



WVDP-040

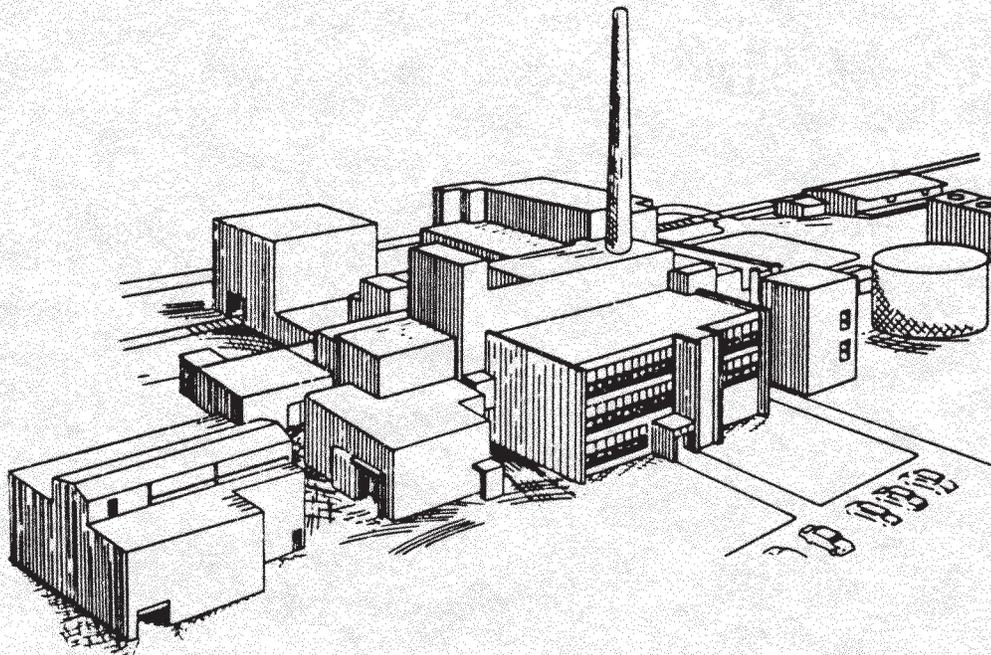
1985

ENVIRONMENTAL MONITORING REPORT

WEST VALLEY DEMONSTRATION PROJECT

March 1986

West Valley Nuclear Services Company, Inc.



1985

ENVIRONMENTAL MONITORING REPORT

WEST VALLEY DEMONSTRATION PROJECT

March, 1986

Operated for the U.S. Department of Energy

by

West Valley Nuclear Services Company, Inc.

Rock Springs Road

West Valley, New York 14171-0191

WVDP 040, Rev. 0

BLC0465:SEA33

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1-1
2.0 SUMMARY	2-1
3.0 ENVIRONMENTAL MONITORING PROGRAM - DESCRIPTION AND RESULTS	3-1
3.1 Radiological Monitoring	3-1
3.1.1 Radioactivity in Air	3-2
3.1.2 Radioactivity in Surface Water and Sediment	3-4
3.1.3 Radioactivity in the Food Chain	3-6
3.1.4 Direct Environmental Radiation.....	3-8
3.2 Nonradiological Monitoring.....	3-9
3.2.1 Air Discharges.....	3-10
3.2.2 Aqueous Discharges.....	3-10
3.2.3 Results.....	3-11
3.2.4 Pollution Abatement Projects.....	3-11
3.3 Ground Water Monitoring	
3.3.1 Hydrology of the Site.....	3-12
3.3.2 Ground Water Monitoring.....	3-12
3.4 Special Monitoring.....	3-14
4.0 Radiological Dose Assessment.....	4-1
4.1 Methodology.....	4-1
4.2 Source Term Estimates.....	4-4
4.2.1 Airborne Radioactive Effluents.....	4-4
4.2.2 Liquid Radioactive Effluents.....	4-5
4.3 Potential Radiation Doses to the Public.....	4-5
4.3.1 Maximum Hypothetical Individual Doses.....	4-5
4.3.2 Collective Dose to the Population.....	4-7
4.3.4 Dose Assessment Model Prediction Versus/Actual Release Data.....	4-8
5.0 Standards and Quality Assurance.....	5-1
5.1 Environmental Standards and Regulations.....	5-1
5.2 Quality Assurance.....	5-2
5.3 Statistical Reporting of Data.....	5-4
5.4 Analytical Detection Limits.....	5-5

