
Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

For the Niagara Falls Site,
New York



U.S. Department of Energy



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Department of Energy

Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831—

MAY 31 1996

Dear Addressee:

NIAGARA FALLS STORAGE SITE - 1995 ENVIRONMENTAL SURVEILLANCE INFORMATION

The purpose of this letter is to transmit the annual environmental surveillance technical memorandum for the Niagara Falls Storage Site (NFSS) located in Lewiston, New York. This site is currently managed by the U. S. Department of Energy (DOE) for disposal of radiologically contaminated soils.

Environmental surveillance activities conducted at this site included annual analysis of groundwater, surface water, and sediment samples for radiological and chemical parameters, semiannual external gamma exposure rate measurements, quarterly radiological analysis of atmospheric radon and thoron concentrations, and radon flux from the waste containment structure. The environmental surveillance memorandum identifies sampling locations, monitoring parameters, and a summary of associated analytical results.

Results from the 1995 environmental surveillance are generally similar to measurements taken in past years and indicate that average concentrations of radioisotopes and metals are well below applicable standards and derived concentration guides. Results from the monitoring program indicate that no current public drinking water sources are being affected by the Niagara Falls Storage Site.

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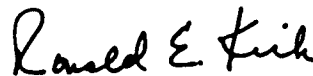
Contained within the memorandum are estimates of the potential public exposure to radioactivity present at NFSS. Based on the site surveillance data and local land usages, potential human exposures are well below health-based guidelines established by the DOE and the Environmental Protection Agency.

If you are interested in receiving more detailed information on the NFSS environmental surveillance program (including additional copies of the annual environmental surveillance memorandum or its supporting technical data) call DOE's toll free information number, 1-800-253-9759, or write to me at the following address:

Ronald E. Kirk, Site Manager
Former Sites Restoration Division
U. S. Department of Energy
P. O. Box 2001
Oak Ridge, TN 37831-8723

Please contact me if you wish to discuss the surveillance program or any other element of DOE's cleanup program for the Niagara Falls site.

Sincerely,



Ronald E. Kirk, Site Manager
Former Sites Restoration Division

Enclosure

28-MAY-1998

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List ID: NFSS-TECH
Category: %

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FUSRAP TECHNICAL MEMORANDUM

To: Jason Darby, Environmental Scientist - FSRD
From: James C. McCague, Project Engineering Manager - FUSRAP
Subject: Environmental Surveillance Results for 1995 for the Niagara Falls Storage Site

Prepared By <i>Angela K. John</i>	ES Team Lead <i>William R. Dwyer</i>	Project Engineer <i>John H. Smith</i>	Project Manager <i>C. M. McNamee</i> PMG
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SUMMARY

This memorandum presents and interprets analytical results and measurements obtained as part of the 1995 environmental surveillance program for the Niagara Falls Storage Site (NFSS) under the Formerly Utilized Sites Remedial Action Program (FUSRAP). The discussion provides a comparative analysis of local background conditions and applicable regulatory criteria to results reported for external gamma radiation and for samples from the media investigated (air, surface water, streambed sediment, and groundwater). Results from the 1995 surveillance program at NFSS indicate that applicable U.S. Department of Energy (DOE) guidelines were not exceeded for any measured parameter or for any dose calculated for potentially exposed members of the general public.

1.0 INTRODUCTION

NFSS is located in the Township of Lewiston and Porter in northwest New York state, northeast of Niagara Falls and south of Lake Ontario (Figure 1). Presently, the site property includes buildings; storage facilities; and a clay-capped, grass-covered waste containment structure (WCS). The property is entirely fenced, and public access is restricted.

Land use in the region is predominantly rural; however, the site is bordered by a chemical waste disposal facility (ChemWaste Management Chemical Services, Inc.) on the north, a solid waste disposal facility (Modern Disposal, Inc.) on the east and south, and a Niagara Mohawk Power Corporation right-of-way on the west. The nearest residential areas are approximately 1.1 km southwest of the site; the residences are primarily single-family dwellings.

The site presently consists of approximately 77 ha. All onsite and offsite areas of residual radioactivity above current DOE guidelines were remediated between 1955 and 1992; materials generated during remedial actions (approximately 195,000 m³) are encapsulated within the WCS, specifically designed to provide long-term storage of the material. The site was resurveyed and fenced in 1992.

From 1944 to 1954, portions of the site were used for receipt and storage or shipment of radioactive wastes. These wastes were primarily pitchblende residues from uranium processing operations conducted at other sites. From 1953 to 1959 and 1965 to 1971, the site was used as a boron-10 isotope separation plant. Based on the process and the typical raw materials used, no potential contaminants of concern have been identified from this process.

Residues stored in the WCS originated from sites other than NFSS. The WCS also contains contaminated rubble, uranium metal billets, combustibles stored in wooden crates, processing wastes stored in drums, and contaminated soils and wastes excavated from onsite and offsite areas.

1.1 Monitored Constituents

The key elements of the 1995 environmental surveillance program at NFSS were as follows:

- measurement of external gamma radiation;
- measurement of radon gas concentrations in air (combined contributions from radon-220 and radon-222; see note below);
- monitoring of radon-222 flux (rate of radon-222 emission from the storage piles);
- sampling and analyses of surface water for radioactive constituents (total uranium and radium-226);
- sampling and analyses of streambed sediments for radioactive constituents (total uranium, thorium-232, and radium-226);
- sampling and analyses of groundwater for radioactive constituents (total uranium and radium-226), metals, total organic carbon (TOC), and water quality parameters.

[Note: Radon gas consists of two isotopes, radon-220 and radon-222. Radon-220, traditionally referred to as "thoron," is the immediate decay product of radium-224, originating from thorium-232. Radon-222 is the immediate decay product of radium-226, originating from uranium-238. In this document, radon-220 and radon-222 will be referred to as radon gas, unless isotopic specificity is required. Based on the radioactive constituents in the wastes contained in the WCS, it is unlikely that radon-220 would be emitted from the WCS; it is, however, possible that radon-222 would be emitted.]

1.2 Unit Conversions

The following tables provide the units of measurement and appropriate abbreviations used in this document. Conventional units for radioactivity are used in this document because the applicable regulatory guidelines are generally provided in these terms; Système Internationale (SI) units of measurement are used in the discussion of all other parameters. Unit conversions will be provided in the text only for water level information.

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Units of Measurement and Conversion Factors - Radioactivity

Parameter	Conventional Units	SI Units	Conversion Factor
Dose	millirem (mrem)	milliSievert (mSv)	1 mrem = 0.01 mSv
Activity	picocurie (pCi)	becquerel (Bq)	1 pCi = 0.037 Bq

Units of Measurement and Conversion Factors - Mass, Length, Area, and Volume

Parameter	SI Units	English Units	Conversion Factor
Mass	gram (g)	ounce (oz)	1 g = 0.035 oz
	kilogram (kg)	pound (lb)	1 kg = 2.2046 lb
Length	centimeter (cm)	inch (in)	1 cm = 0.394 in
	meter (m)	foot (ft)	1 m = 3.281 ft
	kilometer (km)	mile (mi)	1 km = 0.621 mi
Area	hectare (ha)	acre	1 ha = 2.47 acres
Volume	milliliter (mL)	fluid ounce (fl. oz.)	1 mL = 0.0338 fl. oz.
	liter (L)	gallon (gal)	1 L = 0.264 gal
	cubic meter (m ³)	cubic yard (yd ³)	1 m ³ = 1.307 yd ³

2.0 REGULATORY GUIDELINES

The primary regulatory guidelines that affect activities at FUSRAP sites are found in DOE Orders, Federal statutes, Federal regulations, and state regulations. DOE Orders (5400 series and 5820.2A) were applicable to all FUSRAP sites in 1995, while the applicability of other Federal and state regulations varies from site to site. Regulatory criteria that were used to evaluate the results of the 1995 environmental surveillance program at NFSS are summarized below, categorized by applicable medium and parameter.

External Gamma Radiation and Air (Radon Gas and Airborne Particulates)

Applicable regulatory criteria for evaluating the calculated maximum doses from external gamma radiation and inhalation of radioactive particulates, and the measured concentrations of radon gas are as follows:

- DOE Order 5400.5

Dose limits for members of the public are presented in this DOE Order. The primary dose limit is expressed as an effective dose equivalent. The limit of 100 mrem effective dose equivalent above background in a year from all sources is specified in this Order; external gamma radiation dose and the calculated doses from airborne particulate releases are included in the calculation of the effective dose equivalent total. DOE limits for radon concentrations in air are also presented in this Order. The limits for radon-220

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and radon-222 concentrations in air are both 3.0 pCi/L above background concentrations. If both isotopes are present, the sum of the ratios of the concentration of each isotope to the allowable limit must be less than one. Only radon-222 is a contaminant of concern at NFSS.

- **Clean Air Act**

Section 112 of the Clean Air Act authorized the Environmental Protection Agency (EPA) to promulgate the National Emission Standards for Hazardous Air Pollutants (NESHAPs), which is applicable at NFSS. Compliance with Subpart H (for nonradon, radioactive constituents) is verified by applying the EPA-approved CAP88-PC model (EPA 1992a). Compliance with Subpart Q is verified by annual monitoring of the piles for radon-222 flux.

**Summary of Radiological Standards and Guidelines
- External Gamma Radiation and Air -**

Radioactive Parameter	DOE Order 5400.5 ^a	Federal Standard or Guideline
Radon-222 flux	---	20 pCi/m ² /s ^b
Radon-222	3.0 pCi/L	4 pCi/L ^c
Radionuclide Emissions (airborne particulates and radioactive gases excluding radon-220 and radon-222)	10 mrem/yr	10 mrem/yr ^b
Effective Dose Equivalent (total contribution from all sources ^d)	100 mrem/yr	---

^a Guidelines provided in the DOE Order are above background concentrations or exposure rates.

^b Federal (EPA) Standard from 40 CFR, Part 61.

^c EPA action level for radon concentration in homes (reference EPA 400-R-92-011).

^d Contributing sources at NFSS consist of external gamma radiation exposure, radionuclide emissions listed above, and ingested radionuclides in water and soil/sediment (listed in the following table).

- No existing standard.

Surface Water, Sediment, and Groundwater - Radioactive Parameters

Applicable regulatory criteria for evaluating the measured concentrations of radionuclides in sediment, surface water, and groundwater at NFSS are as follows:

- **DOE Order 5400.5**

The environmental surveillance program does not include analysis of onsite soils; however, because there are no standards for sediment, the residual soil cleanup criteria specified in DOE Order 5400.5 are used to provide a basis for evaluation of the analytical results in sediment. The soil guidelines are health-based values that are established based on future use scenarios, such as farming and grazing livestock.

DOE Order 5400.5 states that the guideline for residual concentrations of radium-226 and thorium-232 in soil is 5 pCi/g above background, based on an average of the first 15 cm of soil below the surface. The NFSS proposed site-specific DOE soil cleanup criterion for total uranium is 90 pCi/g above background. For mixtures of radionuclides, the Order prescribes that the data be evaluated by the sum-of-the-ratios. By this method, the above-background concentration of each of the radioisotopes is divided by the respective criterion, and the ratios are summed. If the result is greater than 1, the mixture of radionuclides fails the sum-of-the-ratios test and is considered to exceed the soil guidelines.

DOE derived concentration guides (DCGs) for water, which are also presented in this Order, are used to evaluate analytical data for groundwater at NFSS, and are called out in the appropriate data tables within this report.. The DCG for each radionuclide represents the concentration that would result in a dose of 100 mrem during a year, conservatively calculated for continuous exposure conditions.

Summary of Radiological Standards and Guidelines - Water and Sediment

Radioactive Parameter	DOE DCG ^a for Water ^b	DOE Soil Cleanup Criterion ^{c,d}
Total Uranium	600 pCi/L ^e	90 pCi/g
Thorium-232	N/A	5 pCi/g
Radium-226	100 pCi/L	5 pCi/g

^a DOE Derived Concentration Guide (DOE Order 5400.5)

^b Surface water and groundwater (non-drinking water values); represent concentrations above background.

^c Above background concentration in soil, averaged over the topmost 15 cm of soil.

^d There are no standards for sediment; therefore, the DOE residual (radium and thorium) and proposed site-specific (uranium) soil cleanup criteria are used to provide a basis for evaluation of analytical results for sediment. If a mixture of the radionuclides is present, then the sum of the ratios of the concentration of each isotope to the allowable limit must be less than one.

^e This guideline applies for total uranium in natural isotopic abundance.

N/A Not analyzed in water under the NFSS environmental surveillance program.

Groundwater - Chemical Parameters

Although the groundwater at NFSS does not provide a public drinking water supply, state and Federal standards for drinking water are used in this document (as detailed below) to provide a conservative basis for comparison of chemical analytical results.

- Safe Drinking Water Act (SDWA)

SDWA is the primary Federal regulation applicable to the operation of a public water system and the development of drinking water quality standards. These regulations, found in 40 Code of Federal Regulations (CFR) Part 141, set maximum permissible levels of organic, inorganic, and microbial contaminants in drinking water by specifying

the maximum contaminant level (MCL) for each [*EPA Drinking Water Regulations and Health Advisories* (EPA 1994)].

- New York State Department of Environmental Conservation (NYSDEC) Water Quality Regulations

NYSDEC has adopted the Federal SDWA standards into its own regulations in Title 6, New York Codes, Rules, and Regulations (NYCRR) Parts 700-705, "Water Quality Regulations for Surface and Groundwater" (NYSDEC 1994a). In addition, NYSDEC has independently established more stringent standards for some constituents.

The State of New York categorizes groundwater resources by groundwater quality and use in order to apply established standards. At NFSS, because of uniformly poor groundwater quality and availability in the general region, the shallow groundwater resources are of little consequence. Regional studies and studies conducted near the site (La Sala 1968, Wehran 1977, Acres American 1981) conclude that groundwater quality is poor in the vicinity of the site because of high mineralization. Additionally, local studies (Wehran 1977 and Acres American 1981) indicate that the permeabilities of the shallow groundwater systems are sufficiently low that it is not practical to obtain groundwater from these systems for water supply. Onsite permeability testing at NFSS confirms the low permeabilities.

Well surveys conducted in 1988 and 1995 identified eight private wells within a 4.8-km radius of the site; these wells further confirm the impracticability of using the shallow groundwater system for obtaining water in appreciable quantities. Of the eight wells identified during the survey, only one [2 km north of the site] is downgradient of the site. None of the wells identified in the well survey is reportedly used for drinking water supply; most are used for irrigation (DOE 1994). In light of these findings, the NYSDEC Class GA (water supply) groundwater standards represent a conservative basis for comparing analytical results because the groundwater at NFSS does not meet the criteria for Class GA groundwater.

However, to establish a basis for comparison of analytical results, Class GA (groundwater) water quality standards for some constituents were obtained from the above-referenced NYSDEC document (last updated January 9, 1994).

- NYSDEC Technical and Administrative Guidance Memorandum (January 24, 1994) (NYSDEC 1994b)

This Technical and Administrative Guidance Memorandum (TAGM) specifically addresses soil cleanup objectives. However, because the method for determining these objectives is partly based on protection of the groundwater, groundwater standards for some constituents were included in this TAGM. These standards have been used to

establish additional Class GA (related, conservative case) state water quality standards for comparison of analytical results.

3.0 SAMPLING LOCATIONS AND RATIONALE

Radioactive materials that exceed guidelines at NFSS are stored in the WCS. Exposure of members of the public to radioactivity at NFSS is unlikely due to site access restrictions (e.g., fences) and engineering controls; however, potential pathways include direct exposure to external gamma radiation; inhalation of air containing radon or radioactively contaminated particulates; and contact with, or ingestion of, contaminated surface water, streambed sediments, or groundwater. The environmental surveillance program at NFSS has been developed to provide surveillance of these exposure routes through periodic sampling and analysis for radioactive and chemical constituents. Figures 1 through 3 present the environmental surveillance program at NFSS and indicate sampling locations and media. Figure 4 presents a total well inventory for the site. Table 1 summarizes the environmental surveillance program at NFSS for external gamma radiation, air (radon), surface water, sediment, and groundwater.

External gamma radiation monitoring and radon gas measurement occur at fenceline locations surrounding NFSS and the WCS to assess the potential exposures to the public and site workers (Figures 1 and 2). Measurement of radon-222 flux rates is periodically conducted at discrete grid intersections on the WCS (Figure 3).

Groundwater monitoring wells have been selected to assess background, downgradient, and source-area (near the WCS) groundwater quality conditions in the upper groundwater system (Figure 2). The upper groundwater system would provide the earliest indication in the unlikely event of a breach of the WCS. The lower groundwater system is not monitored because past analytical results from the upper groundwater system have not indicated migration of radioactive material from the WCS. Groundwater monitoring includes analysis for radioactive constituents, metals, and total organic carbon.

Surface water and streambed sediment sampling is conducted along the drainage ditch system to assess upstream, onsite, and downstream concentrations of radioactive constituents (Figure 2). Surface water and sediment sampling locations were selected to assess the migration of constituents in these media should any be apparent. Surface water and streambed sediment samples are analyzed for radioactive constituents.

4.0 SURVEILLANCE METHODOLOGY

Under the NFSS environmental surveillance program, standard analytical methods approved and published by EPA and the American Society for Testing and Materials (ASTM) are used for chemical (i.e., all nonradiological) analyses. The laboratories conducting the radiological analyses adhere to EPA-approved methods and to procedures developed by the Environmental Measurements Laboratory (EML) and ASTM. The specific analytical methods and the sampling locations at NFSS are summarized in Table 2.

All 1995 environmental surveillance activities at NFSS were conducted in accordance with the FUSRAP *Environmental Monitoring Plan* (BNI 1995a) and the instruction guides (IGs) listed in the following table. The IGs are based on guidelines provided in *RCRA Ground Water Monitoring: Draft Technical Guidance* (EPA 1992b), *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846, EPA 1992c), and *A Compendium of Superfund Field Operations Methods* (EPA 1987).

FUSRAP Instruction Guides Used for Environmental Surveillance Activities

Document Number	Document Title
191-IG-007	IG for Meteorological and Water Level Measurements
191-IG-011	IG for Decontamination of Field Sampling Equipment at FUSRAP Sites
191-IG-028	IG for Surface Water and Sediment Sampling Activities
191-IG-029	IG for Radon/Thoron and TETLD Exchange
191-IG-033	IG for Groundwater Sampling Activities

5.0 ANALYTICAL DATA AND INTERPRETATION OF RESULTS

This section presents the data and interpretation of results for the environmental surveillance program at NFSS. Data for 1995 are presented in Tables 3 through 12.

Note that in data tables containing analyses for radioactive constituents, some results may be expressed as negative numbers. This phenomenon occurs if the average background activity of the laboratory counting instrument exceeds the measured sample activity. In such cases, when this instrument background activity is subtracted from the sample activity, a negative number results. For the purposes of interpretation, all values below the baseline minimum detectable activity (MDA) are interpreted as having an unknown value between zero and the MDA. Such a value will be referred to as a nondetect in the text discussion.

For direct comparison of analytical results to the DOE DCGs, average background radioactivity in surface water, sediment, and groundwater is subtracted from the 1995 results. The reported results and the background corrected results are both provided in the data tables; but for simplicity, discussions in the text present only the actual analytical results (background not subtracted) because none of the measured concentrations is near the DCG. All figures displaying results present actual analytical data.

Average historical background concentration for each sampled analyte is determined from background sampling results from 1992 to 1995, unless otherwise noted. Subtracting the calculated average background from the sampling results for 1995 then gives an estimate of the above-background concentration of the measured constituent at each location. When background is subtracted from the sampling result, it is possible that a negative number will be obtained, much the same as a negative value may be obtained when the laboratory subtracts instrument background from a sample measurement. A negative number will be considered indistinguishable from background.

The most precise analytical method for analysis of total uranium yields results in $\mu\text{g/L}$ and $\mu\text{g/g}$ for water and sediment samples, respectively. To allow direct comparison of results to the DCGs and soil guidelines, the data must be converted to pCi/L and pCi/g , as appropriate. The specific activity for total uranium in its natural isotopic abundance (uranium that is neither depleted nor enriched) is $0.677 \text{ pCi}/\mu\text{g}$ (BNI 1995b), which is used as the conversion factor to convert the data to pCi/L or pCi/g , as appropriate. Only the converted data are provided in the tables and text of this document.

5.1 External Gamma Radiation

External gamma radiation dose rates are measured using tissue-equivalent thermoluminescent dosimeters (TETLDs) in place at NFSS continuously throughout the year. Each TETLD measures a cumulative dose, which, when divided by the period of exposure (one year), yields the external gamma radiation dose rate at that location. TETLD results for external gamma radiation dose rate in 1995 (both raw data and data corrected for shelter/absorption and background) are summarized in Table 3. TETLD surveillance locations are shown in Figures 1 and 2.

All 1995 external gamma radiation results at NFSS were indistinguishable from background. Based on these data, the dose rate from direct gamma exposure at NFSS is essentially 0 mrem/yr above background. This value is well within compliance with the DOE guideline of 100 mrem/yr above background.

