

drinking water wells within five miles of Davis-Besse, as verified by the Ottawa County Health Department, and the indicator groundwater sampling was discontinued for a year. During the third quarter of 2001, a beach well was located within five miles of the Station. Although the residents confirmed that they use only the township system for their drinking water needs, they continue to use the well water for outside purposes. This well was added to our sampling program as an Indicator location during the fall of 2001, even though it is no longer a source of uptake. One Control location is still sampled quarterly at T-27, and the gross beta averaged 3.7 pCi/l gross beta for the year 2002. Strontium-90 was detected in the Control sample T-27 on one occasion, and tritium was detected at 440 pCi/L at Indicator location T-225.

Gross Beta Ground Water 1982-2002

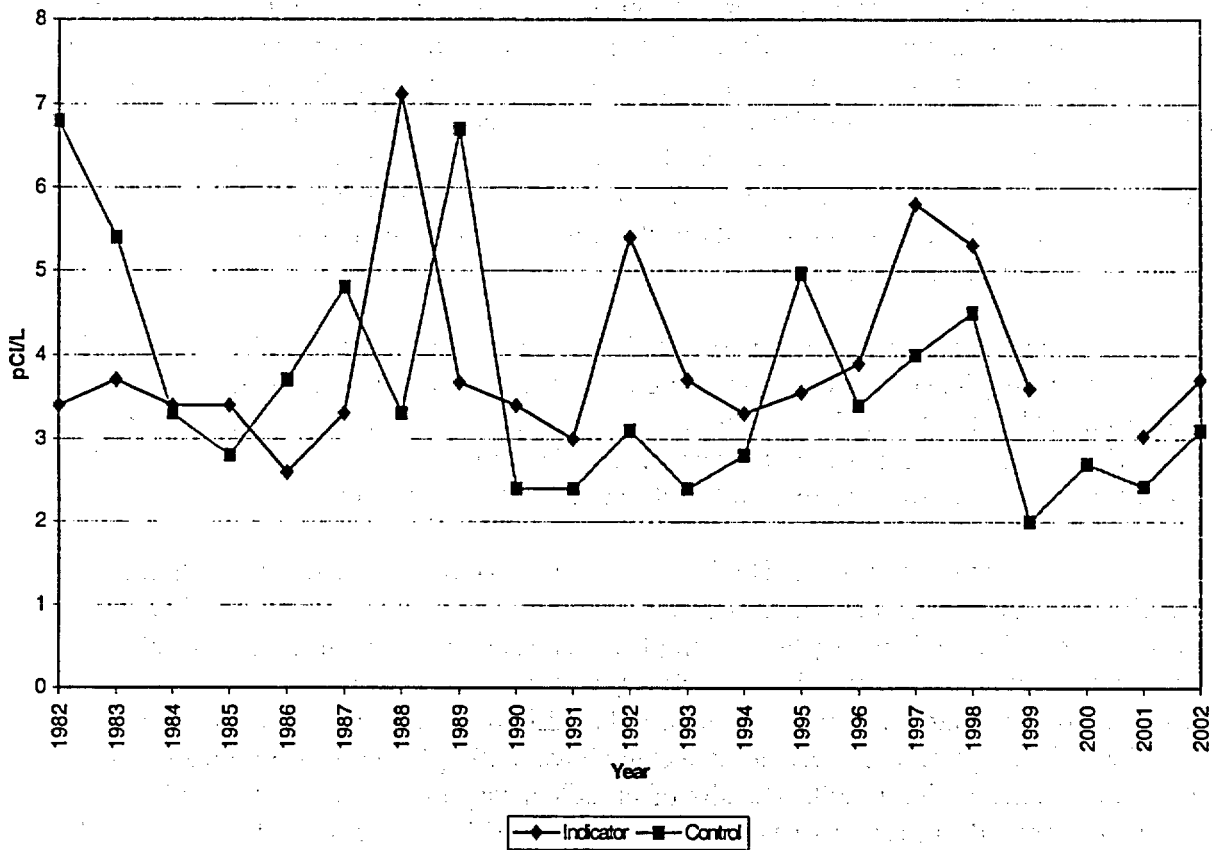


Figure 14: Shown above are the annual averages for gross beta in groundwater from 1982 - 2002.

