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ENVIRONMENTAL MONITORING REPORT

UNITED STATES ATOMIC ENERGY COMMISSION OAK RIDGE FACILITIES

Calendar Year 1973

UNION CARBIDE

NUCLEAR DIVISION
OAK RIDGE, TENNESSEE

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UNION CARBIDE CORPORATION • NUCLEAR DIVISION
Oak Ridge Gaseous Diffusion Plant
Oak Ridge National Laboratory
Oak Ridge Y-12 Plant

Office of Safety and Environmental Protection
Post Office Box Y
Oak Ridge, Tennessee 37830

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INTRODUCTION

Oak Ridge is located in East Tennessee in a broad valley which lies between the Cumberland Mountains on the northwest and the Great Smoky Mountains on the southeast. The AEC Reservation is located in the Valley and Ridge physiographic province which is characterized by parallel ridges of sandstone, shale, and cherty dolomite, separated by valleys of less weather-resistant limestone and shale. The ridges are oriented southwest-northeast. Topography of the area is due to differential erosion of severely folded and faulted rocks ranging in age from Early Cambrian to Early Mississippian. Elevations range from 740 feet to 1360 feet above mean sea level with a maximum relief of 620 feet. The area includes gently sloping valleys and rolling to steep slopes and ridges. The Tennessee Valley Authority's (TVA) Melton Hill and Watts Bar Reservoirs on the Clinch River form the southern, western, and eastern boundaries of the Reservation while the City of Oak Ridge (approximately 28,000 population) is the northern boundary.

The local climate is noticeably influenced by topography. Prevailing winds are usually either up-valley, from west to southwest, or down-valley, from east to northeast. During periods of light winds, daytime winds are usually southwesterly and nighttime winds usually northeasterly. Wind velocities are somewhat decreased by the mountains and ridges, and tornadoes rarely occur. In winter, the Cumberland Mountains have a moderating influence on the local climate by retarding the flow of cold air from the north and west. Temperatures of 100° or higher and zero or below are unusual. Low-level temperature inversions occur during approximately 56 percent of the hourly observations. Winter and early spring are the seasons of heaviest precipitation with the monthly maximum normally occurring during January to March. The mean annual precipitation is approximately 54 inches.

The topography of the Oak Ridge Area is such that all drainage from the AEC Reservation flows into the Clinch River which has its headwaters in southwestern Virginia and flows southwest to its mouth near Kingston, Tennessee. The Clinch River flow is regulated by several dams which provide reservoirs for flood control, electric power generation, and recreation. The principal tributaries through which liquid waste effluents from the plant areas reach the Clinch River are White Oak Creek, East Fork Poplar Creek, and Poplar Creek.

With the exception of the City of Oak Ridge, the land within 5 miles of the AEC Reservation is predominately rural being utilized largely for residences, small farms, and pasturage for cattle. The approximate location and population of the towns nearest the AEC Reservation are: Oliver Springs (pop. 3400) 7 miles to the northwest; Clinton (pop. 4800) 10 miles to the northeast; Lenoir City (pop. 5300) 7 miles to the southeast; Kingston (pop. 4100) 7 miles to the southwest; and Harriman (pop. 8700) 8 miles to the west. Knoxville, the major metropolitan area nearest Oak Ridge, is located about 25 miles to the east and has a population of approximately 175,000.

The AEC Reservation contains three major operating facilities: the Oak Ridge National Laboratory (ORNL), the Oak Ridge Gaseous Diffusion Plant (ORGDP), and the Y-12 Plant, all of which are operated by Union Carbide Corporation, Nuclear Division. In addition, two smaller AEC facilities are in the area: the Comparative Animal Research Laboratory, and Oak Ridge Associated Universities.

The Oak Ridge National Laboratory is a large multipurpose research laboratory whose basic mission is the discovery of new knowledge, both basic and applied, in all areas related to nuclear energy. To accomplish this mission, the Laboratory conducts research in all fields of modern science and technology. Oak Ridge National Laboratory employs a multidisciplinary staff of approximately 4000 employees composed largely of engineers and scientists in the traditional science fields, supplemented by social scientists and support personnel. The Laboratory's facilities consist of nuclear reactors, chemical pilot plants, research laboratories, radioisotope production laboratories, and support facilities.