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5.2 Radon Gas

Based on the radioactive constituents in the wastes contained in the WCS, it is unlikely that radon-220 would be emitted from the WCS; however, it is possible that radon-222 would be emitted. Air surveillance is conducted to determine the concentration of radon gas at NFSS using RadTrack[®] detectors that are designed to measure alpha particle emissions from both isotopes of radon (radon-220 and radon-222) and to collect integrated data throughout the period of exposure. Because radon-220 is not a contaminant of concern at NFSS, all concentrations are assumed to be radon-222. Results of quarterly monitoring in 1995 are presented in Table 4; the corresponding surveillance locations are shown in Figures 1 and 2. The results are well below the DOE limit of 3.0 pCi/L for radon-222. Nearly all measurements were less than detection limit (results ranged from less than 0.3 pCi/L to 0.8 pCi/L, including background) and were comparable to the concentrations measured at the five offsite locations. Results for 1995 were also comparable to 1994 results (BNI 1995c).

5.3 Radon-222 Flux

Measurement of radon-222 flux provides an indication of the rate of radon-222 emission from a surface. Radon-222 flux is measured with activated charcoal canisters placed at 15-m intervals across the surface of the WCS for a 24-hr exposure period. Measurements for 1995 are presented in Table 5; measurement locations are shown in Figure 3.

Analytical results from 1995 monitoring ranged from 0.02 to 1.89 pCi/m²/s. As in previous years (BNI 1995c), these results are well below the 20 pCi/m²/s standard specified in 40 CFR Part 61, Subpart Q, and strongly demonstrate the effectiveness of the containment cell design and construction in mitigating radon-222 migration.

5.4 Airborne Particulate Dose

To determine the dose from airborne particulates, airborne particulate release rates are calculated using historical data for site soil contamination and a limited reservoir surface wind erosion model (EPA 1985). Airborne particulate release rates are then entered into the CAP88-PC computer model (EPA 1992a) to perform two calculations. The first calculation estimates the resultant hypothetical doses from airborne particulates to individuals at the distances to the nearest residence (1,100 m southwest of the site) and to the nearest commercial/industrial facility (510 m east of the site). Hypothetical doses are then corrected for the occupancy of the nearest residence (24 hour/day) and the nearest commercial/industrial facility (40 hour/week). The higher of these two hypothetical doses then becomes the hypothetical airborne particulate dose to the maximally exposed individual for the site. The second calculation estimates the hypothetical airborne particulate collective dose to the population within 80 km of the site. The second calculation also

uses a population file (generated from county population densities) to determine numbers of people in circular grid sections fanning out to 80 km from the center of the site.

The first of the calculations indicates that the 1995 hypothetical airborne particulate dose to the maximally exposed individual, a resident 1,100 m southwest of the site, was essentially zero (0.0000015 mrem/yr, or 1.5×10^{-6} mrem/yr). This value is well below the 10 mrem/yr standard specified in 40 CFR, Part 61, Subpart H. The second calculation indicates that the hypothetical airborne particulate collective dose to the population within 80 km of the site was 1.5×10^{-5} person-rem/yr (equivalent to 0.015 person-mrem/yr).

5.5 Surface Water and Sediment

In 1995, annual surface water and sediment samples were collected at five locations: location 9 (SWSD009) and location 21 (SWSD021) at the upstream fenceline; location 10 (SWSD010) and location 22 (SWSD022) onsite along the central drainage ditch; and location 11 (SWSD011) downstream, offsite along the central drainage ditch. The tables refer to the sediment sampling locations by their formal identification numbers, listed above in parentheses; text and figures refer to the locations by the last digit of the formal identifiers. Surface water samples were analyzed for radium-226 and total uranium. Sediment samples were analyzed for radium-226, thorium-232, and total uranium. The 1995 environmental surveillance analytical results for surface water and sediment samples are presented in Tables 6 and 7, respectively. Sampling locations are presented in Figure 2. Only analytical results with detected values are presented.

Analytical results for surface water in 1995 were compared to the DOE DCGs for radium-226 and total uranium. Because there are no established standards for sediments, the residual soil cleanup criterion of 5 pCi/g was used to provide a basis for comparison of radium-226 and thorium-232 analytical results. The NFSS DOE site-specific soil cleanup criterion of 90 pCi/g was used as a basis for comparison of total uranium analytical results.

Background concentrations were determined by averaging analytical results for 1992 through 1995 for the appropriate constituents (1995 only for thorium-232) at surface water/sediment sampling locations 9 and 21. Surface water and sediment sampling location 9 was selected as a background location because it is at the upstream boundary of the South 31 drainage ditch, a drainage which eventually joins the central drainage ditch. Surface water and sediment sampling location 21 was selected because it is located upstream, along the NFSS fenceline, where the central drainage ditch first enters the property.

Surface Water

In 1995 as in previous years (BNI 1995c), surface water analytical results were consistently less than the DOE DCGs. Actual results (background not subtracted) are discussed below:

- The 1995 analytical results for radium-226 were consistent with historical results and are indistinguishable from background. The average historical background concentration for radium-226 in surface water is 0.51 pCi/L. In 1995, radium-226 was detected at only location 22 at a trace concentration of 0.47 pCi/L. All radium-226 analytical results for 1995 were less than 1 percent of the DOE DCG of 100 pCi/L.
- The 1995 analytical results for total uranium are generally consistent with historical results and are 2 percent or less than the DOE DCG of 600 pCi/L. Total uranium concentrations at downstream sampling locations 10, 11, and 22 were 9.55, 10.97, and 12.25 pCi/L, respectively. These values were only slightly higher than the upstream concentrations at locations 9 and 21, which were 7.85 and 10.90 pCi/L, respectively.

Sediment

Sediment concentrations of radium-226, thorium-232, and total uranium were less than the DOE soil guidelines and were generally indistinguishable from upstream (background) conditions. At all sampled locations, results were less than the DOE guideline for mixtures of radionuclides (sum of the ratios). Measure results are presented below (background not subtracted).

- The 1995 analytical results for radium-226 are consistent with historical analytical results. Radium-226 results from upstream locations 9 and 21 were 2.10 and 1.30 pCi/g, respectively, comparing favorably with the calculated historical background of 1.6 pCi/L. The 1995 results of analysis for radium-226 in samples collected at downstream locations 10, 11, and 22 ranged from 1.30 to 2.30 pCi/g. All radium-226 concentrations in sediment were less than the DOE soil cleanup criterion of 5 pCi/g above background.
- Downstream thorium-232 results ranged from 1.00 to 1.40 pCi/g, and upstream results from locations 9 and 21 were 1.20 and 1.30 pCi/g, respectively. All 1995 analytical results for thorium-232 samples were comparable to the historical average background concentration of 1.3 pCi/L, therefore, none of the thorium-232 concentrations in sediment exceeded the DOE soil cleanup criterion of 5 pCi/g above background.
- The 1995 analytical results for total uranium at upstream sampling locations 9 and 21 were 3.79 and 2.10 pCi/g, respectively, comparing favorably with the historical upstream average of 3.71 pCi/g. The 1995 analytical results for total uranium at downstream sampling locations 10, 11, and 22 ranged from nondetect to 2.37 pCi/g, consistent with historical analytical results and comparable to upstream results. The DOE-established site-specific

standard for total uranium is 90 pCi/g above background; the historical and 1995 analytical results are well below this standard.

5.6 Groundwater

The locations of environmental surveillance groundwater monitoring wells at NFSS are shown in Figure 2. Background information, descriptions of activities performed under the groundwater surveillance program, and surveillance results are discussed below.

5.6.1 Groundwater Flow System

Natural System

Four unconsolidated units and one bedrock unit are readily identified in the subsurface at the site. The uppermost unit is composed of a low-permeability silty clay till. Discontinuous sand lenses have been identified and mapped within this clay till. The clay till is underlain by a very low permeability glaciolacustrine clay that is present at varying thickness across the entire site. The glaciolacustrine clay is underlain by a second glaciolacustrine unit, which consists of sand and gravel; this unit exhibits the highest permeability identified in the shallow unconsolidated subsurface materials at the site. This unit is underlain by a dense, silty, glacial till that exhibits very low permeability. Beneath this till is the shale bedrock.

Groundwater at NFSS occurs in both the unconsolidated deposits and the shale bedrock. In the unconsolidated deposits, two distinct groundwater systems are present: the upper groundwater system, which occurs within the uppermost clay unit, and the lower groundwater system, which occurs within the sand and gravel unit, the underlying till unit, and the weathered portion of the bedrock shale. The bedrock groundwater system occurs within the unweathered portion of the bedrock shale. Regionally, groundwater in both the upper and lower groundwater systems and the bedrock system flows northwestward toward Lake Ontario. Four-year, representative hydrographs for both the upper and lower groundwater systems are presented in Figures 5 and 6.

Surface drainage from the site originally entered Fourmile, Sixmile, and Twelvemile Creeks, which all flow northward to Lake Ontario. In the 1940s, a system of drainage ditches was installed to drain surface water to a central drainage ditch. The largest of these drainage ditches, the central drainage ditch, significantly influences groundwater flow in the upper groundwater system near the WCS and ditch.

Historical analytical results from groundwater wells completed in the lower groundwater system and the low concentration levels of constituents monitored in the upper groundwater system indicate that annual monitoring of the lower groundwater system is not presently necessary. Because the monitoring wells completed in the upper groundwater system provide an effective early warning network by which to monitor the performance of the WCS, the lower groundwater

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system is not routinely monitored as part of the environmental surveillance program. Special groundwater studies that are conducted periodically at NFSS typically include sampling and analysis of groundwater samples from the lower groundwater system. These studies help to verify the effectiveness of the upper groundwater system monitoring well network for monitoring WCS performance.

Background concentrations for the upper groundwater system were determined by averaging 1992 through 1995 analytical results for the appropriate constituents at the background monitoring well B02W20S. This well was selected as the background well because it is distant and is not downgradient from the WCS.

Water Level Measurements

Sixty-three groundwater monitoring wells are used to monitor groundwater levels in both the upper and lower groundwater systems. Water level measurements are obtained using an electronic depth-to-water meter. Of these wells, 25 are screened in the upper groundwater system. The screened intervals for wells completed in the upper groundwater zone range from 1.7 to 8.4 m (5.5 to 27.6 ft) below ground surface. Thirty-eight of these wells are screened in the lower groundwater system. The screened intervals for wells completed in the lower groundwater zone range from 7.7 to 14.0 m (25.2 to 46.0 ft) below ground surface. Groundwater monitoring wells are located primarily on the perimeter of the WCS and along the northern property fenceline (Figure 4).

In most monitoring well pairs, groundwater elevations of the upper groundwater system are greater than those of the lower groundwater zone, indicating a downward, vertical hydraulic gradient. In some monitoring well pairs near the central drainage ditch, groundwater elevations of the upper groundwater system are less than those of the lower groundwater system, indicating an upward, vertical hydraulic gradient.

In the upper groundwater system, the depth to water ranged from about -0.080 m (slightly artesian) to 3.88 m (-0.26 to 12.72 ft) below ground surface during the year. Water level fluctuations in the upper groundwater system in 1995 were on the order of 1.6 m (5.2 ft). In the lower groundwater system, the depth to water ranged from about 0.91 to 3.94 m (3.0 to 12.94 ft) below ground surface during the year. Water level fluctuations in the lower groundwater system in 1995 were on the order of 0.94 m (3.1 ft). A review of Figures 5 and 6 indicates that the upper groundwater system responds more rapidly than the lower groundwater system to seasonal fluctuations in groundwater recharge and the effects of watering the WCS to maintain the appropriate soil-moisture content in the capping material. Groundwater level fluctuations in the lower groundwater system occur over a significantly longer period than in the upper groundwater system, indicating that the glaciolacustrine clay aquitard slows and dampens recharge to the lower groundwater system.

Figures 7 (upper groundwater system) and 8 (lower groundwater system) present piezometric surfaces and groundwater flow directions representative of high condition in the upper groundwater system. Figures 9 (upper groundwater system) and 10 (lower groundwater system) present piezometric surfaces and groundwater flow directions representative of low condition in the upper groundwater system.

Groundwater Flow

Groundwater occurs in near-surface alluvial sediments consisting mostly of horizontal layers of unconsolidated sand, silt, and clay. Two groundwater systems monitored at the site are associated with the uppermost clay unit and the sand and gravel unit, corresponding to the upper and lower groundwater systems, respectively. Hydrologic data indicate that the upper clay unit and the lower sand and gravel unit are hydraulically isolated by the glaciolacustrine clay unit, which is present across the entire site.

Generally, groundwater flows northwestward across the site at a gradient of about 0.004 to 0.03 (in the immediate vicinity of the central drainage ditch) in the upper groundwater system. In the lower groundwater system, groundwater flow in the northern portion of the site is generally northwestward. A persistent area of elevated groundwater elevations located in the vicinity of the southwestern corner of the WCS existed throughout 1995. Additionally, groundwater flow in the eastern portion of the site appears to be influenced by pumping on the adjacent property (Modern Landfill). In this portion of the site, groundwater flow is toward the east and southeast.

The flow in the upper groundwater system is strongly influenced by the central drainage ditch during periods of relatively high groundwater levels. As indicated in Figure 9, during periods of low groundwater levels, the frequent watering of the WCS creates a groundwater mound in the vicinity of the WCS and consequently induces radial flow in the upper groundwater system. This is a localized effect and only temporarily affects the overall northwest regional flow. A groundwater flow velocity of 38 cm/yr (15 in./yr) has previously been estimated at NFSS (DOE 1994). This velocity does not necessarily represent the rate at which a contaminant could migrate, because contaminant-dependent transport factors such as retardation (caused by phenomena such as binding to clay particles) can significantly slow the rate of transport.

Groundwater elevations during the seasonal high condition (February 3, 1995) ranged from 95.07 m (311.91 ft) above mean sea level at BH48 to 97.39 m (319.51 ft) above mean sea level at B02W20S. Groundwater elevations during the seasonal low condition (September 21, 1995) ranged from 93.26 m (305.98 ft) above mean sea level at OW09B to 96.57 m (316.82 ft) above mean sea level at OW06B during the year.

5.6.2 Groundwater Quality

Field Parameters

Table 8 presents a summary of field parameters collected during environmental surveillance sampling in 1995 at NFSS.

Water Quality Parameters

The hydrochemical nature of the groundwater from both the upper and lower groundwater systems is presented in the trilinear Piper diagram, Figure 11. This diagram provides a graphical presentation of inorganic water analyses and allows the determination of inorganic hydrochemical type. Recently recharged water in many aquifers is typically dominated by a calcium/bicarbonate hydrochemical type. This condition plots in the upper left-hand field of the diagram. Natural softening of groundwater via ion exchange with the soil or rock matrix (sodium for calcium) to a sodium/bicarbonate hydrochemical type generally occurs with extended residence time and/or distance traveled in the aquifer (upper right-hand field of the diagram). Oldest waters are generally dominated by the sodium/chloride type and plot in the lower right-hand field of the diagram. These waters represent stagnant or connate groundwater types.

At NFSS, the upper groundwater system water quality parameters plot primarily in the upper left-central portion of the diagram, in the calcium/bicarbonate field, indicating relatively recently recharged groundwater. The lower groundwater system water quality parameters plot in the upper right portion of the diagram, indicating sodium/bicarbonate groundwater conditions, which typically indicate longer residence times or distance traveled. It is likely that the primary recharge of the lower groundwater system occurs at the base of the Niagara Escarpment, situated approximately 3.2 km south of the site (DOE 1994). Both groundwater systems are plotted on Figure 11; 1995 water quality parameter data are provided in Tables 9 (anions) and 10 (metals).

TDS results in all wells (ranging from 834 to 1,900 mg/L; Table 9) are above the NYSDEC water quality standard (500 mg/L). Sodium results indicate that groundwater is naturally slightly saline in the region (Table 10). Sodium was detected in all wells at concentrations ranging from 6,830 µg/L (A50) to 60,500 µg/L (OW17B), consistently greater than the NYSDEC groundwater quality standard for sodium (20 µg/L). There are no Federal standards for sodium or TDS.

5.6.3 Groundwater - Radioactive Constituents

In 1995, groundwater samples collected from 8 groundwater monitoring wells completed in the upper groundwater system were analyzed for radium-226 and total uranium. Well A42 was not sampled in 1995 because it is completed in a discontinuous sand lens; consequently, groundwater samples collected from this well would not be representative of conditions in the upper clay unit nor would they be representative of potential contaminant migration from the WCS through the

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upper clay unit. Environmental surveillance analytical results for radioactive constituents in groundwater are presented in Table 11. Only results for detected analytes are presented. Historical and current analytical results for radium-226 and total uranium concentrations (background not subtracted) in groundwater samples are presented in Figures 12 and 13, respectively.

Upper Groundwater Zone Results

All analytical results for radium-226 and total uranium in groundwater were well below the DOE DCGs. Consistent with previous years (BNI 1995c), radium-226 concentrations were indistinguishable from background.

- Radium-226 results in groundwater in 1995 ranged from nondetect to 0.24 pCi/L, and were comparable to the average historical background concentration (sampling location B02W20S) of 0.22 pCi/L. The DOE DCG for radium-226 is 100 pCi/L above background. As shown in Figure 12, radium-226 concentrations in groundwater at NFSS have been consistently low, with all measured concentrations (background not subtracted) less than 1 pCi/L.
- The average historical background concentration (sampling location B02W20S) of total uranium in groundwater was determined to be 7.73 pCi/L. Uranium was detected in all sampled wells with results ranging from 6.16 to 36.90 pCi/L. None of the 1995 analytical results exceeded the DOE DCG for uranium of 600 pCi/L above background, consistent with the historical results presented in Figure 13 (measured results, background not subtracted). Since 1992, total uranium concentrations in all sampled wells have been less than 60 pCi/L.

5.6.4 Groundwater - Chemical Constituents

Metals

The 1995 environmental surveillance analytical results for metals in groundwater are presented in Table 10. Only results for detected analytes are presented.

Groundwater at NFSS is not used as a public drinking water supply; however, to provide a conservative basis for comparison of analytical results, SDWA MCLs and New York State Water Quality Regulation Class GA standards were used. Although copper, lead, and vanadium are present in groundwater monitoring wells at NFSS, the 1995 analytical results indicate that neither the SDWA MCLs nor the New York State Water Quality Regulation Class GA standards for these metals were exceeded at any of the wells. The 1995 metals results show a decline in overall concentrations from prior years (BNI 1995b).

- In 1994 the maximum concentration of copper was 20.6 µg/L in well OW06B. In 1995, three of eight wells sampled showed traces of copper [five of nine in 1994 (BNI 1995c)]. In

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those wells where copper was detected, the results ranged from 7.1 (A45 QC duplicate) to 8.8 $\mu\text{g/L}$ (A45). The SDWA MCLs for copper are 1300 $\mu\text{g/L}$ and the New York State Water Quality Regulation Class GA standards are 200 $\mu\text{g/L}$.

- In 1995, two wells (OW06B and B02W20S) showed traces of lead. The analytical results ranged from nondetect to 0.6 $\mu\text{g/L}$. The SDWA MCLs are 15 $\mu\text{g/L}$ and the New York State Water Quality Regulation Class GA standards are 25 $\mu\text{g/L}$ for lead.
- In 1994, the maximum concentration of vanadium was 53.4 $\mu\text{g/L}$ in well A45. In 1995, only one sampled well (OW04B, 7.1 $\mu\text{g/L}$) showed traces of vanadium [five of nine in 1994 (BNI 1995c)]. Well OW04B showed no traces of vanadium in 1994. Neither SDWA MCLs nor New York State Water Quality Regulation Class GA standards have been established for vanadium.

Organics

Analyses for total organic carbon (TOC) were conducted in groundwater as a screening tool for organics because a previous soil-gas investigation had indicated that volatile organic constituents might be present onsite. Historical and 1995 analytical results (Table 9) do not indicate elevated TOC concentrations. Analytical results for groundwater samples collected in July 1995, as part of a data gap investigation to resolve the soil-gas survey results, confirm that volatile organic constituents are not currently present in the groundwater.

6.0 CONCLUSIONS

A. External Gamma Radiation

The 1995 dose to a hypothetical maximally exposed individual has been calculated at 0 mrem/yr above background.

B. Radon Gas

Results of the 1995 radon gas surveillance program indicate that the combined radon-220 and radon-222 concentrations at the site were consistently low (nondetect to 0.8 pCi/L, including background) and in many cases were at or below the detection limit. All radon gas concentrations at NFSS were well below the DOE limit for radon-222 of 3.0 pCi/L above background.

C. Radon-222 flux

The 1995 radon-222 flux measurements at NFSS were less than 1.7 percent of the standard of 20 pCi/m²/s specified in 40 CFR Part 61, Subpart Q of the National Emission Standards for Hazardous Air Pollutants (NESHAPs). Radon-222 flux measurements

ranged from 0.02 to 0.34 pCi/ m²/s, strongly demonstrating the effectiveness of the containment cell design and construction in mitigating radon-222 migration.

D. Airborne Particulate Dose

The 1995 hypothetical airborne particulate dose from the wind erosion of soil to an individual 1,100 m southwest of the site is 1.5×10^{-6} mrem/yr. The 1995 hypothetical airborne particulate collective dose to the population within a 80-km radius of the site has been calculated at 1.5×10^{-5} person-rem/yr. The hypothetical dose to an individual is essentially zero relative to the 10 mrem/yr standard in 40 CFR Part 61, Subpart H of NESHAPs.

