10040	A	2.2 ± 0.2	1.4 ± 0.2
W00320	N10060	A	2.9 ± 0.2	1.4 ± 0.2
W00330	N10030	2.5 ± 1.2	2.4 ± 0.2	1.8 ± 0.2
W00330	N10050	A	3.8 ± 0.2	1.3 ± 0.3
W00330	N10070	A	3.0 ± 0.2	0.9 ± 0.2
W00330	N10090	A	3.7 ± 0.2	1.1 ± 0.2
W00340	N10040	A	1.9 ± 0.2	0.5 ± 0.4
W00340	N10060	A	3.4 ± 0.2	0.9 ± 0.2
W00340	N10080	A	2.0 ± 0.2	0.7 ± 0.2
W00350	N10050	A	1.3 ± 0.1	1.3 ± 0.2
W00350	N10070	A	2.0 ± 0.2	0.8 ± 0.2
W00350	N10090	A	2.6 ± 0.2	1.0 ± 0.2
W00360	N10040	A	1.3 ± 0.2	0.7 ± 0.2

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W00360	N10060	A	1.6 ± 0.2	0.9 ± 0.2
W00360	N10080	A	2.9 ± 0.2	1.2 ± 0.2
W00370	N10050	A	0.9 ± 0.2	0.9 ± 0.2
W00370	N10070	A	3.4 ± 0.2	0.8 ± 0.3
W00370	N10090	A	2.2 ± 0.2	1.0 ± 0.2
W00380	N10060	A	1.0 ± 0.1	1.2 ± 0.2
W00380	N10080	A	2.5 ± 0.2	1.4 ± 0.2
W00380	N10100	A	2.3 ± 0.2	A
W00390	N10050	A	1.0 ± 0.1	0.5 ± 0.2
W00390	N10070	A	1.2 ± 0.2	1.1 ± 0.2
W00390	N10090	A	5.5 ± 0.3	0.8 ± 0.2
W00390	N10110	A	3.7 ± 0.2	0.6 ± 0.2
W00390	N10120	A	6.0 ± 0.3	1.0 ± 0.2
W00400	N10060	A	0.8 ± 0.1	1.2 ± 0.2
W00400	N10080	A	5.4 ± 0.4	A
W00400	N10100	A	2.7 ± 0.2	0.8 ± 0.3
W00400	N10120	A	1.5 ± 0.1	1.0 ± 0.2
W00400	N10140	A	5.2 ± 0.3	0.8 ± 0.3
W00410	N10090	A	3.8 ± 0.2	0.7 ± 0.2
W00410	N10110	A	1.4 ± 0.2	1.5 ± 0.3
W00410	N10130	A	1.1 ± 0.1	0.8 ± 0.2
W00410	N10150	4.9 ± 2.2	5.1 ± 0.3	1.4 ± 0.2
W00420	N10100	A	6.0 ± 0.3	1.2 ± 0.3
W00420	N10120	A	3.4 ± 0.2	0.7 ± 0.2
W00420	N10140	A	4.5 ± 0.2	0.8 ± 0.3
W00430	N10090	A	1.0 ± 0.1	0.9 ± 0.2
W00430	N10110	A	4.3 ± 0.2	A
W00440	N10100	3.4 ± 2.1	4.1 ± 0.3	1.3 ± 0.2
W00440	N10120	A	5.2 ± 0.3	1.2 ± 0.2
W00450	N10110	A	5.4 ± 0.3	0.7 ± 0.2
W00450	N10130	A	3.7 ± 0.2	1.0 ± 0.2
W00460	N10120	A	5.1 ± 0.3	1.7 ± 0.2
W00460	N10140	A	3.2 ± 0.2	1.0 ± 0.2
W00460	N10160	A	4.2 ± 0.2	1.4 ± 0.3
W00470	N10120	A	5.4 ± 0.3	A
W00470	N10140	A	1.2 ± 0.1	0.7 ± 0.2
W00480	N10140	A	3.0 ± 0.2	0.7 ± 0.2
W00480	N10160	A	4.0 ± 0.2	1.2 ± 0.2
W00490	N10130	A	4.8 ± 0.2	1.0 ± 0.2
W00490	N10150	A	4.7 ± 0.2	1.1 ± 0.2
W00500	N10140	A	3.7 ± 0.2	0.7 ± 0.2
W00500	N10160	A	4.3 ± 0.2	2.4 ± 0.3
W00510	N10150	A	4.7 ± 0.2	1.1 ± 0.3

TABLE 1 3 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W00520	N10150	A	6.6 ± 0.3	0.8 ± 0.2
W00520	N10160	A	4.2 ± 0.2	0.8 ± 0.3
W00530	N10150	A	6.0 ± 0.3	1.1 ± 0.2
W00530	N10170	A	3.7 ± 0.2	0.9 ± 0.2
W00540	N10160	A	4.4 ± 0.3	0.9 ± 0.2
W00550	N10170	A	8.5 ± 0.4	1.3 ± 0.3
W00560	N10160	A	4.5 ± 0.2	1.3 ± 0.2
W00570	N10170	A	5.2 ± 0.3	0.7 ± 0.3
W00580	N10180	A	6.5 ± 0.4	1.0 ± 0.3
W00580	N10190	A	5.0 ± 0.2	0.7 ± 0.2
W00590	N10170	A	4.3 ± 0.2	1.0 ± 0.2
W00600	N10180	A	4.3 ± 0.2	0.9 ± 0.2
W00600	N10200	A	7.0 ± 0.3	1.0 ± 0.3
W00610	N10190	A	5.5 ± 0.3	0.8 ± 0.3
W00620	N10180	A	2.7 ± 0.2	1.2 ± 0.2
W00620	N10200	A	4.1 ± 0.2	0.5 ± 0.2
W00630	N10190	A	11.3 ± 0.6	2.2 ± 0.6
W00630	N10210	A	4.6 ± 0.2	0.8 ± 0.2
W00640	N10200	A	4.2 ± 0.2	1.1 ± 0.2
W00650	N10190	A	0.8 ± 0.1	0.9 ± 0.2
W00650	N10210	A	5.3 ± 0.2	1.0 ± 0.2
W00660	N10200	A	2.8 ± 0.2	1.2 ± 0.2
W00660	N10220	A	3.9 ± 0.2	1.5 ± 0.2
W00670	N10210	A	3.1 ± 0.2	0.7 ± 0.2
W00670	N10220	A	3.6 ± 0.3	1.5 ± 0.3
W00670	N10230	A	4.4 ± 0.2	1.1 ± 0.2
W00680	N10240	A	4.8 ± 0.3	1.0 ± 0.2
W00690	N10210	A	3.0 ± 0.2	0.9 ± 0.2
W00690	N10230	A	2.4 ± 0.2	1.0 ± 0.2
W00700	N10220	A	4.0 ± 0.2	1.0 ± 0.3
W00700	N10240	A	3.2 ± 0.2	1.0 ± 0.2
W00710	N10230	A	3.2 ± 0.2	0.9 ± 0.2
W00720	N10240	A	3.5 ± 0.2	A
W00730	N10230	A	3.6 ± 0.2	0.9 ± 0.2
W00730	N10250	A	3.4 ± 0.2	0.9 ± 0.2
W00740	N10240	A	3.3 ± 0.2	1.2 ± 0.2
W00750	N10250	A	2.1 ± 0.1	1.6 ± 0.2
W00760	N10240	A	6.5 ± 0.3	1.1 ± 0.3
W00760	N10260	A	3.6 ± 0.2	0.9 ± 0.2
W00770	N10270	A	3.5 ± 0.2	1.1 ± 0.2
W00780	N10260	A	6.0 ± 0.3	1.2 ± 0.2
W00780	N10280	A	4.4 ± 0.2	1.3 ± 0.2
W00790	N10250	A	3.1 ± 0.5	1.2 ± 0.4

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W00790	N10270	A	4.7 ± 0.2	1.4 ± 0.2
W00800	N10260	A	2.4 ± 0.2	0.9 ± 0.2
W00800	N10280	A	5.0 ± 0.3	1.0 ± 0.3
W00810	N10270	A	5.7 ± 0.3	A
W00810	N10290	A	3.6 ± 0.2	1.3 ± 0.2
W00820	N10260	4.9 ± 1.3	1.0 ± 0.1	1.1 ± 0.2
W00820	N10280	A	6.2 ± 0.3	1.2 ± 0.4
W00820	N10300	A	1.7 ± 0.1	1.3 ± 0.2
W00830	N10270	A	3.1 ± 0.2	0.7 ± 0.2
W00830	N10290	A	6.1 ± 0.3	1.1 ± 0.3
W00840	N10280	A	6.5 ± 0.3	0.6 ± 0.2
W00840	N10300	A	2.5 ± 0.2	1.0 ± 0.2
W00850	N10290	A	2.9 ± 0.2	1.2 ± 0.2
W00850	N10310	A	3.7 ± 0.2	1.1 ± 0.2
W00860	N10300	A	3.9 ± 0.2	1.1 ± 0.5
W00870	N10280	A	1.0 ± 0.4	A
W00870	N10290	A	4.6 ± 0.2	1.0 ± 0.2
W00870	N10310	A	7.5 ± 0.4	1.0 ± 0.3
W00880	N10280	A	2.0 ± 0.4	A
W00880	N10300	A	4.7 ± 0.3	1.0 ± 0.3
W00880	N10320	A	3.5 ± 0.2	0.7 ± 0.2
W00890	N10310	A	4.6 ± 0.3	0.7 ± 0.2
W00900	N10300	A	2.0 ± 0.2	0.9 ± 0.2
W00900	N10320	A	4.1 ± 0.3	0.9 ± 0.2
W00910	N10310	A	3.9 ± 0.2	1.0 ± 0.2
W00910	N10330	A	3.9 ± 0.2	0.6 ± 0.2
W00920	N10300	A	1.8 ± 0.1	0.7 ± 0.2
W00920	N10320	A	4.3 ± 0.2	0.8 ± 0.3
W00920	N10340	A	1.1 ± 0.3	0.8 ± 0.4
W00930	N10330	A	2.1 ± 0.5	A
W00940	N10320	A	3.5 ± 0.2	0.8 ± 0.2
W00940	N10340	A	1.0 ± 0.4	A
W00950	N10330	A	3.0 ± 0.6	A
W00950	N10350	A	4.5 ± 0.2	1.0 ± 0.2
W00960	N10340	A	7.2 ± 0.3	A
W00970	N10330	A	0.9 ± 0.1	0.6 ± 0.2
W00970	N10350	A	3.6 ± 0.2	1.6 ± 0.2
W00980	N10340	A	4.2 ± 0.2	1.0 ± 0.2
W00980	N10360	A	3.0 ± 0.2	1.0 ± 0.2
W00990	N10350	A	1.6 ± 0.4	A
W00990	N10370	A	4.7 ± 0.2	0.6 ± 0.2
W01000	N10340	A	1.1 ± 0.1	1.6 ± 0.2
W01010	N10360	A	3.6 ± 0.2	0.5 ± 0.2

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W01010	N10370	A	3.2 ± 0.2	0.8 ± 0.2
W01020	N10360	A	2.6 ± 0.2	1.1 ± 0.2
W01020	N10380	A	3.0 ± 0.2	1.3 ± 0.2
W01030	N10370	A	3.8 ± 0.2	0.8 ± 0.2
W01040	N10360	A	3.1 ± 0.2	A
W01040	N10380	A	2.8 ± 0.2	0.9 ± 0.1
W01050	N10370	A	3.5 ± 0.2	1.1 ± 0.2
W01050	N10390	A	3.5 ± 0.2	0.6 ± 0.2
W01060	N10380	A	3.9 ± 0.2	1.0 ± 0.2
W01060	N10400	A	2.8 ± 0.2	0.9 ± 0.2
W01070	N10390	A	3.7 ± 0.2	0.6 ± 0.2
W01080	N10380	A	3.3 ± 0.2	0.7 ± 0.2
W01080	N10400	A	4.8 ± 0.2	1.0 ± 0.2
W01090	N10390	A	3.2 ± 0.2	0.7 ± 0.2
W01090	N10410	A	4.0 ± 0.2	0.5 ± 0.2
W01100	N10380	A	3.9 ± 0.2	0.7 ± 0.3
W01100	N10400	A	2.4 ± 0.2	1.0 ± 0.2
W01100	N10420	A	3.0 ± 0.2	0.9 ± 0.2
W01110	N10390	A	0.7 ± 0.1	0.6 ± 0.2
W01110	N10410	A	5.1 ± 0.3	0.6 ± 0.2
W01120	N10420	A	3.6 ± 0.2	1.0 ± 0.2
W01120	N10490	A	3.6 ± 0.2	0.8 ± 0.2
W01130	N10410	A	3.3 ± 0.2	1.2 ± 0.2
W01130	N10430	A	2.6 ± 0.2	0.8 ± 0.2
W01140	N10420	A	3.4 ± 0.2	1.4 ± 0.2
W01150	N10410	A	3.6 ± 0.2	0.7 ± 0.2
W01150	N10430	A	5.0 ± 0.2	A
W01160	N10420	A	3.2 ± 0.2	0.8 ± 0.2
W01160	N10440	A	4.6 ± 0.2	1.3 ± 0.2
W01170	N10410	A	0.9 ± 0.1	0.9 ± 0.1
W01170	N10430	A	4.5 ± 0.2	0.7 ± 0.2
W01170	N10450	A	2.1 ± 0.2	0.9 ± 0.1
W01180	N10420	A	1.4 ± 0.1	1.1 ± 0.2
W01180	N10440	A	2.8 ± 0.2	1.0 ± 0.2
W01180	N10460	A	0.8 ± 0.1	1.0 ± 0.2
W01190	N10430	A	2.9 ± 0.2	0.7 ± 0.2
W01190	N10450	A	4.9 ± 0.2	0.7 ± 0.2
W01200	N10440	A	3.0 ± 0.2	0.6 ± 0.3
W01200	N10460	A	1.5 ± 0.1	0.7 ± 0.2
W01210	N10450	A	3.9 ± 0.2	A
W01220	N10440	A	3.3 ± 0.2	0.9 ± 0.2
W01220	N10460	A	13.7 ± 0.5	2.4 ± 0.6
W01230	N10450	6.0 ± 2.2	5.3 ± 0.3	0.7 ± 0.2

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W01230	N10470	A	4.7 ± 0.2	1.7 ± 0.2
W01240	N10460	A	5.8 ± 0.3	1.0 ± 0.2
W01240	N10480	A	3.9 ± 0.2	1.3 ± 0.2
W01250	N10450	A	1.0 ± 0.1	1.0 ± 0.2
W01250	N10470	A	4.9 ± 0.2	0.7 ± 0.2
W01260	N10460	A	1.2 ± 0.1	0.6 ± 0.2
W01260	N10480	A	3.7 ± 0.2	0.8 ± 0.2
W01270	N10470	A	3.2 ± 0.2	1.1 ± 0.2
W01270	N10490	A	5.4 ± 0.3	0.9 ± 0.2
W01280	N10480	A	4.2 ± 0.2	1.2 ± 0.2
W01280	N10500	A	4.5 ± 0.2	1.3 ± 0.2
W01290	N10470	A	3.2 ± 0.2	1.1 ± 0.2
W01290	N10490	A	6.4 ± 0.3	1.3 ± 0.2
W01300	N10480	A	3.4 ± 0.2	0.6 ± 0.2
W01300	N10500	A	4.3 ± 0.2	1.9 ± 0.2
W01310	N10490	A	4.5 ± 0.2	1.0 ± 0.2
W01310	N10510	A	3.6 ± 0.2	1.2 ± 0.2
W01320	N10480	A	1.1 ± 0.1	0.7 ± 0.1
W01320	N10500	A	4.5 ± 0.2	1.8 ± 0.2
W01330	N10490	1.7 ± 1.1	1.1 ± 0.1	0.8 ± 0.2
W01330	N10510	A	3.9 ± 0.2	1.0 ± 0.2
W01340	N10500	A	3.7 ± 0.2	0.9 ± 0.2
W01340	N10520	A	4.3 ± 0.2	0.8 ± 0.2
W01350	N10490	A	0.8 ± 0.1	1.0 ± 0.2
W01350	N10510	A	3.7 ± 0.2	1.0 ± 0.2
W01360	N10500	A	4.6 ± 0.2	1.1 ± 0.2
W01360	N10520	A	4.4 ± 0.2	1.4 ± 0.2
W01370	N10510	A	4.6 ± 0.2	1.2 ± 0.2
W01370	N10530	A	5.0 ± 0.2	1.2 ± 0.3
W01380	N10500	A	2.7 ± 0.2	0.7 ± 0.2
W01380	N10520	A	4.1 ± 0.2	0.6 ± 0.2
W01380	N10540	A	2.8 ± 0.4	0.7 ± 0.3
W01390	N10510	A	4.4 ± 0.2	0.9 ± 0.3
W01390	N10530	A	4.8 ± 0.2	0.8 ± 0.2
W01400	N10520	A	3.3 ± 0.2	1.2 ± 0.2
W01400	N10540	A	3.2 ± 0.2	0.7 ± 0.2
W01410	N10510	A	0.7 ± 0.1	0.9 ± 0.2
W01410	N10530	A	4.0 ± 0.2	0.5 ± 0.2
W01410	N10550	A	2.8 ± 0.2	0.9 ± 0.2
W01420	N10520	A	4.0 ± 0.2	0.8 ± 0.2
W01420	N10540	2.7 ± 1.6	3.9 ± 0.2	1.5 ± 0.2
W01430	N10530	A	5.5 ± 0.3	0.8 ± 0.2
W01430	N10550	A	4.2 ± 0.2	1.6 ± 0.2

TABLE 13 (continued)

Grid Coordinates		Concentrations (pCi/g ± /- 1 sigma)		
E, W	N, S	Uranium-238	Radium-226	Thorium-232
W01430	N10560	A	3.2 ± 0.2	A
W01440	N10540	A	4.4 ± 0.2	1.3 ± 0.2
W01450	N10530	A	1.4 ± 0.1	0.9 ± 0.2
W01450	N10550	A	3.2 ± 0.2	1.4 ± 0.2

'A' denotes less than detectable activity.

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Unexcavated Area

Excerpt from Post-Remedial Action Report for the Niagara Falls Storage Site Vicinity Properties 1983 and 1984

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3.0 RADIOLOGICAL ASSESSMENT

To assess the potential radiological effects from the unexcavated portion of the CDD, all reasonable exposure pathways to man were considered. Only those determined to be realistic were calculated.

3.1 SOURCE TERMS

Radioactivity in the sediment and water of the unexcavated portion of the CDD constitute the source terms. While soil samples collected were not analyzed for thorium-230, this radionuclide was assumed to be in equilibrium with its radium-226 daughter. During 1985, 60 soil samples were taken along the ditch, 30 at a depth of 0 to 15 cm (0 to 6 in.) and 30 at a depth of 15 to 30 cm (6 to 12 in.). The average radium-226 and thorium-230 concentrations in the soil at each of these depths are presented in Table 3-1. Quarterly water samples were taken at each of two locations in the ditch during 1984-85; the annual average radium-226 and thorium-230 concentrations in the water are presented in Table 3-2.

3.2 METHODOLOGY AND RESULTS OF EXTERNAL RADIATION DOSE CALCULATIONS

3.2.1 External Dose from Contaminated Sediment

The methodology for calculating external radiation dose from contaminated ground was based on the dose conversion factors calculated by Kocher and Sjoreen (Ref. 8). The dose conversion factors for contamination in soil are for exposures 1 m (3 ft) from the ground. The contamination is assumed to be uniformly distributed to an infinite depth and lateral extent. The dose conversion factors for radionuclides distributed in the soil will depend on the density of the soil, which in this case was assumed to be 1.5 g/cm^3. Other parameters considered in the calculations were an occupancy factor (average fraction of time the individual is

TABLE 3-1

AVERAGE CONCENTRATION OF RADIONUCLIDES IN SEDIMENT IN THE UNEXCAVATED SECTION OF THE CDD

Depth (cm/in.)	Average Concentration (pCi/g)*	
	Thorium-230**	Radium-226
0-15 / 0-6	6.1	6.1
15-30 / 6-12	3.6	3.6

*Source: ANL (Ref. 3).

**Thorium-230 is assumed to be in equilibrium with its radium-226 daughter.

TABLE 3-2

AVERAGE CONCENTRATION OF DISSOLVED RADIONUCLIDES IN CDD WATER

Year	Average Concentration (pCi/l)*	
	Thorium-239**	Radium-226
1984	0.35	0.35
1985	0.30	0.30
1984-85 Average	0.33	0.33

*Source: BNI (Refs. 9 and 10)

**Thorium-230 is assumed to be in equilibrium with its radium-226 daughter.

exposed to the source); an area factor (fraction of the area contributing to the external exposure) (Ref. 11); and a depth factor. The latter is the ratio of the external exposure from a layer of contamination of known thickness and cover depth to the external exposure from a layer of contamination of infinite thickness and no cover. In this case, no cover materials are present. Since averaging the radionuclide concentration over the entire thickness of the contaminated zone [30 cm (12 in.)] would give a lower dose, doses were calculated separately for the 0-to-15-cm (0-to-6-in.) and 15-to-30-cm (6-to-12-in.) depths, using the appropriate depth factor for each. The resulting doses were then summed for the total dose from external gamma radiation. Details of the calculation are presented in Appendix A.

