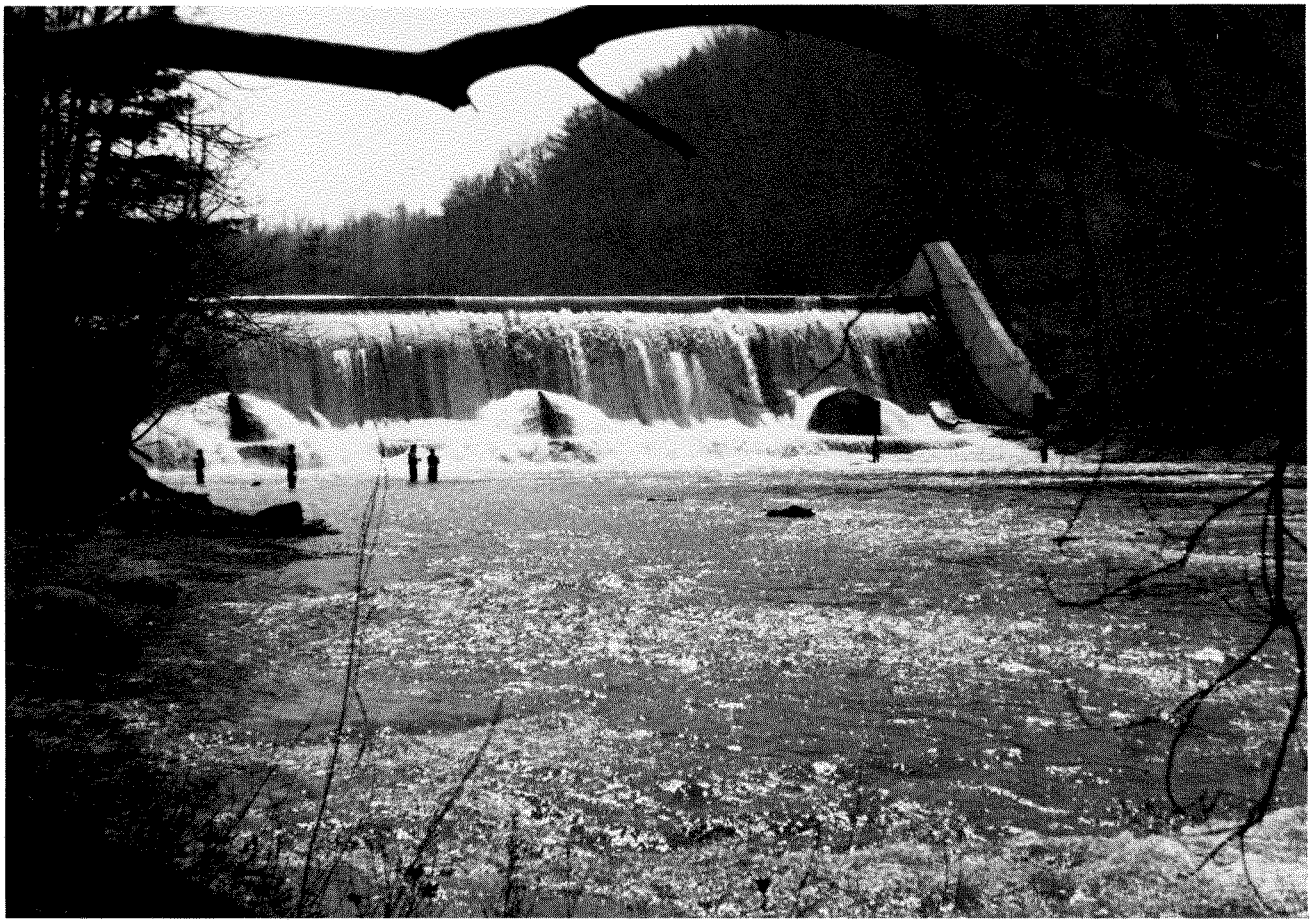

Springville Dam on Cattaraugus Creek

Introduction

The West Valley Site

Location

The West Valley Demonstration Project (WVDP) is located in a rural area approximately 50 kilometers (30 mi) south of Buffalo, New York (Fig.1-1), at an average elevation of 400 meters (1,300 ft) on New York State's western plateau. The plant facilities used by the Project occupy approximately 80 hectares (200 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 kilometers (5 mi) of the plant. Several roads and one railway pass through the Center, but no human habitation, hunting, fishing, or public access are permitted on the WNYNSC.