E. Cumulative Dose from External Gamma Radiation and Airborne Particulates

The 1995 cumulative external gamma radiation and airborne particulate dose to an individual is 1.5×10^{-6} mrem/yr. This value is essentially zero when compared to the DOE DCG of 100 mrem/yr.

F. Surface Water

Radium-226 concentrations (nondetect to 0.47 pCi/L) in surface water samples were 0 to 0.5 percent of the DOE DCG (100 pCi/L).

Total uranium concentrations (7.85 to 12.25 pCi/L) in surface water samples were all 2 percent or less than the DOE DCG (600 pCi/L).

G. Sediment

Radium-226 concentrations (1.30 to 2.30 pCi/g) and thorium-232 concentrations (1.00 to 1.40 pCi/g) in sediment samples were less than the DOE soil cleanup level guideline for each isotope (5 pCi/g above background).

Total uranium concentrations (1.83 to 3.79 pCi/g) in sediment samples were 2 to 4 percent of the DOE site-specific soil cleanup level (90 pCi/g above background).

H. Groundwater

Radium-226 concentrations (nondetect to 0.24 pCi/L) in groundwater samples were indistinguishable from background.

Total uranium concentrations (6.16 to 36.90 pCi/L) in groundwater samples were less than 6 percent of the DOE DCG (600 pCi/L).

Although drinking water standards are not directly applicable to the groundwater systems at NFSS, copper and lead concentrations in groundwater samples were all well below the established Federal primary and secondary SDWA MCLs and the NYSDEC

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Class GA groundwater standards. There are no standards for vanadium provided in these regulations. Results for TDS and sodium were greater than state standards in all sampled wells.

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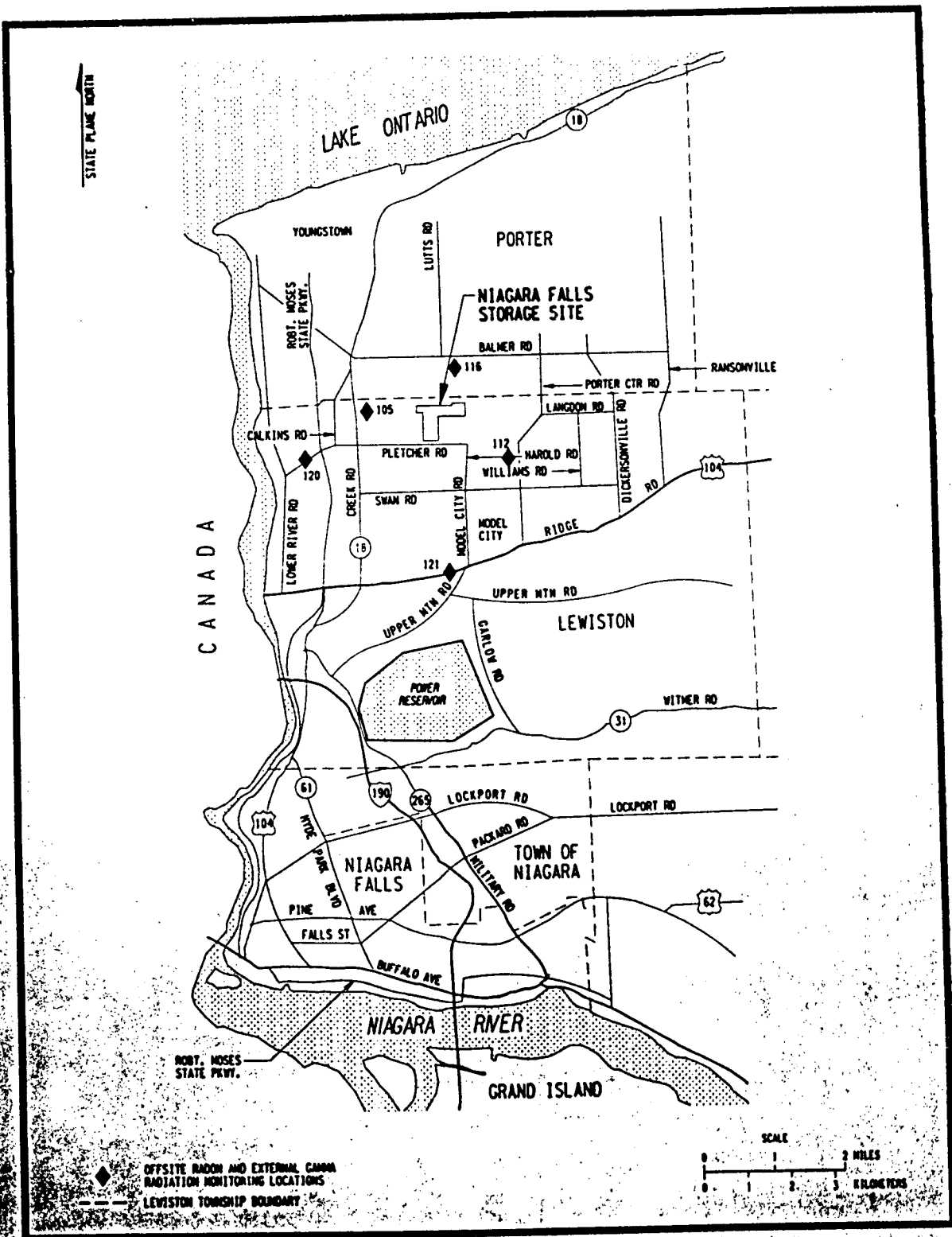
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Figure 12: Historical and Current Results for Radium-226
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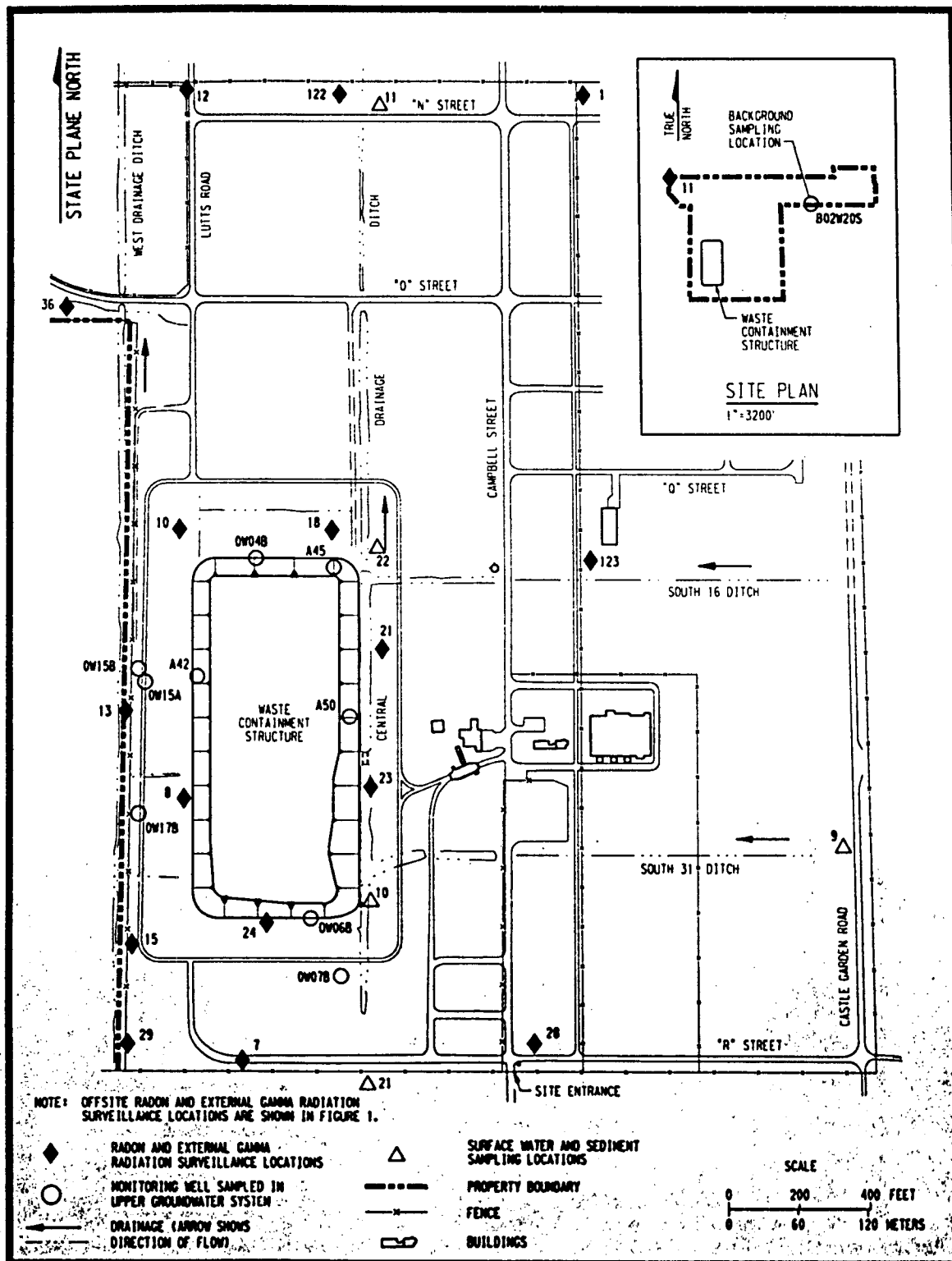
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Figure 1
Niagara Falls Storage Site Environmental Surveillance Locations
Offsite Radon and External Gamma Radiation

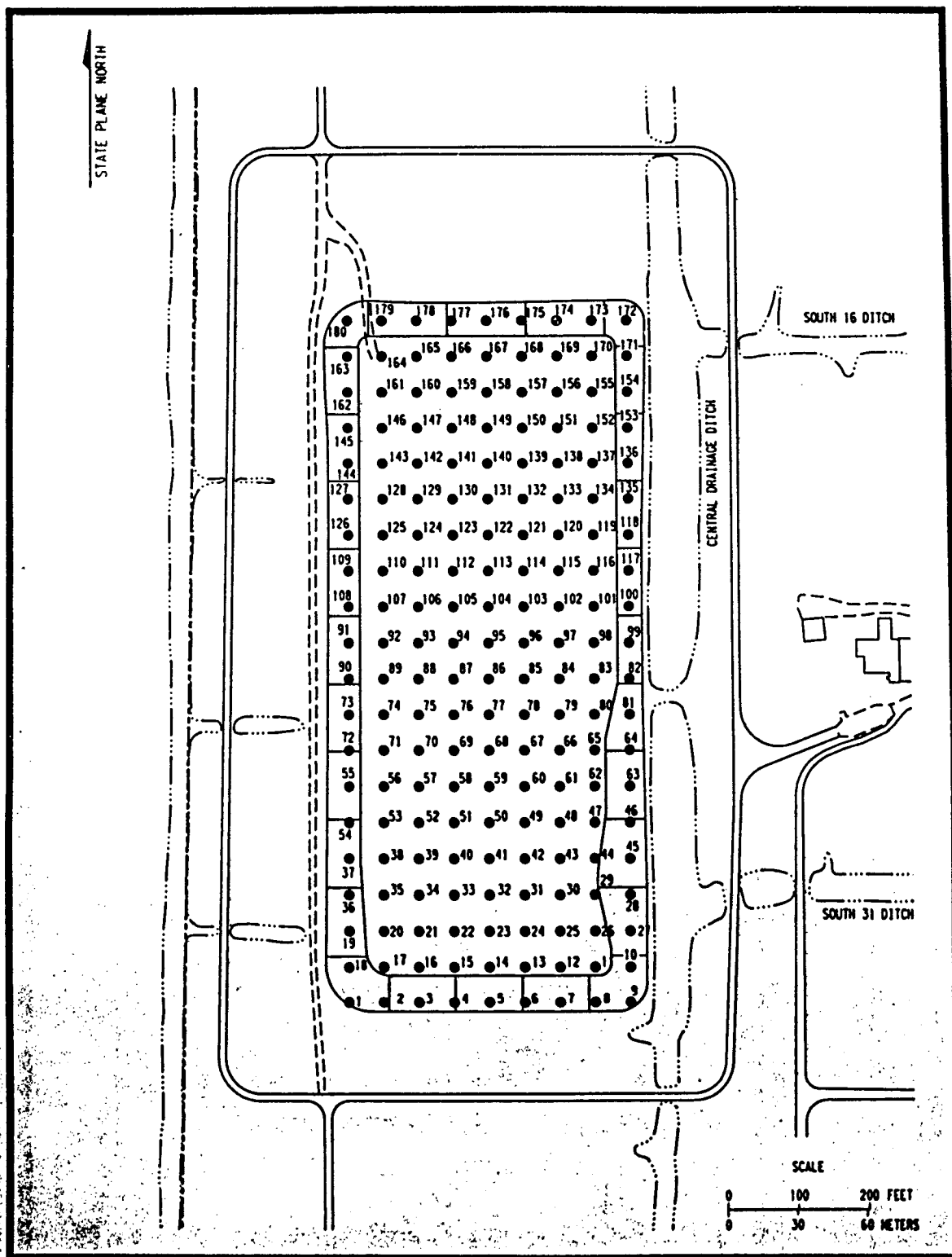
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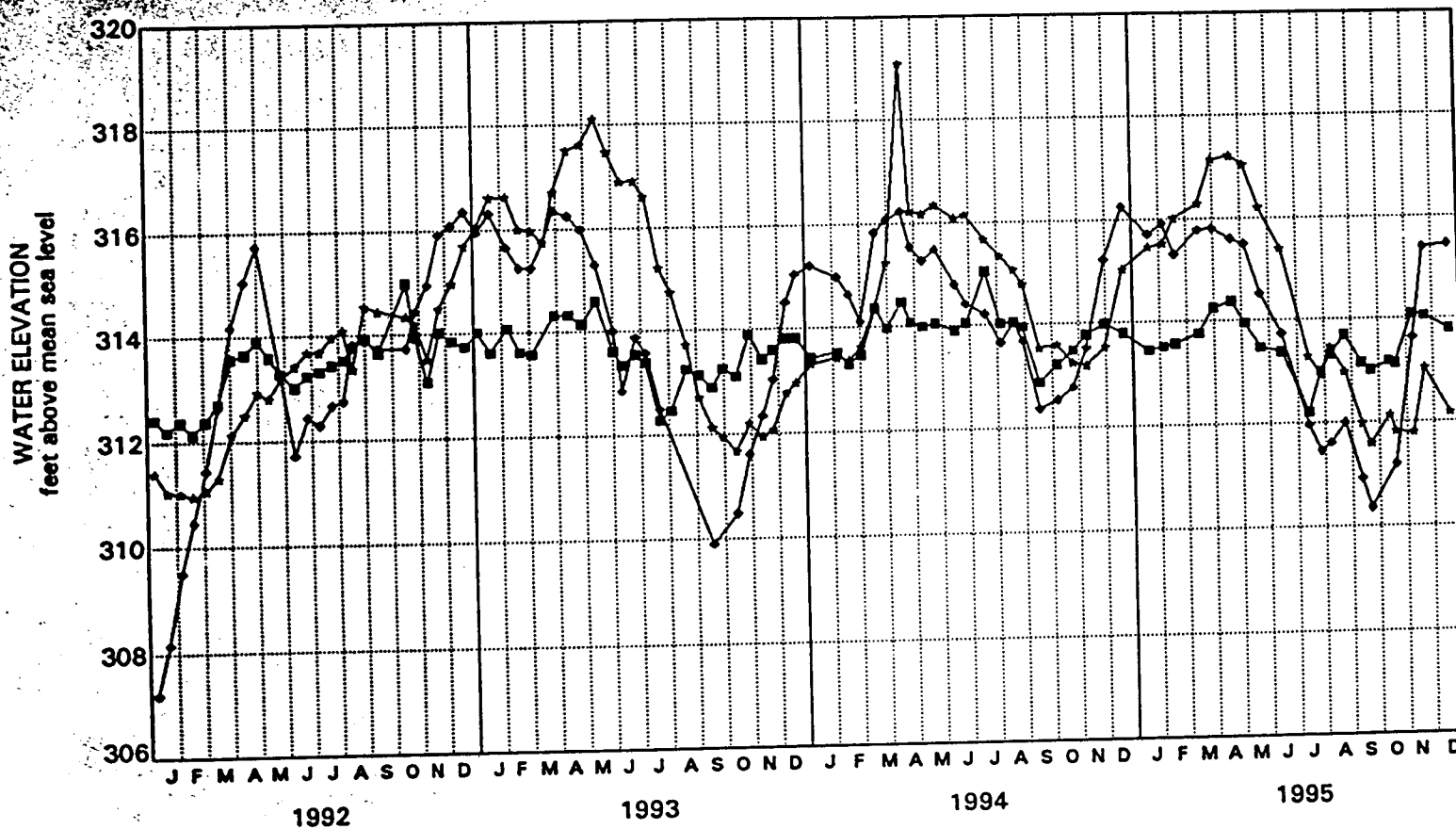
Figure 2
Niagara Falls Storage Site Environmental Surveillance Locations
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14-014



RBSF 009.DCN

Figure 3
Niagara Falls Storage Site
Approximate Radon Flux Monitoring Locations
for the Waste Containment Structure



LEGEND: ■ Well ID A-45 Ground Elev (ft above sea level) 323.97
 ★ OW-138 320.15
 ◆ OW-58 317.10

Figure 5
 Four-Year Hydrograph for Niagara Falls Storage Site - Upper Groundwater System

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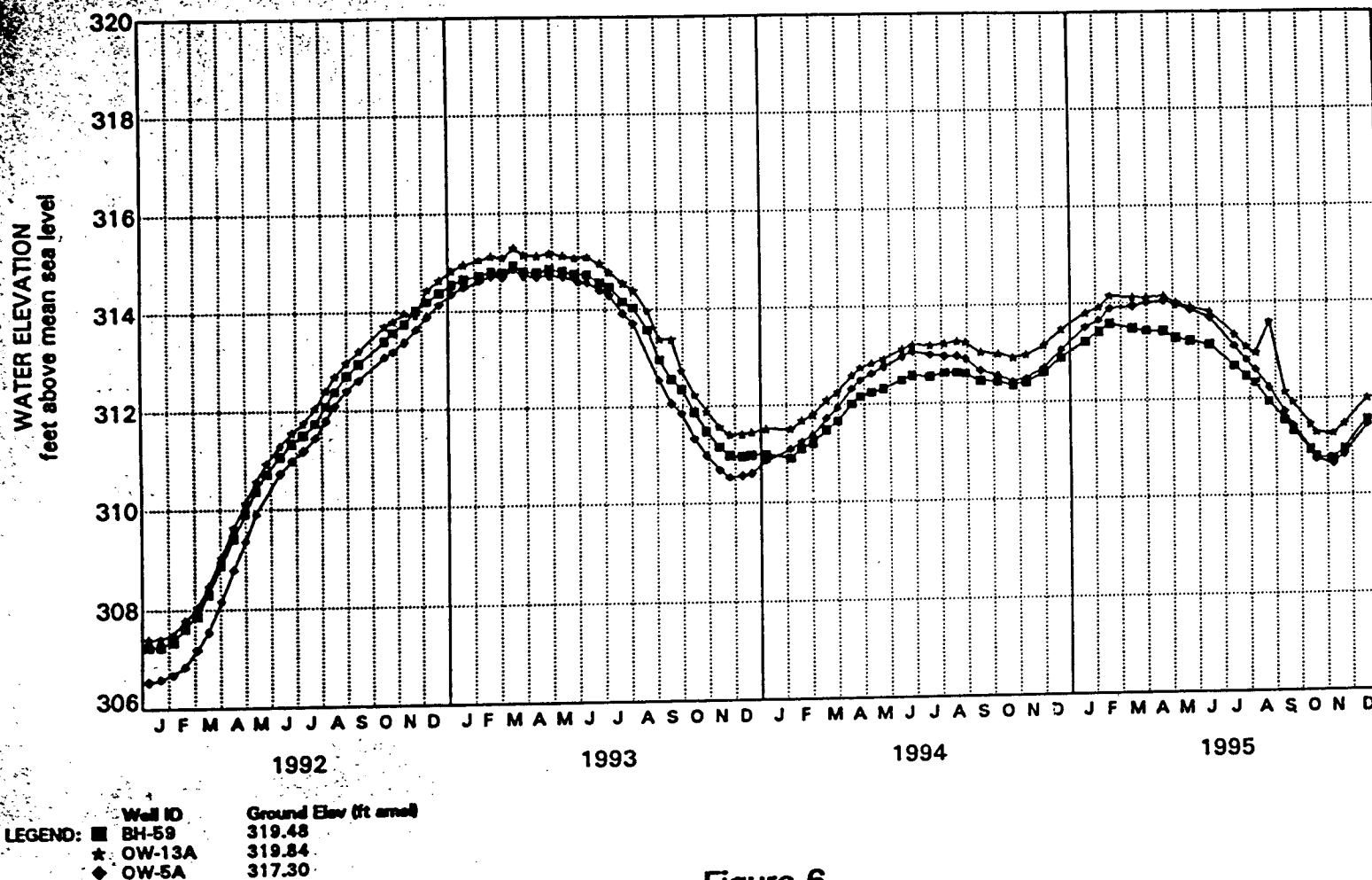