The Oak Ridge Gaseous Diffusion Plant is a complex of production, research, development, and supporting facilities, employing approximately 3300 personnel. The primary mission of the plant is the enrichment of uranium hexafluoride in the uranium-235 isotope, with the performance of other atomic energy related activities as required by the Atomic Energy Commission. To accomplish these assignments, a physical plant has been constructed at an initial capital cost of about $815,000,000. The principal process facilities are the five gaseous diffusion cascade buildings, portions of which are now in standby. These are supplemented by about 70 support buildings and facilities (maintenance, supply stores, administration, cafeteria, data processing, etc.).

The Oak Ridge Y-12 Plant is located immediately adjacent to the City of Oak Ridge and employs about 5100 people. The Y-12 Plant has four major responsibilities: (1) production of nuclear weapon components, (2) fabrication support for weapon design agencies, (3) support for the Oak Ridge National Laboratory, and (4) support and assistance to other government agencies. Activities associated with these functions include the production of lithium compounds, the recovery of enriched uranium from unirradiated scrap material, and the fabrication of uranium and other materials into finished parts and assemblies. Fabrication operations include vacuum casting, arc melting, powder compaction, rolling, forming, heat treating, machining, inspection, and testing. As an indication of the scope of Y-12's work, the plant has over 1500 machine tools located in over 50 shops of various types.

Operations associated with the AEC research and production facilities in Oak Ridge give rise to several types of waste materials.

Radioactive wastes are generated from reactor operations, pilot plant operations involving radioactive materials, isotope separation processes, uranium enrichment, and uranium processing operations. Nonradioactive wastes are generated by normal

industrial-type support operations that include water demineralizers, air conditioning, cooling towers, acid disposal, sewage plant operations, and steam plant operations.

Nonradioactive solid wastes are buried in a centralized sanitary landfill or designated burial areas. Radioactive solid wastes are buried in designated burial areas or placed in retrievable storage either above or below ground depending upon the type and quantity of radioactive material present and the economic value involved.

Gaseous wastes generally are treated by filtration, electrostatic precipitation, and/or chemical scrubbing techniques prior to release to the atmosphere. The major gaseous waste streams are released through stacks to provide atmospheric dilution for waste materials which may remain in the stream following treatment.

Liquid radioactive wastes are not released but are concentrated and contained in tanks for ultimate disposal. Process water which may contain small quantities of radioactive or chemical pollutants is discharged, after treatment, to White Oak Creek, Poplar Creek, East Fork Poplar Creek, and Bear Creek, which are small tributaries to the Clinch River.

SUMMARY

The Environmental Monitoring Program for the Oak Ridge area includes sampling and analysis of air, water from surface streams, several food products, flora, and soil for both radioactive and nonradioactive materials. This report presents a summary of the results of the program for calendar year 1973.

Surveillance of radioactivity in the Oak Ridge environs indicates the atmospheric concentrations of radioactivity were not significantly different from other areas in East Tennessee. Concentrations of radioactivity in the Clinch River and in fish collected from the river were less than one percent of the permissible concentration and intake guides for individuals in the off-site environment. While some radioactivity was released to the environment from plant operations, measurements in the Oak Ridge area show that environmental levels were well below established standards.

The maximum potential exposure at the perimeter of the AEC-controlled area was calculated to be 0.48 mrem/year to the whole body and 17.8 mrem/year to the lung which are 0.09% and 1.2%, respectively, of the AEC Manual Chapter 0524 allowable standard. The maximum potential exposure to an Oak Ridge resident was calculated to be 0.17 mrem/year to the whole body and 4.8 mrem/year to the lung. These calculated exposures are 0.03% and 0.3%, respectively, of the allowable standard. The average exposure to an Oak Ridge resident was estimated to be 0.1 mrem/year as compared to approximately 100 mrem/year from natural background radiation.

Surveillance of nonradioactive materials in the Oak Ridge environs shows that established limits were not exceeded for those materials possibly present in the air as a result of plant operations. The ORGDP steam plant was out of compliance with respect to State emission limits for particulates, visible emissions, and occasionally sulfur dioxide during the winter months when coal was used as a supplemental fuel. Engineering studies are continuing in an effort to identify appropriate corrective action.