Table 7: Groundwater Monitoring Locations

Sample Location Number	Type of Location	Location Description
T-27	C	Crane Creek State Park, 5.3 miles WNW of Station
T-225	I	Ben Shultz residence, 1.55 miles NW of Station

C = control I = indicator

### Broadleaf Vegetation and Fruit Samples

Fruits and broadleaf vegetation also represent a direct pathway to humans. Fruits and broadleaf vegetation may become contaminated by deposition of airborne radioactivity (nuclear weapons fallout or airborne releases from nuclear facilities), or from irrigation water drawn from lake water which receives liquid effluents (hospitals, nuclear facilities, etc.). Radionuclides from the soil may be absorbed by the roots of the plants and become incorporated into the edible portions. During the growing season, edible broadleaf vegetation samples, such as kale and cabbage, are collected from gardens and farms in the vicinity of the Station. Fruit, such as apples, is collected from orchards in the vicinity of Davis-Besse.

In 2002, broadleaf vegetation samples were collected at two indicator locations (T-17 and T-19) and one control location (T-37). Fruit samples were collected at two indicator locations (T-8 and T-25) and one control location (T-209). Broadleaf vegetation was collected once per month during the growing season and consisted of cabbage. The fruit collected was apples. All samples were analyzed for gamma-emitting radionuclides, Strontium-89, Strontium-90, and Iodine-131.

Iodine-131 was not detected above the LLD of 0.027 pCi/g (wet) in any broadleaf vegetation nor above the LLD of 0.022 pCi/g (wet) in fruit samples. The only gamma-emitting radionuclide detected in the fruit and broadleaf vegetation samples was Potassium-40, which is naturally occurring. In broadleaf vegetation, Strontium-90 (Sr-90) was detected at average concentrations of 0.005 pCi/g (wet) for indicator locations and below the LLD of 0.0043 pCi/g (wet) for control locations. In the fruit samples, Sr-90 was not detected above 0.001 pCi/g (wet) at indicator sites T-8 and T-25, or at control site T-209. Results of broadleaf vegetation and fruit samples were similar to results observed in previous years. The operation of Davis-Besse had no observable adverse radiological effect on the surrounding environment in 2002.

Table 8: Broadleaf Vegetation and Fruit Locations

Sample Location Number	Type of Location	Location Description
T-8	I	Moore Farm, 2.7 miles WSW of Station
T-17	I	J. Sobieralski, 1.8 miles SSE of Station
T-19	I	B. Skinner, 1.0 mile W of Station
T-25	I	Witt Farm, 1.6 miles south of Station
T-37	C	Bench Farm, 13.0 miles SW of Station
T-209	C	Roving Control Location

I = indicator, C = control

### Animal/Wildlife Feed Samples

Vegetation consumed by wildlife, and feed consumed by domestic animals can provide an indication of airborne radionuclides deposited in the vicinity of the Station. Analyses of animal/wildlife feed samples can also provide data for determining radionuclide concentration in the food chain. Domestic animals feed samples are collected at two domestic meat-sampling locations. Wildlife feed samples are collected from the Navarre Marsh and from a local marsh within five miles of the Station. As in all terrestrial samples, naturally occurring Potassium-40, cosmic ray-produced radionuclides such as Beryllium-7, and fallout radionuclides from nuclear weapons testing may be present in the feed samples.

There is one indicator (T-197) and one control location (T-34). The feed collected was chicken feed. All samples were analyzed for gamma-emitting radionuclides.

Wildlife feed was collected annually at three locations (T-31, T-32 and T-198). The samples consisted of the edible portions of cattails. Samples were analyzed for gamma-emitting radionuclides.

In both the animal and wildlife feed, naturally-occurring Potassium-40 was detected. Beryllium-7 was detected at T-31. All other radionuclides were below their respective LLDs. The operation of Davis-Besse had no adverse effect on the surrounding environment.

Table 9: Animal/Wildlife Feed Locations

Sample Location Number	Type of Location	Location Description
T-31	I	Davis-Besse, onsite roving location
T-32	C	Roving offsite location – collected 7.0 miles W of station in 2001
T-34	C	Brian Lowe residence, 8.2 miles W of the Station
T-197	I	Lochotzki residence 4.0 miles W of the Station Lemon Road
T-198	I	Toussaint Creek Wildlife Area 4.0 miles WSW of the Station

I = indicator  
C = control

#### Wild and Domestic Meat Samples

Sampling of domestic and wild meat provides information on environmental radionuclide concentrations that humans may be exposed to through an ingestion pathway. The principle pathways for radionuclide contamination of meat animals include deposition of airborne radioactivity in their food and drinking water and contamination of their drinking water from radionuclides released in liquid effluents.