Radium-226 would contribute the highest potential dose from the external gamma radiation pathway to a youth playing in the CDD. During periods of dry weather, some of the sediment in the bottom of the channel is left exposed. It is assumed that a youth might spend 2 h/day during the summer (for a total of 180 h/yr) playing in the ditch. The total external dose received would be 1.1 mrem/yr (see Table 3-3). Since the CDD is not used for other recreational purposes, this exposure scenario represents the maximum potential dose from exposure to the sediments.

The calculation in Appendix A is for the dose rate at the "standard" 1 m (3 ft) above the ground. For the above scenario, the height of 1 m (3 ft) would seem too far above the ground to be appropriate for the dose to a youth. To determine the increase in dose at a height of 0.5 m (1.6 ft), two different calculations were used. First, the percentage increase was calculated using the formula for an infinite plane source. Second, equations were used for a rectangular source plane with dimensions approximating the ditch, assuming it to be 8 m (26 ft) wide and 40 m (131 ft) long. The percentage increases were 23 and 39, respectively. Using the latter value, the external dose at 0.5 m (1.6 ft) would be 1.6 mrem/yr instead of 1.1 mrem/yr. Since the difference is not significant compared with a yearly dose limit of 100 mrem/yr, the 1.1 mrem/yr factor will be used because it

TABLE 3-3

SUMMARY OF COMMITTED EFFECTIVE DOSE EQUIVALENTS RESULTING FROM ENVIRONMENTAL PATHWAYS EXPOSURES TO THE UNEXCAVATED CDD

Pathway	Committed Effective Dose Equivalent (mrem/yr)		
	Thorium-230	Radium-226	Total
External Exposure	1.0×10^{-4}	1.1	1.1
Internal Exposure			
Milk Intake	5.1×10^{-6}	1.2×10^{-3}	1.2×10^{-3}
Beef Intake	5.5×10^{-5}	2.9×10^{-3}	3.0×10^{-3}
Fish Intake	2.9×10^{-4}	1.3×10^{-2}	1.3×10^{-2}
Total	0.001	1.2	1.2

represents the standard approach for calculating dose rate at 1 m (3 ft) from the ground surface.

3.2.2 External Dose from Contaminated Water

Any dose received from direct exposure to the water is insignificant for several reasons: (1) the volume of water is small, (2) the water contains concentrations of radium-226 and thorium-230 lower than the DOE concentration guides for release for unrestricted use, and (3) no recreational use is made of the CDD (e.g., boating or swimming).

3.2.3 External Dose from Dredged Sediments

A scenario of dredging the CDD and using the excavated soil from the ditch as topsoil for a building lot along the bank was also considered. Since concentrations of the radionuclides in the ditch are very near those permitted by the generic guidelines for residual contamination, physical handling during dredging activities would dilute the contamination to concentrations below these guideline values. Nevertheless, the dredging scenario was considered the most realistic of the scenarios evaluated and therefore was used as the basis for developing the supplemental guideline.

3.3 METHODOLOGY AND RESULTS OF INTERNAL RADIATION DOSE CALCULATIONS

The methodology for calculating internal dose from the ingestion of radionuclides was based on detailed information from Killough and McKay (Ref. 12) and the U.S. Nuclear Regulatory Commission Regulatory Guide 1.109 (Ref. 13).

The dose conversion factors used in the calculations represent the effective committed dose equivalent per unit intake of radionuclide by the ingestion pathway. The dose conversion factors are taken from ORNL/NUREG/TM-19/V3 (Ref. 14) and are based on information in

Publication 30 of the International Committee on Radiation Protection (Ref. 15). The dose conversion factors are listed in Table A-1 of Appendix A.

Other parameters used in the dose calculations are shown in Tables A-2 through A-5 of Appendix A. Stable element transfer factors for milk and meat are taken from NUREG-0707 (Ref. 16), animal (cattle) consumption rates are taken from Regulatory Guide 1.109 (Ref. 13), and food (milk, beef, and fish) intake patterns for man are taken from Report No. 76 of the National Council on Radiation Protection (Ref. 17). The bioaccumulation factors for freshwater fish are taken from DOE/TIC/11468 (Ref. 18).

3.3.1 Internal Dose from Ingestion of Stream Water

Internal exposure from water consumption does not occur since water from the CDD is not used for drinking. Furthermore, the actual radionuclide concentrations are below those specified by DOE concentration guides for release of water for unrestricted use. If a person did take all of his drinking water from the ditch, his dose for a year's intake would be only 0.73 mrem. Consequently, the scenario of ditch water infiltrating into groundwater is also an insignificant dose pathway.

3.3.2 Internal Dose from Drinking Milk

A farmer in the area could theoretically receive all of his daily intake of milk from cows that obtain water only from the CDD. The committed effective dose equivalent from this pathway would be 0.0012 mrem/yr (see Table 3-3).

3.3.3. Internal Dose from Eating Beef

Assuming hypothetically that beef cattle grazing in the area could obtain their yearly intake of drinking water from the CDD and that a local resident could receive his yearly intake of beef from this source, the committed effective dose equivalent from this pathway would be 0.003 mrem/yr (see Table 3-3).

3.3.4 Internal Dose from Eating Fish

Although fishing is not commonly practiced along the CDD, the conservative assumption was made that during most of the year, fresh fish could be taken from the CDD and would provide the entire dietary intake for a local fisherman. The committed effective dose equivalent from this pathway would be 0.013 mrem/yr (see Table 3-3).

3.3.5 Internal Dose from Inhaling Resuspended Dust

The low concentrations of radionuclides in the CDD, maximum mass loading of dust in air, moist condition of the streambed, and presence of vegetation along the bank, combine to render this exposure pathway insignificant. Occupancy factors near the ditch are low, and atmospheric dispersion of dust leaving the vicinity of the ditch further reduces airborne radionuclide concentrations to immaterial levels.

3.3.6 Internal Dose from Ingesting Crops

Irrigation and airborne deposition are two mechanisms by which crops could accumulate radionuclides that could be ingested by an individual.

Airborne deposition is not a realistic pathway for the same reasons as those listed in Subsection 3.3.5. There is no known use of the CDD as a source of irrigation water. However, since radionuclide concentrations in the water are below those specified by DOE guidelines for unrestricted release, the water could be used for unrestricted purposes without contributing significantly to dose.

3.3.7 Internal Dose from Radon Inhalation

Since radon gas is generated by the radioactive decay of radium-226, inhalation of the gas was considered as an internal exposure pathway. However, because concentrations of radium in the ditch sediments are low and because, in this case, radon can disperse freely into the atmosphere, no appreciable dose from this pathway is foreseen.

3.3.8 Use of the CDD by a Resident

The scenario of a house being built over a section of the CDD was considered. For this scenario, the assumption was made that the ditch would be either rerouted and filled with soil or routed through a covered culvert. Given these assumptions, the effects of this exposure pathway is reduced by several orders of magnitude.

4.0 SUMMARY AND DISCUSSION

Several exposure pathways were evaluated to develop a residual contamination guideline specifically for the CDD. This guideline will supplement the generic FUSRAP remedial action guidelines of 5 pCi/g and 15 pCi/g for radium-226 in surface and subsurface soil, respectively.

Of the exposure pathways evaluated, the scenario considered most realistic was that in which a residence was built on sediments that had been dredged from the ditch and spread along the bank.

Table 3-3 presents a summary of the potential doses associated with living near the section of the CDD along which no remedial action was performed. The total dose from the sediments in the ditch via all pathways is approximately 1.2 mrem/yr. This dose was received primarily from radium-226, the average concentration of which was 6.1 pCi/g, which equates to a dose factor of 0.2 mrem/yr per pCi/g. The dose from thorium-230 did not contribute significantly to the total dose. The external exposure pathway accounts for approximately 1.2 percent of the DOE radiation protection standard of 100 mrem/yr. Based on this analysis, the basic dose limit of 100 mrem/yr would not be exceeded unless radium-226 concentrations in the sediments exceeded 500 pCi/g.

However, use of a supplemental guideline as high as 500 pCi/g is not realistic based on the dredging scenario described above. Rather, calculation of the supplemental guideline was based on the predicted dilution that would occur as a result of spreading the sediments along the bank.

The assumptions made in calculating the supplemental guideline were: (1) the NFSS waste containment facility would not be the source of any increase in radionuclide concentrations in the CDD since modelling studies have shown no contaminant migration from the facility during its 50-yr design life and no migration off-site for 10,000 years (Ref. 19); (2) the streambed in the CDD is 8 m wide; (3) contamination extends to a depth of 15 cm in the sediments in the ditch; (4) spoils from dredging the ditch would be spread evenly over a 30-m-wide area adjacent to the ditch.

Given the above assumptions and the topography of the CDD, calculations showed that the contamination in the sediments would be diluted by a factor of 4 when spread along the bank. The supplemental guideline was therefore set at 20 pCi/g, four times the generic remedial action guideline of 5 pCi/g for radium-226 in surface soil.

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APPENDIX A

METHODOLOGY AND PARAMETERS USED IN DOSE CALCULATIONS FOR DEVELOPING SUPPLEMENTAL RESIDUAL CONTAMINATION GUIDELINE FOR THE NFSS CENTRAL DRAINAGE DITCH

APPENDIX A

METHODOLOGY AND PARAMETERS USED IN DOSE CALCULATIONS FOR DEVELOPING SUPPLEMENTAL RESIDUAL CONTAMINATION GUIDELINE FOR THE NFSS CENTRAL DRAINAGE DITCH

DOSE CALCULATIONS

External Dose

Dose = concentration of radionuclide in soil (pCi/g) x density of soil (g/cm^3) x occupancy factor x area factor x depth factor x dose conversion factor (mrem/yr)/(pCi/cm^3)

where:

- o The density factor (g/cm^3) is included in order to convert the dose conversion factor (mrem/yr)/(pCi/cm^3) to (mrem/yr)/(pCi/g).
- o The occupancy factor is a unitless factor that gives the average fraction of time the individual spends exposed to the radiation source.
- o The area factor can be obtained by interpretation of data from NUREG/CR-3620 (Ref. 1).
- o The depth factor is the ratio of the external exposure from a layer of contamination of known thickness and cover depth to the exposure from a layer of contamination of infinite thickness and no cover.

1. Dose from drinking milk contaminated by a cow drinking contaminated stream water:

Dose (mrem/yr) = 0.33 pCi/l (average concentration of radium-226 in water) x 60 l/day (water intake by cow) x 4.5 10^{-4} days/l (milk transfer factor) x 0.26 l/day (milk intake by man) x 365 days/yr x 1.38 x 10^{-3} mrem/pCi (dose conversion factor for radium-226 ingestion) = 1.2 x 10^{-3} mrem/yr.

2. Dose from eating beef contaminated by cattle drinking stream water:

Dose (mrem/yr) = 0.33 pCi/l (average concentration of radium-226 in water) x 50 l/day (water intake by cattle) x 4 x 10^{-3} days/kg (flesh transfer factor) x 8.6 10^{-2} kg/day (beef intake by man) x 365 days/yr x 1.38 x 10^{-3} mrem/pCi (dose conversion factor for radium-226 ingestion) = 2.9 x 10^{-3} mrem/yr.

3. Dose from eating fish caught in contaminated stream:

Dose (mrem/yr) = 0.33 pCi/l divided by 1000 g/l x 5.0 x 10' (bioaccumulation factor) x 5.4 x 10^{2} g/yr (fish intake) x 1.38 x 10^{-3} mrem/pCi (dose conversion factor) = 1.3 x 10^{-2} mrem/yr.

4. External dose to youth playing in Central Drainage Ditch for 180 h/yr:

   a. Dose from contamination at a depth of 0 to 15 cm (0 to 6 in.):

   Dose (mrem/yr) = 6.1 pCi/g (concentration of radium-226 in soil) x 1.5 g/cm^3 (density of soil) x 0.02 (occupancy factor) x 0.61 (area factor) x 0.79 (depth factor) x 11.2 mrem/yr/pCi/cm^3 (dose conversion factor) = 9.9 x 10^{-1} mrem/yr.

b. Dose from contamination at a depth of 15 to 30 cm (6 to 12 in.):

Dose (mrem/yr) = 3.6 pCi/g (concentration of radium-226 in soil) x 1.5 g/cm^3 (density of soil) x 0.02 (occupancy factor x 0.61 (area factor) x 0.21 (depth factor) x 11.2 $(mrem/yr)/pCi/cm^3$) = 1.5 x 10^{-1} mrem/yr

c. Total dose from external exposure:

Total dose = 9.9 x 10^{-1} mrem/yr (dose from 0 to 15 cm) + 1.5 x 10^{-1} mrem/yr (dose from 15 to 30 cm) = 1.14 mrem/yr

Internal Dose

1. Dose from drinking milk contaminated by a cow drinking contaminated water:

Dose (mrem/yr) = concentration of radionuclide in water (pCi/l) x water intake by cow (l/day) x 365 days/yr x dose conversion factor (mrem/pCi)

2. Dose from eating beef contaminated by cattle drinking contaminated water:

Dose (mrem/yr) = concentration of radionuclide in water (pCi/l) x water intake by cattle (l/day) x flesh transfer factor (days/kg) x beef intake by man (kg/day) x 365 days/yr x dose conversion factor (mrem/pCi)

3. Dose from eating fresh fish caught in the stream:

Dose (mrem/yr) = concentration of radionuclide in water (pCi/l)/1000 g/l x bioaccumulation factor for fresh fish x fish intake by man (g/yr) x dose conversion factor (mrem/pCi)

PARAMETERS

TABLE A-1

DOSE CONVERSION FACTORS

Radionuclide	Internal Dose (mrem/pCi) Committed Dose Equivalent*	External Dose** (mrem/yr)/(pCi/cm^3)
Radium-226	1.38×10^{-3}	11.2
Thorium-230	5.48×10^{-4}	1.42×10^{-3}

*Reference 2.

**Reference 3. Based on a soil density of 1.5 g/cm^3.

TABLE A-2

TRANSFER FACTORS (STABLE ELEMENT)*

Radionuclide	Milk (days/l)	Meat (days/kg)
Radium-226	4.5×10^{-4}	4.0×10^{-3}
Thorium-230	5.0×10^{-6}	2.0×10^{-4}

*Reference 4.

TABLE A-3

ANIMAL CONSUMPTION RATES*

Animal	Water Intake (liters/day)
Milk Cow	60
Beef Cattle	50

*Reference 5.

TABLE A-4

BIOACCUMULATION FACTOR FOR RADIONUCLIDES*

Aquatic Food (Fresh Fish)	Factor
Radium-226	50
Thorium-230	50

*Reference 6.

TABLE A-5

DIETARY PARAMETERS FOR MAN

(GREATER THAN 18 YEARS OF AGE)*

Food	Intake
Milk	261 ml/day
Beef	86 g/day
Fresh Fish	1.48 g/day

*Reference 6.

APPENDIX A

REFERENCES

1. Pacific Northwest Laboratory. Intruder Dose Pathway Analysis for Onsite Disposal of Radioactive Waste: The ONSITE/MAX1 Computer Program, NUREG/CR-3620, Washington, DC, October 1984.

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Verification Data

Excerpt from Verification of 1983 and 1984 Remedial Actions Niagara Falls Storage Site Vicinity Properties, Lewiston, New York, December 1989

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VERIFICATION
OF
1983 AND 1984 REMEDIAL ACTIONS
NIAGARA FALLS STORAGE SITE
VICINITY PROPERTIES
LEWISTON, NEW YORK

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Formerly Utilized Sites - Remedial Action Program

FINAL REPORT

December 1989

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TABLE 17

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM THE WEST DRAINAGE DITCH
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a]		Radionuclide Concentrations (pCi/g)		
N	W	Ra-226	U-238	Th-232
614	145	3.1 ± 0.3[b]	2.3 ± 0.8	0.9 ± 0.5
814	145	1.0 ± 0.3	<0.6	1.0 ± 0.4
1014	145	1.4 ± 0.3	<0.8	1.3 ± 0.4
1214	145	0.8 ± 0.2	0.7 ± 0.5	0.9 ± 0.5
1414	145	1.0 ± 0.3	<0.6	0.9 ± 0.4
1614	145	3.1 ± 0.4	2.1 ± 1.7	0.7 ± 0.5
1814	60	1.2 ± 0.3	2.2 ± 1.8	1.0 ± 0.3
2024	115	0.7 ± 0.2	0.6 ± 1.4	0.8 ± 0.3
2214	127	1.7 ± 0.3	<0.9	1.0 ± 0.3
2404	-25	2.7 ± 0.3	1.1 ± 0.6	0.7 ± 0.3
2614	-120	1.3 ± 0.3	1.8 ± 1.5	1.1 ± 0.5
2814	-250	0.5 ± 0.2	1.3 ± 0.7	0.8 ± 0.3
3014	-390	0.9 ± 0.3	<0.8	1.3 ± 0.5

[a]Refer to Figure 3.
[b]Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

TABLE 18

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM THE CENTRAL DRAINAGE DITCH
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a]		Radionuclide Concentrations (pCi/g)		
N	E	Ra-226	U-238	Th-232
614	490	22.9 ± 1.0[b,c]	<1.8	0.5 ± 0.4
714	480	1.1 ± 0.2	0.6 ± 1.1	0.8 ± 0.4
814	490	1.6 ± 0.3	2.5 ± 0.6	0.8 ± 0.4
914	500	1.9 ± 0.3	<0.8	0.7 ± 0.3
1014	490	1.6 ± 0.2	0.5 ± 1.2	0.8 ± 0.2
1114	480	0.9 ± 0.2	0.8 ± 0.5	1.0 ± 0.5
1214	490	2.5 ± 0.5	<1.2	1.4 ± 0.7
1314	500	1.3 ± 0.4	<0.8	1.1 ± 0.7
1414	490	2.9 ± 0.4	1.3 ± 0.7	1.1 ± 0.5
1514	480	1.0 ± 0.2	<0.7	1.3 ± 0.5
1614	490	1.3 ± 0.3	0.9 ± 1.3	0.9 ± 0.4
1714	500	1.2 ± 0.2	1.6 ± 1.0	1.1 ± 0.3
1814	490	d	d	d
1904	480	1.2 ± 0.3	2.2 ± 1.5	0.9 ± 0.5
2014	480	0.8 ± 0.2	2.4 ± 1.2	0.9 ± 0.4
2114	460	1.0 ± 0.2	0.4 ± 0.5	1.1 ± 0.4
2214	460	1.0 ± 0.3	1.6 ± 1.5	0.9 ± 0.5
2314	460	0.9 ± 0.2	0.7 ± 1.1	1.1 ± 0.5
2414	440	0.9 ± 0.2	1.0 ± 0.6	1.2 ± 0.4
2514	420	0.9 ± 0.4	<0.8	1.2 ± 0.4
2614	420	0.9 ± 0.2	0.9 ± 0.9	0.7 ± 0.4

TABLE 18 (continued)

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM THE CENTRAL DRAINAGE DITCH
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a]		Radionuclide Concentrations (pCi/g)		
N	E	Ra-226	U-238	Th-232
2714	420	1.6 ± 0.2	0.5 ± 0.9	0.9 ± 0.4
2814	400	1.2 ± 0.3	<0.8	1.1 ± 0.4
2914	380	1.5 ± 0.4	<0.5	0.8 ± 0.4
3014	390	0.8 ± 0.2	0.9 ± 0.8	1.1 ± 0.3
3114	400	1.2 ± 0.2	<0.7	1.1 ± 0.4
3214	390	1.0 ± 0.2	1.5 ± 1.3	1.1 ± 0.4
3304	380	0.9 ± 0.3	0.8 ± 0.8	1.0 ± 0.3
3414	390	0.9 ± 0.3	<0.7	0.8 ± 0.3
3514	400	0.8 ± 0.2	1.1 ± 1.2	0.6 ± 0.2
3614	390	1.1 ± 0.2	1.5 ± 0.8	0.9 ± 0.3
3714	380	4.2 ± 0.5	<1.0	1.0 ± 0.5
3814	390	1.1 ± 0.3	<0.8	1.0 ± 0.4
3914	400	0.7 ± 0.2	0.7 ± 1.5	0.8 ± 0.4
4014	390	1.0 ± 0.3	0.7 ± 0.7	0.8 ± 0.5
4114	380	2.3 ± 0.4	<0.9	1.1 ± 0.5
4214	390	1.0 ± 0.3	1.7 ± 3.3	1.1 ± 0.3
4314	400	0.8 ± 0.3	<0.8	1.1 ± 0.5
4414	390	1.3 ± 0.3	1.5 ± 0.6	1.1 ± 0.5
4514	380	1.3 ± 0.3	1.2 ± 1.1	0.7 ± 0.5
4614	390	1.1 ± 0.3	<0.8	1.4 ± 0.6
4714	400	0.8 ± 0.2	1.2 ± 0.8	0.9 ± 0.4

TABLE 18 (continued)

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM THE CENTRAL DRAINAGE DITCH
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a]		Radionuclide Concentrations (pCi/g)		
N	E	Ra-226	U-238	Th-232
4814	390	1.3 ± 0.3	1.0 ± 1.7	1.1 ± 0.5
5138	380	0.9 ± 0.2	0.8 ± 1.1	1.0 ± 0.5
5466	390	0.9 ± 0.2	0.8 ± 1.0	0.8 ± 0.3
5794	400	1.2 ± 0.3	<0.8	1.0 ± 0.3
6122	390	1.3 ± 0.3	<0.5	0.7 ± 0.3
6450	380	0.6 ± 0.2	1.0 ± 0.4	0.8 ± 0.3
6778	390	1.3 ± 0.3	<0.7	0.7 ± 0.3
7106	400	0.8 ± 0.2	1.1 ± 1.0	0.9 ± 0.3
7434	390	1.4 ± 0.2	1.7 ± 1.6	1.2 ± 0.4
7762	380	0.6 ± 0.2	0.8 ± 1.3	0.8 ± 0.4
8090	390	4.3 ± 0.5	<0.7	0.7 ± 0.9
8418	400	1.2 ± 0.2	0.5 ± 0.4	0.9 ± 0.5
8746	390	2.6 ± 0.5	<1.4	0.7 ± 0.7
9074	380	2.0 ± 0.4	1.1 ± 2.0	1.3 ± 0.5
9402	390	0.9 ± 0.3	1.8 ± 0.7	1.1 ± 0.4
9730	400	1.0 ± 0.2	1.0 ± 0.9	0.7 ± 0.4
10058	390	4.0 ± 0.5	<1.0	1.0 ± 0.6
9905	275	1.7 ± 0.3	<0.6	0.7 ± 0.5
9950	80	1.8 ± 0.3	0.4 ± 0.6	1.1 ± 0.5

TABLE 18 (continued)

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM THE CENTRAL DRAINAGE DITCH
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Location[a]		Radionuclide Concentrations (pCi/g)		
N	E	Ra-226	U-238	Th-232
10010	-85	3.3 ± 0.5	<1.0	1.0 ± 0.4
10030	-240	2.2 ± 0.3	3.4 ± 1.6	1.0 ± 0.7
10100	-400	0.9 ± 0.2	0.9 ± 0.9	1.0 ± 0.3
10140	-475	2.2 ± 0.3	<0.9	1.4 ± 0.5

[a]Refer to Figure 3.
[b]Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.
[c]Application of the hot spot criteria results in meeting the DOE guidelines.
[d]No sampling due to high water level.