Figure 6
Four-Year Hydrograph for Niagara Falls Storage Site - Lower Groundwater System

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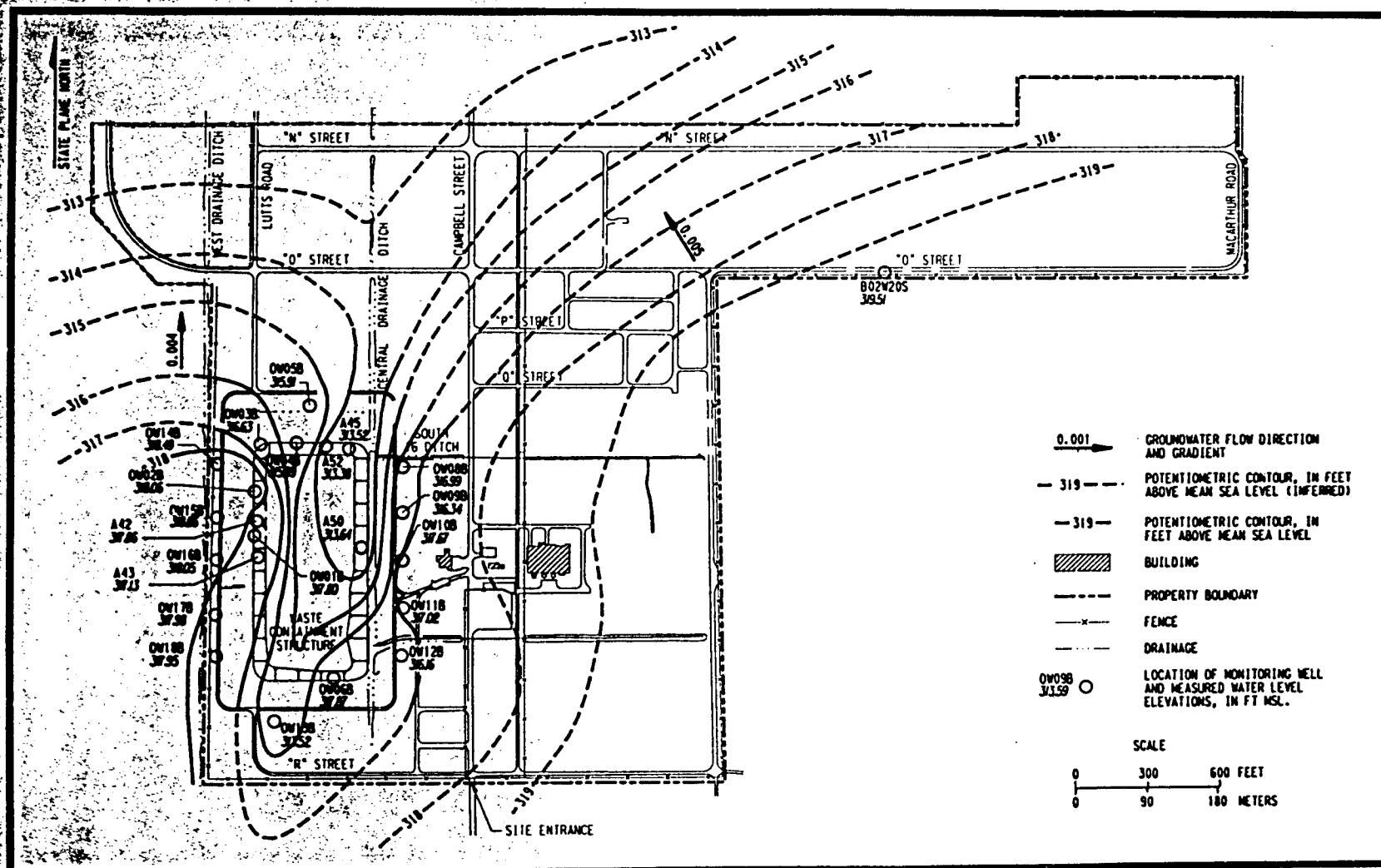
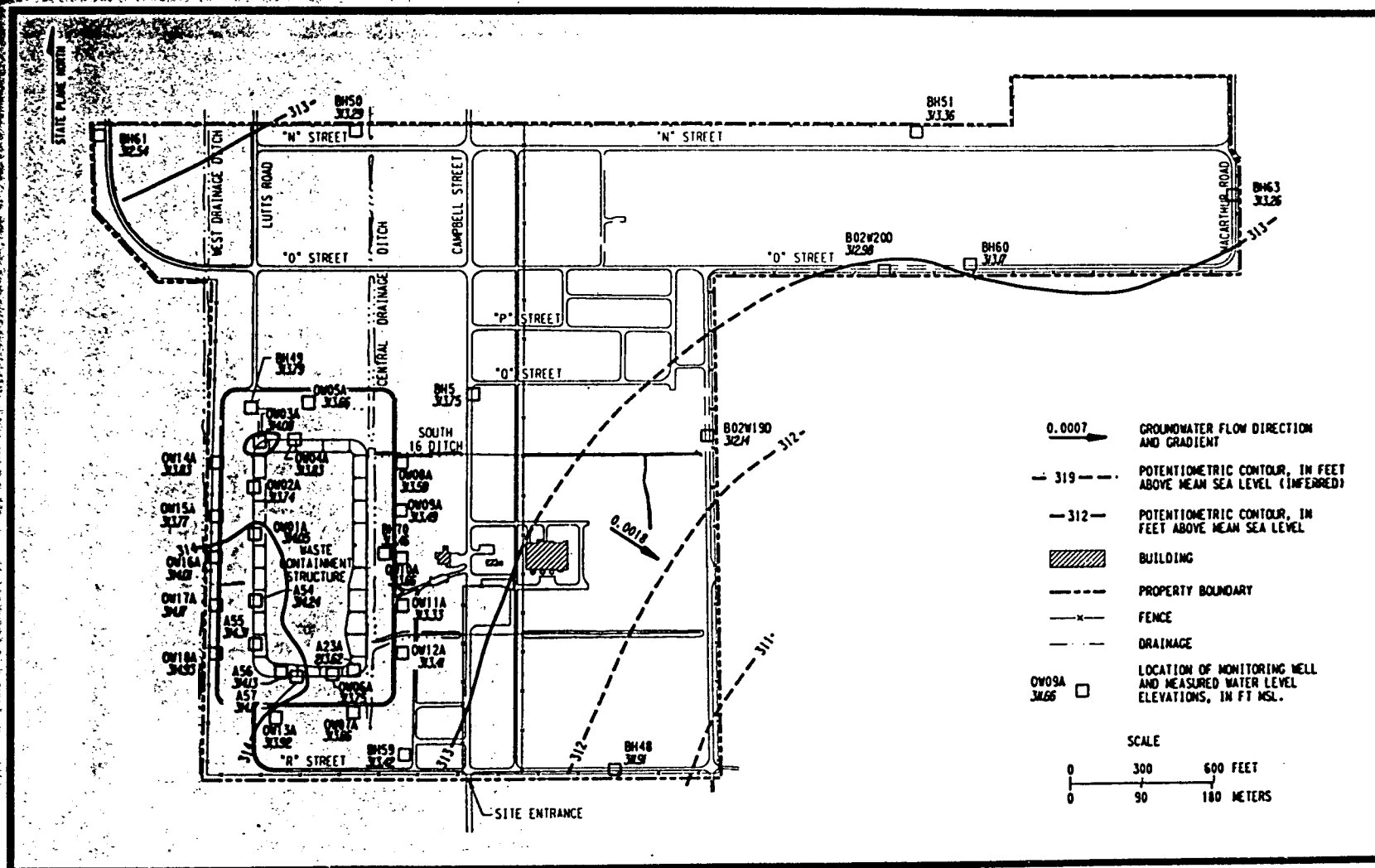


Figure 7
Potentiometric Surface Map (February 3, 1995)
Upper Groundwater System



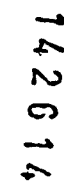


Figure 9
Potentiometric Surface Map (September 21, 1995)
Upper Groundwater System

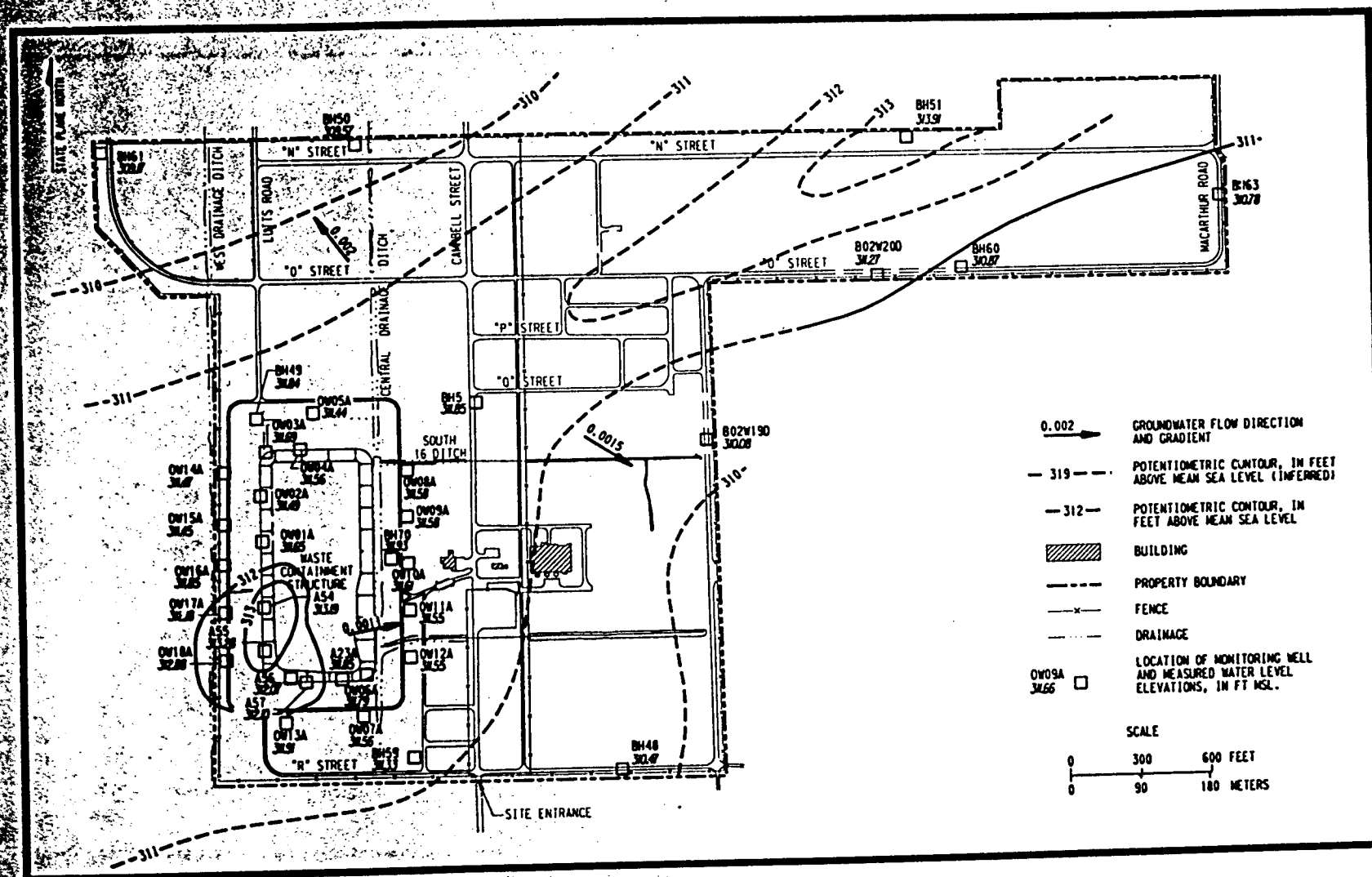


Figure 10
Potentiometric Surface Map (September 21, 1995)
Lower Groundwater System

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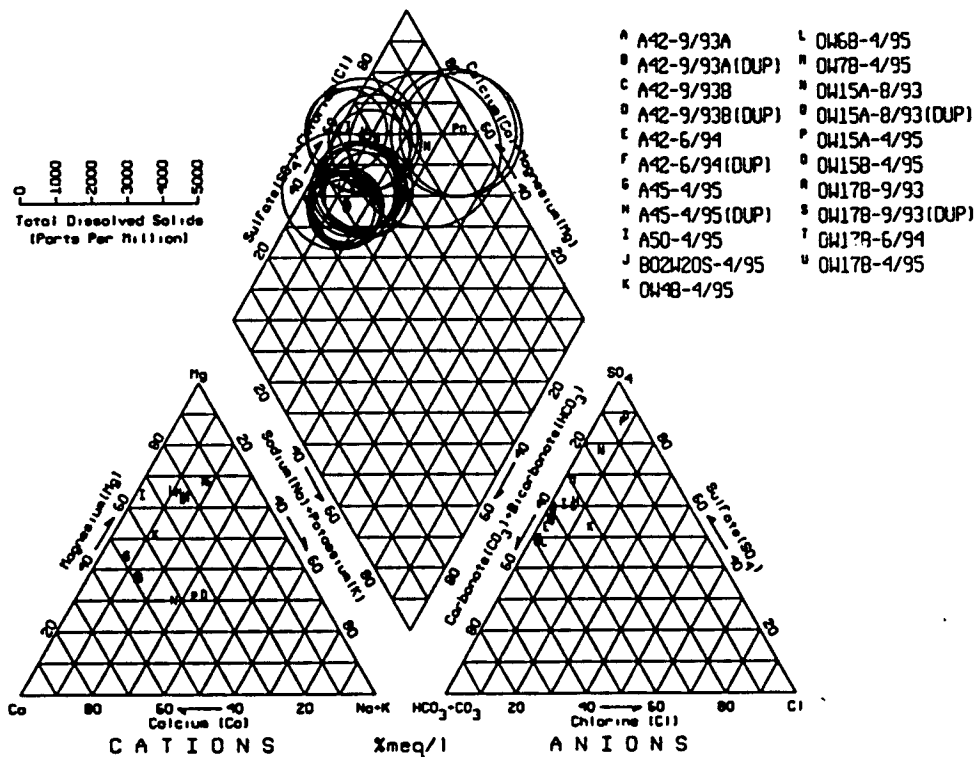


Figure 11
Trilinear Piper Diagram For Groundwater Quality
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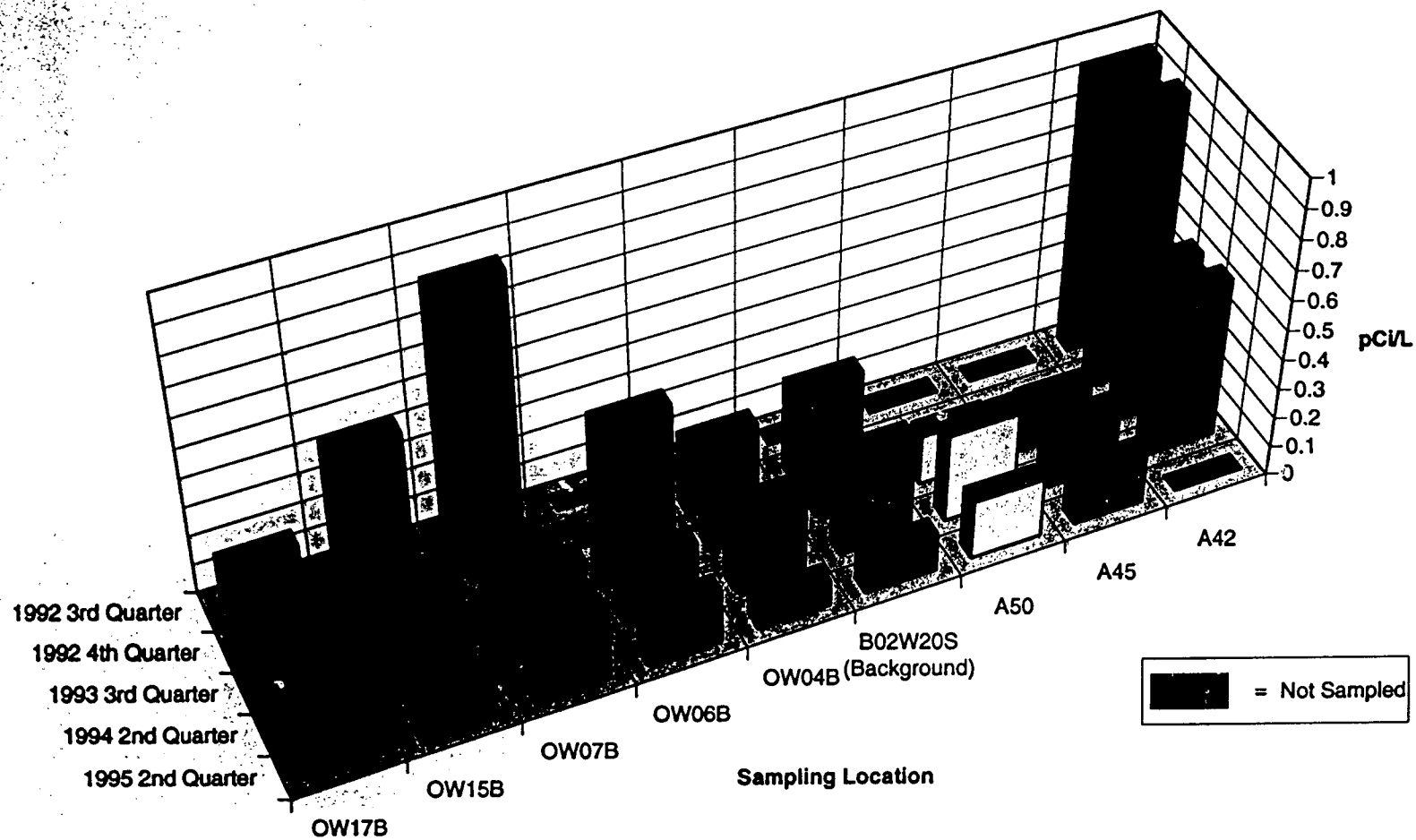
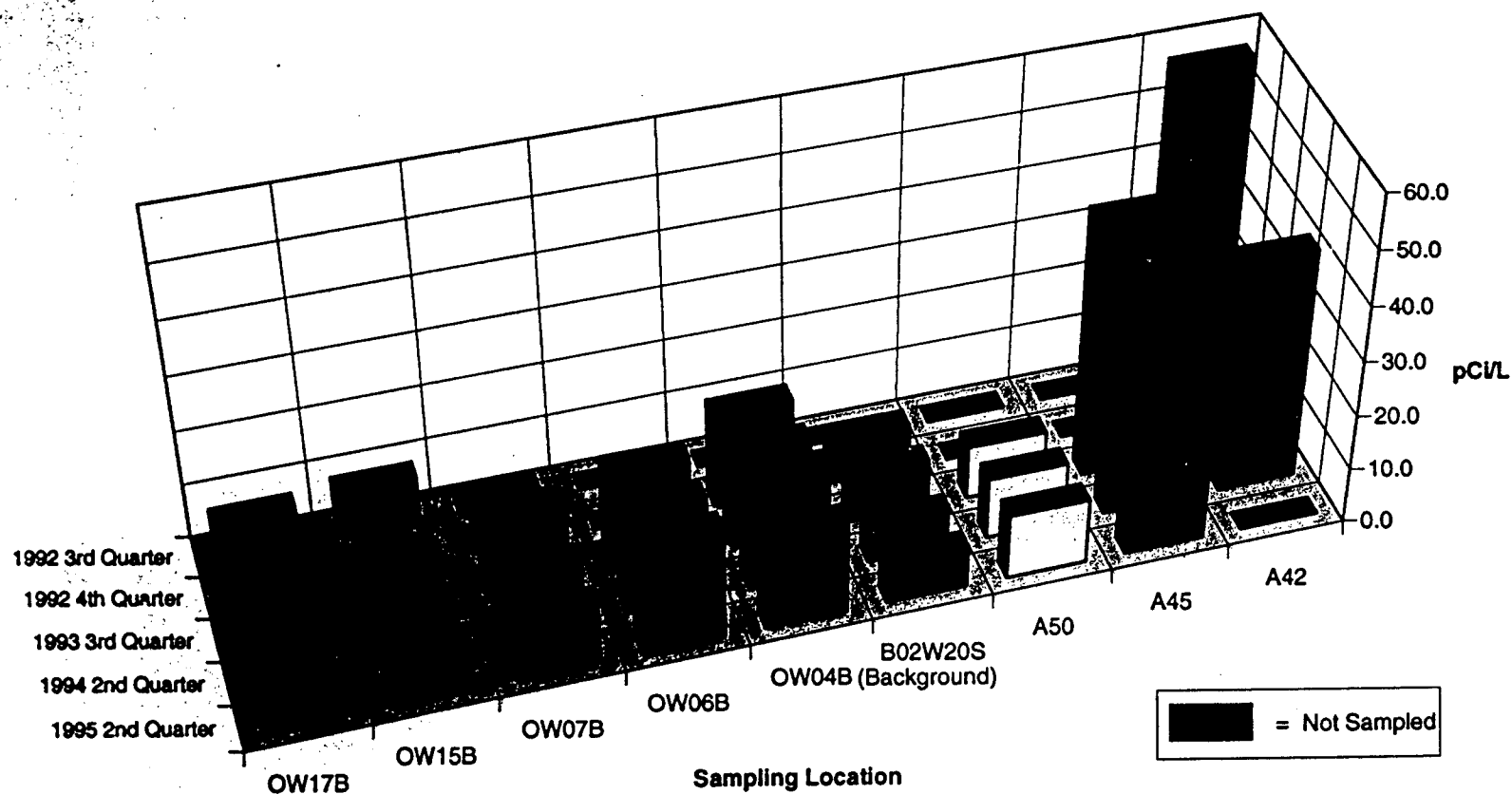