The REMP generally collects wild meat and domestic meat (chicken) on an annual basis. Wild animals commonly consumed by residents in the vicinity of Davis-Besse include waterfowl, deer, rabbits and muskrats. Analyses from these animals provide general information on radionuclide concentration in the food chain. When evaluating the results from analyses performed on meat animals, it is important to consider the age, diet and mobility of the animal before drawing conclusions on radionuclides concentration in the local environment or in a species as a whole.

Meat samples were taken in 2002 as follows:

- Domestic Meat: Chickens were collected at one indicator location (T-197) and one control location (T-34). The samples were analyzed for gamma-emitting nuclides. Only naturally-occurring radionuclides were detected in the edible portion of the chicken.
- Wild Meat: Muskrat samples were collected on Station property and showed only naturally occurring activity due to Potassium 40.

Table 10: Wild and Domestic Meat Locations

Sample Location Number	Type of Location	Location Description
T-31	I	Onsite roving location
T-34	C	Brian Lowe residence, 8.2 miles W of the the Station
T-197	I	Lochotzki residence, Lemon Road, 4.0 miles W of the Station
T-210	C	Roving offsite location (5.5 mi. WNW of the Station in 2001)

I = indicator C = control

### Soil Samples

Soil samples are generally collected twice a year at the sites that are equipped with air samplers. Only the top layer of soil is sampled in an effort to identify possible trends in the local environmental nuclide concentration caused by atmospheric deposition of fallout and station-released radionuclides. Generally, the sites are relatively undisturbed, so that the sample will be representative of the actual deposition in the area. Ideally, there should be little or no vegetation present, because the vegetation could affect the results of analyses. Approximately five pounds of soil are taken from the top two inches at each site. Many naturally-occurring radionuclides such as Beryllium-7 (Be-7), Potassium-40 (K-40) and fallout radionuclides from nuclear weapons testing are detected. Fallout radionuclides that are often detected include Strontium-90 (Sr-90), Cesium-137 (Cs-137), Cerium-141 (Ce-141) and Ruthenium-106 (Ru-106).

Soil was collected at ten sites in April and October of 2002. The indicator locations included T-1, T-2, T-3, T-4, T-7, and T-8. The control locations were T-9, T-11, T-12, and T-27. All soil samples were analyzed for gamma-emitting radionuclides. The only gamma emitter detected (in addition to naturally-occurring Be-7 and K-40) was Cs-137. Cs-137 was found in Indicator and Control locations at average concentrations of 0.13 pCi/g (dry) and 0.16 pCi/g (dry), respectively. The concentrations were similar to that observed in previous years (Figure15).