TABLE 1 (continued)

RESULTS OF CONFIRMATORY ANALYSES ON SOIL SAMPLES
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Property	Sample ID[a]	Grid Location	Analysis By	Radionuclide Concentration(pCi/g)[b] Ra-226	U-238	Th-232
	63	S2320, E3660	BNI	0.6 ± 0.2	<MDA	0.7 ± 0.2
			ORAU	0.6 ± 0.2	1.1 ± 0.6	0.7 ± 0.4
	69	S2330, E3690	BNI	0.6 ± 0.2	<MDA	0.7 ± 0.2
			ORAU	0.6 ± 0.2	1.1 ± 0.6	0.7 ± 0.4
R	2	S3140, W 607	BNI	4.0 ± 0.4	<MDA	1.1 ± 0.6
			ORAU	3.8 ± 0.5	<0.8	0.5 ± 0.3
	6	S3140, W 527	BNI	1.3 ± 0.2	<MDA	<MDA
			ORAU	1.2 ± 0.3	<0.7	1.6 ± 0.5
S	3	N1305, E 885	BNI	2.8 ± 0.6	<MDA	0.9 ± 0.4
			ORAU	2.1 ± 0.3	1.5 ± 0.9	1.0 ± 0.4
V	2	N3709, E1138	BNI	0.8 ± 0.2	<MDA	1.1 ± 0.4
			ORAU	0.9 ± 0.3	6.9 ± 1.3	1.0 ± 0.5
X	312	N 640, W 410	BNI	1.2 ± 0.2	1.3 ± 3.6	0.8 ± 0.4
			ORAU	1.0 ± 0.3	4.3 ± 2.0	1.4 ± 0.4
	4	N 690, W 420	BNI	1.0 ± 0.2	<MDA	0.7 ± 0.2
			ORAU	0.9 ± 0.3	2.9 ± 1.4	0.7 ± 0.3
	9	N 710, W 400	BNI	1.1 ± 0.2	<MDA	1.3 ± 0.4
			ORAU	0.8 ± 0.2	2.1 ± 2.2	1.3 ± 0.3
West Ditch	67	N 820, W 170.5	BNI	0.9 ± 0.2	<MDA	1.2 ± 0.6
			ORAU	1.0 ± 0.2	0.3 ± 1.1	0.9 ± 0.4
	125	N1560, W 170	BNI	1.3 ± 0.4	<MDA	1.2 ± 0.6
			ORAU	1.5 ± 0.3	1.5 ± 1.3	1.0 ± 0.3
	128	N1600, W 160	BNI	<MDA	<MDA	0.9 ± 1.2
			ORAU	78.7 ± 1.8	9.3 ± 12.5	0.9 ± 1.1
	200	N2220, W 110	BNI	1.3 ± 0.4	<MDA	0.6 ± 0.4
			ORAU	1.4 ± 0.3	1.3 ± 1.1	1.1 ± 0.4
	252	W2500, E 090	BNI	1.0 ± 0.2	<MDA	0.8 ± 0.4
			ORAU	1.0 ± 0.3	2.2 ± 1.4	1.2 ± 0.4

TABLE 1 (continued)

RESULTS OF CONFIRMATORY ANALYSES ON SOIL SAMPLES
NIAGARA FALLS STORAGE SITE VICINITY PROPERTIES
LEWISTON, NEW YORK

Property	Sample ID[a]	Grid Location	Analysis By	Radionuclide Concentration(pCi/g)[b] Ra-226	U-238	Th-232
Central Ditch	142	N 660, E 480	BNI	1.3 ± 0.6	<15	1.2 ± 0.6
			ORAU	1.4 ± 0.3	<0.9	0.4 ± 0.2
	248	N1020, E 490	BNI	1.1 ± 0.2	0.8 ± 0.4	0.6 ± 0.2
			ORAU	1.1 ± 0.2	2.2 ± 0.8	0.8 ± 0.3
	469	N2160, E 461	BNI	1.0 ± 0.2	<MDA	1.0 ± 0.4
			ORAU	1.0 ± 0.2	0.7 ± 0.9	1.0 ± 0.3
	33	N5330, E 415	BNI	1.0 ± 0.2	<MDA	0.6 ± 0.2
			ORAU	0.9 ± 0.2	< 0.5	0.8 ± 0.4
	1302	N7590, E 410	BNI	0.9 ± 0.2	<MDA	1.0 ± 0.4
			ORAU	0.8 ± 0.2	2.1 ± 1.2	1.1 ± 0.3
	1761	N10190, W 650	BNI	0.8 ± 0.2	<MDA	0.9 ± 0.4
			ORAU	3.8 ± 0.5	1.8 ± 1.9	1.7 ± 0.8

[a]Sample Identification as presented in the BNI post-remedial action report.[14]
[b]Reported data includes background contributions from naturally occurring materials in soil.
[c]Uncertainties represent the 95% confidence levels, based only on counting statistics: systematic ORAU laboratory uncertainties, estimated at ± 6 to 10%, are not included in the reported values for the ORAU analyses.
[d]Reported as less than the minimum detectable activity (no values given).

Responsiveness Summary

The U.S. Department of Energy (DOE) released the *Formerly Utilized Sites Remedial Action Program Niagara Falls Storage Site Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches* on April 23, 2010, for public comment. Report availability was announced through a message to stakeholders sent on behalf of DOE by USACE. The announcement provided a 30-day comment period, closing on March 19, 2010. DOE extended the comment period to June 14, 2010, in response to multiple requests for additional time to review FUSRAP documentation.

Twenty comments were received, of which five were from one stakeholder and two from another. The following is a summary of comments received and DOE's response to each. Comments are grouped according to those addressing protectiveness and site conditions and those addressing the roles, responsibilities, and procedures followed by DOE and USACE for FUSRAP. Actual comments are provided at the end of this Responsiveness Summary.

All comments are attached in chronological order at the end of this Responsiveness Summary and numbered to correspond with the comment numbers provided in parentheses at the end of each comment summary below.

Protectiveness

Comment: One stakeholder asked DOE to demonstrate the proper remediation of portions of the Central Drainage Ditch, citing a presentation in the Community LOOW Report that showed the dose rate exceeded State of New York limits. Note: this comment was received before the subject report was issued for public comment but is included because it addresses public concerns about the safety of the remediated NFSS VPs. (Comment 1)

DOE Response: (Sent via e-mail April 8, 2009)
Thank you for contacting DOE to express your concerns about a remediated portion of the former Lake Ontario Ordnance Works. I hope to address your concerns and assure you and other nearby residents that you have access to DOE to receive answers to your questions about the work DOE performed before 1997 to control the radiological hazards that originated during the 1940s.

In your March 26, 2009, email, you included a link to a 2007 presentation that summarizes the information provided in the Post-Remedial Action Report for the Niagara Falls Storage Site Vicinity Properties – 1983 and 1984, published in December 1986. I wanted to let you know that this document is posted on the DOE Office of Legacy Management public website at http://www.lm.doe.gov; from there select site-specific documents or go directly to this document at http://csd.lm.doe.gov/PDFs/NY.17-15.pdf.

DOE will investigate this issue further by retrieving records from the remediation and searching for the exposure assumptions used for the dose calculation you provided.

DOE has coordinated this response with the U.S. Army Corps of Engineers. Questions regarding DOE activities completed prior to 1997 will be answered by DOE. USACE will respond to questions regarding post-1997 and future FUSRAP activities. DOE and USACE will jointly address concerns such as yours and determine if additional FUSRAP investigations or actions by USACE are warranted to protect human health and safety.

One of LM's primary missions is to assure environmental remedies at all LM sites remain protective of human health and the environment. We will complete the additional investigations noted above to determine if that primary mission is being met at this site. We will provide you with our findings no later than June 15, 2009. Contact information for each agency is provided below.

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FUSRAP Outreach Program
Buffalo District
1776 Niagara Street
Buffalo, NY 14207
1-800-833-6390
fusrap@usace.army.mil

Sincerely,

Christopher J. Clayton
Office of Legacy Management
Department of Energy
(202) 586-9034 - work
(202) 586-1540 - fax
christopher.clayton@hq.doe.gov

Follow-up DOE response sent by e-mail June 15, 2009:

In your e-mail correspondence of March 26, 2009, to DOE and the U.S. Army Corp of Engineers Buffalo District, you raised the following issue:

"As a mother and advocate for health and safety of our children and community, I am formally asking for proof of remediation of radiological anomalies on the drainage ditch along Lutts Rd. in the former Lake Ontario Ordinance Works site. If you do not have proof of proper remediation, I am asking for a cooperative effort among you to protect our community and remediate the radiological anomalies left by DOE. Our community in WNY has been burdened since early 1940's and it's time for real environmental justice for our community. One of the main concerns I have is the ditch along Lutts Rd that drains into the Four Mile Creek and into Lake Ontario."

On April 8, 2009, DOE responded to your e-mail, stating that DOE would review existing records and evaluate the findings in a presentation included by reference in your inquiry. DOE also included links to information about final conditions, which we hope you found useful in addressing your concerns. After careful review of the presentation, Radioactivity on the LOOW Site, by Mr. R. Harris, and Dr. M. Resnikoff, to the Community LOOW Project on June 13, 2007, and based on the existing records on the site, DOE is providing the following response.

DOE is assuming that the anomalies noted in your inquiry are the elevated concentrations detected at seven discrete sample locations in the portion of the ditch where DOE performed remediation. DOE also assumes that the data provided in the referenced presentation refer to a different portion of the ditch ("unexcavated portion") where DOE determined that remediation was not required.

In the December 1986 report, *Post Remedial Action Report for the Niagara Falls Storage Site Vicinity Properties—1983 and 1984*, DOE concludes that the anomalies in the remediated portion of the ditch and the low levels of contamination in the unexcavated portion of the ditch pose no unacceptable risk to children or adults. Assumptions in that report describe a worst-case exposure scenario along the unexcavated portion of the ditch, which entails building a residence on sediment removed from the ditch. The calculated dose is less than current guidelines for any federal or state agency. Because concentrations in the remediated portion of the ditch are much lower, the dose from exposures there would also be much lower.

The presentation you provided indicates an annual dose at the unexcavated portion of the Central Drainage Ditch to be 57.6 millirem per year. The presentation references reports concerning the cleanup but did not provide details and assumptions used in the dose calculations. DOE finds that the resulting dose estimate used in the presentation can be obtained by assuming continuous exposure (i.e., every minute of every day) to the average levels of radionuclides detected in the unexcavated portion of the ditch. In contrast, DOE's dose estimate recognized that an individual such as a child playing in the ditch would spend much less time in the ditch (DOE assumed 4 hours per day through the summer months at the area of highest concentration) and therefore would receive a lower dose of 1.2 millirem per year. The dose estimate for the remediated portion of the ditch would be much lower (based on lower average concentrations), even taking into account the several anomalous locations.

We recognize the concerns of you and your neighbors. We also recognize that the previous surveys at the site were conducted more than 20 years ago and that site conditions may have changed during that time; however, based on the existing documentation for the site, DOE believes that the remediation of the Central Drainage Ditch resulted in conditions that continue to remain protective based on reasonable exposure patterns.

DOE will continue to work with you and other stakeholders, including USACE and state agencies, to address any concerns that remain about the work DOE performed at the former Lake Ontario Ordnance Works. Please feel free to contact me at (202) 586-9034 or at Christopher.clayton@hq.doe.gov if you have questions concerning this response. If you have questions about current remediation activities, you should contact USACE at their Buffalo District office.

Sincerely,

Christopher J. Clayton
FUSRAP Manager
Office of Legacy Management
Department of Energy
(202) 586-9034
(202) 586-1540
christopher.clayton@hq.doe.gov

Comment: One stakeholder commented that the report infers that KAPL material was left on the site because the report indicated it was not eligible for remediation under FUSRAP, and asked if the KAPL waste was remediated from the completed VPs. (Comment 8)

DOE Response: Non-FUSRAP material that was co-mingled with FUSRAP material would have been remediated with the FUSRAP material. Once the FUSRAP-related material was remediated, if KAPL-SPRU–related waste was still present, this material would have been left in place. DOE reviewed the vicinity property records concerning these wastes and has concluded that KAPL material has not been identified at concentrations that would trigger assessment or remedial action. Regarding eligibility of KAPL material, DOE acknowledges that the KAPL waste stream was generated as a result of MED/AEC activities. However, this same waste stream is being remediated by the DOE Office of Environmental Management at the KAPL facility in Schenectady, NY. Therefore, USACE would have to determine if KAPL residuals at LOOW should also be addressed by this other program. If that is determined to be the case, the waste stream would not be eligible for remediation under FUSRAP.

Comment: One stakeholder asked if FUSRAP addressed contaminated groundwater. (Comment 8)

DOE Response: All eligible contamination in any environmental medium is addressed under FUSRAP. Groundwater contamination was identified on the closed-off site properties VP-H′ and VP-E′ during the assessment phase of their evaluations. USACE will address contaminated groundwater at NFSS, including any spillover onto the closed vicinity properties, as part of their remedial actions

Comment: One stakeholder asked about a 2005 USACE report that additional contamination was found on VP-H′. (Comment 18)

DOE Response: DOE has reviewed the 2005 USACE report and finds that the radiological data are insufficient to refer VP-H′ to USACE for additional assessment and, if necessary, remedial action. Therefore, DOE intends to request that USACE collect additional radiological data under Article IV of the 1999 MOU, “Further Assistance,” to determine if contamination remains that would trigger referral of the property to USACE (the MOU is posted at http://www.lm.doe.gov/pro_doc/references/framework.htm#fusrap).

Comment: One stakeholder asked if additional testing would be performed on the 30-inch water discharge line and the 42-inch water supple line. (Comment 17)

DOE Response: USACE is characterizing these lines as part of their investigation of the former LOOW.

Comment: One stakeholder asked if his son's melanoma resulted from contamination at LOOW. (Comment 16)

DOE Response: DOE regrets that it does not have public health information to address this comment. DOE has seen reports of cancer incidence rates and believes the commenter should contact county or state public health officials for guidance in answering this question. The commenter may also wish to visit the Energy Employees Occupational Illness Compensation Program website at http://www.lm.doe.gov/Office_of_Business_Operations/EEOICPA_Program.aspx.

Comment: One stakeholder provided a 1994 report of elevated gamma activity along Pletcher Road. (Comment 7)

DOE Response: DOE has reviewed Mr. Rauch’s report and concluded that the data presented corresponds to slag within the road base. Discussions with the state agencies involved with the slag issue, the New York Department of Health and Department of Environmental Quality confirm that the issue is prevalent in the area and that it is currently being addressed during road reconstruction or improvements. DOE has also reviewed a preliminary survey of Pletcher Road (Berger 1983), a report from the ORNL mobile gamma scanning of all transportation routes to the LOOW (ORNL 1984), and a report on radiological measurements taken in the Niagara Falls, New York area by ORNL in 1986 to support its determination. The levels detected by Mr. Rauch are well below DOE remediation guidelines (essentially twice background or approximately 2 pCi/g). Unless Mr. Rauch has already been in contact with the state agencies, DOE suggests that Mr. Rauch contact the New York Department of Health or the New York Department of Environmental Quality to address his concerns. If however, the state agencies determine that the material is FUSRAP related then DOE will perform the necessary evaluation to refer the areas to USACE in order to address the problem.

Comment: One stakeholder indicated that sample locations for KAPL material were incorrect because of incorrect information about historical activities; in particular, the railroad loading platforms were not properly investigated. (Comment 5)

DOE Response: KAPL storage areas located on VP-X consisted of Building 446 (former paint shop), Building 447 (former tool house), Building 448 (former Lord Electric shop), as well as the wastewater treatment plant Building 435 (former pump house) (Aerospace 1982; King, 2008). The bulk of the waste stored on VP-X consisted of combustible KAPL waste (38,500 cubic feet) located in Buildings 446 and 448. No incineration took place on the VP-X area. Additional KAPL storage and shipment took place on the property south of VP-X which is known as the Baker Smith Shops area on NFSS proper. DOE acknowledges that KAPL materials were apparently handled in the railroad loading platforms on the current VP-X and NFSS Proper boundary.

The 1984 assessment (DOE 1984) was completed in accordance with an approved survey plan (DOE 1981). Prior to the surveys, historical information was reviewed, and the surveys were designed according to waste-handling practices for each VP. This included review of available radiation characterization reports and engineering drawings and assessment data for all the VPs.

Walkover surface scans were performed over all accessible areas of the property. Records indicate the assessment did not exclude any areas on VP-X. The assessment survey consisted of beta-gamma dose rate measurements and soil sampling at each node of a 40-meter survey grid over the property, a gamma scan over the entire property, and surface soil sampling where gamma activity was elevated. Gamma anomalies were targeted with soil borings to determine vertical extent.

Four soil borings were placed along the southern boundary, including the railroad platforms area (Borings H6, H14, H15, and H16). Gamma activity measured in the boreholes indicated that contamination was limited to the upper 15 to 30 centimeters (cm) of soil. Gamma logging data were not used to quantify radionuclide concentrations in the subsurface soils because of the varying ratios of Ra-226, U-235, U-238, Cs-137, and Th-232 occurring in the soil in this area. Only borehole H15, at grid location 392S and 352W, contained a subsurface Ra-226 concentration exceeding 15 picocuries per gram (pCi/g) (17.9 pCi/g including background) at the 15-cm depth. At 30 cm below ground surface the net Ra-226 level dropped to 12.8 pCi/g. Cs-137 concentrations were within the range of background in all surface and subsurface samples.

Water grab samples from four of the boreholes contained gross alpha and beta concentrations ranging from 0.55 to 4.54 picocuries per liter (pCi/L) for gross alpha and 1.25 to 6.23 pCi/L for gross beta. Sample W-3 from the boring H6 near the southern boundary contained gross alpha of 0.55 pCi/L and gross beta of 1.25 pCi/L. All subsurface water values for the site were well below the EPA Interim Drinking Water Standard of 15 pCi/L gross alpha, 50 pCi/L gross beta, and 3 pCi/L Ra-226.

In addition, the surveys provide no indication of significant spillage along the former rail lines or the former platform areas. Data do not indicate if borings were placed in the alignment of the railroad tracks.