TABLE OF CONTENTS (continued)

6.0	References.....	6-1
7.0	Distribution.....	7-1
Appendix A-1	1985 Effluent, On-Site and Off-Site Radiological Monitoring Program.....	A-1
Appendix A-2	Effluent, On-Site and Off-Site Radiological Monitoring Program for Implementation During 1986.....	A2-1
Appendix B	Standards and Concentration Guides.....	B-1
Appendix C-1	Summary of Water and Sediment Monitoring Data.....	C-1
Appendix C-2	Summary of Air Monitoring Data.....	C2-1
Appendix C-3	Summary of Biological Sample Data.....	C3-1
Appendix C-4	Summary of Direct Radiation Monitoring.....	C4-1
Appendix C-5	Summary of Nonradiological Monitoring.....	C5-1
Appendix D	Summary of Quality Assurance Analyses.....	D-1
Appendix E	Hydrogeology of the WVDP Site.....	E-1

LIST OF TABLES

		<u>Page</u>
4-1	Relative Concentration Values (sec/m^3) by Sector from 60 Metre Stack Release	4-10
4-2	Relative Concentration Values (sec/m^3) by Sector from Ground Level Release	4-11
4-3	Radioactivity Released to the Atmosphere during 1985	4-12
4-4	Radioactivity Released in Liquid Effluents During 1985	4-13
4-5	Summary of Hypothetical Estimated Dose Commitments to an Adult Individual at Locations of Maximum Exposure During 1985	4-14
5-1	Minimum Detectable Concentrations for Routine Samples.....	5-7
A-1	1985 Effluent, On-Site and Off-Site Radiological Monitoring Program	A-2

LIST OF TABLES (continued)

A-2	Effluent, On-Site and Off-Site Radiological Monitoring Program for Implementation During 1986	A2-2
B-1	Standards and Concentration Guides (DOE Order 5480.1, Chapter XI)	B-2
C-1.1	Total Radioactivity of Liquid Effluents Released from West Valley Demonstration Project Lagoon 3 in 1985.....	C-2
C-1.2	Radioactivity Concentrations in Surface Water Upstream of WVDP at Fox Valley (WFBCBKG)	C-3
C-1.3	Radioactivity Concentrations in Surface Water Downstream of WVDP at Thomas Corners (WFBCTCB)	C-4
C-1.4	Radioactivity Concentrations in Surface Water Downstream of WVDP at Franks Creek (WNSP006)	C-5
C-1.5	Radioactivity Concentrations in Surface Water Upstream of Buttermilk Creek at Bigelow Bridge (WFBIGBR)	C-6
C-1.6	Radioactivity Concentrations in Surface Water Downstream of Buttermilk Creek at Felton Bridge (WFFELBR)	C-7
C-1.7	Radioactivity Concentrations in Shallow Wells Near Site Facilities	C-8
C-1.8	Radioactivity Concentrations in Shallow Wells Near the NRC Disposal Area	C-9
C-1.9	Radioactivity Concentrations in Potable Well Water Around the WVDP SITE in 1985	C-10
C-1.10	Radioactivity of Stream Sediment Around the WVDP Site in 1985	C-11
C-1.11	Contribution by New York Low-Level Waste Burial Area to Radioactivity in 1985 WVDP Liquid Effluents	C-11
C-2.1	1985 Airborne Radioactive Effluent Activity Totals from Main Ventilation Stack (ANSTACK)	C2-2
C-2.2.1	Radioactivity Concentrations in Airborne Particulate Around WVDP Environs - (AFFXVRD) 1985	C2-3

LIST OF TABLES (continued)

C-2.2.2	Radioactivity Concentrations in Airborne Particulate Around WVDP Environs - (AFRSPRD) 1985	C2-4
C-2.2.3	Radioactivity Concentrations in Airborne Particulate Around WVDP Environs - (AFRT240) 1985	C2-5
C-2.2.4	Radioactivity Concentrations in Airborne Particulate Around WVDP Environs - (AFSPRVL) 1985	C2-6
C-2.2.5	Radioactivity Concentrations in Airborne Particulate Around WVDP Environs - (AFTCORD) 1985	C2-7
C-2.2.6	Radioactivity Concentrations in Airborne Particulate Around WVDP Environs - (AFWEVAL) 1985	C2-8
C-2.2.7	Radioactivity Concentrations in Airborne Particulate Around WVDP Environs - (AFGRVAL) 1985	C2-9
C-2.3	Radioactivity in Fallout	C2-10
C-2.4	Total Precipitation at West Valley Demonstration Project in 1985	C2-11
C-3.1	Radioactivity Concentrations in Milk - 1985.....	C3-2
C-3.2	Radioactivity Concentrations in Meat - 1985.....	C3-3
C-3.3	Radioactivity Concentrations in Food Crop - 1985.....	C3-4
C-3.4	Radioactivity Concentrations in Fish from Streams Around WVDP - 1985.....	C3-5
C-4.1	Summary of TLD Measurements - 1985	C4-2
C-5.1	West Valley Demonstration Project Environmental Permits	C5-5
C-5.2	WVDP SPDES Sampling Program Prior to September 1, 1985	C5-6
C-5.3	WVDP SPDES Sampling Program Effective September 1, 1985	C5-7
C-5.4	WVDP 1985 SPDES Noncompliance Episodes	C5-8