The data obtained from the water sampling program indicated compliance with "standards" with the exception of chromium, nitrates, fluorides, pH, and dissolved oxygen. Environmental protection control projects are under way to bring these parameters into compliance. Sewage treatment plants at ORNL and ORGDP currently do not meet Federal secondary treatment requirements. Projects to provide secondary treatment at these facilities are expected to be completed during the next fiscal year.

MONITORING DATA COLLECTION, ANALYSIS, AND EVALUATION

Environmental monitoring data for calendar year 1973 are summarized in Tables 1 through 24. In general, the data tables show the number of samples collected at each location, the maximum concentration, the minimum concentration, the average concentration, the relevant standard, and percent of standard for the average of each parameter. Averages are usually accompanied by plus-or-minus (±) values which represent the 95% confidence limits. The 95% confidence limit is calculated from the standard deviation of the average, assuming a normal frequency distribution, and is a measure of the variability in the range of concentrations measured. It does not represent the conventional error in the average of repeated measurements on identical samples. Data which are below the minimum detectable limit are expressed as less than (<) the minimum detectable value. In computing average values, sample results below the detection limit are assigned the detection limit value with the resulting average value being expressed as less than (<) the computed average value.

Average concentrations are compared with environmental quality standards, where such standards have been established, as a means of evaluating the impact of effluent releases. In some cases, for lack of an official standard, stream concentrations have been compared with U. S. Public Health Service Drinking Water Standards even though the streams are not a source of drinking water.

Air Monitoring

Radioactive - Atmospheric concentrations of radioactive materials occuring in the general environment of East Tennessee are monitored by two systems of monitoring stations. One system consists of nine stations (HP-31 through HP-39) which

encircle the perimeter of the Oak Ridge area and provides data for evaluating releases from Oak Ridge facilities to the immediate environment, Figure 1. A second system consists of eight stations (HP-51 through HP-58) encircling the Oak Ridge area at distances of from 12 to 75 miles, Figure 2. This system provides background data to aid in evaluating local conditions. Sampling for radioactive particulates is carried out by passing air continuously through filter papers. Filter papers are evaluated by gross beta and gross alpha counting techniques for normal operations. More detailed analyses are performed if concentrations in the environment are significantly above normal. Airborne radioactive iodine is monitored by passing air continuously through cartridges containing activated charcoal. Charcoal cartridges are evaluated for radioactive iodine by gamma spectrometry.

Ambient radiation background measurements are made at the perimeter and remote air monitoring stations using thermoluminescent dosimeters suspended four feet above the ground. Dosimeters are collected for evaluation of integrated exposure on an approximate monthly frequency.

Data on the concentrations of radioactive materials in air and the quantities of radioactive materials released to the atmosphere in the Oak Ridge and surrounding areas are given in Tables 1 through 4. Data on the average ambient radiation background exposure rates are given in Table 5.

The average gross beta concentrations of radioactivity from particulates in air measured by both the perimeter and remote monitoring systems were 0.03% of the applicable concentration guide (CG) specified in the AEC Manual, Appendix 0524,[1] for individuals in uncontrolled areas (Table 1). The average gross alpha concentrations were 0.05% or less of the CG for a mixture of uranium isotopes in both systems (Table 2). The average concentration of ^{131}I measured by the perimeter air monitoring system was less than 0.01% of the inhalation concentration guide for individuals in uncontrolled areas (Table 3).

While some radioactivity was released to the atmosphere during the year (Table 4), measurements in the Oak Ridge area show that environmental levels were well below established standards. The uniform level of filterable radioactivity measured by the perimeter and remote stations indicates that the radioactivity was principally of non-AEC facility origin. The ambient radiation background values were not significantly different from those for the previous year and from measurements made in East Tennessee by the Health and Safety Laboratory in 1971.[2]

Nonradioactive - Environmental air samples are taken for the determination of fluorides, reactive sulfur, dustfall, and suspended particulates.