Figure 12. Historical and Current Results for Radium-226 in the Upper Groundwater System
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**Figure 13. Historical and Current Results for Total Uranium in the Upper Groundwater System
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Table 1
1995 Sampling Summary
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Well ID / Sampling Location	Radioactive				Metals				Water Quality				TOC ^a			
	Q1 ^b	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Groundwater																
OW04B		✓				✓				✓				✓		
OW06B		✓				✓				✓				✓		
OW07B		✓				✓				✓				✓		
OW15B		✓				✓				✓				✓		
OW17B		✓				✓				✓				✓		
B02W20S		✓				✓				✓				✓		
A45		✓				✓				✓				✓		
A50		✓				✓				✓				✓		
Surface Water																
SWSD009 ^c		✓														
SWSD010		✓														
SWSD011		✓														
SWSD021		✓														
SWSD022		✓														
Sediment																
SWSD009 ^c		✓														
SWSD010		✓														
SWSD011		✓														
SWSD021		✓														
SWSD022		✓														
External Gamma Radiation																
1		✓		✓												
7		✓		✓												
8		✓		✓												
10		✓		✓												
11		✓		✓												
12		✓		✓												
13		✓		✓												
15		✓		✓												
18		✓		✓												
21		✓		✓												
23		✓		✓												
24		✓		✓												
28		✓		✓												
29		✓		✓												
36		✓		✓												
105		✓		✓												
112		✓		✓												

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Table 1
1995 Sampling Summary
Niagara Falls Storage Site

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Well ID / Sampling Location	Radioactive				Metals				Water Quality				TOC ^a			
	Q1 ^b	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
External Gamma Radiation (continued)																
116	✓		✓													
120	✓		✓													
121	✓		✓													
122	✓		✓													
123	✓		✓													
Radon-220/ Radon-222																
1	✓	✓	✓	✓												
7	✓	✓	✓	✓												
8	✓	✓	✓	✓												
10	✓	✓	✓	✓												
11	✓	✓	✓	✓												
12	✓	✓	✓	✓												
13	✓	✓	✓	✓												
15	✓	✓	✓	✓												
18	✓	✓	✓	✓												
21	✓	✓	✓	✓												
23	✓	✓	✓	✓												
24	✓	✓	✓	✓												
28	✓	✓	✓	✓												
29	✓	✓	✓	✓												
36	✓	✓	✓	✓												
105	✓	✓	✓	✓												
112	✓	✓	✓	✓												
116	✓	✓	✓	✓												
120	✓	✓	✓	✓												
121	✓	✓	✓	✓												
122	✓	✓	✓	✓												
123	✓	✓	✓	✓												

a. Total Organic Carbon

b. Q1 = first quarter 1995

Q2 = second quarter 1995

Q3 = third quarter 1995

Q4 = fourth quarter 1995

c. Text and figures refer to surface water and sediment sampling locations
 by the last nonzero digit of the formal identifier presented in the table
 (e.g., SWSD009 is Location 9)

Table 2
1995 Sampling Locations and Analytical Methods
Niagara Falls Storage Site
- External Gamma Radiation and Air (Radon Gas) -

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Category	Analytical Parameter	Analytical Level	Analytical Technique	Analytical Method ^a	Sampling Locations
Field Measurements					
Laboratory Measurements					
Radiation	External gamma radiation	V	Thermoluminescence - TETLD ^b	N/A	1, 7, 8, 10, 11, 12, 13, 15, 18, 21, 23, 24, 28, 29, 36, 105, 112, 116, 120, 121, 122, 123 (Figure 3)
Radiological	Radon-220 / Radon-222	V	Radtrack [®]	N/A	
Radiological	Radon-222 flux	V	LAACC ^c / γ -spec	N/A	Storage Pile (Figure 4)

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Table 2
1995 Sampling Locations and Analytical Methods
Niagara Falls Storage Site
- Groundwater -

Category	Analytical Parameter	Analytical Level	Analytical Technique	Analytical Method	Sampling Locations
Field Measurements					
Chemical	Dissolved oxygen	II	Electrometric	EPA ^d 360.1	A45, A50, OW04B, OW06B, OW07B, OW15B, OW17B, B02W20S (Figure 3)
	Eh	II	Electrometric	N/A	
	Turbidity	II	Turbidimetric	EPA 180.1	
	Temperature	II	Electrometric	EPA 170.1	
	Specific conductivity	II	Electrometric	EPA 120.1	
	pH	II	Electrometric	EPA 150.0	
Laboratory Measurements					
Radiological	Total uranium	V	KPA ^e	ASTM ^f D-5174	A45, A50, OW4B, OW6B, OW7B, OW15B, OW17B, B02W20S (Figure 3)
	Radium-226	V	Alpha spec	EPA 903.1	
Chemical	Copper	III	ICPAES ^g	EPA 6010A	
	Lead	III	GFAA ^h	EPA 7421	
	Vanadium	III	ICPAES	EPA 6010A	
	Calcium	III	ICPAES	EPA 6010A	
	Magnesium	III	ICPAES	EPA 6010A	
	Potassium	III	ICPAES	EPA 6010A	
	Sodium	III	ICPAES	EPA 6010A	
	Chloride	III	Colorimetric	EPA 325.2	
	Sulfate	III	Turbidimetric	EPA 375.4	
	Phosphate - P	III	Colorimetric	EPA 365.2	
	Carbonate	III	Titrametric	EPA 310.1	
	Bicarbonate	III	Titrametric	EPA 310.1	
	Nitrate-N	III	Colorimetric	EPA 353.2	
	Total dissolved solids	III	Gravimetric	EPA 160.1	

Table 2
1995 Sampling Locations and Analytical Methods
Niagara Falls Storage Site
- Surface Water and Sediment -

Category	Analytical Parameter	Analytical Level	Analytical Technique	Analytical Method	Sampling Locations ¹
Field Measurements					
Chemical, Surface water	Dissolved oxygen	II	Electrometric	EPA 360.1	SWSD009, SWSD010 SWSD011 SWSD021, SWSD022 (Figure 5)
	Eh	II	Electrometric	N/A	
	Turbidity	II	Turbidimetric	EPA 180.1	
	Temperature	II	Electrometric	EPA 170.1	
	Specific conductivity	II	Electrometric	EPA 120.1	
	pH	II	Electrometric	EPA 150.0	
Laboratory Measurements					
Radiological, Surface water	Total uranium	V	KPA	ASTM D-5174	SWSD009, SWSD010, SWSD011 SWSD021, SWSD022 (Figure 5)
	Radium-226	V	Alpha spec	EPA 903.1	
Radiological, Sediment	Total uranium	V	KPA	ASTM D-5174	
	Thorium-232	V	Alpha spec	EML ² Th-01	
	Radium-226	V	Alpha spec	EPA 903.0	

- a. Analytical methods for radioactive constituents have been adapted from the referenced method as well as other methods
- b. Tissue-equivalent thermoluminescent dosimeter
- c. Large area activated charcoal canister
- d. Environmental Protection Agency
- e. Kinetic phosphorescence analysis
- f. American Society for Testing and Materials
- g. Inductively coupled plasma atomic emission spectrophotometry
- h. Graphite furnace atomic absorption
- i. Text and figures refer to surface water and sediment sampling locations by the last nonzero digit of the formal identifier presented in the table (e.g., SWSD009 is Location 9)
- j. Environmental Measurements Laboratory

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Table 3
1995 External Gamma Radiation Dose Rates
Niagara Falls Storage Site

TETLD ^a			TETLD				
Monitoring Location ^c	Readings (mrem/yr)	Corrected ^b (mrem/yr)	Monitoring Location	Readings (mrem/yr)	Corrected (mrem/yr)		
NFSS	1	71.6	-4.6	WCS ^d	8	69.6	-6.7
Perimeter	1	66.6	-9.7	Perimeter	8	70.6	-5.6
	7	66.6	-9.7		10	71.0	-5.2
	7	67.6	-8.7		10	74.0	-2.2
	11	64.0	-12.4		18	80.6	4.5
	11	66.0	-10.3		18	75.0	-1.2
	12	64.0	-12.4		21	72.8	-3.4
	12	66.8	-9.5		21	73.0	-3.2
	13	68.4	-7.9		23	72.4	-3.8
	13	65.4	-10.9		23	73.2	-3.0
	15	77.3	1.2		24	64.8	-11.6
	15	72.8	-3.4		24	66.6	-9.7
	28	76.4	0.3		Background	105	-- ^e
	28	72.0	-4.2	105		--	--
	29	71.8	-4.4	112		60.2	-16.2
	29	76.8	0.7	112		67.4	-8.9
	36	71.2	-5.0	116		66.8	-9.5
	36	72.6	-3.6	116		66.4	-9.9
	122	78.6	2.5	120		86.6	10.7
	122	72.8	-3.4	120		87.0	11.1
	123	71.0	-5.2	121	98.4	22.7	
123	72.0	-4.2	121	-- ^f	--		

TETLD Exposed Days.....	385
Calculated values:	
Average Background ^g	76.1
Corrected Background / year ^h	77.6
1 mrem = 0.01mSv ⁱ	

- a. TETLD = Tissue-equivalent thermoluminescent dosimeter. There are two TETLDs per station, each containing five chips. Reported values are an average chip reading per TETLD.
- b. TETLD readings are corrected for shelter/absorption factor ($s/a = 1.075$), normalized to a one-year exposure, and corrected for corrected background/year.
Corrected exposure = (reading * 1.075 * days per year/exposed days) - (corrected background/year)
Example (Location 1): $(71.6 * 1.075 * 365/385) - (77.6) = -4.6$ mrem/yr
- c. Monitoring locations are shown on Figures 1 and 2.
- d. Monitoring locations are along the perimeter of the waste containment structure (WCS).
- e. The TETLDs were stolen from background location 105 (offsite). Data is not available.
- f. Only one TETLD from location 121 was sent to the laboratory for analysis.
- g. Average background is the average of reported values at locations 112, 116, 120, and 121.
- h. Corrected background/year = (days per year/exposed days)*(average background)*1.075
Example: $365/385 * 76.1 * 1.075 = 77.6$ mrem/yr
- i. 1 mrem = 0.01mSv

Table 4
1995 Combined Radon-220 and Radon-222 Concentrations^a
Niagara Falls Storage Site

Monitoring Location ^b		Average Concentration (pCi/L)			
		01/10/95 ^c 04/13/95	04/13/95 ^c 07/11/95	07/11/95 ^c 10/23/95	10/23/95 ^c 01/30/96
NFSS	1	0.3 *	0.3 *	0.3 *	0.3 *
Perimeter	7	0.3 *	0.3 *	0.4	0.3 *
	11	0.3 *	0.3 *	0.3 *	0.3 *
	12	0.3 *	0.3 *	0.3 *	0.3 *
QC duplicate ^d	12	0.3 *	0.4	0.3 *	0.3 *
	13	0.3 *	0.3 *	0.3 *	0.3 *
	15	0.3 *	0.3 *	0.3 *	0.8
	28	0.3 *	0.3 *	0.3	0.3 *
	29	0.3 *	0.3 *	0.3	0.3 *
	36	0.3 *	0.3 *	0.3 *	0.3 *
	122	0.3 *	0.3 *	0.3 *	0.3 *
	123	0.3 *	0.3 *	0.3	0.3 *
WCS ^e	8	0.3 *	0.3 *	0.4	0.3 *
Perimeter	10	0.3 *	0.3 *	0.3 *	0.3 *
	18	0.3 *	0.3 *	0.3	0.3 *
	21	0.3 *	0.3 *	0.4	0.3 *
	23	0.3 *	0.3 *	0.3 *	0.3 *
	24	0.3 *	0.3 *	0.3	0.3 *
Background	105	0.3 *	0.3	0.3	0.3 *
	112	0.3 *	0.3 *	0.3 *	0.3 *
	116	0.3 *	0.3 *	0.3 *	0.3 *
	120	0.3 *	0.3 *	0.3 *	0.3 *
	121	0.3 *	0.3 *	0.3 *	0.3 *

- a. 1995 radon gas concentrations were measured with RadTrack[®] detectors. These detectors measure the combined concentration of radon-220 and radon-222 in air. Historically, radon-220 has not been detected at NFSS.
- b. Monitoring locations are shown on Figures 1 and 2.
- c. Detectors were installed and removed on the dates listed.
- d. A quality control (QC) duplicate is collected at the same time and location and is analyzed by the same method for use in evaluation of precision in sampling and analysis.
- e. Monitoring locations are located at the perimeter of the waste containment structure (WCS).

Note: The DCE limit for radon is 3.0 pCi/L.

(*) Indicates detection limit is reported. Actual result is less than this value.

1 pCi = 0.037 becquerel

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Table 5
1995 Radon-222 Flux Monitoring Results *
Niagara Falls Storage Site

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Radon-222 Flux		Radon-222 Flux		Radon-222 Flux	
Sample ID	(pCi/m ² /s)	Sample ID	(pCi/m ² /s)	Sample ID	(pCi/m ² /s)
202-RF-001	0.18 ± 0.02	202-RF-038	0.11 ± 0.02	202-RF-075	0.04 ± 0.01
202-RF-002	0.12 ± 0.02	202-RF-039	0.07 ± 0.02	202-RF-076	0.16 ± 0.02
202-RF-003	0.34 ± 0.03	202-RF-040	0.12 ± 0.02	202-RF-077	0.12 ± 0.02
202-RF-004	0.06 ± 0.02	202-RF-041	0.17 ± 0.02	202-RF-078	0.10 ± 0.02
202-RF-005	0.13 ± 0.02	202-RF-042	0.18 ± 0.02	202-RF-079	0.07 ± 0.01
202-RF-006	0.13 ± 0.02	202-RF-043	0.10 ± 0.02	202-RF-080	0.04 ± 0.01
202-RF-007	0.09 ± 0.02	202-RF-044	0.09 ± 0.02	202-RF-081	0.05 ± 0.02
202-RF-008	0.17 ± 0.02	202-RF-045	0.16 ± 0.02	202-RF-082	0.06 ± 0.01
202-RF-009	0.09 ± 0.02	202-RF-046	0.06 ± 0.02	202-RF-083	0.07 ± 0.02
202-RF-010	0.10 ± 0.02	202-RF-047	0.06 ± 0.02	202-RF-084	0.06 ± 0.02
202-RF-011	0.06 ± 0.02	202-RF-048	0.11 ± 0.02	202-RF-085	0.13 ± 0.02
202-RF-012	0.07 ± 0.02	202-RF-049	0.09 ± 0.02	202-RF-086	0.07 ± 0.02
202-RF-013	0.13 ± 0.02	202-RF-050	0.09 ± 0.02	202-RF-087	0.07 ± 0.02
202-RF-014	0.13 ± 0.02	202-RF-051	0.08 ± 0.02	202-RF-088	0.11 ± 0.02
202-RF-015	0.11 ± 0.02	202-RF-052	0.11 ± 0.02	202-RF-089	0.06 ± 0.02
202-RF-016	0.15 ± 0.02	202-RF-053	0.12 ± 0.02	202-RF-090	0.07 ± 0.02
202-RF-017	0.14 ± 0.02	202-RF-054	0.14 ± 0.02	202-RF-091	0.08 ± 0.02
202-RF-018	0.09 ± 0.02	202-RF-055	0.11 ± 0.02	202-RF-092	0.07 ± 0.02
202-RF-019	0.08 ± 0.02	202-RF-056	0.22 ± 0.02	202-RF-093	0.08 ± 0.02
202-RF-020	0.20 ± 0.02	202-RF-057	0.07 ± 0.02	202-RF-094	0.05 ± 0.02
202-RF-021	0.16 ± 0.02	202-RF-058	0.10 ± 0.02	202-RF-095	0.04 ± 0.02
202-RF-022	0.16 ± 0.02	202-RF-059	0.11 ± 0.02	202-RF-096	0.08 ± 0.02
202-RF-023	0.09 ± 0.02	202-RF-060	0.07 ± 0.02	202-RF-097	0.03 ± 0.01
202-RF-024	— ^b	202-RF-061	0.14 ± 0.02	202-RF-098	0.04 ± 0.02
202-RF-025	0.11 ± 0.02	202-RF-062	1.89 ± 0.05	202-RF-099	0.07 ± 0.02
202-RF-026	0.34 ± 0.02	202-RF-063	0.08 ± 0.02	202-RF-100	0.05 ± 0.01
202-RF-027	0.09 ± 0.02	202-RF-064	0.08 ± 0.02	202-RF-101	0.08 ± 0.02
202-RF-028	0.08 ± 0.02	202-RF-065	0.11 ± 0.02	202-RF-102	0.02 ± 0.01
202-RF-029	0.10 ± 0.02	202-RF-066	0.11 ± 0.02	202-RF-103	0.06 ± 0.01
202-RF-030	0.08 ± 0.02	202-RF-067	0.09 ± 0.02	202-RF-104	0.07 ± 0.02
202-RF-031	0.12 ± 0.02	202-RF-068	0.09 ± 0.02	202-RF-105	0.03 ± 0.01
202-RF-032	0.30 ± 0.02	202-RF-069	0.12 ± 0.02	202-RF-106	0.17 ± 0.02
202-RF-033	0.12 ± 0.02	202-RF-070	0.07 ± 0.02	202-RF-107	0.13 ± 0.02
202-RF-034	0.04 ± 0.02	202-RF-071	0.11 ± 0.02	202-RF-108	0.08 ± 0.02
202-RF-035	0.10 ± 0.02	202-RF-072	0.12 ± 0.02	202-RF-109	0.09 ± 0.02
202-RF-036	0.11 ± 0.02	202-RF-073	0.12 ± 0.02	202-RF-110	0.10 ± 0.02
202-RF-037	0.25 ± 0.02	202-RF-074	0.08 ± 0.02	202-RF-111	0.10 ± 0.02

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Table 5
1995 Radon-222 Flux Monitoring Results *
Niagara Falls Storage Site

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Radon-222 Flux		Radon-222 Flux		Radon-222 Flux	
Sample ID	(pCi/m ² /s)	Sample ID	(pCi/m ² /s)	Sample ID	(pCi/m ² /s)
202-RF-112	0.11 ± 0.02	202-RF-147	0.10 ± 0.02	QC duplicates ^a	
202-RF-113	0.05 ± 0.01	202-RF-148	0.08 ± 0.02	202-RF-010	0.13 ± 0.02
202-RF-114	0.03 ± 0.02	202-RF-149	0.06 ± 0.02	202-RF-020	0.28 ± 0.02
202-RF-115	0.04 ± 0.01	202-RF-150	0.08 ± 0.02	202-RF-030	0.08 ± 0.02
202-RF-116	0.05 ± 0.02	202-RF-151	0.05 ± 0.02	202-RF-040	0.16 ± 0.02
202-RF-117	0.09 ± 0.02	202-RF-152	0.03 ± 0.02	202-RF-050	0.12 ± 0.02
202-RF-118	0.11 ± 0.02	202-RF-153	0.03 ± 0.02	202-RF-060	0.07 ± 0.02
202-RF-119	0.05 ± 0.02	202-RF-154	0.06 ± 0.02	202-RF-070	0.07 ± 0.02
202-RF-120	0.05 ± 0.01	202-RF-155	0.05 ± 0.02	202-RF-080	0.07 ± 0.01
202-RF-121	0.04 ± 0.02	202-RF-156	0.06 ± 0.02	202-RF-090	0.05 ± 0.02
202-RF-122	0.08 ± 0.01	202-RF-157	0.05 ± 0.02	202-RF-100	0.04 ± 0.02
202-RF-123	0.04 ± 0.01	202-RF-158	0.05 ± 0.02	202-RF-110	0.08 ± 0.02
202-RF-124	0.06 ± 0.02	202-RF-159	0.10 ± 0.02	202-RF-120	0.06 ± 0.02
202-RF-125	0.10 ± 0.02	202-RF-160	0.05 ± 0.02	202-RF-130	0.06 ± 0.02
202-RF-126	0.05 ± 0.02	202-RF-161	0.09 ± 0.02	202-RF-140	0.07 ± 0.02
202-RF-127	0.09 ± 0.02	202-RF-162	0.13 ± 0.02	202-RF-150	0.06 ± 0.02
202-RF-128	0.04 ± 0.02	202-RF-163	0.11 ± 0.02	202-RF-160	0.05 ± 0.02
202-RF-129	0.09 ± 0.02	202-RF-168	0.10 ± 0.02	202-RF-170	0.13 ± 0.02
202-RF-130	0.09 ± 0.02	202-RF-164	0.06 ± 0.02	202-RF-180	0.08 ± 0.02
202-RF-131	0.04 ± 0.02	202-RF-165	0.02 ± 0.02		
202-RF-132	0.04 ± 0.02	202-RF-166	0.09 ± 0.02		
202-RF-133	0.04 ± 0.02	202-RF-167	0.04 ± 0.02		
202-RF-134	0.06 ± 0.02	202-RF-169	0.06 ± 0.02		
202-RF-135	0.08 ± 0.02	202-RF-170	0.13 ± 0.02		
202-RF-136	0.09 ± 0.02	202-RF-171	0.11 ± 0.02		
202-RF-137	0.07 ± 0.02	202-RF-172	0.08 ± 0.02		
202-RF-138	0.07 ± 0.02	202-RF-173	0.07 ± 0.02		
202-RF-139	0.07 ± 0.02	202-RF-174	0.09 ± 0.02		
202-RF-140	0.06 ± 0.02	202-RF-175	0.09 ± 0.02		
202-RF-141	0.04 ± 0.02	202-RF-176	0.04 ± 0.02		
202-RF-142	0.05 ± 0.02	202-RF-177	0.11 ± 0.02		
202-RF-143	0.06 ± 0.02	202-RF-178	0.11 ± 0.02		
202-RF-144	0.11 ± 0.02	202-RF-179	0.33 ± 0.03		
202-RF-145	0.06 ± 0.02	202-RF-180	0.09 ± 0.02		
202-RF-146	0.04 ± 0.02				

Note: The EPA standard for radon-222 flux is 20 pCi/m²/s.