Cs-137 in Soil 1972-2002

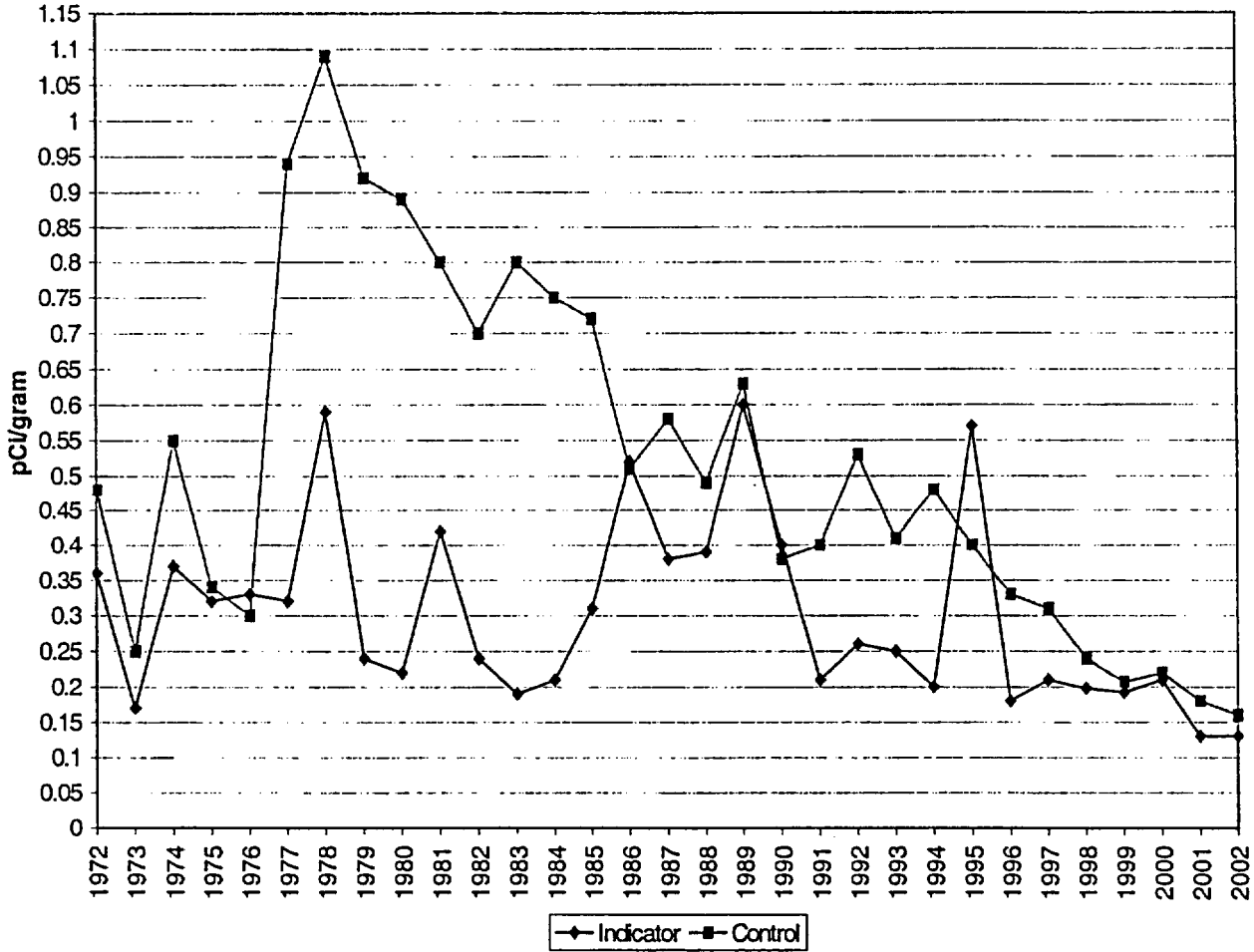


Figure 15: The concentration of Cesium-137 in soil has remained fairly constant over the years REMP has been conducted. The peak seen in 1978 was due to fallout from nuclear weapons testing.

Table 11: Soil Locations

Sample Location Number	Type of Location	Location Description
T-1	I	Site boundary, 0.6 miles ENE of Station
T-2	I	Site boundary, 0.9 miles E of Station
T-3	I	Site boundary 1.4 miles ESE of Station
T-4	I	Site boundary 0.8 miles S of Station
T-7	I	Sand Beach, main entrance, 0.9 miles NW of Station
T-8	I	Moore Farm, 2.7 miles WSW of Station
T-9	C	Oak Harbor Substation, 6.8 miles SW of Station
T-11	C	Port Clinton Water Treatment Plant, 9.5 miles SE of Station
T-12	C	Toledo Water Treatment Plant, 20.7 miles WNW of Station
T-27	C	Crane Creek State Park, 5.3 miles WNW of Station