Economic Activities

The land immediately adjacent to the WNYNSC is used primarily for agriculture and arboriculture. Cattaraugus Creek provides a water recreation area for swimming, canoeing, and fishing. Although limited irrigation water for adjacent golf course greens and tree farms is taken from Cattaraugus Creek, no public water supply is drawn from the creek downstream of the WNYNSC.

Climate

Although there are recorded extremes of 37°C (98.6 °F) and - 42 °C (- 43.6 °F) in the region, the Western New York climate is moderate, with an average annual temperature of 7.2 °C (45.0 °F). Rainfall is relatively high, averaging about 104 centimeters (41 in.) per year. Precipitation is evenly distributed throughout the year and is markedly influenced by Lake Erie to the west and, to a lesser extent, by Lake Ontario to the north. Regional winds are predominantly from the west and south at about 4 m/sec (9 mph) during most of the year.

Vegetation and Wildlife

The Western New York Nuclear Service Center lies within the northeastern deciduous forest biome, and the diversity of its vegetation is typical of the region. Equally divided between forest and open land, the site provides habitats especially attractive to white-tailed deer and various indigenous birds, reptiles, and small mammals. No endangered species are known to be present on the WNYNSC.

Geology and Groundwater Hydrology

The WVDP site is underlain by a sequence of glacial deposits that occupy an older valley. The valley is cut into the sedimentary rocks that underlie the entire region and are exposed in the upper drainage channels on the hillsides. The soil is mainly silty till consisting of unconsolidated rock fragments, pebbles, sand, and clays. The uppermost till unit is the Lavery, a very dense, compact, gray, silty clay. Below the Lavery till is a more granular zone, the lacustrine unit, which is made up of silts, sands, and, in some places, gravels that overlie a layered clay. The lacustrine unit, in turn, is underlain by an older glacial till, the Kent till, which is quite similar to the Lavery.