LIST OF TABLES (continued)

D-1.1	Comparisons of Radiological Concentrations in Quality Assurance Samples Between WVNS Lab (WV) and Idaho National Engineering Laboratory (INEL) January 1985.....	D-2
D-1.2	Comparison of Radiological Concentrations in Quality Assurance Samples Between WVNS Lab (WV) and Environmental Measurements Laboratory (EML) May - 1985	D-3
D-1.3	Comparison of Radiological Concentrations in Quality Assurance Samples Between WVNS Lab (WV) and Environmental Measurements Laboratory (EML) November - 1985.....	D-4
D-1.4	Comparison of WVDP to USNRC Co-located Environmental TLD Dosimeters - 4th Quarter 1985.....	D-5

LIST OF FIGURES

<u>FIGURE</u>		<u>Page</u>
1-1	Location of Western New York Nuclear Service Center.....	1-4
3-1	Locations of Perimeter Environmental Monitoring Stations.....	3-16
3-2	Environmental Sampling Points More Than 5 km From WVDP Site.....	3-17
3-3	Locations of Effluent Radiological Monitoring Points On-site.....	3-18
3-4	Locations of SPDES Monitoring Points On-site.....	3-19
3-5	Generalized East-West Geologic Cross Section at the West Valley Demonstration Project.....	3-20
4-1	Compartment Model of Pathways and Monitoring Intercept Points.....	4-15
4-2	1990 Population Projections by Sector (16 km From Site).....	4-16
4-3	1990 Population Projections by Sector (16-80 km From Site).....	4-17
4-4	Number of Dairy Cows by Sector (16 km From Site).....	4-18
4-5	Number of Dairy Cows by Sector (16-80 km From Site).....	4-19
4-6	Number of Meat - Producing Animals by Sector (16 km From Site).....	4-20

LIST OF FIGURES (continued)

4-7	Number of Meat - Producing Animals by Sector (16-80 km From Site).....	4-21
4-8	Agricultural Produce Land Area (ha) by Sector (16 km From Site).....	4-22
4-9	Agricultural Produce Land Area (ha) by Sector (16-80 km From Site).....	4-23
A-1	Location of Effluent Radiological Monitoring Points On-site.....	A2-20
A-2	Locations of Near-Plant Effluent Monitoring Point.....	A2-21
A-3	Location of On-site Wells Monitored in 1985.....	A2-22
A-4	Location of Perimeter Environmental Monitoring Stations.....	A2-23
A-5	Near-Site Drinking Water and Biological Sample Points 1985.....	A2-24
A-6	Environmental Sampling Points More Than 5km From WVDP Site.....	A2-25
C-1.1	Gross Beta Concentration in Surface Water Downstream of WVDP - 1985.....	C-12
C-1.2	Trends of Gross Beta Activity in Surface Water From Cattaraugus Creek 1983-1985.....	C-13
C-1.3	Trends of Gross Beta Activity in Sediment From Buttermilk Creek 1983 and 1985.....	C-14
C-2.1	1985 Sampling Data for Station ANSTACK Curies Released Per Month.....	C2-12
C-2.2	Trends of Gross Beta Activity in Perimeter Air Samplers - 1983-1985.....	C2-13
C-3.1	Comparison of Radioactivity in Fish Samples from Around WVDP - 1985.....	C3-6
C-3.2	Trends of Sr-90 Concentrations in Fish From Cattaraugus Creek 1982-1985.....	C3-7
C-3.3	Trends of Radionuclides in Venison from Near WVDP Site 1982-1985.....	C3-8
C-4.1	Average Quarterly Gamma Exposure Rates Around WVDP - 1985.....	C4-3