- a. Radon-222 flux measurements were taken during the second quarter in June 1995.
- b. The canister was damaged prior to receipt at the laboratory. The laboratory did not analyze 202-RF-024.
- c. The canisters are counted twice in the laboratory as quality control (QC) duplicates in order to evaluate analytical precision.

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Table 6
1995 Surface Water Analytical Results - Radioactive Constituents
Niagara Falls Storage Site

Sampling Location ^a	Date Collected	Analyte	Result ^b (pCi/L)	BNI Flag ^c	MDA ^d (pCi/L)	Result Above Background ^e (pCi/L)	DCG ^f (pCi/L)
SWSD010	04/20/95	Radium-226	0.09 ± 0.10	UJ	0.17	-0.42 ± 0.20	100
	04/20/95	Total uranium	9.55 ± 1.15		0.02	3.04 ± 1.21	600
SWSD011	04/20/95	Radium-226	0.08 ± 0.09	UJ	0.12	-0.43 ± 0.19	100
	04/20/95	Total uranium	10.97 ± 1.29		0.02	4.46 ± 1.34	600
SWSD011 QC duplicate ^g	04/20/95	Radium-226	0.02 ± 0.05	UJ	0.16	-0.49 ± 0.18	100
	04/20/95	Total uranium	10.70 ± 1.29		0.02	4.19 ± 1.34	600
SWSD022	04/20/95	Radium-226	0.47 ± 0.31		0.32	-0.04 ± 0.35	100
	04/20/95	Total uranium	12.25 ± 1.49		0.02	5.74 ± 1.53	600
SWSD009 Background	04/20/95	Radium-226	0.16 ± 0.18	UJ	0.29	-0.35 ± 0.25	100
	04/20/95	Total uranium	7.85 ± 0.95		0.02	1.34 ± 1.01	600
SWSD021 Background	04/20/95	Radium-226	0.25 ± 0.26	UJ	0.49	-0.26 ± 0.31	100
	04/20/95	Total uranium	10.90 ± 1.29		0.02	4.39 ± 1.34	600

- Text and figures refer to surface water sampling locations by the last one or two digits of the formal identifier presented in the table (e.g., SWSD010 is location 10, SWSD009 is location 9).
- Results reported with (±) radiological error quoted at 2-sigma (95 percent confidence level).
- Bechtel National, Inc. data qualifier flags:
 UJ = Analyte was undetected; estimated value reported. The result is below the MDA or less than the associated error.
- Minimum detectable activity
- Historical (1992-1995) average background for surface water (pCi/L) is 0.51±0.17 and 6.51±0.36 for radium-226 and total uranium, respectively. Associated error term for result above background was calculated: $(\text{error}_{\text{result}}^2 + \text{error}_{\text{background}}^2)^{1/2}$
- DOE derived concentration guide for water.
- A quality control (QC) duplicate is collected at the same time and location and is analyzed by the same method for use in evaluation of precision in sampling and analysis.

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Table 7
1995 Sediment Analytical Results - Radioactive Constituents
Niagara Falls Storage Site

Sampling Location ^a	Date Collected	Analyte	Result ^b (pCi/g)	BNI Flag ^c	MDA ^d (pCi/g)	Result Above Background ^e (pCi/g)	Cleanup Criteria ^f (pCi/g)
SWSD010	04/20/95	Radium-226	1.30 ± 0.41		0.20	-0.30 ± 0.44	5
	04/20/95	Thorium-232	1.40 ± 0.43		0.09	0.10 ± 0.52	5
	04/20/95	Total uranium	2.37 ± 0.24		0.07	-1.34 ± 0.30	90 ^g
SWSD011	04/20/95	Radium-226	2.00 ± 0.53		0.19	0.40 ± 0.56	5
	04/20/95	Thorium-232	1.10 ± 0.39		0.06	-0.20 ± 0.49	5
	04/20/95	Total uranium	1.83 ± 0.18	U	0.07	-1.88 ± 0.26	90
SWSD011	04/20/95	Radium-226	2.30 ± 0.81		0.47	0.70 ± 0.83	5
QC duplicate ^b	04/20/95	Thorium-232	1.00 ± 0.38		0.12	-0.30 ± 0.48	5
	04/20/95	Total uranium	2.03 ± 0.20		0.07	-1.68 ± 0.27	90
SWSD022	04/20/95	Radium-226	2.30 ± 0.54		0.12	0.70 ± 0.57	5
	04/20/95	Thorium-232	1.30 ± 0.42		0.09	0.00 ± 0.51	5
	04/20/95	Total uranium	1.90 ± 0.19	U	0.07	-1.81 ± 0.26	90
SWSD009	04/20/95	Radium-226	2.10 ± 0.49		0.17	0.50 ± 0.52	5
Background	04/20/95	Thorium-232	1.20 ± 0.40		0.09	-0.10 ± 0.49	5
	04/20/95	Total uranium	3.79 ± 0.38		0.07	0.08 ± 0.42	90
SWSD021	04/20/95	Radium-226	1.30 ± 0.42		0.21	-0.30 ± 0.45	5
Background	04/20/95	Thorium-232	1.30 ± 0.41		0.05	0.00 ± 0.50	5
	04/20/95	Total uranium	2.10 ± 0.21		0.07	-1.61 ± 0.28	90

a. Text and figures refer to sediment sampling locations by the last one or two digits of the formal identifier presented in the table (e.g., SWSD010 is location 10, SWSD009 is location 9).

b. Results reported with (±) radiological error quoted at 2-sigma (95 percent confidence level).

c. Bechtel National, Inc. data qualifier flags:

U = The analyte was not detected. Total uranium was present in the associated laboratory blank. If the sample result is less than 5 times the blank contamination the result is nodedetect.

d. Minimum detectable activity

e. Historical (1992-1995) average background for sediment is 1.6 ± 0.17 and 3.71 ± 0.18 pCi/g for radium-226 and total uranium, respectively. Background (1995 only) for thorium-232 is 1.3 ± 0.29 pCi/g. Associated error term for result above background was calculated: $(\text{error}_{\text{result}}^2 + \text{error}_{\text{background}}^2)^{1/2}$

f. DOE soil cleanup criteria, averaged over topmost 6 in. (15 cm) of soil. Because there are no standards for radioactive constituents in sediment, these soil values are used to provide a basis for comparison of sediment results.

g. NFSS proposed site-specific cleanup criterion for total uranium.

h. A quality control (QC) duplicate is collected at the same time and location and is analyzed by the same method for use in evaluation of precision in sampling and analysis.

Table 8
1995 Field Parameter Summary
Niagara Falls Storage Site

Sampling Location	Date	Temp (°C)	pH	Spec. Cond. ^a (mS/cm)	DO ^b (mg/L)	Eh (mV) ^c	Turbidity (NTU) ^d	Purge Volume ^e	Discharge (GPM) ^f
GROUNDWATER									
A45	04/25/95	9.9	6.84	1.874	0.69	86	8	3.12	0.12
A50	04/25/95	9.7	7.43	1.570	5.25	134	13	1.13	0.08
OW04B	04/25/95	8.1	7.19	1.440	1.19	128	77	2.86	0.08
OW06B	04/25/95	9.2	7.14	2.0	5.01	167	4	2.6	0.12
OW07B	04/21/95	9.6	7.41	1.634	6.96	130	3	2.6	0.08
OW15B	04/24/95	10.7	7.74	2.10	0.94	-46	171	1.04	0.12
OW15B	04/24/95	8.5	7.28	1.504	4.79	147	6	1.9	0.12
OW17B	04/25/95	9.4	7.94	1.488	9.65	131	4	1.25	0.05
B02W20S	04/24/95	9.4	7.90	1.074	3.23	49	13	1.56	0.08
SURFACE WATER									
SWSD009	04/20/95	8.6	6.82	1.030	6.01	152	18	- ^g	-
SWSD010	04/20/95	12.2	7.78	0.540	6.84	203	46	-	-
SWSD011	04/20/95	7.4	7.95	1.048	7.81	197	9	-	-
SWSD021	04/20/95	12.3	7.20	1.018	7.46	184	81	-	-
SWSD022	04/20/95	11.2	8.01	1.042	8.01	186	126	-	-

- a. Specific Conductance, measured in milliSiemens/centimeter (mS/cm)
b. Dissolved Oxygen
c. Oxidation/reduction potential, measured in milliVolts (mV)
d. Nephelometric turbidity units
e. Purge volumes = gallons purged/one purge volume
f. Gallons per minute
g. (-) Parameter not applicable

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Table 9
1995 Groundwater Quality Analytical Results
Niagara Falls Storage Site

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Sampling Location	Date Collected	Analyte ^a	Result (mg/L)	Data Qualifiers ^b		Detection Limit (mg/L)	Related Regulations ^c	
				BNI	Lab		Federal ^d (mg/L)	State ^e (mg/L)
A45	04/25/95	Alkalinity	447	=		2	NE	NE
	04/25/95	Bicarbonate	447	=		2	NE	NE
	04/25/95	Carbonate	2		U	2	NE	NE
	04/25/95	Chloride	51.3	=		6.2	250	250
	04/25/95	Nitrate, As N	0.09	=		0.02	10	10
	04/25/95	Phosphate	0.05		U	0.05	NE	NE
	04/25/95	Sulfate	598	=		50	NE	NE
	04/25/95	Total dissolved solids	1,900	=		5	500	500
	04/25/95	Total organic carbon	6	=		0.5	NE	NE
A45 QC duplicate ^f	04/25/95	Alkalinity	447	=		2	NE	NE
	04/25/95	Bicarbonate	447	=		2	NE	NE
	04/25/95	Carbonate	2		U	2	NE	NE
	04/25/95	Chloride	51.1	=		6.2	250	250
	04/25/95	Nitrate, As N	0.09	=		0.02	10	10
	04/25/95	Phosphate	0.05		U	0.05	NE	NE
	04/25/95	Sulfate	642	=		50	NE	NE
	04/25/95	Total dissolved solids	1,800	=		5	500	500
	04/25/95	Total organic carbon	2.5	=		0.5	NE	NE
A50	04/25/95	Alkalinity	385	=		2	NE	NE
	04/25/95	Bicarbonate	385	=		2	NE	NE
	04/25/95	Carbonate	2		U	2	NE	NE
	04/25/95	Chloride	22.7	=		1.2	250	250
	04/25/95	Nitrate, As N	0.05	=		0.02	10	10
	04/25/95	Phosphate	0.05		U	0.05	NE	NE
	04/25/95	Sulfate	488	=		50	NE	NE
	04/25/95	Total dissolved solids	1,340	=		5	500	500
	04/25/95	Total organic carbon	3.5	=		0.5	NE	NE
OW04B	04/25/95	Alkalinity	325	=		2	NE	NE
	04/25/95	Bicarbonate	325	=		2	NE	NE
	04/25/95	Carbonate	2		U	2	NE	NE
	04/25/95	Chloride	84.6	=		12.5	250	250
	04/25/95	Nitrate, As N	0.08	=		0.02	10	10
	04/25/95	Phosphate	0.1	=		0.05	NE	NE
	04/25/95	Sulfate	402	=		50	NE	NE
	04/25/95	Total dissolved solids	1,200	=		5	500	500
	04/25/95	Total organic carbon	2.7	=		0.5	NE	NE

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Table 9
1995 Groundwater Quality Analytical Results
Niagara Falls Storage Site

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Sampling Location	Date Collected	Analyte ^a	Result (mg/L)	Data		Detection Limit (mg/L)	Related Regulations ^c	
				Qualifiers ^b	Lab		Federal ^d (mg/L)	State ^e (mg/L)
OW06B	04/25/95	Alkalinity	670	=		2	NE	NE
	04/25/95	Bicarbonate	670	=		2	NE	NE
	04/25/95	Carbonate	2	U		2	NE	NE
	04/25/95	Chloride	31.7	=		1.2	250	250
	04/25/95	Nitrate, As N	0.06	=		0.02	10	10
	04/25/95	Phosphate	0.05	U		0.05	NE	NE
	04/25/95	Sulfate	512	=		50	NE	NE
	04/25/95	Total dissolved solids	1,670	=		5	500	500
	04/25/95	Total organic carbon	3.4	=		0.5	NE	NE
OW07B	04/24/95	Alkalinity	401	=		2	NE	NE
	04/24/95	Bicarbonate	401	=		2	NE	NE
	04/24/95	Carbonate	2	U		2	NE	NE
	04/24/95	Chloride	17.7	=		0.5	250	250
	04/24/95	Nitrate, As N	0.06	=		0.02	10	10
	04/24/95	Phosphate	0.05	U		0.05	NE	NE
	04/24/95	Sulfate	694	=		50	NE	NE
	04/24/95	Total dissolved solids	1,500	=		5	500	500
	04/24/95	Total organic carbon	1.4	=		0.5	NE	NE
OW15B	04/24/95	Alkalinity	498	=		2	NE	NE
	04/24/95	Bicarbonate	498	=		2	NE	NE
	04/24/95	Carbonate	2	U		2	NE	NE
	04/24/95	Chloride	13.4	=		0.5	250	250
	04/24/95	Nitrate, As N	0.08	=		0.02	10	10
	04/24/95	Phosphate	0.05	U		0.05	NE	NE
	04/24/95	Sulfate	495	=		125	NE	NE
	04/24/95	Total dissolved solids	1,230	=		5	500	500
	04/24/95	Total organic carbon	12	=		0.5	NE	NE
OW17B	04/25/95	Alkalinity	451	=		2	NE	NE
	04/25/95	Bicarbonate	451	=		2	NE	NE
	04/25/95	Carbonate	2	U		2	NE	NE
	04/25/95	Chloride	16.2	=		0.5	250	250
	04/25/95	Nitrate, As N	0.06	=		0.02	10	10
	04/25/95	Phosphate	0.05	U		0.05	NE	NE
	04/25/95	Sulfate	447	=		50	NE	NE
	04/25/95	Total dissolved solids	1,200	=		5	500	500
	04/25/95	Total organic carbon	1.6	=		0.5	NE	NE

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Table 9
1995 Groundwater Quality Analytical Results
Niagara Falls Storage Site

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Sampling Location	Date Collected	Analyte ^a	Result (mg/L)	Data Qualifiers ^b		Detection Limit (mg/L)	Related Regulations ^c	
				BNI	Lab		Federal ^d (mg/L)	State ^e (mg/L)
B02W20S	04/24/95	Alkalinity	406	=		2	NE	NE
Background	04/24/95	Bicarbonate	406	=		2	NE	NE
	04/24/95	Carbonate	2	U		2	NE	NE
	04/24/95	Chloride	7.4	=		0.25	250	250
	04/24/95	Nitrate, As N	0.03	=		0.02	10	10
	04/24/95	Phosphate	0.05	U		0.05	NE	NE
	04/24/95	Sulfate	301	=		50	NE	NE
	04/24/95	Total dissolved solids	834	=		5	500	500
	04/24/95	Total organic carbon	5	=		0.5	NE	NE

- a. Analytical results for calcium, magnesium, potassium, and sodium (utilized in the construction of Figure 11) can be found in Table 10.
- b. Bechtel National, Inc. and laboratory data qualifier flags:
 U = The analyte was not detected. The detection limit is reported.
 (=) = Actual value reported.
- c. Regulations presented pertain to drinking water quality and are listed for comparison only.
 No drinking water supply is obtained from groundwater at NFSS. NE = Not established.
- d. Safe Drinking Water Act maximum contaminant levels from EPA Drinking Water Regulations and Health Advisories (November 1994).
- e. NYSDEC Water Quality Regulations (6NYCRR chapter X, Subchapter A, Part 703) (January 1994) or NYSDEC TAGM (January 1994).
- f. A quality control (QC) duplicate is collected at the same time and location and is analyzed by the same method for use in evaluation of precision in sampling and analysis.

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Table 10
1995 Groundwater Analytical Results - Detected Metals *
Niagara Falls Storage Site

Page 1 of 2

Sampling Location	Date Collected	Analyte	Result (µg/L)	Data		Detection Limit (µg/L)	Related Regulations *	
				Qualifiers ^b	BNI Lab		Federal ^d	State ^e
A45	04/25/95	Calcium	229,000	=		14.3	NE	NE
	04/25/95	Copper	8.8	=		7.1	1,300	200
	04/25/95	Magnesium	120,000	=		38.8	NE	NE
	04/25/95	Potassium	4,770	=		847	NE	NE
	04/25/95	Sodium	36,500	=		57.5	NE	20
A45 QC duplicate ^f	04/25/95	Calcium	269,000	=		14.3	NE	NE
	04/25/95	Copper	7.1	=		7.1	1,300	200
	04/25/95	Lead	0.7	=		0.6	15	25
	04/25/95	Magnesium	138,000	=		38.8	NE	NE
	04/25/95	Potassium	5,120	=		847	NE	NE
	04/25/95	Sodium	41,700	=		57.5	NE	20
A50	04/25/95	Calcium	129,000	=		14.3	NE	NE
	04/25/95	Magnesium	139,000	=		38.8	NE	NE
	04/25/95	Potassium	1,890	=		847	NE	NE
	04/25/95	Sodium	6,830	=		57.5	NE	20
OW04B	04/25/95	Calcium	144,000	=		14.3	NE	NE
	04/25/95	Copper	8.4	=		7.1	1,300	200
	04/25/95	Magnesium	115,000	=		38.8	NE	NE
	04/25/95	Potassium	3,410	=		847	NE	NE
	04/25/95	Sodium	50,100	=		57.5	NE	20
	04/25/95	Vanadium	7.1	=		4	NE	NE
OW06B	04/25/95	Calcium	148,000	=		14.3	NE	NE
	04/25/95	Copper	8	=		7.1	1,300	200
	04/25/95	Lead	0.6	=		0.6	15	25
	04/25/95	Magnesium	221,000	=		38.8	NE	NE
	04/25/95	Potassium	3,490	=		847	NE	NE
	04/25/95	Sodium	60,700	=		57.5	NE	20
OW07B	04/24/95	Calcium	67,700	J		14.3	NE	NE
	04/24/95	Magnesium	104,000	J		38.8	NE	NE
	04/24/95	Potassium	984	=		847	NE	NE
	04/24/95	Sodium	36,500	J		57.5	NE	20
OW15B	04/24/95	Calcium	90,100	J		14.3	NE	NE
	04/24/95	Magnesium	136,000	J		38.8	NE	NE
	04/24/95	Potassium	1,010	=		847	NE	NE
	04/24/95	Sodium	58,400	J		57.5	NE	20

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Table 10
1995 Groundwater Analytical Results - Detected Metals ^a
Niagara Falls Storage Site

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Sampling Location	Date Collected	Analyte	Result (µg/L)	Data Qualifiers ^b		Detection Limit (µg/L)	Related Regulations ^c	
				BNI	Lab		Federal ^d (µg/L)	State ^e (µg/L)
OW17B	04/25/95	Calcium	87,000	=		14.3	NE	NE
	04/25/95	Magnesium	142,000	=		38.8	NE	NE
	04/25/95	Potassium	2,280	=		847	NE	NE
	04/25/95	Sodium	60,500	=		57.5	NE	20
B02W20S	04/24/95	Calcium	50,500	J	=	14.3	NE	NE
Background	04/24/95	Lead	0.6	=		0.6	15	25
	04/24/95	Magnesium	80,800	J	=	38.8	NE	NE
	04/24/95	Potassium	1,020	=		847	NE	NE
	04/24/95	Sodium	34,000	J	=	57.5	NE	20

- a. Only the analytes that were detected are reported. See Table 12 for a comprehensive listing of requested analyses and associated detection limits.
- b. Bechtel National, Inc. and laboratory data qualifier flags:
 J = Reported as an estimated value. Data quality evaluation indicates that the analytical result is an estimate of the actual value.
 (=) = Analytical result reported.
- c. Regulations presented pertain to drinking water quality and are listed for comparison only. No drinking water supply is obtained from groundwater at NFSS. NE = Not established.
- d. Safe Drinking Water Act maximum contaminant levels from EPA Drinking Water Regulations and Health Advisories (November 1994).
- e. NYSDEC Water Quality Regulations (6NYCRR chapter X, Subchapter A, Part 703) (January 1994) or NYSDEC TAGM (January 1994).
- f. A quality control (QC) duplicate is collected at the same time and location and is analyzed by the same method for use in evaluation of precision in sampling and analysis.