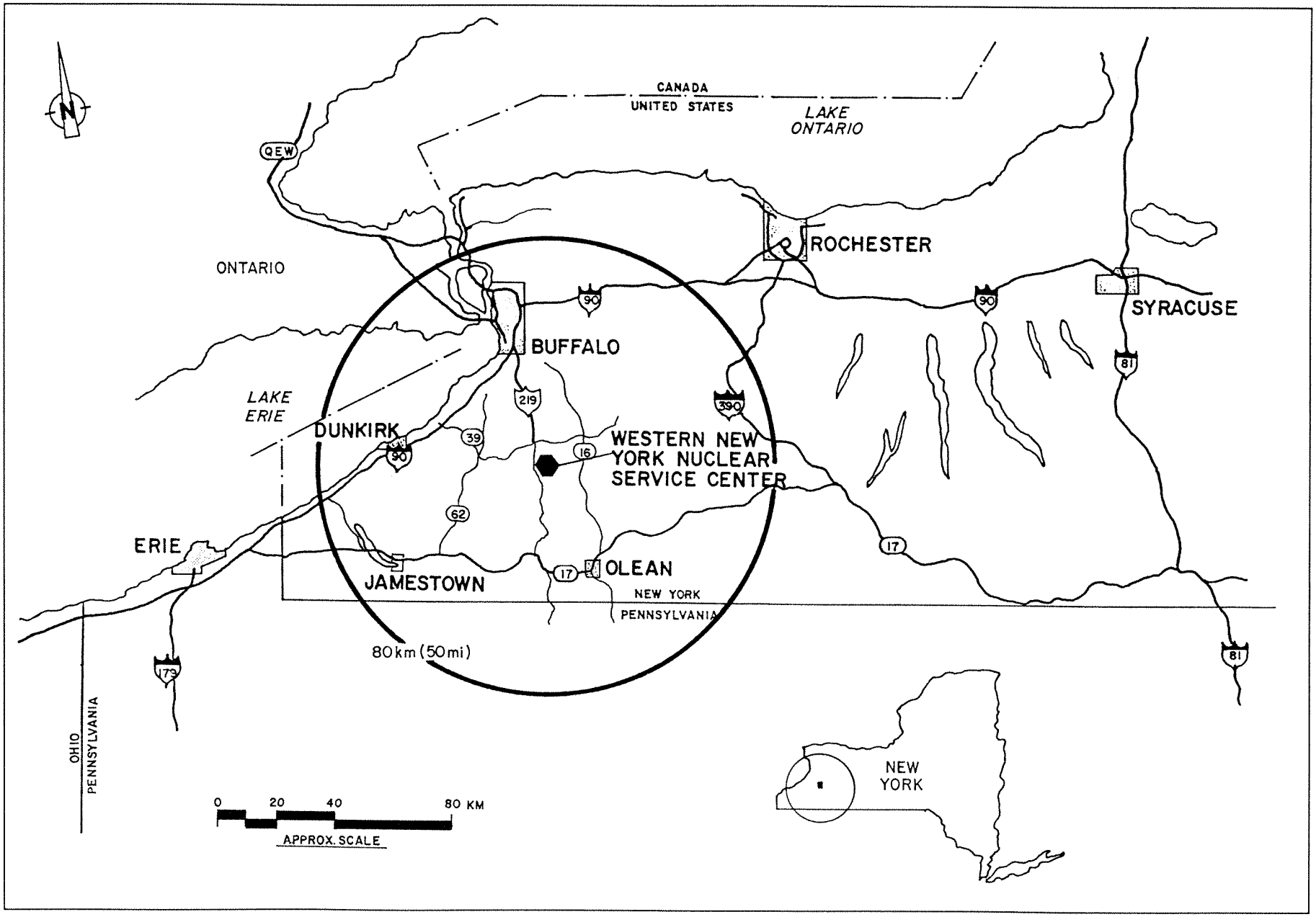

Figure 1-1. Location of the Western New York Nuclear Service Center

There are two aquifers in the site area but neither is considered highly permeable. The upper aquifer is a transient water table aquifer in the upper 6 meters (20 ft) of weathered Lavery till and alluvial gravels concentrated near the western edge of the site. High ground to the west of the WVDP and Buttermilk Creek valley to the east each intersect this aquifer, precluding off-site migration of groundwater. Several shallow, isolated, water-transmitting strata also occur at various other locations within the site boundary but do not appear to be continuous enough to provide avenues for the movement of groundwater from on-site to off-site areas.

The uppermost bedrock is another aquifer consisting of decomposed shale and rubble that ranges in depth from 2 meters (6 ft) underground on the hillsides to 170 meters (560 ft) deep just east of the Project's fenced exclusion area. The groundwater flow patterns are related to the recharge and downgradient movement for the two aquifers. Groundwater in the surficial unit tends to move east or northeast, away from Rock Springs Road. Most of this groundwater empties into Frank's Creek. Groundwater from the lower aquifer tends to move east toward the lowest point of the valley (see Fig. 3-1), about 300-350 meters west of Buttermilk Creek, and may emerge to flow north-northwest as surface water. All surface drainage from the WNYNSC is to Buttermilk Creek, which flows into Cattaraugus Creek and ultimately into Lake Erie.

Environmental Monitoring Program

Monitoring Goals

The environmental monitoring program for the West Valley Demonstration Project began in February 1982. This program has been developed to detect any changes in the environment resulting from Project activities and to assess the effect of any such changes on the human population and the environment surrounding the site. The monitoring network and sample collection schedule have been designed to accommodate specific biological and physical characteristics of the area. Among the several factors considered in designing the environmental monitoring program were the kinds of wastes and other byproducts produced by the processing of high-level waste; possible routes that radiological and nonradiological contaminants could follow into the environment; geologic, hydrologic, and meteorological site conditions; quality assurance standards for monitoring and sampling procedures and analyses; and the limits and standards set by federal and state governments and agencies. As new processes and systems become part of the program, additional monitoring points are selected for sampling.