Post-remediation and verification samples demonstrate that U-238, Ra-226, and Th-232 concentrations were all less than the cleanup standards. Post-remediation and verification samples were not analyzed for Cs-137 because there were no elevated results identified during the assessment (Bechtel 1986; ORAU, 1989). Gamma exposure rates were less than 20 microroentgens per hour (μR/h). During the verification survey, gamma scans were performed over a large portion of the southern boundary in the area of the railroad platforms. These scans revealed no areas of elevated contact exposure rates (contact exposure rates ranged from 7 to 12 μR/h). Depth of soil removal was 0.5 feet in the areas of remediation.

After remediation was complete, surveys were performed on all haul roads and included the west and central drainage ditches to confirm that no cross contamination had occurred.

Additional information provided by the USACE RIR and Addendum reports confirms that relatively minor amounts of Cs-137 remain in the areas south of VP-X on the NFSS. (USACE 2007)

On the basis of the above information, DOE finds no indication that KAPL waste residuals remain in the railroad track or platform areas.

Processes and Procedures

Comment: Six stakeholders (one twice) asked for additional time to comment on the DOE report. (Comments 10, 11, 12, 13, 14, 15, 19)

DOE Response: In a message to stakeholders sent May 4, 2010, DOE extended the public comment period to June 14, 2010. DOE informed stakeholders that DOE would accept information about radiological conditions at any time, even after the public comment period closed. If necessary, DOE would revise the report to incorporate new information.

Text of message:

DOE to Extend Comment Period for NFSS Vicinity Properties
Review of Radiological Conditions Preliminary Report

In response to the requests of several stakeholders, the U.S. Department of Energy (DOE) will extend the public comment period for the preliminary report, *Formerly Utilized Sites Remedial Action Program, Niagara Falls Storage Site Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches*, through June 14, 2010.

DOE conducted this review in response to stakeholder inquiries concerning the completeness of the cleanup conducted by DOE at the Niagara Falls Storage Site vicinity properties. The review demonstrates that the properties are protective with regard to contamination remediated under the Formerly Utilized Sites Remedial Action Program (FUSRAP). DOE also confirmed that documentation supports the conclusions reached during the remediation of the vicinity properties. Therefore, on the basis of available information, DOE will not refer a completed vicinity property to the U.S. Army Corps of Engineers (USACE) for additional assessment. The draft report is available for review on the DOE website at http://www.lm.doe.gov/Niagara/Vicinity/Documents.aspx .

One of the objectives of this review was to solicit additional information from stakeholders to ensure that all information was considered in the review and to augment the DOE records collections for use by future custodians. The bibliography in the final report will include all information received from USACE and stakeholders. USACE documentation used in the DOE review is available on the Buffalo District website.

Completion of this report in no way reduces or limits the public's ability to comment on the radiological conditions at the completed vicinity properties or the documentation used for the review. DOE will accept information from stakeholders at any time and will address any information indicating changed radiological conditions appropriately to ensure the continued protection of human health and the environment. If new information is obtained after the report is completed that could change the report's conclusions, DOE will revise and update the report.

Thank you for your interest in supporting the DOE review of completed NFSS vicinity properties. Please forward comments to Bob Darr, SM Stoller, at bdarr@lm.doe.gov.

Comment: Five stakeholders (one twice) requested that DOE provide stakeholders an opportunity to comment on decisions to refer a completed VP to USACE for additional assessment and, if necessary, remedial action. (Comments 6, 10, 11, 12, 13, 15)

DOE response: DOE must follow the protocols set by the congressional directive assigning responsibilities under FUSRAP and in the Memorandum of Understanding between DOE and USACE. Although public participation is not addressed in the legislation or the MOU, DOE is committed to maintaining a transparent public process and posts all documents concerning FUSRAP referrals to the DOE Legacy Management website. DOE is responsible for determining whether any site meets the eligibility criteria for FUSRAP. If a site is determined to be eligible under FUSRAP, DOE then refers the potential site to USACE to determine if the contamination is eligible for remedial action under FUSRAP. DOE is reviewing the protocols for execution of FUSRAP (http://www.lm.doe.gov/default.aspx?id=874) to reflect current roles and responsibilities. As part of this review, DOE will evaluate the referral process to ensure that it includes an opportunity for stakeholder input.

Several of the preceding comments were received in a letter from U.S. Senators Schumer and Gillibrand. DOE's complete reply is attached behind their letter, which is numbered Comment 10.

Comment: One stakeholder asked twice that DOE determine Potentially Responsible Parties before referring a property to USACE. (Comments 6, 12)

DOE Response: In the 1999 MOU between DOE and USACE, Congress assigned responsibility to recover costs from Potentially Responsible Parties to USACE. Congressional action is required to change this provision.

Comment: Three stakeholders requested that DOE make all documentation available for public review. (Comments 9, 11, 14)

DOE Response: DOE provided links to documentation and informed stakeholders that DOE will provide any documentation that stakeholders cannot access from the links.

Comment: One stakeholder commented that DOE should use only appropriated funds to investigate referrals concerning contaminant migration to a completed property, a referred property should be addressed by the state if that authority exists, and it would be inappropriate to refer a property to USACE for taxpayer-financed remedial action and then try to recover costs from a responsible party. (Comment 6)

DOE Response: DOE does not respond to referred properties; rather, the Department evaluates a potential property to determine FUSRAP eligibility under the mandates of federal law and the Memorandum of Understanding with USACE and refers appropriate properties to USACE for evaluation. USACE will conduct cost recovery actions if they determine that another party is responsible for waste on a FUSRAP site.

Comment: One stakeholder commented that DOE has not provided documentation of meetings between agencies and regulators. (Comment 10)

DOE Response: DOE conducted a telephone conference with representatives of USACE, NYDEC, NYDOH, and USEPA to discuss a path forward for addressing the KAPL waste, University of Rochester waste, and slag that have impacted LOOW. DOE initiated this to try to resolve a long-standing issue for the FUSRAP portion of the LOOW, so that DOE could address any portion of this issue that was DOE's responsibility. In the meeting, the various parties affirmed their responsibilities:

- USACE was responsible for University of Rochester waste under FUSRAP.
- The State of New York was addressing the issue of slag used throughout the Niagara Falls region.
- DOE would address the KAPL waste because that waste stream was already being remediated by DOE at the KAPL Schenectady facility.

This information was presented to the public at the USACE meeting on March 24, 2010.

Comment: One stakeholder thought that KAPL and University of Rochester wastes were eligible for remediation under FUSRAP. (Comment 18)

DOE Response: DOE agrees that KAPL and University of Rochester wastes were generated as a result of MED and early AEC activities and appear to meet some eligibility criteria for FUSRAP waste. The DOE Office of Environmental Management is remediating the KAPL site in Schenectady, NY. Because KAPL waste is being addressed by another program, it appears to be ineligible for remediation under FUSRAP. USACE will address the remaining residual KAPL wastes during the Feasibility Study process. USACE will remediate University of Rochester waste as they complete remediation of the three active VPs and NFSS proper. DOE will revise the report to reflect these determinations.

Comment: One stakeholder indicated that the slag found on the former LOOW that contains naturally occurring radioactive material is a federal responsibility. (Comment 5)

DOE Response: Slag at the site contains naturally-occurring radioactive material and will be addressed by the New York State Department of Health, in conjunction with a broader effort to investigate the use of the slag in the region.

Comment: One stakeholder asked if DOE is satisfied with USACE collecting five samples to characterize KAPL waste in Building 401. (Comment 4)

DOE Response: DOE has no authority to intervene or formally comment on USACE activities.

Comment Number 1

-----Original Message-----
From: Judith Mokhiber
Sent: Thursday, March 26, 2009 2:25 PM
To:
Subject: Radiological concerns on LOOW Site
Importance: High

To: Kent D. Johnson, Engineering Geologist, NYS DEC
Thomas Papura,Environmental Radiation Specialist NYS DEC Bureau of Hazardous Waste and Radiation Management
Public Afairs Office U.S. Army Corp Buffalo District
Derick Cunningham, DOE
K. Martin, U.S. EPA Region 2

Dear Government organization representatives,

As a mother and advocate for health and safety of our children and community, I am formally asking for proof of remediation of radiological anomalies on the drainage ditch along Lutts Rd. in the former Lake Ontario Ordance Works site. If you do not have proof of proper remediation, I am asking a cooperative effort amoung you to protect our community and remediate the radiological anamalies left by DOE. Our community in WNY have been burdened since early 1940's and it's time for real environmental justice for our community.

Here is the document I am taking about.
http://www.niagaracounty.com/Health/docs/meeting3presentation3.PDF
Additional information is available on the this link:
http://communityloowproject.com/viewer.htm

The conclusion of the report compiled by Niagara County Community LOOW project specifically Dr. Resnikoff's analysis shows radiological levels above EPA guideline which is now public properties or Town of Lewiston and Porter properties.
The anamalies in the report have not been proven to be remediated along the ditch on Lutts Rd. and other areas claimed to be "certified" clean and released for public use and ownership.

One of the main concern I have is the ditch along Lutts Rd. drains into the Four Mile Creek and into Lake Ontario.

The congressional representatives, county and state representatives have been notified for action on this issue.
Project Manager (LOOW): Bill Kowalewski, U.S. Army Corp has also been notified of my concern. Mr. Kowalewski has told me DOE must be solicited to put the areas back on FUSRAP site to be cleaned up and investigated. This is my formal request for all parties to do what is necessary to clean up what was left behind and forgotten by DOE for the sake of our health and safety.

Please do not wait for elected representatives to contact you, act accordingly to your mission which is to protect the public and our environment.

Yours sincerely,

Judith Mokhiber
Member NYS Advisory Council on Children's Environmental Health and Safety and most importantly a mother

cc: President Barack Obama
The White House
1600 Pennsylvania Avenue NW
Washington, DC 20500

Comment Number 2

-----Original Message-----
From: Amy Witryol
Sent: Thursday, August 27, 2009 2:49 PM
To: Clayton, Christopher
Cc: christopher zeltmann
Subject: DOE and CWM property

Hello Chris -

Two weeks ago I asked what areas were being evaluated, and, why. Today I learned that you've already furnished some or all of your analysis of the Central Drainage Ditch and area VPs (CWM) to another member of the community.

1. Could you forward me copies of your exchanges with Ms. Mokhiber?

2. Could you forward me anything else that is relevant to CWM property? (I have all the 1980's DOE surveys and published USACE data - you may have additional draft data.)

Please do not feel the need to limit your responses to direct CWM-DOE communication.

Thank you again,

Amy

-----Original Message-----
From: Clayton, Christopher
Sent: Tuesday, August 25, 2009 2:52 PM
To: Amy Witryol
Subject: RE: LOOW FUSRAP

Amy,

As I have previously indicated, the DOE has not received anything from CWM regarding their VP's. CWM contacted both the DOJ and USACE to address their concerns. DOJ has responded and indicated that CWM should contact DOE. I have not seen the USACE response to CWM's letter.

With regard to the NFSS VP's, the only work that is scheduled is for the 3 VP's currently assigned with USACE when FUSRAP remediation was transitioned to them in 1997.

DOE did take a look at the previous surveys and subsequent remediations that were conducted at the VP's located near the Central Drainage Ditch area.

Since CWM has not contacted me, specifically, or DOE, in general, I do not know what their plans are for their VP's.

As I had previously indicated, I will keep you posted as to any new developments concerning the CWM VP's.

Thanks,

Chris

Christopher J. Clayton

Office of Legacy Management
Department of Energy

-----Original Message-----
From: Amy Witryol
Sent: Wednesday, August 12, 2009 12:18 PM
To: Clayton, Christopher
Cc: christopher Zeltmann
Subject: LOOW FUSRAP

Hello Chris -

Since our last exchange, I obtained a copy of the June 15th letter from DOJ to CWM, attached. Also attached is the original April 17, 2009 letter from CWM.

1. CWM is insisting the federal government remediate radiological contamination which CWM, not the federal government, placed in the areas identified during construction of its facilities (and in doing so may have violated state law.) In addition, CWM is presently beginning a MARSSIM survey and investigation of the same area, which will inevitably increase the amount of contamination, ergo expense it will seek to attribute to the federal government. (The survey referenced in CWM's letter was not MARSSIM compliant.)

2. Agencies have privately alluded to a DOE re-evaluation of closed vicinity properties at the LOOW - one suggested it would be completed this month. What is this evaluation? a) what areas are being evaluated and why? b) when will it be completed? c) what information is being used to conduct it? d) what decisions may be made as a result of this evaluation and when? e) will we have an opportunity to comment? any meaningful comment would depend on an understanding of the evaluation.

There are many, many other issues beyond those noted in item 1 above which may influence the allocation of federal taxpayer responsibility and CWM responsibility for radiological contamination on CWM - I would appreciate the opportunity to discuss those with DOE in advance of any decisions regarding CWM vicinity properties. [Note: With respect to the Town of Lewiston vicinity property, there has been no such soil movement or soil import by its property owner.]

I look forward to your reply.

Sincerely,

Amy Witryol

Comment Number 3

-----Original Message-----
From: Amy Witryol
Sent: Tuesday, November 03, 2009 2:01 PM
To: Clayton, Christopher
Subject: CWM and Vicinity Properties

Chris -

In the past 60 days have you had any conversations with Bill Kowlewski about radiological issues on closed vicinity properties, or your review of them?

I ask because we were just notified that DOE would be making a presentation at the Corps 12/2 public meeting about its review - so I assume you've reached some conclusions by now. What input did Bill or Corps staff provide you?

Amy

Comment Number 4

-----Original Message-----
From: Amy Witryol
Sent: Monday, February 22, 2010 8:05 AM
To: Clayton, Christopher
Cc: Gillespie, Joey; Darr, Bob
Subject: NFSS Bldg 401 - missing info

Hi Chris –

Please let me know if DOE is satisfied with five (haphazard) samples to characterize Knolls waste in the Building 401 structure proposed for demolition - attached are results from those samples. Or, if DOE is prohibited from weighing in, please advise.

Thanks,

Amy

From: Amy Witryol
Sent: Monday, February 22, 2010 9:02 AM
To: Kreusch, Arleen K LRB
Subject: Building 401 follow-up

Hi Arleen –

Could you please transmit this letter and its attachment to LTC Snead and the team?

Thank you.

Amy

Comment Number 5

Gillespie, Joey

From:	William Boeck [
Sent:	Sunday, March 21, 2010 5:59 PM
To:	Darr, Bob
Cc:	
Subject:	Radioactivity on Vicinity X (Lewiston property)
Attachments:	LewistonPropertyIssues.pdf; Comments onLewistonWWTP.doc; commentWWTPcleanup.doc

LewistonPropertyIssues.pdf (2 ... Comments onLewistonWWTP.doc (commentWWTPcleanup.doc (26 KB)...

I am unable to attend the public meeting on March 24, 2010 to discuss these issues in person. I will be at the baptism of a grandchild in California.

There is strong evidence that the 1954 survey of vicinity property X had serious omissions because the survey design ignored documentary evidence of prior activities when choosing the locations to sample for spilled radioactive materials.

I will reference three documents:
Appxf.pdf (posted by Legacy Management)
LewistonPropertyIssues.pdf (attached)
Comments on LewistonWWTP.doc (attached) these are comments for each slide in the above PDF.

a) Figure 2 on appxf page 4 omits significant locations of activities relevant for spills of radioactive materials.
Evidence:
1) Page 1 of Lewiston property and comments.
The track, loading platforms and vicinity shops used for storing waste are omitted from the cleanup survey plans.
2) See also figure 5-1 of main LM report for aerial photo showing rail line bedding.
3) Page 3 of Lewiston property and comments has a photo of the loading platform that was used for KAPL and MED shipments. The appendix appxf does not even mention the existence of the foundations for these structures used to store KAPL waste. After the pictures in LewistonPropertyIssues are the lists and diagrams of radioactive contaminated locations. The diagrams are followed by documents describing the KAPL operations and a relevant letter.

b) There was significant radioactive spillage immediately south of the property X. (p10 of LewistonPropertyIssues) These Baker –Smith shops locations were artificially separated from the rest of the shops near the WWT by a fence line installed well after the areas were contaminated by usage.

c) Appxf page 25 Table 9 lists a contaminated area of 980 sq meters. It contains no evidence that the platforms were surveyed in spite of the obvious fact the cleanup stopped about 5 meter east of the edge of the loading platform. It defies common sense to stop decontamination on a grid line and not sample the soils between the railroad platform and the spill location. How did barrels unloaded on the platform get to a location adjacent to the platform?

d) The track bed. There were no samples taken of soils under or adjacent to the track bed. Again common sense says leaking barrels of radioactive sludge or tailings could contaminate the track bed. A sieve could separate the radioactive slag used for the track bed from the contaminated soils. Even if the slag was brought to the site before the Manhattan District activities it still is a Federal responsibility.

Comment Number 5 (continued)

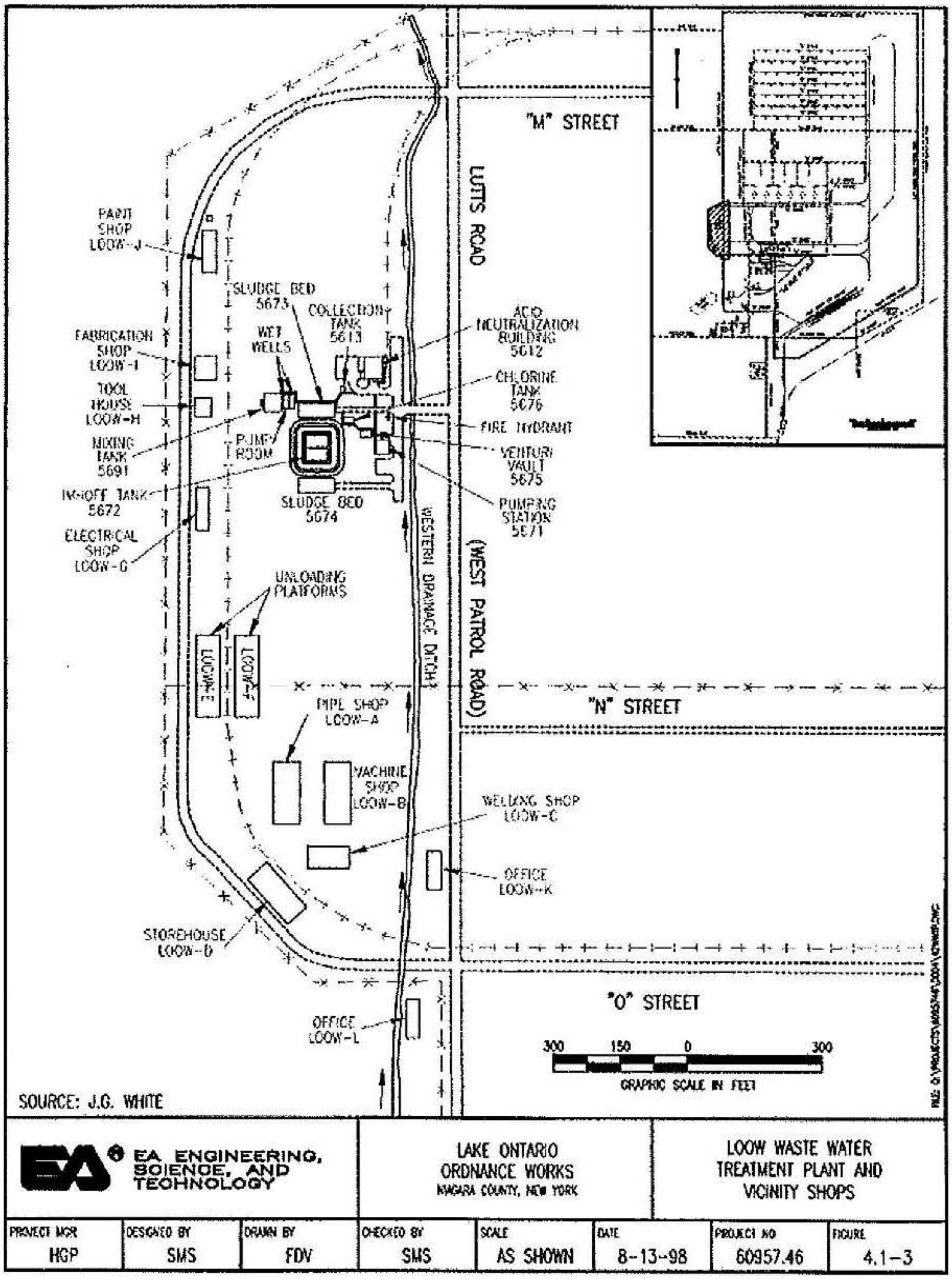
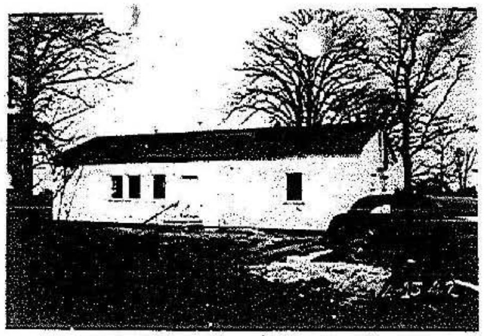