I = indicator C = control

DAVIS-BESSE NUCLEAR POWER STATION RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM  
 TERRESTRIAL SAMPLES: SITE

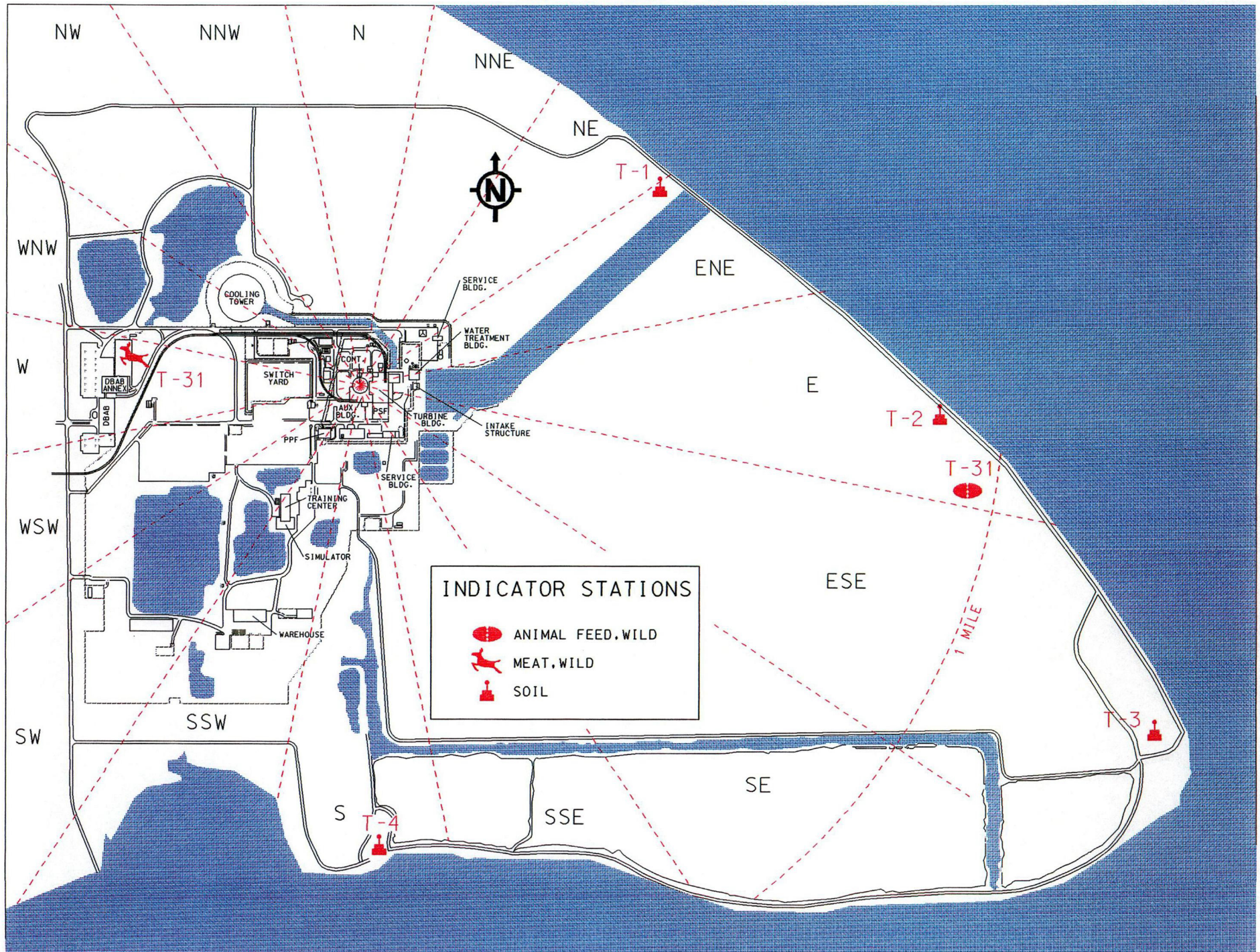


Figure 16: Terrestrial Site Map



DAVIS-BESSE NUCLEAR POWER STATION RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM  
 TERRESTRIAL SAMPLES: 5 MILE RADIUS