Table 11
1995 Groundwater Analytical Results - Radioactive Constituents
Niagara Falls Storage Site

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Sampling Location	Date Collected	Analyte ^a	Result ^b (pCi/L)	BNI Flag ^c	MDA ^d (pCi/L)	Result Above Background ^e (pCi/L)	DCG ^f (pCi/L)
A45	04/25/95	Radium-226	0.18 ± 0.14		0.12	-0.04 ± 0.17	100
	04/25/95	Total uranium	35.95 ± 4.20		0.02	28.22 ± 4.22	600
A45	04/25/95	Radium-226	0.11 ± 0.11	UJ	0.15	-0.11 ± 0.14	100
QC duplicate ^g	04/25/95	Total uranium	36.90 ± 4.33		0.02	29.17 ± 4.36	600
A50	04/25/95	Radium-226	0.20 ± 0.15		0.13	-0.02 ± 0.17	100
	04/25/95	Total uranium	11.98 ± 1.42		0.02	4.25 ± 1.49	600
OW04B	04/25/95	Radium-226	0.09 ± 0.09	UJ	0.10	-0.13 ± 0.13	100
	04/25/95	Total uranium	17.33 ± 2.03		0.02	9.60 ± 2.08	600
OW06B	04/25/95	Radium-226	0.18 ± 0.15		0.16	-0.04 ± 0.17	100
	04/25/95	Total uranium	20.65 ± 2.44		0.02	12.92 ± 2.48	600
OW07B	04/24/95	Radium-226	0.24 ± 0.18		0.16	0.02 ± 0.20	100
	04/24/95	Total uranium	10.83 ± 1.29		0.02	3.10 ± 1.36	600
OW15B	04/24/95	Radium-226	0.14 ± 0.15	UJ	0.20	-0.08 ± 0.17	100
	04/24/95	Total uranium	9.14 ± 1.08		0.02	1.41 ± 1.17	600
OW17B	04/25/95	Radium-226	0.03 ± 0.06	UJ	0.09	-0.19 ± 0.11	100
	04/25/95	Total uranium	6.16 ± 0.64		0.02	-1.57 ± 0.77	600
B02W20S	04/24/95	Radium-226	0.13 ± 0.14	UJ	0.19	-0.09 ± 0.17	100
Background	04/24/95	Total uranium	7.38 ± 0.88		0.02	-0.35 ± 0.98	600

- a. All analyses results are reported as total (unfiltered) unless otherwise specified in the Sampling Location column.
- b. Results reported with (±) radiological error quoted at 2-sigma (95 percent confidence level).
- c. Bechtel National, Inc. data qualifier flags:
UJ = Analyte was undetected; estimated value reported. The result is below the MDA or less than the associated error.
- d. Minimum detectable activity
- e. Historical (1992-1995) average background for groundwater is 0.22±0.09 and 7.73±0.44 pCi/L for radium-226 and total uranium, respectively. Associated error term for result above background was calculated: $(\text{error}_{\text{result}}^2 + \text{error}_{\text{background}}^2)^{1/2}$
- f. DOE derived concentration guide for water.
- g. A quality control (QC) duplicate is collected at the same time and location and is analyzed by the same method for use in evaluation of precision in sampling and analysis.

Table 12
1995 Comprehensive List of Analytes and
Detection Limits for Metals Analyses
Niagara Falls Storage Site

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Groundwater Metals	Detection Limit (µg/L) ^a
Calcium	--
Copper	7.1
Lead	0.6
Magnesium	--
Potassium	--
Sodium	--
Vanadium	4

- a. The detection limit listed for each analyte is the maximum detection limit taken from all non-detect results (i.e., results that were U qualified by either BNI or the laboratory) for the same analyte.
- b. (--) = The specific analyte was detected at all sampling locations. Reported values and detection limits are listed on Table 10.

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Data Package
for
Niagara Falls Storage Site
1995 Environmental Surveillance Program

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Niagara Falls Storage Site
Environmental Surveillance Data Package
Glossary of Terms and Notes

Data Qualifier Flags

- = Actual laboratory result reported
B This chemical data flag is used when the analyte is found in the associated blank as well as in the sample. It indicates possible/probable blank contamination.
J Estimated. Qualitatively correct but quantitatively suspect.
R Rejected. Data are not suitable for any purpose.
U Undetected. The sample result is equal to or less than the detection limit, or is above the detection limit and the results of the sample are less than 5 times the blank's result.
UJ Undetected-estimated. The reported result is below the MDA or less than the associated error.

Abbreviations

BNI	Bechtel National, Inc.
CNTRL	control
(D)	duplicate sample
DL	detection limit
GW	groundwater
HR	hour
L	liter
MDA	minimum detectable activity
MG	milligrams
MG-N	milligrams as nitrogen
mR	milliroentgen
N	nitrogen
OL	other liquid
PB	lead
PCI	picocurie
QC	quality control
(R)	rinseblank
SD	sediment
STW	stormwater
SW	surface water
(T)	trip blank
UG	micrograms
W	water

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NFSS 1995 Radon Data

Station	Type	Date Start	Date End	Days Exposed	Total Exposure (pCi/L-days)	Average Concentration (pCi/L)	Standard Deviation (%)
001	F	01/10/95	04/13/95	93	30.0	0.3	37.8
001	F	04/13/95	07/11/95	89	30.0	0.3	24.3
001	F	07/11/95	10/23/95	104	30.0	0.3	20.4
001	F	10/23/95	01/30/96	99	30.0	0.3	26.7
007	F	01/10/95	04/13/95	93	30.0	0.3	44.7
007	F	04/13/95	07/11/95	89	30.0	0.3	27.7
007	F	07/11/95	10/23/95	104	45.0	0.4	18.0
007	F	10/23/95	01/30/96	99	30.0	0.3	27.7
008	F	01/10/95	04/13/95	93	30.0	0.3	37.8
008	F	04/13/95	07/11/95	89	30.0	0.3	20.9
008	F	07/11/95	10/23/95	104	38.5	0.4	18.9
008	F	10/23/95	01/30/96	99	30.0	0.3	31.6
010	F	01/10/95	04/13/95	93	30.0	0.3	40.8
010	F	04/13/95	07/11/95	89	30.0	0.3	21.3
010	F	07/11/95	10/23/95	104	30.0	0.3	23.6
010	F	10/23/95	01/30/96	99	30.0	0.3	24.3
011	F	01/10/95	04/13/95	93	30.0	0.3	22.9
011	F	04/13/95	07/11/95	89	30.0	0.3	20.4
011	F	07/11/95	10/23/95	104	30.0	0.3	21.3
011	F	10/23/95	01/30/96	99	30.0	0.3	23.6
012	F	01/10/95	04/13/95	93	30.0	0.3	44.7
012	F	04/13/95	07/11/95	89	30.0	0.3	24.3
012	F	07/11/95	10/23/95	104	30.0	0.3	20.4
012	F	10/23/95	01/30/96	99	30.0	0.3	33.3
013	F	01/10/95	04/13/95	93	30.0	0.3	33.3
013	F	04/13/95	07/11/95	89	30.0	0.3	21.3
013	F	07/11/95	10/23/95	104	30.0	0.3	20.4
013	F	10/23/95	01/30/96	99	30.0	0.3	24.3
015	F	01/10/95	04/13/95	93	30.0	0.3	30.2
015	F	04/13/95	07/11/95	89	30.0	0.3	20.4
015	F	07/11/95	10/23/95	104	30.0	0.3	22.4
015	F	10/23/95	01/30/96	99	77.8	0.8	14.3
018	F	01/10/95	04/13/95	93	30.0	0.3	44.7
018	F	04/13/95	07/11/95	89	30.0	0.3	20.9
018	F	07/11/95	10/23/95	104	34.2	0.3	19.6
018	F	10/23/95	01/30/96	99	30.0	0.3	33.3
021	F	01/10/95	04/13/95	93	30.0	0.3	33.3
021	F	04/13/95	07/11/95	89	30.0	0.3	22.9
021	F	07/11/95	10/23/95	104	45.0	0.4	18.0
021	F	10/23/95	01/30/96	99	30.0	0.3	33.3

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NFSS 1995 Radon Data

Station	Type	Date Start	Date End	Days Exposed	Total Exposure (pCi/L-days)	Average Concentration (pCi/L)	Standard Deviation (%)
023	F	01/10/95	04/13/95	93	30.0	0.3	31.6
023	F	04/13/95	07/11/95	89	30.0	0.3	22.4
023	F	07/11/95	10/23/95	104	30.0	0.3	20.4
023	F	10/23/95	01/30/96	99	30.0	0.3	23.6
024	F	01/10/95	04/13/95	93	30.0	0.3	27.7
024	F	04/13/95	07/11/95	89	30.0	0.3	21.3
024	F	07/11/95	10/23/95	104	34.2	0.3	19.6
024	F	10/23/95	01/30/96	99	30.0	0.3	27.7
028	F	01/10/95	04/13/95	93	30.0	0.3	24.3
028	F	04/13/95	07/11/95	89	30.0	0.3	21.3
028	F	07/11/95	10/23/95	104	32.1	0.3	20.0
028	F	10/23/95	01/30/96	99	30.0	0.3	24.3
029	F	01/10/95	04/13/95	93	30.0	0.3	33.3
029	F	04/13/95	07/11/95	89	30.0	0.3	25.8
029	F	07/11/95	10/23/95	104	36.4	0.3	19.2
029	F	10/23/95	01/30/96	99	30.0	0.3	27.7
032	F	01/10/95	04/13/95	93	30.0	0.3	30.2
032	F	04/13/95	07/11/95	89	35.5	0.4	18.3
032	F	07/11/95	10/23/95	104	30.0	0.3	23.6
032	F	10/23/95	01/30/96	99	30.0	0.3	25.8
036	F	01/10/95	04/13/95	93	30.0	0.3	33.3
036	F	04/13/95	07/11/95	89	30.0	0.3	22.9
036	F	07/11/95	10/23/95	104	30.0	0.3	25.8
036	F	10/23/95	01/30/96	99	30.0	0.3	35.4
105	F	01/10/95	04/13/95	93	30.0	0.3	28.9
105	F	04/13/95	07/11/95	89	30.7	0.3	19.6
105	F	07/11/95	10/23/95	104	32.1	0.3	20.0
105	F	10/23/95	01/30/96	99	30.0	0.3	40.8
112	F	01/10/95	04/13/95	93	30.0	0.3	37.8
112	F	04/13/95	07/11/95	89	30.0	0.3	24.3
112	F	07/11/95	10/23/95	104	30.0	0.3	25.0
112	F	10/23/95	01/30/96	99	30.0	0.3	25.0
116	F	01/10/95	04/13/95	93	30.0	0.3	33.3
116	F	04/13/95	07/11/95	89	30.0	0.3	25.0
116	F	07/11/95	10/23/95	104	30.0	0.3	20.4
116	F	10/23/95	01/30/96	99	30.0	0.3	35.4
120	F	01/10/95	04/13/95	93	30.0	0.3	31.6
120	F	04/13/95	07/11/95	89	30.0	0.3	25.0
120	F	07/11/95	10/23/95	104	30.0	0.3	22.4
120	F	10/23/95	01/30/96	99	30.0	0.3	26.7

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NFSS 1995 Radon Data

Station	Type	Date Start	Date End	Days Exposed	Total Exposure (pCi/L-days)	Average Concentration (pCi/L)	Standard Deviation (%)
121	F	01/10/95	04/13/95	93	30.0	0.3	31.6
121	F	04/13/95	07/11/95	89	30.0	0.3	22.9
121	F	07/11/95	10/23/95	104	30.0	0.3	21.3
121	F	10/23/95	01/30/96	99	30.0	0.3	27.7
122	F	01/10/95	04/13/95	93	30.0	0.3	35.4
122	F	04/13/95	07/11/95	89	30.0	0.3	20.9
122	F	07/11/95	10/23/95	104	30.0	0.3	22.4
122	F	10/23/95	01/30/96	99	30.0	0.3	30.2
123	F	01/10/95	04/13/95	93	30.0	0.3	28.9
123	F	04/13/95	07/11/95	89	30.0	0.3	23.6
123	F	07/11/95	10/23/95	104	32.1	0.3	20.0
123	F	10/23/95	01/30/96	99	30.0	0.3	24.3
SHIP	F	01/10/95	04/13/95	93	30.0	0.3	31.6
SHIP	F	04/13/95	07/11/95	89	119.7	1.3	12.0
SHIP	F	07/11/95	10/23/95	104	30.0	0.3	44.7
SHIP	F	10/23/95	01/30/96	99	30.0	0.3	35.4

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NFSS 1995 TETLD Data

Station	Date Start	Date End	First	Second	Thrd	Fourth	Fifth	Average	mR/week	Two Sigma
001	01/10/95	07/11/95	37	35	41	39	43	39	1.26	6.3
001	01/10/95	07/11/95	40	36	39	42	43	40	1.3	5.5
001	01/10/95	01/30/96	67	72	74	64	56	66.6	1.11	14.3
001	01/10/95	01/30/96	76	72	73	72	65	71.6	1.19	8.1
007	01/10/95	07/11/95	38	35	43	43	38	39.4	1.28	7
007	01/10/95	07/11/95	43	40	36	41	38	39.6	1.28	5.4
007	01/10/95	01/30/96	64	72	72	62	63	66.6	1.11	10
007	01/10/95	01/30/96	67	69	66	69	67	67.6	1.12	2.7
008	01/10/95	07/11/95	39	38	39	34	37	37.4	1.21	4.1
008	01/10/95	07/11/95	41	38	39	38	37	38.6	1.25	3
008	01/10/95	01/30/96	72	68	69	75	69	70.6	1.17	5.8
008	01/10/95	01/30/96	72	65	76	65	70	69.6	1.16	9.4
010	01/10/95	07/11/95	42	45	39	41	39	41.2	1.34	5
010	01/10/95	07/11/95	35	41	39	46	38	39.8	1.29	8.2
010	01/10/95	01/30/96	64	80	81	70	75	74	1.23	14.2
010	01/10/95	01/30/96	69	68	77	72	69	71	1.18	7.3
011	01/10/95	07/11/95	34	41	29	30	38	34.4	1.11	10.3
011	01/10/95	07/11/95	35	39	36	38	34	36.4	1.18	4.1
011	01/10/95	01/30/96	64	64	65	65	62	64	1.06	2.4
011	01/10/95	01/30/96	69	66	64	69	62	66	1.1	6.2
012	01/10/95	07/11/95	37	40	36	39	38	38	1.23	3.2
012	01/10/95	07/11/95	35	37	38	37	37	36.8	1.19	2.2
012	01/10/95	01/30/96	69	67	69	64	65	66.8	1.11	4.6
012	01/10/95	01/30/96	69	68	65	69	49	64	1.06	17.1
013	01/10/95	07/11/95	39	39	41	32	32	36.6	1.19	8.6
013	01/10/95	07/11/95	28	38	40	37	39	36.4	1.18	9.7
013	01/10/95	01/30/96	68	63	74	71	66	68.4	1.14	8.6
013	01/10/95	01/30/96	64	71	71	58	63	65.4	1.09	11.2
015	01/10/95	07/11/95	39	41	42	42	43	41.4	1.34	3
015	01/10/95	07/11/95	38	42	40	40	39	39.8	1.29	3
015	01/10/95	01/30/96	77	75	68	71	73	72.8	1.21	7
015	01/10/95	01/30/96	76	79	76	78	.	77.3	1.28	3
018	01/10/95	07/11/95	42	42	41	44	47	43.2	1.4	4.8
018	01/10/95	07/11/95	44	40	44	46	44	43.8	1.41	4.4
018	01/10/95	01/30/96	75	81	83	81	83	80.6	1.34	6.6
018	01/10/95	01/30/96	78	75	78	72	72	75	1.25	6
021	01/10/95	07/11/95	44	39	43	35	41	40.4	1.31	7.2
021	01/10/95	07/11/95	41	45	46	43	44	43.8	1.42	3.8
021	01/10/95	01/30/96	71	70	81	77	65	72.8	1.21	12.5
021	01/10/95	01/30/96	72	63	80	78	72	73	1.21	13.3
023	01/10/95	07/11/95	35	40	45	42	46	41.6	1.35	8.8
023	01/10/95	07/11/95	40	43	38	40	44	41	1.33	4.9
023	01/10/95	01/30/96	75	72	76	69	74	73.2	1.22	5.5
023	01/10/95	01/30/96	74	68	69	76	75	72.4	1.2	7.3

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NFSS 1995 TETLD Data

Station	Date Start	Date End	First	Second	Third	Fourth	Fifth	Average	mR/week	Two Sigma
024	01/10/95	07/11/95	39	37	37	38	38	37.4	1.21	2.3
024	01/10/95	07/11/95	43	37	41	43	43	41.4	1.34	5.2
024	01/10/95	01/30/96	70	64	63	61	66	64.8	1.08	6.8
024	01/10/95	01/30/96	64	68	65	66	70	66.6	1.11	4.8
028	01/10/95	07/11/95	40	38	42	46	41	41.4	1.34	5.9
028	01/10/95	07/11/95	41	41	40	40	36	39.6	1.28	4.1
028	01/10/95	01/30/96	86	79	74	74	69	76.4	1.27	12.9
028	01/10/95	01/30/96	74	71	70	70	75	72	1.2	4.7
029	01/10/95	07/11/95	42	40	37	42	39	40	1.3	4.2
029	01/10/95	07/11/95	44	32	41	43	39	39.8	1.29	9.5
029	01/10/95	01/30/96	77	79	66	68	69	71.8	1.19	11.6
029	01/10/95	01/30/96	74	78	82	74	76	76.8	1.28	6.7
036	01/10/95	07/11/95	42	40	35	36	36	37.8	1.23	6.1
036	01/10/95	07/11/95	40	41	29	41	41	38.4	1.24	10.5
036	01/10/95	01/30/96	76	76	68	76	67	72.6	1.21	9.3
036	01/10/95	01/30/96	70	70	78	69	69	71.2	1.18	7.7
105	07/13/95	01/30/96	25	32	35	36	28	31.2	.91	9.3
105	07/13/95	01/30/96	31	45	35	37	30	35.6	1.04	12
112	01/10/95	07/11/95	35	40	36	35	35	36.2	1.17	4.3
112	01/10/95	07/11/95	25	40	35	34	36	34	1.1	11
112	01/10/95	01/30/96	57	63	61	61	59	60.2	1	4.6
112	01/10/95	01/30/96	66	66	77	63	65	67.4	1.12	11
116	01/10/95	07/11/95	38	34	34	34	38	35.6	1.15	4.4
116	01/10/95	07/11/95	39	35	38	39	33	36.8	1.19	5.4
116	01/10/95	01/30/96	66	67	64	65	70	66.4	1.1	4.6
116	01/10/95	01/30/96	60	71	66	65	72	66.8	1.11	9.7
120	01/10/95	07/11/95	49	48	48	50	52	49.4	1.6	3.3
120	01/10/95	07/11/95	38	43	48	46	49	44.8	1.45	8.9
120	01/10/95	01/30/96	84	90	87	84	90	87	1.45	6
120	01/10/95	01/30/96	88	84	83	85	93	86.6	1.44	8.1
121	01/10/95	07/11/95	51	59	52	55	54	54.2	1.76	6.2
121	01/10/95	07/11/95	52	55	50	50	55	52.4	1.7	5
121	01/10/95	01/30/96	102	99	97	96	98	98.4	1.64	4.6
122	01/10/95	07/11/95	43	38	39	43	39	40	1.3	6
122	01/10/95	07/11/95	41	42	43	37	41	40.8	1.32	4.6
122	01/10/95	01/30/96	70	78	71	71	74	72.8	1.21	6.5
122	01/10/95	01/30/96	78	79	79	78	79	78.6	1.31	1.1
123	01/10/95	07/11/95	39	37	41	38	38	38.6	1.25	3
123	01/10/95	07/11/95	39	37	39	40	38	38.6	1.25	2.3
123	01/10/95	01/30/96	68	81	69	66	71	71	1.18	11.7
123	01/10/95	01/30/96	71	65	79	76	69	72	1.2	11.1
NTR	01/10/95	07/11/95	21	24	23	24	26	23.6	.76	3.6
NTR	01/10/95	07/11/95	23	26	24	21	24	23.6	.76	3.6