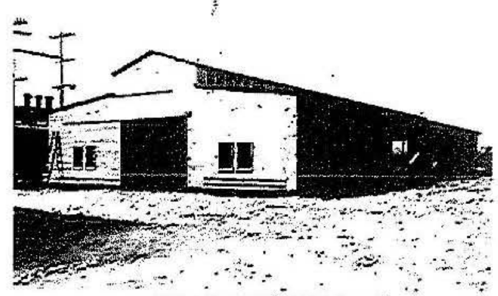
Figure 4-1: LOOW Former WWTP Vicinity Shops

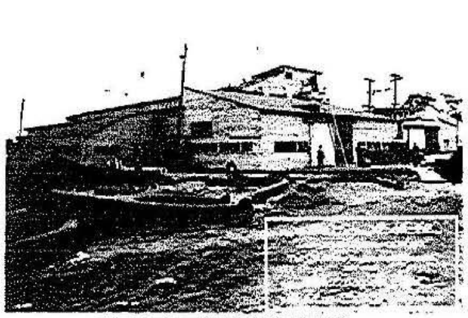
Comment Number 5 (continued)

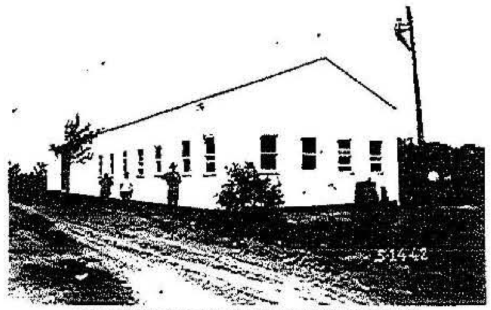


BAKER SMITH FIELD OFFICE (LOOKING NORTHEAST)

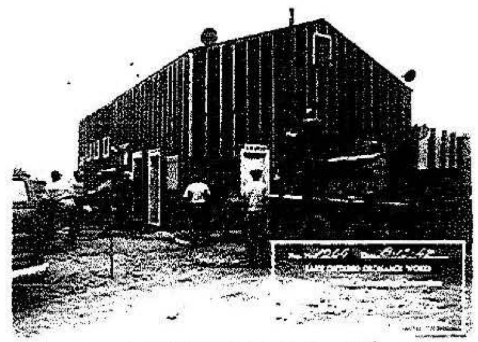

BAKER SMITH WELDING SHOP (LOOKING NORTHWEST)

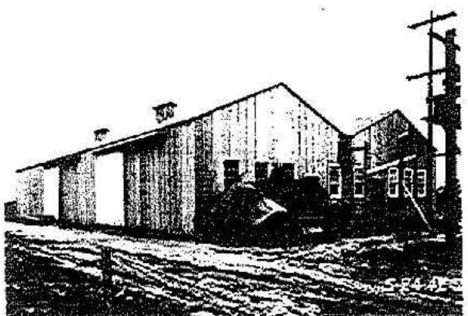

BAKER SMITH MACHINE SHOP (LOOKING SOUTHWEST)

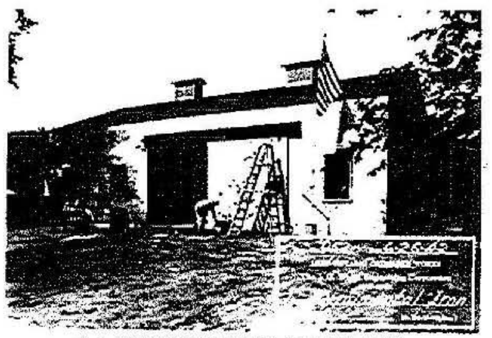

BAKER SMITH PIPE SHOP (LOOKING NORTHEAST)

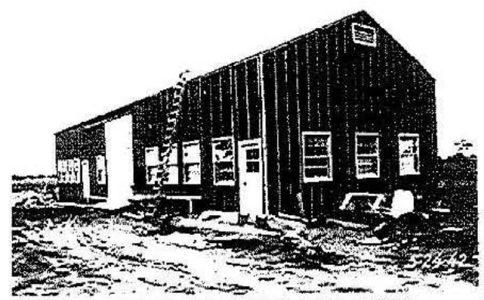


LORD ELECTRIC FIELD OFFICE AND SHOP (LOOKING NORTHEAST)


J. G. WHITE RIGGERS SHOP (LOOKING SOUTHEAST)


J. G. WHITE FABRICATION SHOP (LOOKING NORTHEAST)

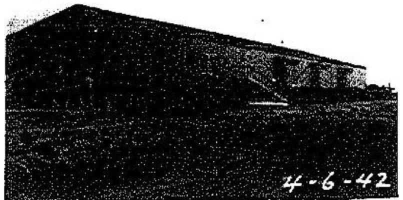

J. G. WHITE ORNAMENTAL IRON SHOP (LOOKING SOUTHWEST)


J. G. WHITE PAINT SHOP AND STORAGE (LOOKING NORTHEAST)

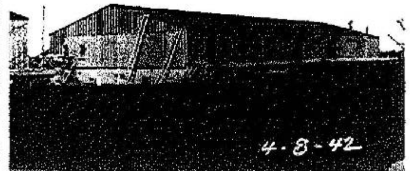
557

TEMPORARY OFFICES AND SHOPS IN CONSTRUCTION SHOPS AREA

PLATE XXVI

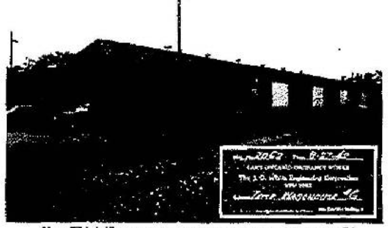


J. G. WHITE WAREHOUSE NO. 1, RECEIVING AREA (LOOKING SOUTHEAST)



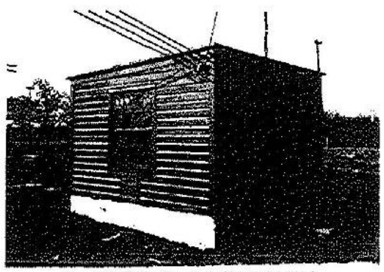
DUPONT WAREHOUSE NO. 2 RECEIVING AREA (LOOKING NORTHWEST)

J. G. WHITE WAREHOUSE NO. 3 RECEIVING AREA (LOOKING SOUTHEAST)

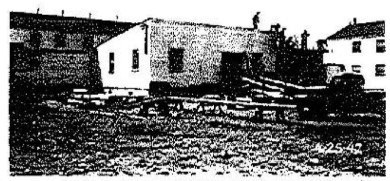


BAKER-SMITH WAREHOUSE NO. 6 CONSTR. SHOPS AREA (LOOKING WEST)

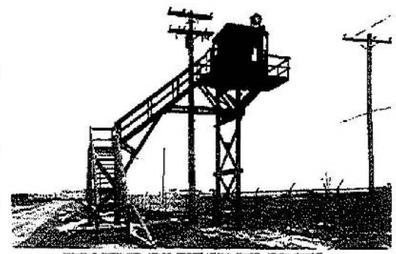
BAKER-SMITH PIPE UNLOADING PLATFORMS



CREEK ROAD CHLORINATION STATION (LOOKING SOUTHEAST)



REPRODUCTION ROOM AND FIREPROOF VAULT, ADM. AREA (LOOKING SOUTHWEST)



TYPICAL ELEVATED GUARD HOUSE ALONG INNER GUARD FENCE

TEMPORARY WAREHOUSES AND PIPE PLATFORMS, ELEVATED GUARD HOUSE AND CHLORINATION STATION

PLATE XXVII

558

Present Building No.	Former Building No.	Figure B-1 Location No.	Building Name	Material Storage
401	401-1	1	Boiler House	KAPL Waste
403	709	2	Fire House	Miscellaneous Storage*
409	5421	3	Fire Reservoir	Uranium Scrap** (C-Material, stainless steel outside)
410	5435	4	Filter Building	P-54, P-56, P-58 in drums, Middlesex Sands and Miscellaneous Sludge in Bulk
411	5421	5	Cooling Water Reservoir	L-30 in Bulk
412	5434	6	Accelator	L-50 (3 drums moved in 1979)
413	5433	7	Accelator	L-50 in Bulk
414	5432	8	Accelator	L-50 in Bulk
419	613-1	9	Incinerator Building	Ashes From KAPL Waste**
420	713-1	10	General Storehouse	K-65 in Drums (East of building), Empty K-65 Drums in Building, Uranium in Building
421	714-1	11	Material Shed	K-65 in Drums (South of Building), Uranium rods in Building, Uranium in Dirt Floor
422	725-1	12	Parking Garage	Miscellaneous Storage,* Uranium Rods**
423	716-1	13	Garage & Repair Shop	Motor Vehicle Storage*
425	733-1	14	Meeting House	Janitor Supplies & Storage*
427	723-1	15	Laundry	General Storage*
428	722-2	16	Millright Shop	General Storage*
430	717-1	17	Combined Shops	Uranium Billets, Useable Scrap*
431	None	18	Vault A	Uranium Rods
432	None	19	Vault B	Uranium Rods
433	843-1	20	Hose House (radium vault)	Radium Sources*
434	842-1	21	Cooling Water Storage Tower	K-65
443	-	22	Welding Shop	L-30 in Drums; KAPL Waste
444	-	23	Storage Building	L-30 in Drums; KAPL Waste
445	-	24	Pipe Shop	L-30 in Drums; KAPL Waste
446	-	25	Lord Electric Shop	KAPL Waste
447	-	26	Tool House	KAPL Waste
448	-	27	Paint Shop	KAPL Waste
458	707-3	28	Change House	Safety Equipment*
460	718-1	29	Locomotive Shop	Locomotive Storage*
(North of 445)		30	Machine Shop	L-30 in Drums
-	5437	31	Recarbonation Pit	F-32
-	707-6	32	Change House	Titanium Alloys Manufacturing Co. Storage*
(North of 467)	722-1	33	Riggers Shop	Uranium Saw Dust**
-	814-1	34	Box Factory	Harshaw Material*
-	822-4	35	Change House	Electromet Storage*
-	845-1	36	Compressor House	KAPL Waste
-	877-4	37	Change House	Linde Storage*
-	877-6	38	Change House	Electromet Storage*
-	9050	39	Igloo	K-65
-	-	40	Loading Platform near Igloo	K-65

* Material listed is not known to be contaminated
** Not verified, but inferred from documentation.

KAPL = Knolls Atomic Power Laboratory

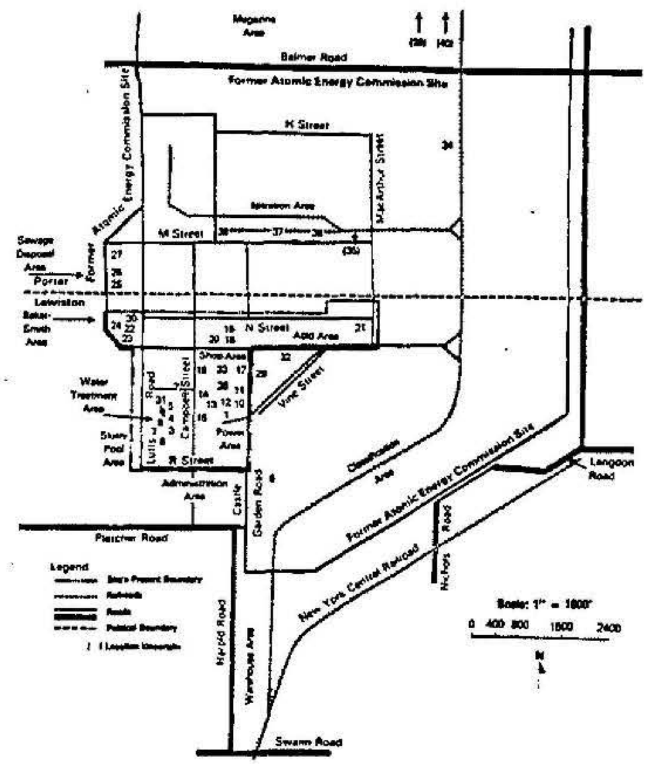


Figure B-1. Buildings Used for Residue or Scrap Storage

Comment Number 5 (continued)

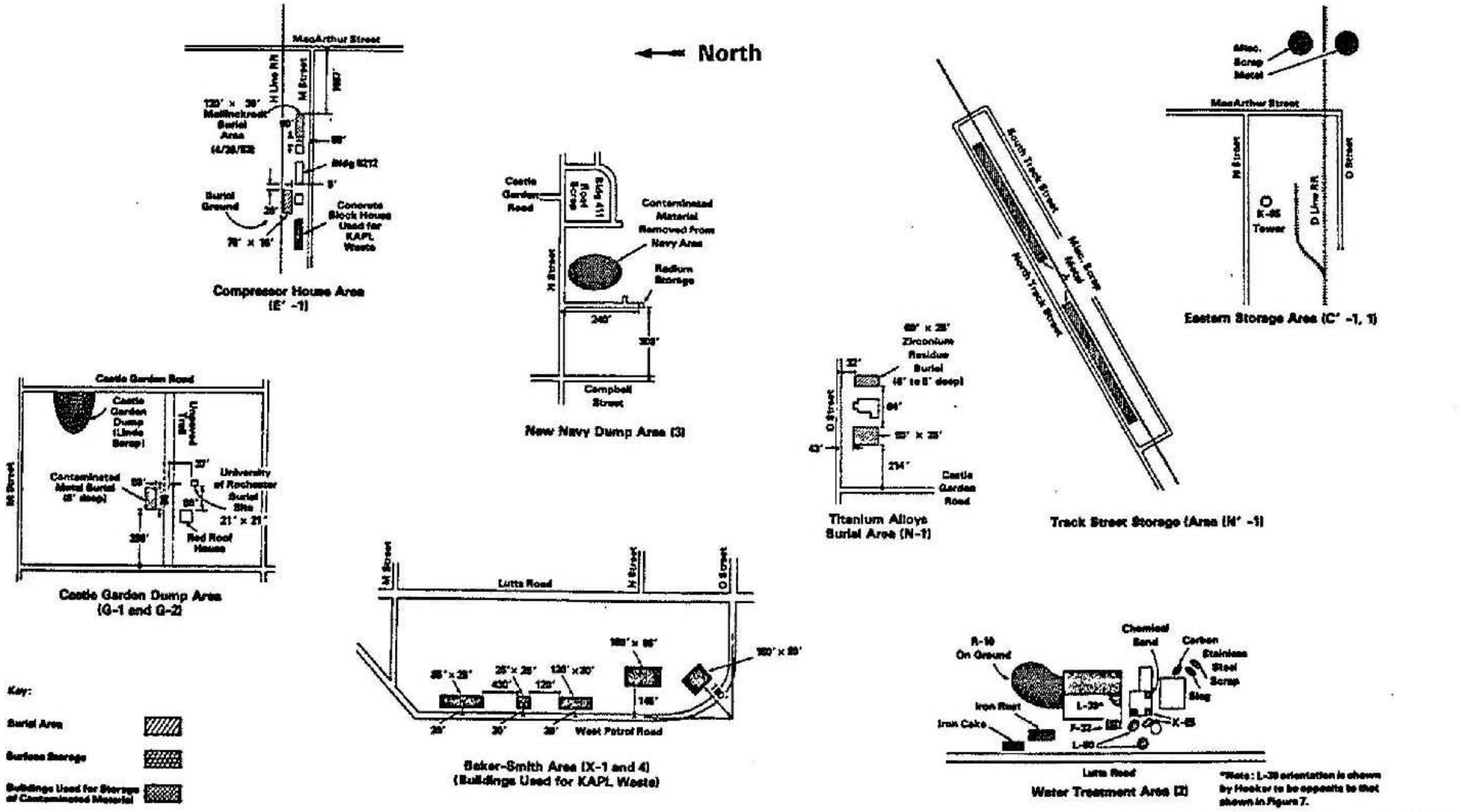


Figure B-2. Storage and Burial Areas (Taken From Hooker Electrochemical Company, Drawing A-D-53, Rev. 2, April 30, 1957)

Knolls Atomic Power Laboratory Waste

The Knolls Atomic Power Laboratory wastes were semisolid neutralized radioactive waste, consisting of fission products from evaporator bottoms of a pilot plant fuel reprocessing operation placed in stainless steel and carbon steel drums. Crates of combustible and noncombustible waste were also received at Lake Ontario Ordnance Works from January 1952 until September 1954 (Sparks, 1954). Plutonium waste was placed inside 1-gallon cans and packed inside drums that were specially marked (Manieri, 1958).

The first shipment of Knolls waste was stored in a 41- x 96-foot blockhouse (Building 845-1) 20 feet north of M Street in the compressor house area (James, 1952). Later receipts were stored in two adjacent wooden buildings (Greenhalgh, 1952) and the boiler house (Building 401) (Eisenbud, 1953; Showalter, 1953).

With the plans to convert the boiler house to a boron-10 plant and the proposed use of the northern sector by the U.S. Navy, the Knolls wastes were moved in late 1953 (Malone, 1953; Klevin, 1955; Sapirie, 1953). Although documentation suggests outside storage of the drums near the pumping station of the sewage treatment plant (Building 435) (Gorman, 1953), it appears that the only buildings used for storage were those marked on the Hooker Electrochemical Company chart (A-D-353, Rev. 2, April 30, 1957; see Appendix B, Figure B-2) in the Baker-Smith area (Buildings 443, 444, 445, 446, 447, and 448).

By 1957, the Baker-Smith area buildings were in a state of disrepair and without adequate fire protection facilities. It was suggested that the Knolls wastes in Building 445 (Pipe Shop) be moved to the thaw house next to the K-65 tower or to Building 421 (Hanner, 1957a). However, in the same month, it was decided to send the 38,500 cubic feet of waste (350,000 pounds) in Buildings 446 and 448 to the Oak Ridge disposal grounds (Hanner, 1957b; Seager, 1957); therefore, it is unlikely that the move to the thaw house took place.

Based on studies and experimental contaminated-waste burning conducted on an open cement pad at the Lake Ontario Ordnance Works, it was discovered that significant volume reduction of combustible wastes could be attained (Harris, 1954; Weinstein, 1954). The Atomic Energy Commission instructed Hooker Electrochemical Company to burn low-level (6 milliroentgens/hour or less) crates and barrel the ashes for shipment to Oak Ridge (Carney, 1958; Hanner, 1958a). The burning was to be done on a cement pad or in the incinerator (Buiding 419). Hooker suggested using a loose cinder block concrete outdoor fireplace erected on an existing concrete pad. A metal backstop used for indoor pistol practice was modified to contain a fan-operated water scrubbing arrangement to remove particulate matter that might be carried up the stack (Walker, 1957). It is possible that the pad used for burning the combustible wastes was the change house south of the locomotive shop on Castle Garden Road where Oak Ridge National Laboratory discovered cesium-137 in the soil (Haywood, 1981). No plutonium-bearing waste or unmarked waste was to be burned. (Ashes in crates sent from the Knolls Atomic Power Laboratory were to be buried onsite because they were uncontaminated. It is not clear why this uncontaminated waste was sent to the Ordnance Works (Hanner, 1958b).)

Building 444 waste crates were described as so weathered that the markings were undecipherable. As a precaution, the crates were shipped to Oak Ridge, rather than risk the inadvertent burning of plutonium-contaminated waste (Sweeney, 1958; Hanner, 1958b). Reports indicate that 494 carbon steel drums were so rusted that they had to be placed in larger drums prior to shipment (Sweeney, 1957). (The location of the redrumming operation has not been ascertained.)

Buildings 401 and the block house in the compressor house area were decontaminated to background levels (stated as less than 0.63 milliroentgen/hour). Buildings 446 and 448 were released for unrestricted use in mid-1958. Building 444 (burned, with only a concrete pad remaining on the present Lake Ontario Ordnance Works site) was discovered to be contaminated (1 to 60 milliroentgens/hour) in the 1970 screening survey. A ditch flowing east from the pad was described as contaminated up to 2 milliroentgens/hour for 200 to 300 feet. Cesium-137 (a fission product) was found by analysis to be present. The cesium-137 was again identified in the 1978 aerial radiological survey report (EG&G, Inc., 1979) and in the 1979 Battelle Columbus Laboratories radiological survey with several areas as high as 70 milliroentgens/hour at 1 centimeter.

Offsite vicinity properties associated with the Knolls waste are the buildings in the compressor house area (due north of the K-65 tower on M Street) and those in the sewage treatment plant area. The location of the waste incineration has not been ascertained, but could possibly be a pad south of the locomotive shop on Castle Garden Road or the incinerator (Building 419).

THE FILES August 31, 1953

Arthur E. Gorman, Sanitary Engineer
Division of Engineering, Washington

DISPOSAL OF KAPL WASTES AT LOSA

Loow

SYMBOL: RD:AEG

While Joe Lieberman was at KAPL August 20-21, information was relayed to him that Art Mathison of KAPL had been advised at a meeting at NYOO that there would be space at LOSA for storage of only three of the nine carloads of miscellaneous radioactive wastes being prepared for shipment. It was requested that this office resolve this matter with NYOO as it appeared to be out of line with information Jim Quidor of NYOO had previously given me.