List of Figures (continued)

C-4.2	Comparison of TLD and HPIC Measurements of Exposure Rates 3rd Quarter 1985.....	C4-4
C-4.3	Trends of Environmental Gamma Radiation Levels Quarterly Averages of 16 Perimeter TLDs.....	C4-5
C-5.1	Locations of SPDES Monitoring Points On-site.....	C5-9
C-5.2	Temperature.....	C5-10
C-5.3	BOD-5	C5-11
C-5.4	Suspended Solids Outfalls 001, 004, 007.....	C5-12
C-5.5	Suspended Solids Outfalls 002, 005.....	C5-13
C-5.6	Settleable Solids.....	C5-14
C-5.7	NH3-N.....	C5-15
C-5.8	Unionized NH3.....	C5-16
C-5.9	Metals (Ba, Mn, Al).....	C5-17
C-5.10	Metals + Cyanide (Cu, Ni, Zn, CN).....	C5-18
C-5.11	Metals (Cr, Pb, As).....	C5-19
C-5.12	Discharge Volume.....	C5-20
C-5.13	Fe.....	C5-21
C-5.14	pH (Outfalls 004, 005, 006).....	C5-22
C-5.15	pH (Outfalls 001, 007, 008).....	C5-23

1.0 INTRODUCTION

This report is submitted in accordance with DOE Order 5484.1 and presents a summary of environmental monitoring data collected at the West Valley Demonstration Project (WVDP) from January 1, 1985 through December 31, 1985 to meet the requirements of Technical Specification 5.1. The program implemented by West Valley Nuclear Services Company provided data in compliance with DOE guidelines and recommendations for calendar year 1985.

On February 26, 1982, the responsibility for operation and maintenance of the former Nuclear Fuel Services, Inc. (NFS) reactor fuel reprocessing facility was transferred to the Department of Energy (DOE). Public Law No. 96-368, enacted in 1980, mandated the demonstration of technology for solidification of the 2.2 million litres (580,000 gallons) of liquid high-level radioactive waste that were produced by commercial fuel reprocessing at the West Valley plant and are now held in underground storage tanks at the facility. The DOE selected West Valley Nuclear Services Company (WVNS) as the contractor to implement the provisions of this law.

When WVNS assumed operational control, NFS was conducting an environmental monitoring program appropriate to the shutdown maintenance operating status of the facility in accordance with Technical Specification 5.1 under NRC License CSF-1. WVNS recognized that the NFS program required substantial change in order to prepare for the high-level waste solidification operations currently scheduled for start-up in September 1988. Accordingly in 1982, WVNS began to implement a full-scale environmental surveillance program in support of these planned operations and by early 1985 had fully implemented this program. As recommended in DOE Order 5484.1, Chapter III, Paragraph 1, this program to date has provided more than two years of preoperational environmental baseline data before solidification operations begin.

A comprehensive Environmental Evaluation (EE) was published in June, 1984 to initiate the decision-making process for disposal of Project low-level radioactive waste (LLW). The intent of the Project is to phase out the methods used by NFS and replace them with state-of-the-art engineered disposal technology. Based on the review of the EE by the Department of Energy Headquarters and the Idaho Operations Office, the Project staff was directed to assist the DOE with the preparation of an Environmental Assessment which analyzed alternative disposal options more thoroughly than was appropriate in the EE. The review draft of the EA was published in September 1985, and finally issued in February 1986. A decision is expected in April 1986.

Although the reprocessing plant is not now being used for its original purpose, it is being maintained in shutdown status. This requires continual operation of basic services, including low-level radioactive waste management. The facility operation includes periodic disposal of solid radioactive waste from decontamination and maintenance activity (plant wastes) in the formerly licensed disposal area. Liquid wastes resulting from plant activities are processed on-site at the low-level waste treatment facility (LLWT) prior to discharge.

The WVDP site is located in a rural setting approximately 50 km (30 mi) south of Buffalo, New York (Figure 1-1), at an average elevation of 400 m (1,300 ft) on New York State's western plateau. The plant facilities used by the Project occupy approximately 63 hectares (156 acres) of chain-link fenced area within a 1,350 hectare (3,300 acre) reservation that constitutes the Western New York Nuclear Service Center (WNYNSC). The communities of West Valley, Riceville, Ashford Hollow, and the village of Springville are located within 8 km (5 mi) of the plant. Several roads and one railway pass through the Center, but no human habitation and no hunting, fishing, or public access are permitted on the WNYNSC.