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NFSS 1995 TETLD Data

Station	Date Start	Date End	First	Second	Third	Fourth	Fifth	Average	mR/week	Two Sigma
PIG	01/10/95	01/30/95	18	21	17	21	19	19.2	.56	3.6
PIG	01/10/95	07/11/95	31	23	21	24	21	24	.78	8.2
PIG	01/10/95	07/11/95	22	22	24	24	26	23.6	.76	3.3
PIG	01/10/95	01/30/96	36	42	38	36	36	37.6	.63	5.2
PIG	01/10/95	01/30/96	34	38	35	37	35	35.8	.6	3.3
PIG	01/10/95	01/30/96	18	21	17	21	19	19.2	.56	3.6
PIG	01/10/95	01/30/96	35	43	37	36	32	36.6	.61	8.1
PIG	01/10/95	01/30/96	43	36	36	37	41	38.6	.64	6.4

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NFSS 1995 Radiological Data

Station ID		Date Collected	Analyte	Result	Error	Units	BNI Flag	MDA	Matrix
A45	(R)	04/25/95	RADIUM-226	0.18	0.14	PCI/L		0.12	GW
A45	(R)	04/25/95	TOTAL URANIUM	53.1	6.2	UG/L		0.03	GW
A45	(D)	04/25/95	RADIUM-226	0.11	0.11	PCI/L	UJ	0.15	GW
A45	(D)	04/25/95	TOTAL URANIUM	54.5	6.4	UG/L		0.03	GW
A50	(R)	04/25/95	RADIUM-226	0.2	0.15	PCI/L		0.13	GW
A50	(R)	04/25/95	TOTAL URANIUM	17.7	2.1	UG/L		0.03	GW
B02W20S	(R)	04/24/95	RADIUM-226	0.13	0.14	PCI/L	UJ	0.19	GW
B02W20S	(R)	04/24/95	TOTAL URANIUM	10.9	1.3	UG/L		0.03	GW
FIELDQC	(R)	04/20/95	RADIUM-226	0.14	0.18	PCI/L	UJ	0.34	OL
FIELDQC	(R)	04/20/95	THORIUM-232	-0.01	0.01	PCI/L	UJ	0.19	OL
FIELDQC	(R)	04/20/95	TOTAL URANIUM	0.01	0.01	UG/L	UJ	0.03	OL
OW04B	(R)	04/25/95	RADIUM-226	0.09	0.09	PCI/L	UJ	0.1	GW
OW04B	(R)	04/25/95	TOTAL URANIUM	25.6	3	UG/L		0.03	GW
OW06B	(R)	04/25/95	RADIUM-226	0.18	0.15	PCI/L		0.16	GW
OW06B	(R)	04/25/95	TOTAL URANIUM	30.5	3.6	UG/L		0.03	GW
OW07B	(R)	04/24/95	RADIUM-226	0.24	0.18	PCI/L		0.16	GW
OW07B	(R)	04/24/95	TOTAL URANIUM	16	1.9	UG/L		0.03	GW
OW15B	(R)	04/24/95	RADIUM-226	0.13	0.13	PCI/L		0.18	GW
OW15B	(R)	04/24/95	RADIUM-226	0.14	0.15	PCI/L	UJ	0.2	GW
OW15B	(R)	04/24/95	TOTAL URANIUM	13.5	1.6	UG/L		0.03	GW
OW15B	(R)	04/24/95	TOTAL URANIUM	13.7	1.6	UG/L		0.03	GW
OW17B	(R)	04/25/95	RADIUM-226	0.03	0.06	PCI/L	UJ	0.09	GW
OW17B	(R)	04/25/95	TOTAL URANIUM	9.1	0.94	UG/L		0.03	GW
SWSD009	(R)	04/20/95	RADIUM-226	2.1	0.49	PCI/G		0.17	SD
SWSD009	(R)	04/20/95	THORIUM-232	1.2	0.4	PCI/G		0.09	SD
SWSD009	(R)	04/20/95	TOTAL URANIUM	5.6	0.56	UG/G		0.1	SD
SWSD009	(R)	04/20/95	RADIUM-226	0.16	0.18	PCI/L	UJ	0.29	SW
SWSD009	(R)	04/20/95	TOTAL URANIUM	11.6	1.4	UG/L		0.03	SW
SWSD010	(R)	04/20/95	RADIUM-226	1.3	0.41	PCI/G		0.2	SD
SWSD010	(R)	04/20/95	THORIUM-232	1.4	0.43	PCI/G		0.09	SD
SWSD010	(R)	04/20/95	TOTAL URANIUM	3.5	0.35	UG/G		0.1	SD
SWSD010	(R)	04/20/95	RADIUM-226	0.09	0.1	PCI/L	UJ	0.17	SW
SWSD010	(R)	04/20/95	TOTAL URANIUM	14.1	1.7	UG/L		0.03	SW
SWSD011	(R)	04/20/95	RADIUM-226	2	0.53	PCI/G		0.19	SD
SWSD011	(R)	04/20/95	THORIUM-232	1.1	0.39	PCI/G		0.06	SD
SWSD011	(R)	04/20/95	TOTAL URANIUM	2.7	0.27	UG/G	U	0.1	SD
SWSD011	(D)	04/20/95	RADIUM-226	2.3	0.81	PCI/G		0.47	SD
SWSD011	(D)	04/20/95	THORIUM-232	1	0.38	PCI/G		0.12	SD
SWSD011	(D)	04/20/95	TOTAL URANIUM	3	0.3	UG/G		0.1	SD
SWSD011	(R)	04/20/95	RADIUM-226	0.08	0.09	PCI/L	UJ	0.12	SW
SWSD011	(R)	04/20/95	TOTAL URANIUM	16.2	1.9	UG/L		0.03	SW
SWSD011	(D)	04/20/95	RADIUM-226	0.02	0.05	PCI/L	UJ	0.16	SW
SWSD011	(D)	04/20/95	TOTAL URANIUM	15.8	1.9	UG/L		0.03	SW

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NFSS 1995 Radiological Data

Station ID		Date Collected	Analyte	Result	Error	Units	BNI Flag	MDA	Matrix
SWSD021	(R)	04/20/95	RADIUM-226	1.3	0.42	PCI/G		0.21	SD
SWSD021	(R)	04/20/95	THORIUM-232	1.3	0.41	PCI/G		0.05	SD
SWSD021	(R)	04/20/95	TOTAL URANIUM	3.1	0.31	UG/G		0.1	SD
SWSD021	(R)	04/20/95	RADIUM-226	0.25	0.26	PCI/L	UJ	0.49	SW
SWSD021	(R)	04/20/95	TOTAL URANIUM	16.1	1.9	UG/L		0.03	SW
SWSD022	(R)	04/20/95	RADIUM-226	2.3	0.54	PCI/G		0.12	SD
SWSD022	(R)	04/20/95	THORIUM-232	1.3	0.42	PCI/G		0.09	SD
SWSD022	(R)	04/20/95	TOTAL URANIUM	2.8	0.28	UG/G	U	0.1	SD
SWSD022	(R)	04/20/95	RADIUM-226	0.47	0.31	PCI/L		0.32	SW
SWSD022	(R)	04/20/95	TOTAL URANIUM	18.1	2.2	UG/L		0.03	SW

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NFSS 1995 Chemical Data

Station ID	Date Collected	Analyte	Results	BNI Flag	Lab Flag	DL	Matrix
A45	(R)	04/25/95	ALKALINITY			2	GW
A45	(R)	04/25/95	BICARBONATE			2	GW
A45	(R)	04/25/95	CARBONATE		U	2	GW
A45	(R)	04/25/95	CHLORIDE			6.2	GW
A45	(R)	04/25/95	NITRATE, AS N			0.02	GW
A45	(R)	04/25/95	TOTAL ORGANIC CARBON			0.5	GW
A45	(R)	04/25/95	PHOSPHATE		U	0.05	GW
A45	(R)	04/25/95	SULFATE			50	GW
A45	(R)	04/25/95	TOTAL DISSOLVED SOLIDS			5	GW
A45	(R)	04/25/95	CALCIUM			14.3	GW
A45	(R)	04/25/95	COPPER			7.1	GW
A45	(R)	04/25/95	POTASSIUM			847	GW
A45	(R)	04/25/95	MAGNESIUM			38.8	GW
A45	(R)	04/25/95	SODIUM			57.5	GW
A45	(R)	04/25/95	LEAD		U	0.6	GW
A45	(R)	04/25/95	VANADIUM		U	4	GW
A45	(D)	04/25/95	ALKALINITY			2	GW
A45	(D)	04/25/95	BICARBONATE			2	GW
A45	(D)	04/25/95	CARBONATE		U	2	GW
A45	(D)	04/25/95	CHLORIDE			6.2	GW
A45	(D)	04/25/95	NITRATE, AS N			0.02	GW
A45	(D)	04/25/95	TOTAL ORGANIC CARBON			0.5	GW
A45	(D)	04/25/95	PHOSPHATE		U	0.05	GW
A45	(D)	04/25/95	SULFATE			50	GW
A45	(D)	04/25/95	TOTAL DISSOLVED SOLIDS			5	GW
A45	(D)	04/25/95	CALCIUM			14.3	GW
A45	(D)	04/25/95	COPPER			7.1	GW
A45	(D)	04/25/95	POTASSIUM			847	GW
A45	(D)	04/25/95	MAGNESIUM			38.8	GW
A45	(D)	04/25/95	SODIUM			57.5	GW
A45	(D)	04/25/95	LEAD			0.6	GW
A45	(D)	04/25/95	VANADIUM		U	4	GW
A50	(R)	04/25/95	ALKALINITY			2	GW
A50	(R)	04/25/95	BICARBONATE			2	GW
A50	(R)	04/25/95	CARBONATE		U	2	GW
A50	(R)	04/25/95	CHLORIDE			1.2	GW
A50	(R)	04/25/95	NITRATE, AS N			0.02	GW
A50	(R)	04/25/95	TOTAL ORGANIC CARBON			0.5	GW
A50	(R)	04/25/95	PHOSPHATE		U	0.05	GW
A50	(R)	04/25/95	SULFATE			50	GW
A50	(R)	04/25/95	TOTAL DISSOLVED SOLIDS			5	GW
A50	(R)	04/25/95	CALCIUM			14.3	GW
A50	(R)	04/25/95	COPPER		U	7.1	GW
A50	(R)	04/25/95	POTASSIUM			847	GW
A50	(R)	04/25/95	MAGNESIUM			38.8	GW
A50	(R)	04/25/95	SODIUM			57.5	GW
A50	(R)	04/25/95	LEAD		U	0.6	GW
A50	(R)	04/25/95	VANADIUM		U	4	GW

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Station ID	Date Collected	Analyte	Results	BNI Flag	Lab Flag	DL	Matrix
B02W20S (R)	04/24/95	ALKALINITY	406 MG/L		=	2	GW
B02W20S (R)	04/24/95	BICARBONATE	406 MG/L		=	2	GW
B02W20S (R)	04/24/95	CARBONATE	2 MG/L		U	2	GW
B02W20S (R)	04/24/95	CHLORIDE	7.4 MG/L		=	0.25	GW
B02W20S (R)	04/24/95	NITRATE, AS N	0.03 MG-N/L		=	0.02	GW
B02W20S (R)	04/24/95	TOTAL ORGANIC CARBON	5 MG/L		=	0.5	GW
B02W20S (R)	04/24/95	PHOSPHATE	0.05 MG/L		U	0.05	GW
B02W20S (R)	04/24/95	SULFATE	301 MG/L		=	50	GW
B02W20S (R)	04/24/95	TOTAL DISSOLVED SOLIDS	834 MG/L		=	5	GW
B02W20S (R)	04/24/95	CALCIUM	50500 UG/L	J	=	14.3	GW
B02W20S (R)	04/24/95	COPPER	7.1 UG/L		U	7.1	GW
B02W20S (R)	04/24/95	POTASSIUM	1020 UG/L		=	847	GW
B02W20S (R)	04/24/95	MAGNESIUM	80800 UG/L	J	=	38.8	GW
B02W20S (R)	04/24/95	SODIUM	34000 UG/L	J	=	57.5	GW
B02W20S (R)	04/24/95	LEAD	0.6 UG/L		=	0.6	GW
B02W20S (R)	04/24/95	VANADIUM	4 UG/L		U	4	GW
OW04B (R)	04/25/95	ALKALINITY	325 MG/L		=	2	GW
OW04B (R)	04/25/95	BICARBONATE	325 MG/L		=	2	GW
OW04B (R)	04/25/95	CARBONATE	2 MG/L		U	2	GW
OW04B (R)	04/25/95	CHLORIDE	84.6 MG/L		=	12.5	GW
OW04B (R)	04/25/95	NITRATE, AS N	0.08 MG-N/L		=	0.02	GW
OW04B (R)	04/25/95	TOTAL ORGANIC CARBON	2.7 MG/L		=	0.5	GW
OW04B (R)	04/25/95	PHOSPHATE	0.1 MG/L		=	0.05	GW
OW04B (R)	04/25/95	SULFATE	402 MG/L		=	50	GW
OW04B (R)	04/25/95	TOTAL DISSOLVED SOLIDS	1200 MG/L		=	5	GW
OW04B (R)	04/25/95	CALCIUM	144000 UG/L		=	14.3	GW
OW04B (R)	04/25/95	COPPER	8.4 UG/L		=	7.1	GW
OW04B (R)	04/25/95	POTASSIUM	3410 UG/L		=	847	GW
OW04B (R)	04/25/95	MAGNESIUM	115000 UG/L		=	38.8	GW
OW04B (R)	04/25/95	SODIUM	50100 UG/L		=	57.5	GW
OW04B (R)	04/25/95	LEAD	0.6 UG/L		U	0.6	GW
OW04B (R)	04/25/95	VANADIUM	7.1 UG/L		=	4	GW
OW06B (R)	04/25/95	ALKALINITY	670 MG/L		=	2	GW
OW06B (R)	04/25/95	BICARBONATE	670 MG/L		=	2	GW
OW06B (R)	04/25/95	CARBONATE	2 MG/L		U	2	GW
OW06B (R)	04/25/95	CHLORIDE	31.7 MG/L		=	1.2	GW
OW06B (R)	04/25/95	NITRATE, AS N	0.06 MG-N/L		=	0.02	GW
OW06B (R)	04/25/95	TOTAL ORGANIC CARBON	3.4 MG/L		=	0.5	GW
OW06B (R)	04/25/95	PHOSPHATE	0.05 MG/L		U	0.05	GW
OW06B (R)	04/25/95	SULFATE	512 MG/L		=	50	GW
OW06B (R)	04/25/95	TOTAL DISSOLVED SOLIDS	1670 MG/L		=	5	GW
OW06B (R)	04/25/95	CALCIUM	148000 UG/L		=	14.3	GW
OW06B (R)	04/25/95	COPPER	8 UG/L		=	7.1	GW
OW06B (R)	04/25/95	POTASSIUM	3490 UG/L		=	847	GW
OW06B (R)	04/25/95	MAGNESIUM	221000 UG/L		=	38.8	GW
OW06B (R)	04/25/95	SODIUM	60700 UG/L		=	57.5	GW
OW06B (R)	04/25/95	LEAD	0.6 UG/L		=	0.6	GW
OW06B (R)	04/25/95	VANADIUM	4 UG/L		U	4	GW

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Station ID	Date Collected	Analyte	Results	BNI Flag	Lab Flag	DL	Matrix
OW07B (R)	04/24/95	ALKALINITY	401 MG/L		=	2	GW
OW07B (R)	04/24/95	BICARBONATE	401 MG/L		=	2	GW
OW07B (R)	04/24/95	CARBONATE	2 MG/L		U	2	GW
OW07B (R)	04/24/95	CHLORIDE	17.7 MG/L		=	0.5	GW
OW07B (R)	04/24/95	NITRATE, AS N	0.06 MG-N/L		=	0.02	GW
OW07B (R)	04/24/95	TOTAL ORGANIC CARBON	1.4 MG/L		=	0.5	GW
OW07B (R)	04/24/95	PHOSPHATE	0.05 MG/L		U	0.05	GW
OW07B (R)	04/24/95	SULFATE	694 MG/L		=	50	GW
OW07B (R)	04/24/95	TOTAL DISSOLVED SOLIDS	1500 MG/L		=	5	GW
OW07B (R)	04/24/95	CALCIUM	67700 UG/L	J	=	14.3	GW
OW07B (R)	04/24/95	COPPER	7.1 UG/L		U	7.1	GW
OW07B (R)	04/24/95	POTASSIUM	984 UG/L		=	847	GW
OW07B (R)	04/24/95	MAGNESIUM	104000 UG/L	J	=	38.8	GW
OW07B (R)	04/24/95	SODIUM	36500 UG/L	J	=	57.5	GW
OW07B (R)	04/24/95	LEAD	0.6 UG/L		U	0.6	GW
OW07B (R)	04/24/95	VANADIUM	4 UG/L		U	4	GW
OW15A (R)	04/24/95	ALKALINITY	112 MG/L		=	2	GW
OW15A (R)	04/24/95	BICARBONATE	112 MG/L		=	2	GW
OW15A (R)	04/24/95	CARBONATE	2 MG/L		U	2	GW
OW15A (R)	04/24/95	CHLORIDE	73.4 MG/L		=	6.2	GW
OW15A (R)	04/24/95	NITRATE, AS N	0.06 MG-N/L		=	0.02	GW
OW15A (R)	04/24/95	TOTAL ORGANIC CARBON	8.1 MG/L		=	0.5	GW
OW15A (R)	04/24/95	PHOSPHATE	0.4 MG/L		=	0.05	GW
OW15A (R)	04/24/95	SULFATE	1130 MG/L		=	250	GW
OW15A (R)	04/24/95	TOTAL DISSOLVED SOLIDS	1880 MG/L		=	5	GW
OW15A (R)	04/24/95	CALCIUM	188000 UG/L	J	=	14.3	GW
OW15A (R)	04/24/95	COPPER	13.1 UG/L		=	7.1	GW
OW15A (R)	04/24/95	POTASSIUM	10400 UG/L		=	847	GW
OW15A (R)	04/24/95	MAGNESIUM	91800 UG/L		=	38.8	GW
OW15A (R)	04/24/95	SODIUM	186000 UG/L	J	=	57.5	GW
OW15A (R)	04/24/95	LEAD	1.8 UG/L		=	0.6	GW
OW15A (R)	04/24/95	VANADIUM	12.5 UG/L		=	4	GW
OW15B (R)	04/24/95	ALKALINITY	498 MG/L		=	2	GW
OW15B (R)	04/24/95	BICARBONATE	498 MG/L		=	2	GW
OW15B (R)	04/24/95	CARBONATE	2 MG/L		U	2	GW
OW15B (R)	04/24/95	CHLORIDE	13.4 MG/L		=	0.5	GW
OW15B (R)	04/24/95	NITRATE, AS N	0.08 MG-N/L		=	0.02	GW
OW15B (R)	04/24/95	TOTAL ORGANIC CARBON	12 MG/L		=	0.5	GW
OW15B (R)	04/24/95	PHOSPHATE	0.05 MG/L		U	0.05	GW
OW15B (R)	04/24/95	SULFATE	495 MG/L		=	125	GW
OW15B (R)	04/24/95	TOTAL DISSOLVED SOLIDS	1230 MG/L		=	5	GW
OW15B (R)	04/24/95	CALCIUM	90100 UG/L	J	=	14.3	GW
OW15B (R)	04/24/95	COPPER	7.1 UG/L		U	7.1	GW
OW15B (R)	04/24/95	POTASSIUM	1010 UG/L		=	847	GW
OW15B (R)	04/24/95	MAGNESIUM	136000 UG/L	J	=	38.8	GW
OW15B (R)	04/24/95	SODIUM	58400 UG/L	J	=	57.5	GW
OW15B (R)	04/24/95	LEAD	0.6 UG/L		U	0.6	GW
OW15B (R)	04/24/95	VANADIUM	4 UG/L		U	4	GW

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NFSS 1995 Chemical Data

Station ID	Date Collected	Analyte	Results	BNI Flag	Lab Flag	DL	Matrix
OW17B (R)	04/25/95	ALKALINITY	451 MG/L		=	2	GW
OW17B (R)	04/25/95	BICARBONATE	451 MG/L		=	2	GW
OW17B (R)	04/25/95	CARBONATE	2 MG/L		U	2	GW
OW17B (R)	04/25/95	CHLORIDE	16.2 MG/L		=	0.5	GW
OW17B (R)	04/25/95	NITRATE, AS N	0.06 MG-N/L		=	0.02	GW
OW17B (R)	04/25/95	TOTAL ORGANIC CARBON	1.6 MG/L		=	0.5	GW
OW17B (R)	04/25/95	PHOSPHATE	0.05 MG/L		U	0.05	GW
OW17B (R)	04/25/95	SULFATE	447 MG/L		=	50	GW
OW17B (R)	04/25/95	TOTAL DISSOLVED SOLIDS	1200 MG/L		=	5	GW
OW17B (R)	04/25/95	CALCIUM	87000 UG/L		=	14.3	GW
OW17B (R)	04/25/95	COPPER	7.1 UG/L		U	7.1	GW
OW17B (R)	04/25/95	POTASSIUM	2280 UG/L		=	847	GW
OW17B (R)	04/25/95	MAGNESIUM	142000 UG/L		=	38.8	GW
OW17B (R)	04/25/95	SODIUM	60500 UG/L		=	57.5	GW
OW17B (R)	04/25/95	LEAD	0.6 UG/L		U	0.6	GW
OW17B (R)	04/25/95	VANADIUM	4 UG/L		U	4	GW