General Permit Requirements

Data gathering, analysis, and reporting to meet permit requirements are an integral part of the WVDP monitoring program. Selected media are sampled and analyzed to meet Department of Energy criteria and plant Operational Safety Requirements (OSRs). The West Valley Demonstration Project participates in the State Pollutant Discharge Elimination System (SPDES) as required by the New York State Department of Environmental Conservation (NYSDEC). The site operates under state-issued air discharge permits for nonradiological plant effluents. Radiological air discharges must also comply with the National Emissions Standards for Hazardous Air Pollutants (NESHAP). See the Environmental Compliance Summary, the Environmental Program Information Summary, and Appendix B for more information and a list of permits.

Monitoring and Sampling

The environmental monitoring program is comprised of effluent monitoring, off-site environmental surveillance, and on-site monitoring in which samples are measured for both radiological and nonradiological components. It includes both the continuous recording of data and the collecting of soil, sediment, water, air, and other samples at various times.

On-line air effluent monitoring and sampling of environmental media provide two ways of

assessing the effects of on-site radioactive waste processing. Continuous air effluent monitoring allows rapid evaluation of the environmental effect of site activities. Sampling is slower than monitoring because it must be followed by laboratory analysis of the collected material, but smaller quantities of radioactivity can be detected through the analysis.

Data in Appendices

Appendix A summarizes the 1990 environmental monitoring schedule at both on-site and off-site locations. Samples are designated by a coded abbreviation indicating sample type and location. (A complete listing of the codes is found in the index to Appendix A.) Appendix A lists the kinds of samples taken, the frequency of collection, the parameters analyzed, and the location of the sample points.

Appendix B provides a partial list of the radiation protection standards set by the Department of Energy. It also lists federal and state regulations that affect the WVDP and regulatory permits held by the site.

Appendix C summarizes analytical data from air, water, sediment, and biological samples (meat, milk, food crops, and fish) as well as direct radiation measurements and meteorological monitoring. Both radiological and nonradiological analysis data are provided in tabular format.

Appendix D provides data from the comparison of identically prepared samples (crosscheck analyses) by both the WVDP and independent laboratories. Radiological concentrations in crosscheck samples of air, water, soil, and vegetation are reported here as well as chemical concentrations from water crosscheck samples.

Appendix E summarizes the data collected from groundwater monitoring. Tables and graphs report concentrations at various locations for parameters such as gross alpha and beta, tritium, cesium, dissolved metals, and fluoride.

Exposure Pathways Monitored at the West Valley Demonstration Project

The major pathways for potential movement of radionuclides away from the site are by surface water drainage and airborne transport. For this reason the environmental monitoring program emphasizes the collection of air and surface water samples. Samples are collected on-site at locations from which small amounts of radioactivity are normally released or might possibly be released. Such locations include plant ventilation stacks as well as various water effluent points and surface water drainage locations. Samples of air, water, soils, and biota from the environs of the site indicate any radioactivity that might reach the public from site releases.

Water and Sediment Pathways

Effluent water is collected regularly or, in the case of Lagoon 3, when the lagoon water is released, and is analyzed for various parameters, including gross alpha and gross beta, tritium, and pH. Additional analyses of composite samples determine metals content, biochemical oxygen demand, specific isotopic radioactivity, and specific conductance.

On-site groundwater and surface water samples are collected regularly and analyzed, at a minimum, for gross alpha and beta, tritium, and pH. Selected samples are analyzed for conductivity, chlorides, phenols, heavy metals, volatile organic compounds, and other parameters. Potable water on the site is analyzed monthly for radioactivity and annually for hazardous constituents.