I called Quidor on August 25 and learned that there had been some discussion between NYOO (or LOSA) with Walton of SOO. The latter had been informed that in the building to which the former shipments from KAPL were to be moved there would not be enough additional space for the entire new shipment if all waste material were placed in covered structures. This apparently was one of the reasons for the KAPL reference to Lieberman.

As I had previously discussed with Art Mathison the feasibility of outdoor storage for some of these wastes - especially concentrates and sludges which were shipped and stored in steel drums - it was suggested to Quidor that storage of drums mights be out of doors with or without cover by tarpaulin. Quidor said NYOO had some reservation about storing boxes and bales of combustible radioactive material out of doors, but was agreeable to outside storage of the steel drums holding radioactive sludges. He said if KAPL would approve outside storage of these drums there would be adequate inside storage at LOSA both for all the earlier KAPL waste in boxes and those in the proposed nine-car shipment. This inside storage would be within the area to be reserved at LOSA for current and future use and would include the two areas studied by the USGS as possible sites for a burial ground for radioactive wastes.

I agreed to call Art Mathison at KAPL to reconfirm his position with reference to outside storage of drums. This was done the same day, August 25, and Mathison concurred. This information was telephoned to Quidor late that afternoon.

The Files - 2 - August 31, 1953

On August 25 Quidor called again and said NYOO had decided to enlarge somewhat the area to be reserved for its new operations, and this would include the sewage treatment plant of the former Lake Ontario Ordnance Plant. The buildings have been stripped of most of the plant operating facilities such as pumps and motors. It is now proposed to store KAPL combustible wastes in the abandoned pumping station at this plant.

CC: A. Mathison, SOO (1)
J. Quidor, NYOO (2)

Comment Number 5 (continued)

H6-6

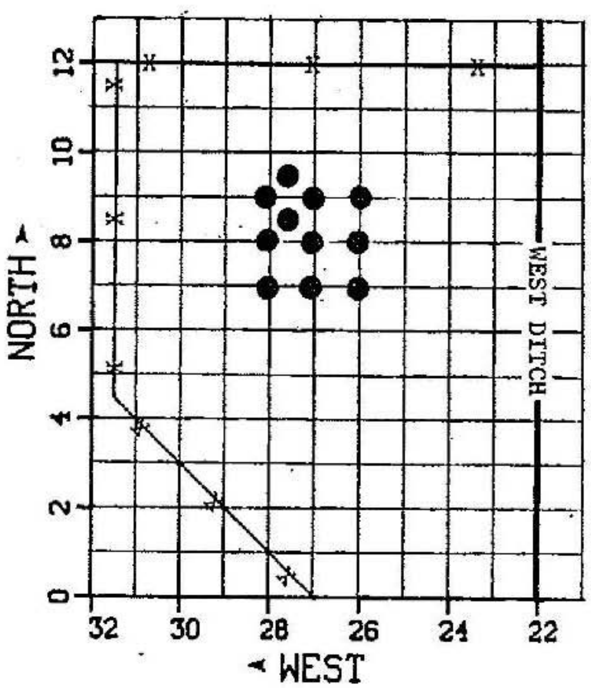


FIGURE H6-1. CORE LOCATION WITHIN THE CONTAMINATED AREA OF THE NORTHWEST QUADRANT

Radiological History

There is no evidence of contaminated waste burial or storage on property X; however, past surveys have identified elevated direct radiation levels along the West Drainage Ditch and near the southern property boundary.[1-3] Previous runoff from residues stored on the NFSS has been indicated as the source of contamination in the West Drainage Ditch. Elevated radiation levels on the southern portion of the property are believed to be due to radioactive materials still present on the adjacent federal government site. Elevated levels have also been noted near several buildings of the sewage treatment plant. The source of these higher levels may be naturally occurring radionuclides in rock used as fill and for cover roads and parking areas.

Comment Number 5 (continued)

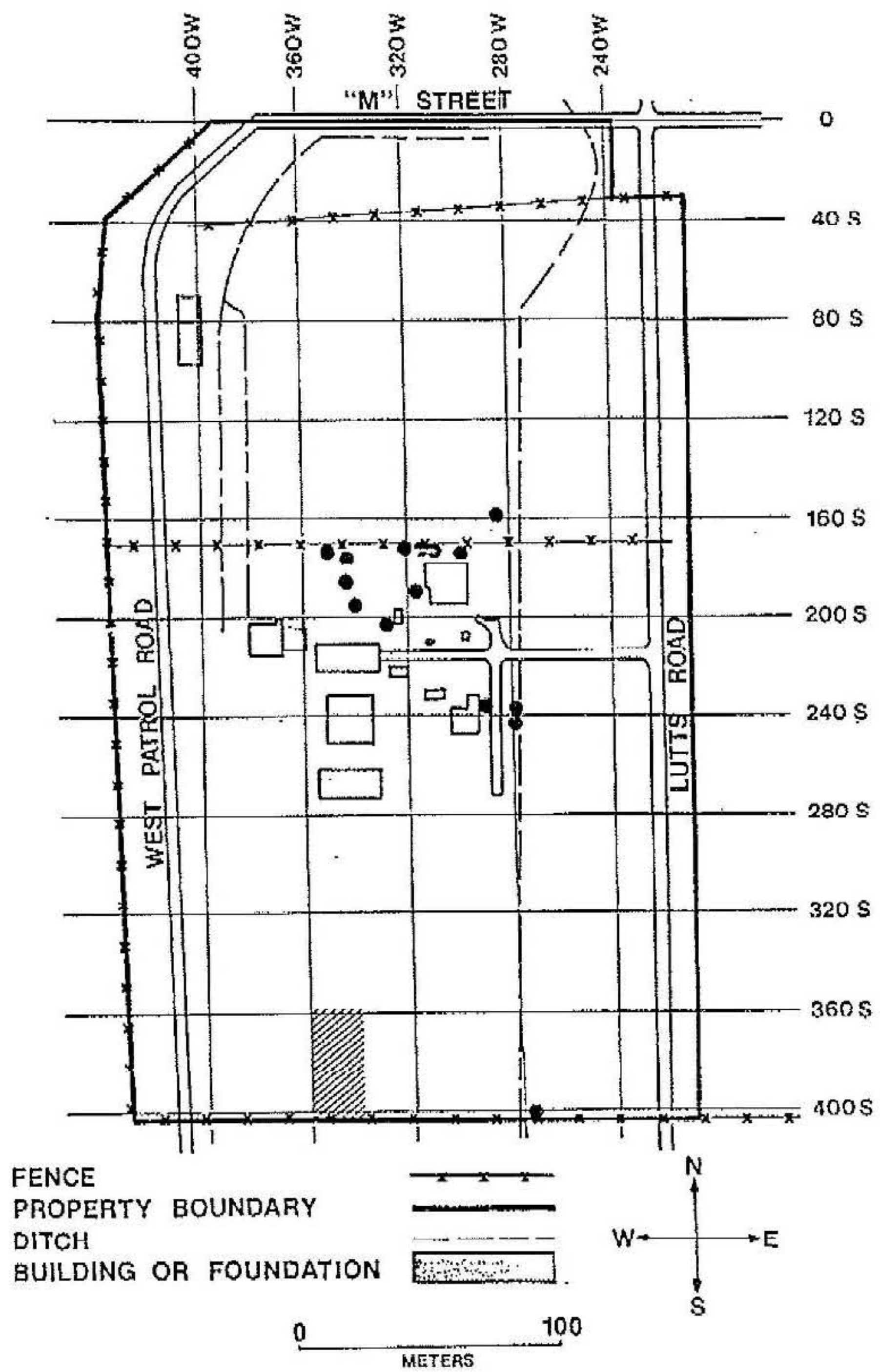


FIGURE 8. Map of NFSS Off-Site Property X Indicating Areas Where Radionuclide Concentrations in Soil Exceed Criteria. (Cross hatching indicates a large general area and dots indicate small isolated areas or "hot spots.")

Comment Number 5 (continued)

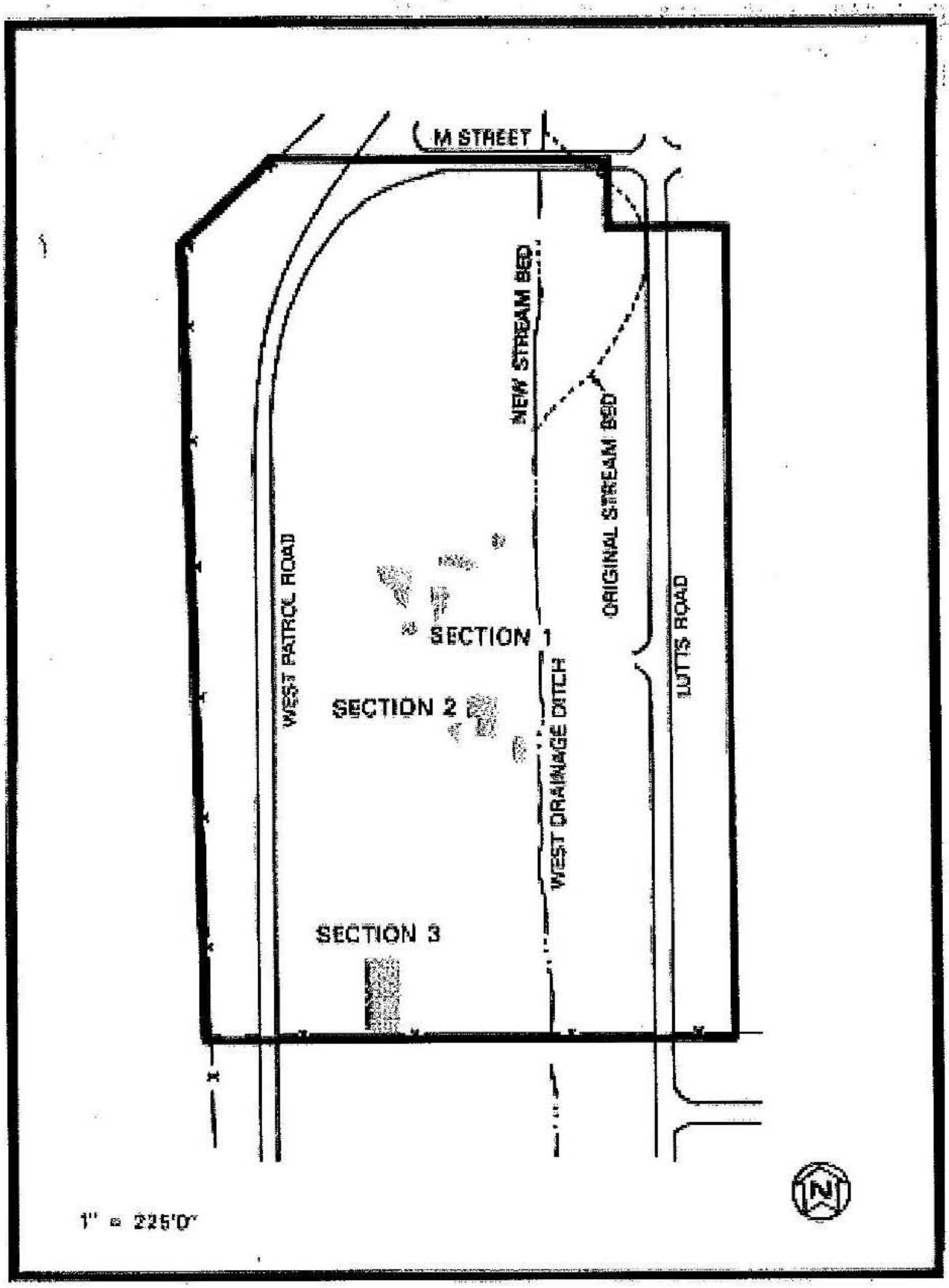


FIGURE 31 EXCAVATED AREAS ON PROPERTY X

Area 3

Area 3 is a small area between West Patrol and Lutts roads slightly south of the north perimeter of the Site. Surface beta-gamma readings (1 cm) ranged up to 70 mR/hr in very small areas near two small concrete pads. On the grid points, beta-gamma readings ranged from background to 2 mR/hr in the area (see Appendix H, Figures H3-5 and H3-6).

Comment Number 5 (continued)

This area is a small portion of the northwest portion of the Site near two small concrete pads. A summary of the radiological and nonradiological characteristics of the area is given in Table 5-4.

The primary contaminant is cesium 137 (^{137}Cs) (see Appendix H, Table H6-1 and H6-2). The contamination is superficial extending to only 1.2 m (4 ft) in depth in a small area 1 m^2 (10.8 ft^2) (see Appendix H, Figure H6-1). Other isotopes (e.g., ^{226}Ra) are only present in small amounts and may be associated with the slag used for a roadbed found in the area (see Appendix H, Table H6-1). No ^{90}Sr was detected in association with the ^{137}Cs contamination.

Several metals were detected in surface soil (see Table 5-4 and Table H6-3). Copper levels exceeded those occurring naturally by an order of magnitude; however, other elements occurred at or below those occurring naturally.

Comment Number 5 (continued)

389. The work included the necessary clearing and grubbing for the right of way and the following quantities of earth and other materials handled or used:

Stripping topsoil	657,818	S.F.
Subgrade excavation	1,423	C.Y.
Ditch and culvert excavation	675	C.Y.
Embankment and grading	146,564	C.Y.
Slag ballast	62,247	C.Y.
Cinder ballast	34,648	C.Y.
Railroad trackage	75,658	L.F.
Culvert pipe	2,269	L.F.
Turnouts or crossovers	67	
Bumpers	26	
Derailers	3	

UTILITIES

Roads (Continued)

New Roads (Continued)

374. Clearing and grubbing was done where required and the earth moved and materials used were as follows:

Earth moved	274,468 Cu. Yds.
Earth manipulated only	9,989 Cu. Yds.
Chemical slag	77,917 Cu. Yds.
Slag and stone	190,567 Tons
Sand and stone dust filler	40,266 Tons
Asphalt emulsion	547,663 Gallons
Hot asphalt	287,053 Gallons

Comment Number 5 (continued)

Comment Number 5 (continued)

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1) The vicinity shops on the Lewiston property as well as the "Baker-Smith" section were the main locations contaminated by reactor waste (KAPL) after earlier use to store L30 uranium residues. Baker-Smith is the name of a contracting company.
A letter dated 11/25/1945 regarding Mx (code for uranium residues) states "Barrels and drums stored in the Baker-Smith area are rapidly deteriorating, and it is estimated that by the summer of 1946 a large amount of the material will have to be rebarreled if the sludge is to be moved." This is the L30 sludge (2,579,232 dry weight) from Linde. L30 was originally 12% uranium ore.
The first remediation effort on the Lewiston property took place in 1971 under the direction of the Atomic Energy Commission. Contamination was identified along the entire length of the West Drainage Ditch and in an area 50ft X 50 ft east of the Acid Neutralization Building. No post remediation data has been located in respect of this decontamination.

(See Visit report of William T. Thornton, May 17, 1971 and National Lead Company of Ohio, LOOW Plot Plan Showing Areas of Work, 7.12.71.)

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Of interest in this figure are the vicinity shops on the left side of the map. From north to south there is the Paint shop, Fabrication shop, Tool house, Lord Electrical shop, two unloading platforms. After the property was divided, a fence separated the LWWTP property from the Baker-Smith section of the NFSS. On the NFSS side are the Machine shop, Pipe shop, Welding shop and a storehouse.
We will come back to the importance of the railroad track adjacent to these buildings

Ref: Summary of Investigations, LOOW, August 2003, Figure 4-1
****

2) There are now pictures and dimensions showing the large size of the buildings used for storage. In particular there is a picture of the large unloading platforms (50 x 204 ft), I claim that these platforms were used to load and unload KAPL waste on the Lewiston property. Plate XXVII center right

1 – Paint shop 29' x 83' Plate XXVI bottom left
1 - Welding, Blacksmith, & Fabricating 58' x 100' Plate XXVI bottom right
1 Tool house
1 Electrical Shop(Lord Electric) 29' x 120' Plate XXVI center of center row
1 - Pipe (Baker-Smith) 60' x 150' Plate XXVI center left
1 - Welding (Baker-Smith) 40' x 100' Plate XXVI top center
1 - Machine (Baker-Smith) 60' x 150' Plate XXVI top right
1 – Storehouse #6 (Baker-Smith) 60' x 150' Plate XXVII center left

Ref: LOOW Construction Completion Report, 4/1/1943, V2 plates 26 and 27
LOOW Construction Completion Report, 4/1/1943, V1 p. 70

****

3) The Aerospace report lists these buildings as KAPL storage locations and the text identifies them explicitly as the paint shop, tool house, Lord electric shop, pipe shop,

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welding shop and Storage building, There may be a discrepancy in identification between the Fabrication shop and the Tool house

Ref: Background and Resurvey Recommendations for the AEC portion of LOOW, November 1982 figures B-1, B-2, and B-3.

****

4) This loading area was a major loading and unloading location the radioactive waste and MED uranium wastes which arrived by train.
Other letters refer to the railroad shipments and LWWTP pumping station (adjacent to buildings already storing KAPL waste). A more complete commentary is in the Community LOOW Project report Appendix H Historical Notes Concerning Radioactive Waste from The Knolls Atomic Power Laboratory on the LOOW Site

****

5) A cleanup diagram shows the contaminated soil area is between three buildings (Machine, Pipe and Welding shops) used to store KAPL wastes on "Baker-Smith".
Ref: A Comprehensive Characterization and Hazard Assessment of the DOE…,1981, Figure H6-1
****

6) The Cleanup report for vicinity property X (LWWTP) includes the erroneous claim" There is no evidence of contaminated waste burial or storage on property X:"
It also claims the elevated levels near the sewage plant may be due to "rock".
This same report located a contaminated area adjacent to the Railroad loading platform without mentioning the presence of this pair of 204 foot loading platforms extending from Baker Smith onto Lewiston property.
There is no record of finding contamination of the NFSS portion of the platform!
No record of sampling the railroad bed for spilled materials!
Note, the only KAPL waste contaminant analyzed for was Cs-137.
Ref: Comprehensive Radiological Survey, Off-site Property X, 1984, p2. p 18
****

7) The contaminated area on Baker-Smith on the NFSS has Cs-137 but not Sr-90. However, the fission product waste from KAPL was known to contain approximately equal amounts of Cs-137 and Sr-90, which suggests testing to date for Sr-90 on the NFSS has been inadequate and requires further review. Radium is associated with slag (railroad bedding). L-30 was also stored in this area.
Ref: A Comprehensive Characterization and Hazard Assessment of the DOE…,1981, p 5-31
****

8) Who is responsible for bringing the radioactive slag onto the LOOW?
Paragraph 389 of the construction report states railroad construction used 62, 247 Cubic Yards of "Slag Ballast".
Paragraph 374 states 77,917 cubic yards were of "Chemical slag" were used to construct new roads on the LOOW site.
The Federal Government brought the radioactive slag onto the LOOW site.

Comment Number 5 (continued)

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Ref: LOOW Construction Completion Report, April 1, 1943, V1, p322, 324

I am unable to attend the public meeting on March 24, 2010 to discuss these issues in person. I will be at the baptism of a grandchild in California.

There is strong evidence that the 1954 survey of vicinity property X had serious omissions because the survey design ignored documentary evidence of prior activities when choosing the locations to sample for spilled radioactive materials.

I will reference three documents:
Appxf.pdf (posted by Legacy Management)
LewistonPropertyIssues.pdf (attached)
Comments on LewistonWWTP.doc (attached) these are comments for each slide in the above PDF.

a) Figure 2 on *appxf* page 4 omits significant locations of activities relevant for spills of radioactive materials.
Evidence:
1) Page 1 of *Lewiston property* and *comments.*
The track, loading platforms and vicinity shops used for storing waste are omitted from the cleanup survey plans.
2) See also figure 5-1 of main LM report for aerial photo showing rail line bedding.
3) Page 3 of *Lewiston property* and *comments* has a photo of the loading platform that was used for KAPL and MED shipments. The appendix *appxf* does not even mention the existence of the foundations for these structures used to store KAPL waste. After the pictures in *LewistonPropertyIssues* are the lists and diagrams of radioactive contaminated locations.
The diagrams are followed by documents describing the KAPL operations and a relevant letter.

b) There was significant radioactive spillage immediately south of the property X. (p10 of *LewistonPropertyIssues)* These Baker –Smith shops locations were artificially separated from the rest of the shops near the WWT by a fence line installed well after the areas were contaminated by usage.

c) *Appxf* page 25 Table 9 lists a contaminated area of 980 sq meters. It contains no evidence that the platforms were surveyed in spite of the obvious fact the cleanup stopped about 5 meter east of the edge of the loading platform. It defies common sense to stop decontamination on a grid line and not sample the soils between the railroad platform and the spill location. How did barrels unloaded on the platform get to a location adjacent to the platform?

d) The track bed. There were no samples taken of soils under or adjacent to the track bed. Again common sense says leaking barrels of radioactive sludge or tailings could contaminate the track bed. A sieve could separate the radioactive slag used for the track bed from the contaminated soils. Even if the slag was brought to the site before the Manhattan District activities it still is a Federal responsibility.