The land immediately adjacent to the WNYNSC is used primarily for agriculture and arboriculture. Cattaraugus Creek to the north is used

for water recreation (swimming, canoeing, and fishing) in the summer. Although limited irrigation of adjacent golf course greens and tree farms is taken from the Cattaraugus Creek, no public water supply is drawn from the creek downstream of the WNYNSC.

The average annual temperature in the region is 7.2°C (45.0°F) with recorded extremes of 37°C (98.6°F) and -42°C (-43.6°F). Rainfall is relatively high, averaging about 104 cm (41 in) per year. Precipitation is evenly distributed throughout the year and is markedly influenced by Lake Erie to the west and Lake Ontario to the north. All surface drainage from the WNYNSC is to Buttermilk Creek which flows into Cattaraugus Creek and ultimately into Lake Erie. Regional winds are predominantly from the west and south at over 4 m/sec (9 mi/hr) during most of the year.

The WNYNSC lies within the northern hardwood forest region, and the diversity of its vegetation is typical of the area. Equally divided between forest and open land, the site provides habitats especially attractive to white-tailed deer and the various birds, reptiles, and small mammals indigenous to the region. No endangered species are known to be present on the reservation.

The geology of the site is characterized by glacial deposits of varying thickness in the valley areas, underlain by sedimentary rocks which are exposed in the upper drainage channels in hillsides. The soil is principally silty till consisting of unconsolidated rock fragments, pebbles, sand, and clays. There is an aquifer in the upper 6 m (20 ft) of granular fluvial materials concentrated near the western edge of the site; high ground to the west and the Buttermilk Creek drainage to the east intersect this aquifer, precluding off-site continuity. Several shallow, isolated, water-bearing strata also occur at various other locations within the site boundary but do not appear to be continuous. The zone at which the till meets bedrock forms another aquifer that ranges in depth from 2 m (6 ft) underground on the hillsides to 170 m (560 ft) deep just east of the boundary of the facility exclusion area.