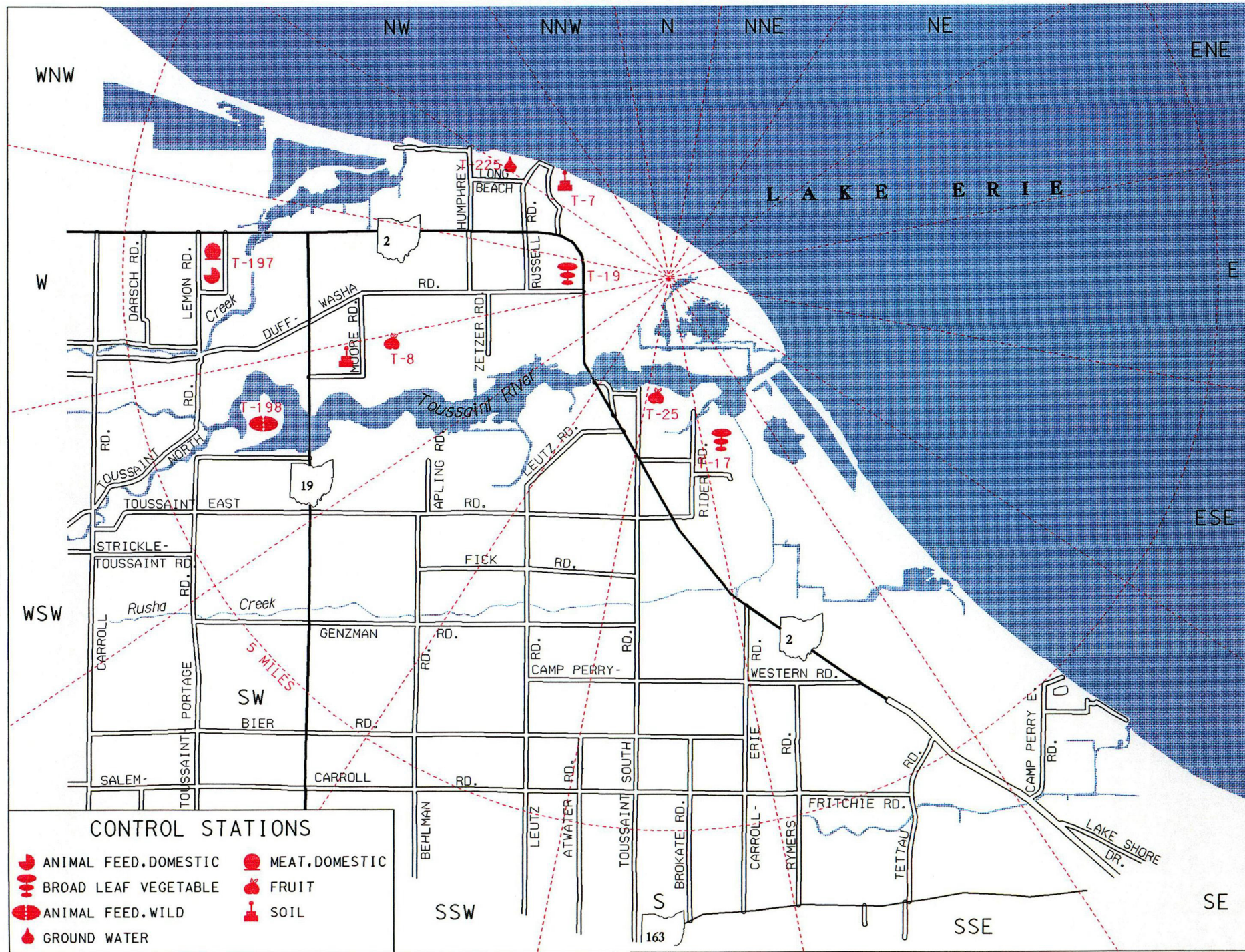


Figure 17: Terrestrial 5-mile Map

DAVIS-BESSE NUCLEAR POWER STATION RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM  
 TERRESTRIAL SAMPLES: 5-25 MILE RADIUS