Comment Number 6

The S.M.Stoller Corporation
Contractor to the U.S.Department of Energy

Memo

To: Niagara Falls Storage Site Vicinity Property (FUSRAP Site) Records

From: Joey Gillespie, S.M.Stoller Corporation (Stoller)

CC: Mike Widdop (Stoller), Bob Darr (Stoller), Chris Clayton (U.S.DOE)

Date: 4/28/2010

Re: Comments Received from Mrs. Amy Witryol

March 2010 For Public Comment Only Report Titled: *Niagara Falls Storage Site Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches.*

One page of comments were hand delivered on the evening of March 24, 2010 from Amy Witryol to Joey Gillespie in the presence of Bob Darr, Stoller Public Affairs for U.S.DOE and Chris Clayton FUSRAP Program Manager. Comments were received typed on one single sided page without date, time, or author information. Therefore it was necessary for the public record to provide this cover as a memo to file to provide the necessary details.

Attachments: Single sided one page of comments on the "For Public Comment Only" document as titled above.

J. E. Gillespie 2010.04.28 12:36:12 -06'00'

From DOE's March 2010 Draft NFSS Vicinity Properties Report:

"DOE uses the following criteria to determine if a site should be referred to USACE for further assessment:

- A third-party characterization or survey reveals existing MED- or AEC-related contamination that was not previously identified; [survey conducted only by CWM Chemical]
- A review of historical records indicates the potential for existing MED/AEC contamination that was not previously identified [the entire LOOW site, ignored by NYS DEC for years until it interfered with CWM's expansion application]; or
- An individual with credible *institutional* knowledge provides information that additional MED/AEC contamination might exist that was not identified in previous assessments." [Allows DEC/Army Corps input but can exclude County Health Dept. or Attorney General; "*institutional*" excludes a referral based on public input.]

The process outlined in the DOE draft report is entirely unacceptable and gives the agencies free reign to lobby the DOE for expenditures on closed vicinity properties absent transparency and meaningful public input. Recommendations:

1. Each request, and, comments from the agencies (DEC/Army Corps,) must be transparent and available *before*, not *after* DOE decisions are made to refer a closed vicinity property to the Corps. The public must be given a reasonable period in which to comment on information provided by any agency or stakeholder issuing a request for a referral.

   This March 2010 draft provides stakeholders only 30 days to gather information on 26 Vicinity Properties. Thereafter, stakeholders are excluded from review of all information and agency communication used to inform DOE referral decisions.

2. Potentially Responsible Parties and agreements on allocable taxpayer costs must be identified in *advance* of any approval to allocate federal resources to a closed vicinity property.

3. Referrals and associated funding should be appropriated for investigation into VPs impacted by potential migration from the NFSS and publicly owned properties.

4. Funds should not be appropriated where state regulatory authority is already available to require investigation and remediation by a responsible party.

According to Bill Kowaleski, FUSRAP does not require a Potentially Responsible Party process in advance of investigating and remediating contamination. It would be inappropriate for DOE to refer the Army Corp to spend federal taxpayer dollars at CWM and then later, if ever, try to collect from this insulated subsidiary company which has only toxic assets.

- CWM has landfilled radiological wastes
- CWM imported contaminated material for construction on its property
- CWM accepted wastes from the Knolls Atomic Power Lab and weapons production sites
- CWM's "scanning" of incoming material is insignificant to the volumes received,

but CWM is not listed as a source of FUSRAP or KAPL material in the DOE March 2010 report.

Comment Number 7

RE Message for Chris Clayton

-----Original Message-----
From: J Rauch
Sent: Thursday, March 25, 2010 2:34 PM
To: Kreusch, Arleen K LRB
Cc: James Rauch
Subject: Message for Chris Clayton

Arleen: Please forward this message to Mr. Clayton.

Mr. Clayton:

In the course of my comments at last evening's combined LOOW/NFSS meeting, I asked you if the radiation survey conducted in 1994 by myself and three other ROLE members was considered during DOE's selection process for areas to investigate following the decision to re-verify several NFSS Vicinity Properties. You were unfamiliar with the 1994 report that I wrote for this survey, and so, you could not answer this question. The report was distributed by Tim Henderson after it was prepared and has been available for many years on the web at:
http://nuclear.bfn.org/nfss-survey-1994.pdf

Jim Rauch

RADIATION SURVEY OF NFSS VICINITY

On Sunday October 2, 1994, Jim Rauch, Tim Henderson, John Kohl and Pete Ohanessian conducted a gamma radiation exposure survey of several areas surrounding the Niagara Falls Storage Site (NFSS). The equipment used was made by Ludlum Measurements, Inc.: a Model 44-2 detector (a one inch sodium iodide crystal and 10 stage photomultiplier tube) connected to a Model 2221 scaler/ratemeter. The meter was used in the gross counting mode and the threshhold energy was set at 50 kilo-electron volts (keV). Measurements were taken with the detector held approximately 2 feet above the ground at each data collection point (see map).

Gross counts were accumulated for one minute, using the digital scaler, and recorded as counts per minute (cpm). With this equipment setup, 200 cpm roughly corresponds to a radiation exposure of one microRoentgen per hour (microR/hr).* MicroRoentgens per hour can be converted to milliRoentgens per year by multiplying by 8.76 (there are 8760 hours in a year); and milliRoentgens per year can be converted to millirems per year (mrem/yr) by multiplying by 0.83. The raw data (cpm) and these conversions (microR/hr and mrem/yr) are presented in the table below.

Background exposure was determined at the rear of the property at 953 Ridge Road and in the front yard at 415 Tryon Drive, both in the Town of Lewiston . These values were within the expected range, for this area, of 7 to 10 microR/hr (51 to 73 mrem/yr).

Measurably elevated exposure rates were found at several of the the locations: 1,5,6,7,8 and 9. These locations exhibited exposure rates (around-the-clock) above recent New York State Department of Environmental Conservation cleanup guidance for soils contaminated with radioactive materials (TAGM-4003) which limits maximum residual exposure to 10 mrem/yr above background. Accordingly, further investigation of these areas may be necessary to determine if these elevated exposures are due to site-related contamination.

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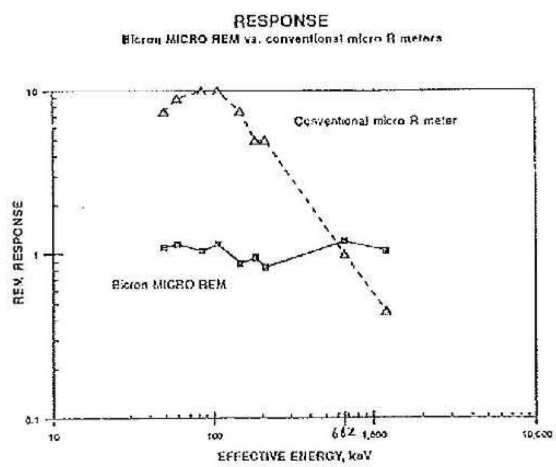
* Because the energy response of the sodium iodide detector is not flat across the gamma energy spectrum, this relationship is dependent upon the distribution of gamma energies (the shape of the gamma energy spectrum) being measured remaining fairly constant. The relationship (200 cpm representing approximately 1 microR/hr) holds for the typical mix of terrestial background gamma sources (naturally-occurring potassium-40, and uranium and thorium decay chain members) encountered in the field. However, a disproportionate increase in the lower energy gamma contribution (below 662 keV) to the total count rate will result in a corresponding overestimation of exposure rate (in microR/hr). Similarly, a disproportionate increase in the higher energy gamma contribution (above 662 keV) will result in a corresponding

underestimation of exposure rate. See energy response curve of typical sodium iodide detector, identified as "conventional micro R meter", shown below.

TABLE

Location	cpm	microR/hr	mrem/yr
Background:			
935 Ridge Road	1800	9.0	65
415 Tryon Drive	1503	7.5	54.5
1) swale between Pletcher Rd. and old LOOW road (near telephone pole SPA 435)	2802	14.0	102
2) West Drainage Ditch, south side of Pletcher Rd.	2424	12.1	88.1
3) West Drainage Ditch, north side of Pletcher Rd.	2050	10.2	74.5
4) swale near DOE fence along West Drainage Ditch	2188	10.9	79.5
5) ditch on east side of NFSS entrance road	2842	14.2	103
6) pavement opposite west side road	3196	16.0	116
7) pavement about 20 yards south of (6)	3104	15.5	113
contact (1 centimeter)	3324	16.6	121
8) Niagara Mohawk access road next to KOA campground	3704	18.5	135
9) pavement along old LOOW road	2997	15.0	109
10) west bank of Four Mile Creek	1607	8.0	58
11) south bank of Central Drainage Ditch, east side Lutts Rd.	2185	10.9	79.4



The **MICRO REM and MICRO SIEVERT models** are lightweight, portable survey meters for applications where accurate dose rate measurements of low radiation levels are required. They read absorbed dose rate directly so no conversion from mR/h is required.

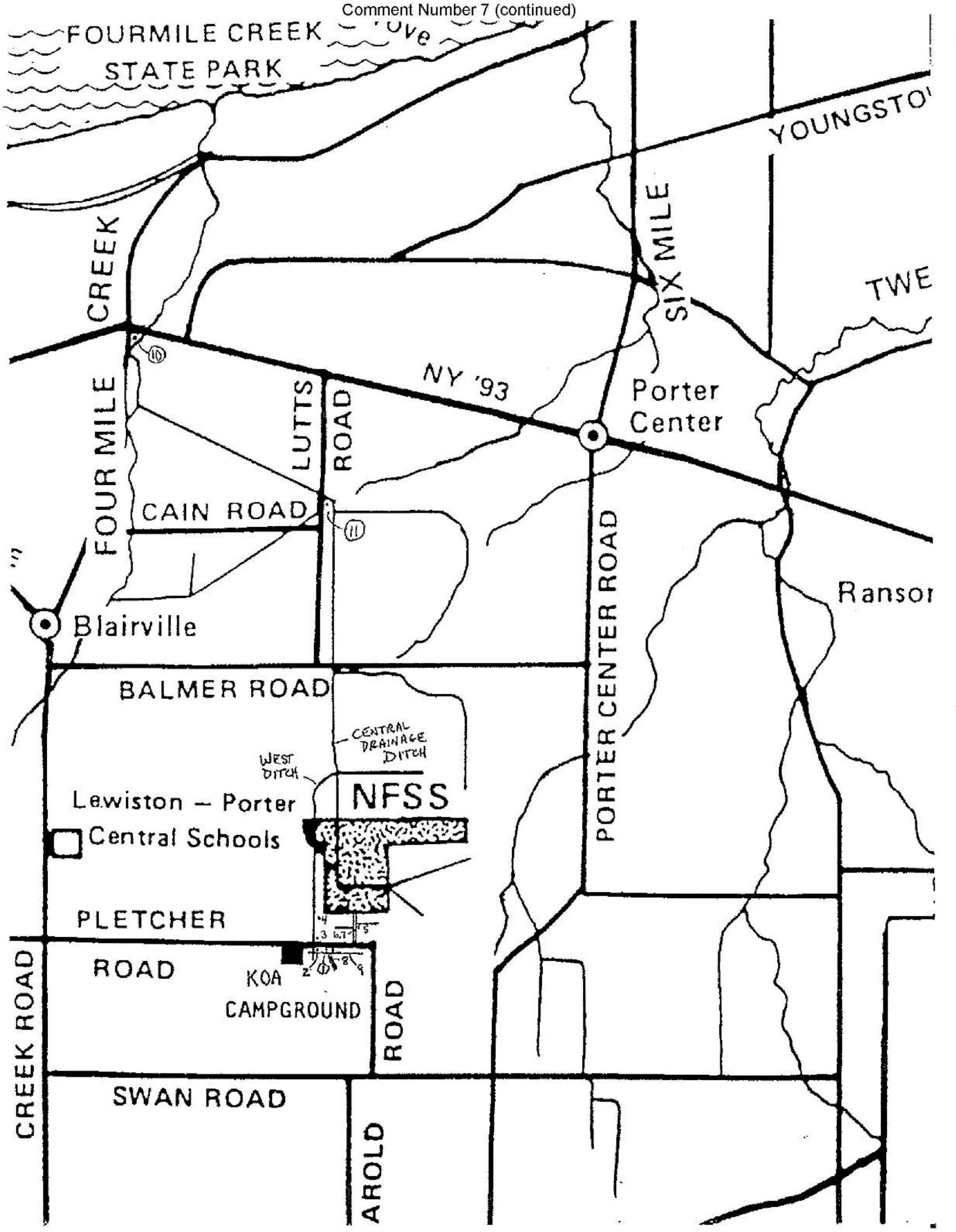
The tissue-equivalent scintillator used in these instruments gives them a nearly flat, rem energy response. This rem response is based on the deep dose equivalent index for 1 cm depth, uniparallel directional beam as calculated on the ICRU standard sphere.

These instruments' rem response and accuracy sets them apart from conventional "micro R" meters which use NaI(Tl) detectors. NaI(Tl) detectors overrespond to low energies and produce erroneously high readings. Also, you have to convert µR/h readings to µrem/h to get absorbed dose.

(graph and text from Bicron Radiation Measurement Products catalog)

James Rauch 12-15-94

Comment Number 7 (continued)



Comment Number 8

-----Original Message-----
From: Ann Roberts
Sent: Tuesday, March 30, 2010 9:49 AM
To: Darr, Bob
Subject: LOOW and prior remediation

Dear Mr Darr,

Unfortunately I was unable to attend the DOE presentation at Lewiston last week. However, I am currently reviewing the March 2010 DOE report,"NFSS VPs, NY: Review of Radiological Conditions at six Vicinity Properties and Two Drainage Ditches" and have a couple of questions.

1) In reading through the report, the following paragraph, suggests that previous remediation efforts by DOE contractors probably left KAPL wastes in place, on both the NFSS and NFSS vicinity properties, because KAPL wastes were not considered to be eligible for remediation under FUSRAP at the LOOW site.

"Based on process knowledge typically when other radiological materials were encountered during assessment, remediation and verification DOE contractors generally left them in place and documented their occurence."
(4.1 Definition of FUSRAP Waste, page 4.1, para 4)

Were radioactive materials, such as Cs-137 and Sr-90, which were generated at the KAPL SPRU in the late 1940s and early 1950s, remediated on areas of the LOOW/NFSS in the 1980s under FUSRAP?

2) Does FUSRAP address radiological groundwater contamination? The focus of prior remediation appears to have been soil only.

Many Thanks,
Ann Roberts

Comment Number 9

-----Original Message-----
From: Amy Witryol
Sent: Friday, April 16, 2010 7:58 AM
To: Clayton, Christopher
Cc: Gillespie, Joey
Subject: 2nd request: March 2010 Report

Status?

Amy

From: Amy Witryol
Sent: Tuesday, April 06, 2010 11:03 AM
To: christopher clayton
Subject: March 2010 Report

Hi Chris -

Per our conversation at the Corps meeting, could your office provide or post all of the documents which the Army Corps provided in connection with this project, which are not listed in the report's bibliography?

Amy

Comment Number 10

-----Original Message-----
From: Zeltmann, Christopher
Sent: Friday, April 23, 2010 1:33 PM
To: Clayton, Christopher; Darr, Bob
Cc: Kowalewski, William E LRB
Subject: RE: USDOE - working it

Chris, I understand your consultant is preparing a response to the request we forwarded from Amy Witryol for an extension of the public comment period. I look forward to getting that this afternoon.

But I also wanted to discuss with you whether there is a pre-existing established process for referring a re-opened vicinity property to the Corps. I heard you are traveling, but would like to speak with you at some point. I can be reached directly at 585-232-2585 or 202-527-0294 (mobile). Thanks

-Chris

Christopher Zeltmann

Director of Economic Development

Office of Congresswoman Louise M. Slaughter

Sign up for the Louise Line to get periodic E-Updates from Congresswoman Slaughter

-----Original Message-----
From: Kowalewski, William E LRB
Sent: Wednesday, April 21, 2010 11:59 AM
To: Zeltmann, Christopher
Subject: USDOE - working it

Chris

Quick update - made contact with USDOE through our Corps HQ. DOE is working the request to extend public comment on their report. Will advise as soon as I hear from them.

Bill

William E. Kowalewski, PE, PMP

US Army Corps of Engineers

Buffalo District

Chief, Special Projects Branch

From: Amy Witryol

Sent: Monday, April 19, 2010 12:24 PM

To: Zeltmann, Christopher

Cc: Joseph Gardella Jr.

Subject: DOE deadline Friday

Chris -

Can your office support the following requests of DOE before the Friday deadline?

1. Request a 120-day extension of the (30-day) public comment period on the draft "Niagara Falls Storage Site Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches, March 2010"

2. Request DOE work with all stakeholders to create a fair and transparent decision-making process when considering the referral of any closed NFSS vicinity property to the U.S. Army Corps of Engineers. The report identifies three criteria for these referrals. However, it provides; a) no process to inform the public of referral requests, b) no public access to information provided DOE for review of such requests, c) no opportunity for the public to comment on the accuracy or add to that information, prior to a DOE decision. *

The second request is extremely important because the current decision-making process is 100% behind-closed-doors between DOE, NYS DEC and USACE - the public has not even been furnished with copies of information USACE has already provided DOE - those documents were NOT included in the DOE report bibliography, so we don't even know what they are.

The agencies are already planning private closed-door conference calls with DOE to discuss new taxpayer-funded referrals. The conflicts of interest at the site call for more, not less transparency.

Finally, very bad news at EPA. The groundwater expert who drafted excellent EPA analysis of the NFSS RI has been transferred from EPA Radiation to EPA RCRA. That will require EPA to rely heavily if not exclusively on DEC analysis going forward.

Amy

REQUESTS TO:

U.S. Department of Energy Office of Legacy Management

c/o Bob Darr, LMS Public Affairs

S.M. Stoller Corporation

Contractor to the U.S. Department of Energy

11025 Dover St., Suite 1000

Westminster, CO 80021

cc: Christopher J. Clayton, Office of Legacy Management,

---

* "DOE uses the following criteria to determine if a site should be referred to USACE for further assessment:

A third-party characterization or survey reveals existing MED- or AEC-related contamination that was not previously identified;

A review of historical records indicates the potential for existing MED/AEC contamination that was not previously identified

An individual with credible institutional knowledge provides information that additional MED/AEC contamination might exist that was not identified in previous assessments."

Comment Number 11

United States Senate

WASHINGTON, DC 20510

April 23, 2010

U.S. Department of Energy Office of Legacy Management
c/o Bob Darr, LMS Public Affairs
S.M. Stoller Corporation
Contractor to the U.S. Department of Energy
11025 Dover St., Suite 1000
Westminster, CO 80021

RE: **Formerly Utilized Sites Remedial Action Program, Niagara Falls Storage Site Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches, March 2010**

Dear Mr. Darr:

Our offices have received the above-referenced draft report published on March 19th for public comment by April 23, 2010. We appreciate the initiative the Department of Energy (DOE) took in making this report available in draft form for public input.

This letter is to request a 120-day extension of the public comment period, and to also request DOE create a transparent decision-making process for the referral of any closed vicinity property to the U.S. Army Corps of Engineers for investigation and remediation.

As the draft report illustrates, the vicinity properties surrounding the Niagara Falls Storage Site ("NFSS") located in Lewiston, New York have a long and complex history dating back to the 1940's. The public should be afforded adequate time to research, review and submit documentation it feels may be relevant to the findings of this report, which was to determine whether previous certifications on six properties were appropriate at the time. To promote transparency, we also encourage DOE to make available to the public all documentation it has received from other agencies in connection with this draft report or vicinity property referrals.

The report states, "If previously undiscovered contamination is found that is eligible for remediation under FUSRAP, DOE will refer the property to USACE for investigation and remediation." The report identifies three criteria for these referrals, however, it does not provide a process to ensure all stakeholders are informed of each request, that they have access to information provided DOE for review of such requests, and that they have an opportunity to provide input on each request. We encourage DOE to work with all stakeholders to establish a fair and transparent decision-making process in advance of considering the referral of any the 23 closed vicinity properties to the U.S. Army Corps of Engineers for investigation or remediation.

Thank you for your attention to this request. Please call Anne Fiala on Senator Schumer's staff at 202-224-6542 or Ben Rosenbaum on Senator Gillibrand's staff at 202-224-4451 with any questions.

Sincerely,

Charles Schumer　　　Kirsten E. Gillibrand

Charles E. Schumer　　　Kirsten Gillibrand

Department of Energy
Washington, DC 20585

May 20, 2010

The Honorable Kirsten Gillibrand
United States Senate
Washington, DC 20510

Dear Senator Gillibrand:

In response to your April 23, 2010, letter, and in coordination with Congresswoman Slaughter's office, the U.S. Department of Energy (DOE) has extended the public comment period for the Preliminary Draft Document: *Formerly Utilized Sites Remedial Action Program, Niagara Falls Storage Site Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches*, for 60 days to June 14, 2010. Please know that completion of the report will not diminish the public's ability to comment. DOE will continue to actively review public comments even after the report is completed, and should such comments affect the report's conclusions, we will revise the report accordingly.