LOCATION OF WESTERN NEW YORK
NUCLEAR SERVICE CENTER

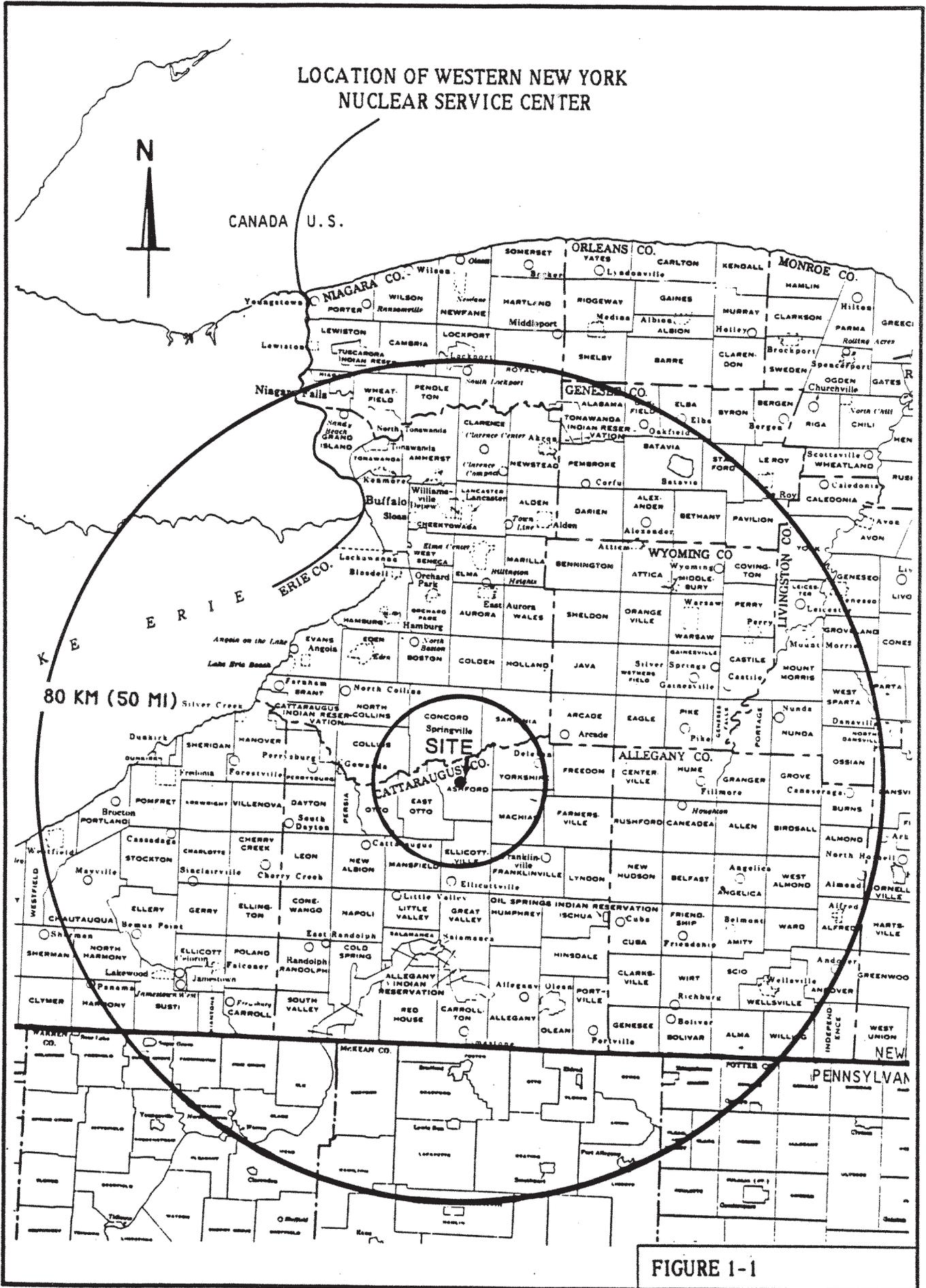


FIGURE I-1

2.0 SUMMARY

In most environmental media collected from the Project environs, radionuclide concentrations could not be distinguished from radioactivity which occurs naturally or has been deposited from weapons testing. Radioactivity levels in surface water and in fish directly downstream of the Project appeared slightly lower relative to background concentrations than those of previous years. The content of radioactivity in venison from a deer collected near the plant (inside the WNYNSC) was comparable to levels in samples from the past several years. Although small amounts of radioactivity were discharged during the course of Project activities, radioactivity levels in air and water effluents were well within the concentration guides of DOE Order 5480.1, Chapter XI. A total of 0.00082 curies of particulate radioactivity was discharged to the air, and 0.044 curies of radioactivity (excluding 3.7 curies of tritium as tritiated water) were released to Buttermilk Creek. The resultant collective and individual dose estimates to the surrounding population from these releases imply negligible consequences with regard to impacts on human health.

The maximum hypothetical effective dose equivalent an off-site individual at the nearest residence could have received via the air pathway in 1985 from WVDP activities is about 0.01% of the 40 CFR 61 protection standard of 25 mrem/year. The collective population dose to persons living within 80 km (50 mi) of the site was estimated to be 0.15 person-rem. This is equivalent to an average individual dose of 0.00009 millirem as compared to approximately 100 millirem received from natural sources.

Concentrations of particulate radioactivity in air measured at the site boundary were no different than those reported from New York State Department of Health background samples for 1982 and 1983 (the 1984 NYS data were not available), or from background samples collected by the Project in 1985. Samples of water obtained off-site

from Cattaraugus Creek (which receives Buttermilk Creek drainage from the entire site) contained three detectable man-made isotopes: tritium, cesium-137 and strontium-90. Buttermilk Creek is not used as a drinking water supply for humans, but the water is accessible to dairy cattle at one location on the creek downstream of the site. Radionuclide concentrations in milk samples from this herd were at or below background levels for all fuel-cycle isotopes. Thermoluminescent dosimeters placed around the WNYNSC perimeter indicated that direct external radiation exposure was within the range expected from natural background in this region and was statistically the same as background measurements at remote locations.

With one exception, no significant increase in radioactivity over previous years' levels was observed in groundwater monitoring wells on-site and off-site around the perimeter of the site. Special surface and groundwater monitoring initiated in December 1983 demonstrated that radioactivity associated with organic material (kerosene/tributyl phosphate) which had migrated to a disposal area monitoring well was confined to that immediate area and did not appear in surface water. Continued monitoring in 1985 confirmed that both the source of this groundwater contamination and effluents from activities designed to eliminate the source remained within the controlled area, and were not identified in adjacent wells or surface runoff water.

Chemical water quality measurements indicated no discharges which would have adversely affected the receiving waters. During 1985, several water quality measurements exceeded the permit limits at the discharge point, but upgraded waste treatment facilities are now in place and new permit conditions have been imposed. This has resulted in a marked decline in the number of excursions for parameters controlled by these systems.