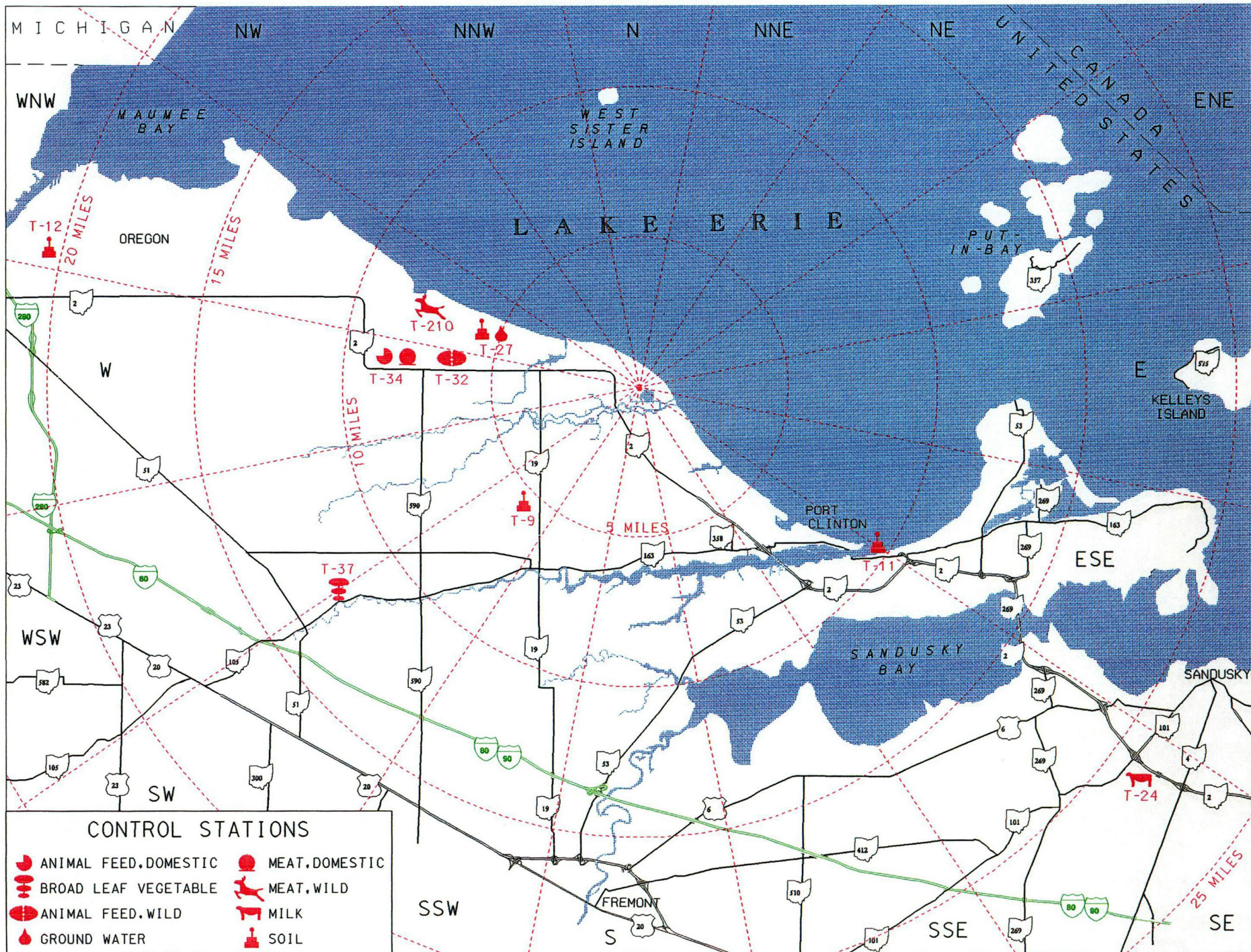


Figure 18: Terrestrial 25-mile Map

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## Aquatic Monitoring



Radionuclides may be present in Lake Erie from many sources including atmospheric deposition, run-off/soil erosion, and releases of radioactive material in liquid effluents from hospitals or nuclear facilities. These sources provide two forms of potential exposure to radiation, external and internal. External exposure can occur from the surface of the water, shoreline sediments and from immersion (swimming) in the water. Internal exposure can occur from ingestion of radionuclides, either directly from drinking water, or as a result of the transfer of radionuclides through the aquatic food chain with eventual consumption of aquatic organisms, such as fish. To monitor these pathways, Davis-Besse samples treated surface water (drinking water), untreated surface water (lake or river water), fish, and shoreline sediments.

### Treated Surface Water

Treated surface water is water from Lake Erie, which has been processed for human consumption. Radiochemical analysis of this processed water provides a direct basis for assessing the dose to humans from ingestion of drinking water.

Samples of treated surface water were collected from two indicators (T-22B and T-50) and two control locations (T-11 and T-12A). These locations include the water treatment facilities for Carroll Township, Erie Industrial Park, Port Clinton and Toledo. Samples were collected weekly and composited monthly. The monthly composites were analyzed for beta-emitting radionuclides. The samples were also composited in a quarterly sample and analyzed for Strontium-89, Strontium-90, gamma-emitting radionuclides, and tritium. One QC sample was collected from a routine location, which was changed each month.

The annual average of beta-emitting radionuclides for indicator and control locations was 2.6 pCi/l and 2.1 pCi/l, respectively. These results are similar to previous years as shown in Fig-

ure 19. Tritium was not detected above the LLD of 330 pCi/l during 2002. Strontium-89 was not detected above the LLD of 0.91 pCi/l. Strontium-90 activity was not detected above its LLD of 0.58 pCi/l. These results are similar to those of previous years and indicate no adverse impact on the environment resulting from the operation of Davis-Besse in 2002

Each month, weekly quality control samples were collected at different locations. The results of the analyses from the quality control samples were consistent with the routine samples. The average concentration of beta-emitting radionuclides detected at the QC location was 2.2 pCi/l. There was good agreement between the routine and QC locations.