The report was prepared in response to stakeholder concerns regarding the adequacy of DOE's clean-up efforts at certain Niagara Falls Storage Site (NFSS) Vicinity Properties (VPs). The six properties selected for comprehensive review were chosen, in part, based on specific stakeholder inquires. The objective of the review is to verify that the completed VPs conform to cleanup standards by surveying all available documentation, and to determine if new information indicates the need to refer a completed VP to the U.S. Army Corps of Engineers (USACE) for assessment. To assure this process is open and transparent, the draft report includes a bibliography of documentation used in researching the radiological conditions of the six selected vicinity properties.[7] One of the primary objectives of compiling this bibliography was to solicit information from stakeholders to ensure an accurate, comprehensive, and transparent review. To further promote transparency, and consistent with your request, the bibliography will include all information received from stakeholders and USACE.[8] In addition, the data used in compiling this report has been posted on the internet prior to the issuance of the draft report. We will continue to explore ways to make our decision making processes more transparent.

Under the Formerly Utilized Sites Remedial Action Program (FUSRAP), DOE is responsible for performing historical research to determine whether radiological contamination is potentially the result of U.S. Atomic Energy Commission or Manhattan Engineer District (AEC/MED) activities. Upon receiving this analysis from DOE, the USACE then determines the extent of FUSRAP-related contamination, the impact of such contamination on human health and the

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[1] Available at http://www.lm.doe.gov/Niagara/Vicinity/Documents.aspx. Additionally, information DOE is reviewing is available to the public through the DOE Legacy Management Considered Sites Database.

[2] USACE documentation includes final reports and electronic base map files that were developed as part of the USACE Remedial Investigation Report (available at http://www.lrb.usace.army.mil/fusrap/nfss/index.htm). In addition, USACE documentation includes historical DOE documents in USACE custody.

Printed with soy ink on recycled paper

environment, and whether remedial action is required.[3] Accordingly, DOE believes stakeholder involvement is of primary importance during the assessment process, when USACE determines the extent to which contamination may be remediated under FUSRAP. Nonetheless, in advance of any referrals to USACE, DOE will continue to actively seek information from stakeholders in determining whether any possible additional FUSRAP-related contamination exists on completed vicinity properties: and ensure stakeholder access to any information used to make such determinations.

Finally, DOE informed stakeholders on March 24, 2010, that a path forward has been defined for three waste streams unrelated to AEC/MED activities, and thus ineligible for FUSRAP remediation. Slag at NFSS contains naturally occurring radioactive material and will be addressed by the New York State Department of Health. Other material may remain from waste generated by the University of Rochester in the 1950s and will be addressed by USACE during remediation of three remaining open vicinity properties (identified as properties VP-E, VP-E', and VP-G). DOE will research whether any waste remains from Knolls Atomic Power Laboratory activities in the 1950s and will work to address these residues.

Please contact me at (202) 586-7550 or david.geiser@hq.doe.gov if you have questions about DOE activities at the Niagara Falls Storage Site Vicinity Properties or the DOE Office of Legacy Management FUSRAP program.

Sincerely,

David W. Geiser
Director
Office of Legacy Management

cc:
Suzanne Beauchamp. USACE-HQ
William Kowalewski, USACE-Buffalo
Steve Gavitt, NYDOH
Kent Johnson, NYDEC
Paul Giardina, USEPA
Christopher Zeltmann, for Congresswoman L. Slaughter

[3] See P.L. 105-62, P.L. 105-245, and the 1999 DOE/USACE Memorandum of Understanding (available at http://www.lm.doe.gov/default.aspx?id=874)

Comment Number 11 (continued)

bcc:

Steven Miller, DOE-GC
Christopher Clayton, DOE-LM
Raymond Plieness, DOE-LM
Thomas Pauling, DOE-LM
Steven Schiesswohl, DOE-LM

Comment Number 12

-----Original Message-----
From: Amy Witryol
Sent: Friday, April 23, 2010 1:21 PM
To: Darr, Bob
Subject: NFSS VP Report - March 2010

Hi Bob –

The purpose of this email is to formally request an extension of the comment period on the NFSS VP report until the end of August. In addition to current and upcoming public comment periods for state permitting of facilities located on the LOOW site that we are busy preparing for, there is a lot of documentation we need to review and organize for inclusion in the DOE report with respect to the proper certification of VPs at the time. I hope it will not be an inconvenience to extend the comment period, particularly since it sounds as if you will not be inundated with comments during this period.

As indicated at the Corps meeting, I hope the referral process will provide at a minimum, 90-day notice period for publication of any referral requests along with information provided for those requests – this includes requests or comments from other agencies. Also, where there is no immediate public health risk, I hope there will be a process to require completion of a transparent PRP analysis, in advance of a referral, as opposed to afterwards.

Thank you.

Sincerely,

Amy Witryol

Comment Number 13

From: Joseph A. Gardella, Jr.
Sent: Friday, April 23, 2010 1:08 PM
To: Darr, Bob; Clayton, Christopher

Subject: Requests regarding extension of public comment and other stakeholder needs for Niagara Falls Storage Site and Vicinity Property

Dear Mssrs. Darr and Clayton:

I serve as the Chair of the Steering Committee of the Lake Ontario Ordnance Works Restoration Advisory Board (LOOW RAB), as an appointee of the Lewiston Porter (LewPort) School District, an important stakeholder in the future of LOOW site properties.

I serve on the RAB because I serve the LewPort Schools as their environmental advisor, governed by a formal MOU executed by the District and Board of Education.

I am writing for two reasons.

First, I would like to formally request a 120-day extension of the (present 30-day) public comment period on the draft "Niagara Falls Storage Site Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches, March 2010" - each vicinity property has a complex history, and residents and stakeholders require significant time for technical review of these documents. As a full time faculty member at the University at Buffalo, I really need the time to review these materials so I can advise the School District of critical issues affecting the District's decisions about the safety of students and staff at the campus. There are many others involved in the community that would also need that time, and the LOOW RAB can help disseminate the information to our stakeholders.

I would appreciate a chance to have the time to review this in a way to advise the School District.

Secondly, given the complexity of the community, and stakeholders, I request that DOE work with all stakeholders to create a fair and transparent decision-making process when considering the referral of any closed NFSS vicinity property to the U.S. Army Corps of Engineers. The report identifies three criteria for these referrals. However, it provides;

a) no process to inform the public of referral requests,

b) no public access to information provided DOE for review of such requests,

c) no opportunity for the public to comment on the accuracy of, or to add to that information, prior to a DOE decision

I am sure you are aware of the public controversy surrounding the Corp's Buffalo District decisions about the LOOW RAB and public input and participation. I am NOT asking that DOE get involved in the present controversies, but simply asking that DOE processes engage all stakeholders, from those satisfied with USACE to those who are not, in an equitable fashion so there is transparency.

Those of us advising elected bodies, stakeholders, towns and the School District cannot easily obtain relevant technical information, decision making criteria and have the time to give good advice to those bodies, if all activities are simply focused on agency staff communication.

I would appreciate your attention to this request and a response as soon as you can.

Thank you for your consideration.

Sincerely,

Joseph A. Gardella, Jr., Ph.D.
Professor and Larkin Chair of Chemistry
University at Buffalo, SUNY

Comment Number 14

Sent: Friday, April 23, 2010 9:27 PM
To: Darr, Bob
Cc: Clayton, Christopher
Subject: Comments on DOE report NFSS vicinity properties

Dear Mr Darr,

I am a former resident of Lewiston Porter, who remains interested in the NFSS and continues to work with members of that community to review technical reports and relevant historical documentation. I am writing to request an extension of the 30 day comment period on the draft DOE report,"Niagara Falls Storage Site Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches", March 2010. I have reviewed the report and found it to be inaccurate in several respects. I wish to submit detailed comments, but find the specified comment period of 30 days to be inadequate. Please allow the community an opportunity to participate in DOE decision making by allowing an appropriate period of time for review of the March 2010 report and submission of comments. I note the report cites a very limited number of documents. It would be helpful if DOE would supply a comprehensive list of all documents it has received, along with the source, in relation to the recent review of the NFSS vicinity properties and drainage ditches.

Ann Roberts

Comment Number 15

Town of Lewiston
P.O. Box 330
1375 Ridge Road
Lewiston, New York 14092
Phone: (716) 754-8213 or 754-8214
Fax: (716) 754-2821

SUPERVISOR
Steven Reiter

DEPUTY SUPERVISOR
Gary Catlin

COUNCIL MEMBERS
Alfonso M. Bax
Michael A. Johnson
Michael Marra
Ernest C. Palmer

TOWN CLERK
Carol J. Brandon
Box 330
Lewiston, NY 14092

RECEIVER OF TAXES
Joan Brandel Stephens

HIGHWAY
1445 Swann Road
Lewiston, New York
754-8218

TOWN JUSTICES
Thomas J. Sheeran
Hugh C. Gee

ASSESSOR
Gene J. Virtuoso

ATTORNEY
Michael Dowd
920 Center Street
Lewiston NY 14092
754-7865

ATTORNEY
Mark Gabriele
800 Main Street
Niagara Falls, NY 14301
285-1536

BUILDING INSPECTOR
PLANNING-ZONING
Timothy R. Masters
754-8213

CHIEF OF POLICE
Christopher P. Salada
754-8477

LWPCC
ADMINISTRATOR &
CHIEF OPERATOR
Timothy R. Lockhart
754-8291

WATER DEPARTMENT
754-8213

SENIOR SERVICES
Jeanette L. Collesano
754-2071

May 3, 2010

U.S. Department of Energy Office of Legacy Management
c/o Bob Darr, LMS Public Affairs
S.M. Stoller Corporation
Contractor to the U.S. Department of Energy
11025 Dover Street – Suite 1000
Westminster, CO 80021

Dear Mr. Darr:

At the Town of Lewiston Board meeting of April 26, 2010 the Board unanimously approved the following resolution,

Whereas, the U.S. Department of Energy issued a draft report titled, *"Niagara Falls Storage Site Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches, March 2010"*;

Whereas, this report evaluates the appropriateness the Dept. of Energy environmental certifications of certain Niagara Falls Storage Site vicinity properties undertaken in the 1980's;

Whereas, one of these vicinity properties is owned by the Town of Lewiston;

Whereas, the history of the environmental impacts to the subject Lewiston property is extensive and complex;

Whereas, the public comment period on this Dept. of Energy report expired April 23, 2010 and has reportedly been temporarily extended to May 23, 2010.

Be it Resolved, that the Town of Lewiston formally requests from the U.S. Dept. of Energy, an additional 90-day extension of the public comment period to August 23, 2010 in order to review the report and solicit input from other agencies and informed members of the public to determine what, if any comments the Town may want to provide;

Be it further Resolved, that the Town of Lewiston requests the Dept. of Energy to create a fair and transparent decision-making process when considering the referral of any previously certified NFSS vicinity property to the U.S. Army Corps of Engineers at taxpayer expense, and, that the referral process:

a.) Inform the public of each referral request,

b.) Provides public access to information provided to Dept. of Energy by any agency or party for review of such requests,

c.) Provides the opportunity for the public to comment on such information, prior to a Dept. of Energy decision to refer tax-payer funded investigation to the U.S. Army Corps of Engineers on a previously certified vicinity property

A copy of this Resolution shall be Immediately transmitted to the Dept. of Energy.

Sincerely,

Carol J. Brandon

Carol J. Brandon
Town Clerk

Comment Number 16

From: Sanford J. Freedman
Sent: Tuesday, May 04, 2010 3:56 PM
To: Darr, Bob
Subject: Fw: FUSRAP Program - - - Comments

Bob,

Please see attached.

Thank you.

S. Freedman

----- Original Message -----
From: Sanford J. Freedman
To: Darr, Bob
Sent: Tuesday, May 04, 2010 5:08 PM
Subject: FUSRAP Program

Mr. Darr,

My son Michael J. Freedman lived at 993 Pletcher Road, Lewiston, New York for several years with his Mother. He attended the LewPort school system.

In 1996 at 16 years old, he was diagnosed with Stage 4 Melanoma.

At 27 years old the Melanoma reappeared. (2007)

Michael needed several surgeries each time and both times had to be treated with Chemotherapy every other day for an entire year.

He never was overexposed to the sun and I truly believe that the contamination in this area is what made him very sick. Now he has to watch himself very closely and will have to for the rest of his life, as to the melanoma reoccurring.

I would be very interested in comments from FUSRAP.

Please advise.

Thank you.

Sanford J. Freedman

Comment Number 17

----- Forwarded Message ----
From: Kevin Myers
To: Bob Darr
Sent: Wed, May 5, 2010 8:25:44 AM
Subject: NFSS and LOOW Pipe lines

Hello Bob Darr

I received your e mail address from a Army Corps notice.

I am concerned about the 42" pipe (and 30" pipe) that travels from the Loow and NFSS down Pletcher road to Niagara river. I have 1970's reports that the town of lewiston had of testing to use river end of pipe. in it the eng. co. found it was contaminated from somewhere in pipe not from river the at Army Corps meetings thay told me there is no interest to test 42" pipe and I think there is. Do you have any information or concerns on this pipeline.
I know the town owns pipe however it may of been contaminated when site was decommissioned and there are now pathways to residents homes.

I plan to send my info to EPA

Kevin Myers

Comment Number 18

New York State Department of Environmental Conservation
Division of Solid & Hazardous Materials
Bureau of Hazardous Waste & Radiation Management
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Alexander B. Grannis
Commissioner

Via E-mail

June 11, 2010

Mr. Bob Darr
Public Affairs
S.M. Stoller Corp.
DOE Legacy Management Support
2597 B3/4 Road
Grand Junction, CO 81503

Dear Mr. Darr:

Re: Niagara Falls Storage Site Vicinity Properties

The New York Department of Environmental Conservation (the "Department") has received the "Niagara Falls Storage Site Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches." dated March 2010. The report presents the findings of a Department of Energy (DOE) review of data and information associated with radiological remedial actions performed by DOE in the 1980's under the FUSRAP program. This Department would like to offer the following two comments.

Section 4.2: This section of the report implies that the wastes in question may not be eligible under the FUSRAP program. Department review of documents associated with wastes associated with the Knolls Atomic Power Laboratory (KAPL) and the University of Rochester radiation safety program indicate that these programs were operated under the control of the Manhattan Engineer District and/or Atomic Energy Commission. The operations at these facilities also pre-dated the beginnings of a civilian nuclear program. Therefore, these materials fit the definition of FUSRAP wastes and should be remediated under this program.

Table5-1: In the fall of 2004 and into 2005, the United States Army Corp of Engineers (USACE), as part of their Formerly Utilized Defense Site responsibilities, removed the Contaminated Materials Storage Area pad located in the southeast corner of Vicinity Property H'. This lined storage area was constructed in 1999 by the Corp as part of the TNT waste pipeline and chemical waste sewer interim remedial action. During this action a fairly large area of radiologically contaminated soil was discovered at concentrations several times the historical cleanup standard. This information differs from what is presented in the table as it would appear that there is remaining FUSRAP material on this parcel. As far as the Department knows, no further action was taken by the USACE. The Department requests that additional characterization be performed on this parcel.

40 years of stewardship 1970-2010

Mr. Bob Darr 2.

The Department is encouraged by DOE's continued involvement in the restoration of the Niagara Falls Storage Site and its Vicinity Properties. Continued dialog with respect to this issue and the long-term stewardship of the facility is in the best interest of all parties involved.

Sincerely,

Robert J. Phaneuf, P.E.
Acting Director
Bureau of Hazardous Waste & Radiation Mgmt.

cc: P. Giradina, USEPA Region II
J. Strickland, Region 9
S Gavitt, NYSDOH

Comment Number 19

-----Original Message-----
From: Amy Witryol
Sent: Tuesday, June 22, 2010 12:52 PM
To: Clayton, Christopher ; Darr, Bob
Cc: christopher Zeltmann; Laura Monte ; Ben Rosenbaum; Joseph Gardella Jr.; Clyde.Burmaster
bill; Melissa Fratello
Subject: NFSS VP Report - March 2010
Importance: High

I'm still waiting for a response to the email below. We are busy finishing work on the information which indicates the NFSS has been leaking, in addition to meeting other state regulatory comment periods for other operations at the LOOW site.

It seems to me that by adding another 45 days to the DOE deadline from here would be far more cost effective and responsive than reacting to corrections to the report after its issuance, and reissuing. I remain concerned about the closed door meetings on the closed VPs which have taken place among the agencies, and the absence of any assurances that closed door decision-making will not ensue with respect to VP referrals.

Amy

From: Amy Witryol
Sent: Friday, April 23, 2010 3:21 PM
To: Bob Darr
Subject: NFSS VP Report - March 2010

Hi Bob -

The purpose of this email is to formally request an extension of the comment period on the NFSS VP report until the end of August. In addition to current and upcoming public comment periods for state permitting of facilities located on the LOOW site that we are busy preparing for, there is a lot of documentation we need to review and organize for inclusion in the DOE report with respect to the proper certification of VPs at the time. I hope it will not be an inconvenience to extend the comment period, particularly since it sounds as if you will not be inundated with comments during this period.

As indicated at the Corps meeting, I hope the referral process will provide at a minimum, 90-day notice period for publication of any referral requests along with information provided for those requests - this includes requests or comments from other agencies. Also, where there is no immediate public health risk, I hope there will be a process to require completion of a transparent PRP analysis, in advance of a referral, as opposed to afterwards.

Thank you.

Sincerely,

Amy Witryol

Comment Number 20

From: Darr, Bob
Sent: Wednesday, June 30, 2010 5:29 PM
To: Clayton, Christopher; Widdop, Michael; Gillespie, Joey
Subject: Amy Witryol phone call

Gentlemen, Amy Witryol called me again today to clarify our email response to her. We were on the phone for approximately two hours, but I think it was a productive discussion. She was very upfront about her desire to bring DOE into her efforts to stop any expansion of the CWM facilities and to ensure that the USACE was providing all their data and decision-making process to the community.

I explained the DOE role in FUSRAP and emphasized the lack of regulatory authority DOE has in the remedial actions the USACE is conducting at the NFSS. I also explained that DOE was developing a path-forward on the potential KAPL wastes on VP X. I explained that the KAPL waste didn't meet FUSRAP criteria, but that if KAPL waste is present, DOE would determine the appropriate response to protect human health and the environment.

She clearly didn't understand how FUSRAP works, so I also explained the historical background of the program to address contamination left over from MED/AEC operations during and shortly after WWII that didn't fall under any other program. She didn't understand why NFSS was a FUSRAP site but Fernald and Rocky were not. I think I cleared this issue up.

I also explained our report and addressed her concern that any new information provided by the stakeholders would be addressed in a timely fashion, even if it was received after the report was completed. She said she was afraid that she or another stakeholder could provide additional documentation and it would be five years before DOE did anything with it. She remains convinced that the NFSS IWCS is leaking and the waste needs to be removed and sent to a disposal site in Texas before that site is filled up. She said that Ann Roberts has sent a technical memo to the USACE with evidence that the cell is leaking, but the USACE refuses to acknowledge that and is disseminating false information to the public so they won't have to dig up the IWCS and remove the waste. She offered to provide a copy of the memo to DOE.

She remains concerned that any future referral of a closed VP to the USACE would be conducted behind closed doors and the public would have no knowledge or input in the decision, allowing CWM to have the public pay for cleaning up contamination they brought onto the site. She said she is concerned that NY DEC and the USACE would try to "hoodwink" DOE into going along with their plans to support the expansion of CWM's disposal facility. I again explained the referral process and assured her that DOE would make public any documents or information that led to such a referral. I explained that DOE's role in the process is to determine whether any new site or contamination discovered was eligible under FUSRAP, and if so, to refer it to USACE for evaluation to determine if additional remedial action was required. I also emphasized that DOE has no regulatory authority over USACE concerning their decision-making or remedial activities and the DOE does not have any authority or responsibility for an open site until the cleanup is completed and the site turned over to LM for long term custody.

She also expressed concern about the property to the west of the NFSS that was not determined to be a VP, but that the community believed it should be. I told her that any new information provided to DOE that indicated there was FUSRAP eligible contamination on any property would trigger the DOE evaluation process and could lead to inclusion of that property into the FUSRAP process.

I believe that our conversation ended on a positive note and she seemed to better understand the FUSRAP program, how a property is referred to the USACE, and the purpose of our VP review report. She indicated at the end of the conversation that one of her goals is to achieve Congressional action to return the responsibility for remedial action at NFSS to DOE because she believes DOE is more inclined than USACE to work with local stakeholders during the cleanup.

Thanks,
Bob

Bob Darr
SM Stoller Corporation
DOE Legacy Management Support

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