Off-site surface waters, primarily from Cattaraugus Creek and Buttermilk Creek, are sampled both upstream of the Project for background radioactivity and downstream to measure possible Project contributions. Residential drinking water wells located near the site are sampled annually. Sediments deposited downstream of the facility are collected semiannually and analyzed for gross alpha, gross beta, and specific radionuclides. (See Appendix C-1 for data summaries).

Air Pathways

Effluent air emissions on-site are continuously monitored for alpha and beta activity with remote alarms that indicate any unusual rise in radioactivity. Air particulate filters, which are retrieved and analyzed weekly for gross radioactivity, are also composited quarterly and analyzed for strontium-90, isotopic gamma, and specific alpha-emitting nuclides.

Iodine-129 and tritium also are measured in effluent ventilation air. At two locations silica gel-filled columns are used to extract water vapor that is then distilled from the desiccant and analyzed for tritium. Four samplers contain activated charcoal adsorbent that is analyzed for radioiodine. The silica gel columns are analyzed weekly; the charcoal is collected weekly and composited quarterly.

Off-site sampling locations include those considered most representative of background conditions and those most likely to be downwind of airborne releases. Among the criteria used to position off-site air samplers are prevailing wind direction, land usage, and population centers.

Air is continuously sampled at nine locations. Background samplers are located in Great Valley and Dunkirk, New York. Nearby community samplers are in Springville and West Valley, New York. Five samplers are located on the perimeter of the Western New York Nuclear Service Center. These samples are analyzed for parameters similar to the effluent air samples. (See Appendix C-2 for air monitoring data summaries.)

Atmospheric Fallout

An important contributor to environmental radioactivity is atmospheric fallout. Sources of fallout materials include earlier atmospheric testing of atomic explosives and, possibly, residual radioactivity from the Chernobyl nuclear power plant accident. Four site perimeter locations currently are sampled for fallout using pot-type samplers that are collected every month. An on-site fallout pot sampler was added to the program in 1990. Long-term fallout is determined by analyzing soil collected annually at each of the nine perimeter and off-site air samplers and from an additional site in Little Valley, New York, twenty-six kilometers from the WVDP. (See Appendix C-2 for fallout data summaries and Appendix C-1 for soil data summaries.)

Food Pathways

A potentially significant pathway is the ingestion and assimilation of radionuclides by game animals and fish that include the WVDP in their range. Appropriate animal and fish samples are gathered and analyzed for radionuclide content in order to reveal any long-term trends. Fish are collected at several locations along Cattaraugus Creek and its tributaries at various distances downstream from the WVDP.

Human consumption of domesticated farm animals and produce raised near the WVDP presents another pathway that is monitored. Beef, milk, hay, and produce are collected at nearby farms and at selected locations well away from any possible WVDP influence. (See Appendix C-3 for data summaries.)

Direct Radiation Monitoring

Direct penetrating radiation is continuously monitored using thermoluminescent dosimeters (TLDs) located on- and off-site. Monitoring points within the site are placed at waste management units and the inner facility fence. Other monitoring stations are situated around the site perimeter and access road and at background locations remote from the WVDP. Forty-one monitoring points were used in 1990. The TLDs are retrieved quarterly and analyzed on-site to obtain the integrated gamma exposure. (See Appendix C-4 for data summaries.)

Meteorological Monitoring

Meteorological data are continuously gathered and evaluated on-site. Wind speed and direction, barometric changes, tempera-

ture, and rainfall are all measured. Such data are valuable when evaluating long-term trends and developing dispersion models. In the event of an emergency the data are indispensable for predicting the path and concentration of any materials that become airborne. (See Appendix C-6 for data summaries.)

Quality Assurance and Control

The work performed by and through the onsite environmental laboratory is regularly reviewed by several agencies for accuracy and compliance with applicable regulations. Audits of the laboratory routinely focus on proper record keeping and reporting, timely calibration of equipment, training of personnel, adherence to accepted procedures, and general laboratory safety. Additionally, the Environmental Laboratory participates in several quality assurance crosscheck programs administered by federal or state agencies. Outside laboratories contracted to perform analyses for the WVDP also are regularly subjected to performance audits. (See Appendix D for a summary of crosscheck performance.)