Gross Beta In Treated Surface Water 1972-2002

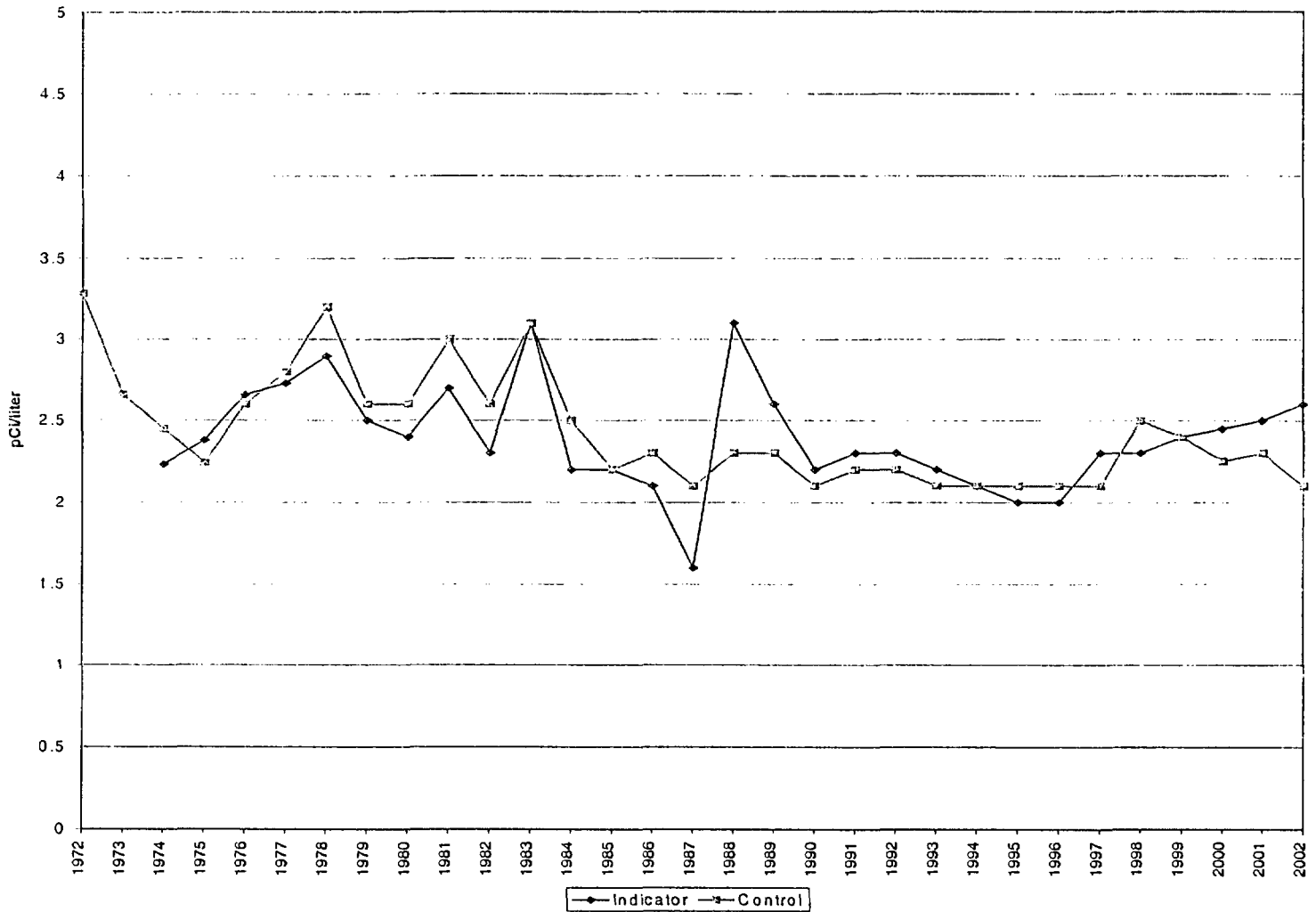


Figure 19: Since 1974, the annual concentrations of beta emitting radionuclides in treated surface water samples collected from indicator locations have been consistent with those from control locations. Davis-Besse has had no measurable radiological impact on surface water used to make drinking water.

Table 12: Treated Surface Water Locations

Sample Location Number	Type of Location	Location Description
T-11	C	Port Clinton Water Treatment Plant 9.5 miles SE of Station
T-12	C	Toledo Water Treatment Plant 20.7 miles WNW of Station
T-22B	I	Carroll Township water sampled at Davis-Besse
T-50	I	Erie Industrial Park, Port Clinton, 4.5 miles SE of Station
T-143	QC	Quality Control Site

I = indicator

C = control

QC = quality control

## Untreated Surface Water

Sampling and analysis of untreated surface water provides a method of assessing the dose to humans from external exposure from the lake surface as well as from immersion in the water. It also provides information on the radionuclides present, which may affect drinking water, fish, and irrigated crops.



### Routine Program

The routine program is the basic sampling program that is performed year round. Untreated water samples are collected from water intakes used by nearby water treatment plants. Routine samples are collected at Port Clinton, Toledo, Carroll Township Intake and Erie Industrial Park. A sample is also collected from Lake Erie at the mouth of the Toussaint River. These samples are collected weekly and composited monthly. The monthly composite is analyzed for beta emitting radionuclides, tritium, and gamma emitting radionuclides. The samples are composited further quarterly and analyzed for Strontium-89 and Strontium-90. A QC sample is also collected weekly, with the location changing each month.

### Summer Program

The summer program is designed to supplement the routine untreated water sampling program in order to provide a more comprehensive study during the months of high lake recreational activity, such as boating, fishing, and swimming. These samples are obtained monthly in areas along the shoreline of Lake Erie, and analyzed for beta emitting radioactivity, tritium, Strontium-89, Strontium-90 and gamma-emitting radionuclides.