Sampling locations for fluorides are indicated by F-1 through F-6, Figure 1. Concentrations in the ppb range are determined by collecting 24-hour samples in caustic solution in a Boyce-Thompson type sampler and analyzing the resulting solution colorimetrically, utilizing eriochrome cyanine R as a color reagent.

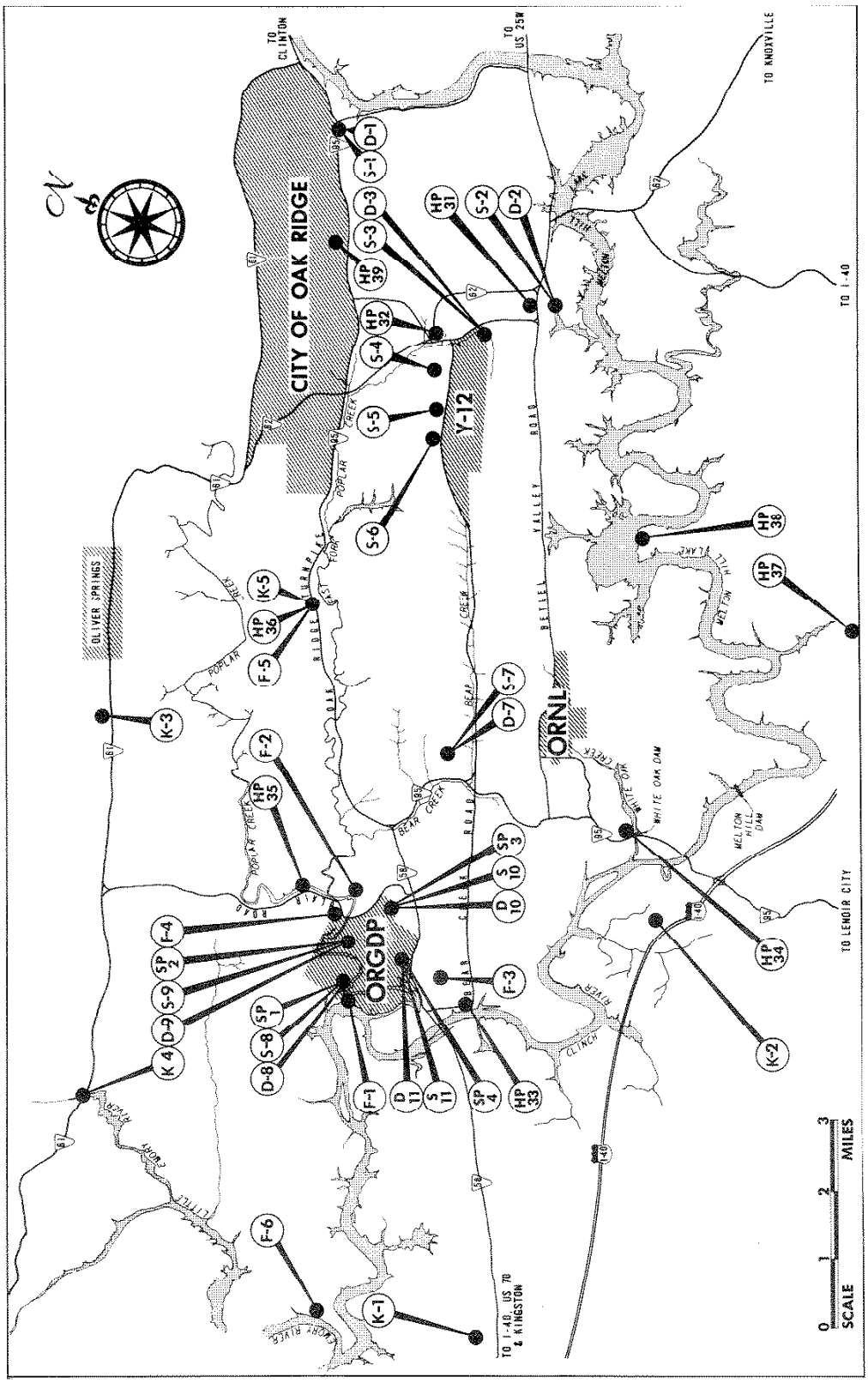

Figure 1
LOCATIONS OF AIR MONITORING STATIONS

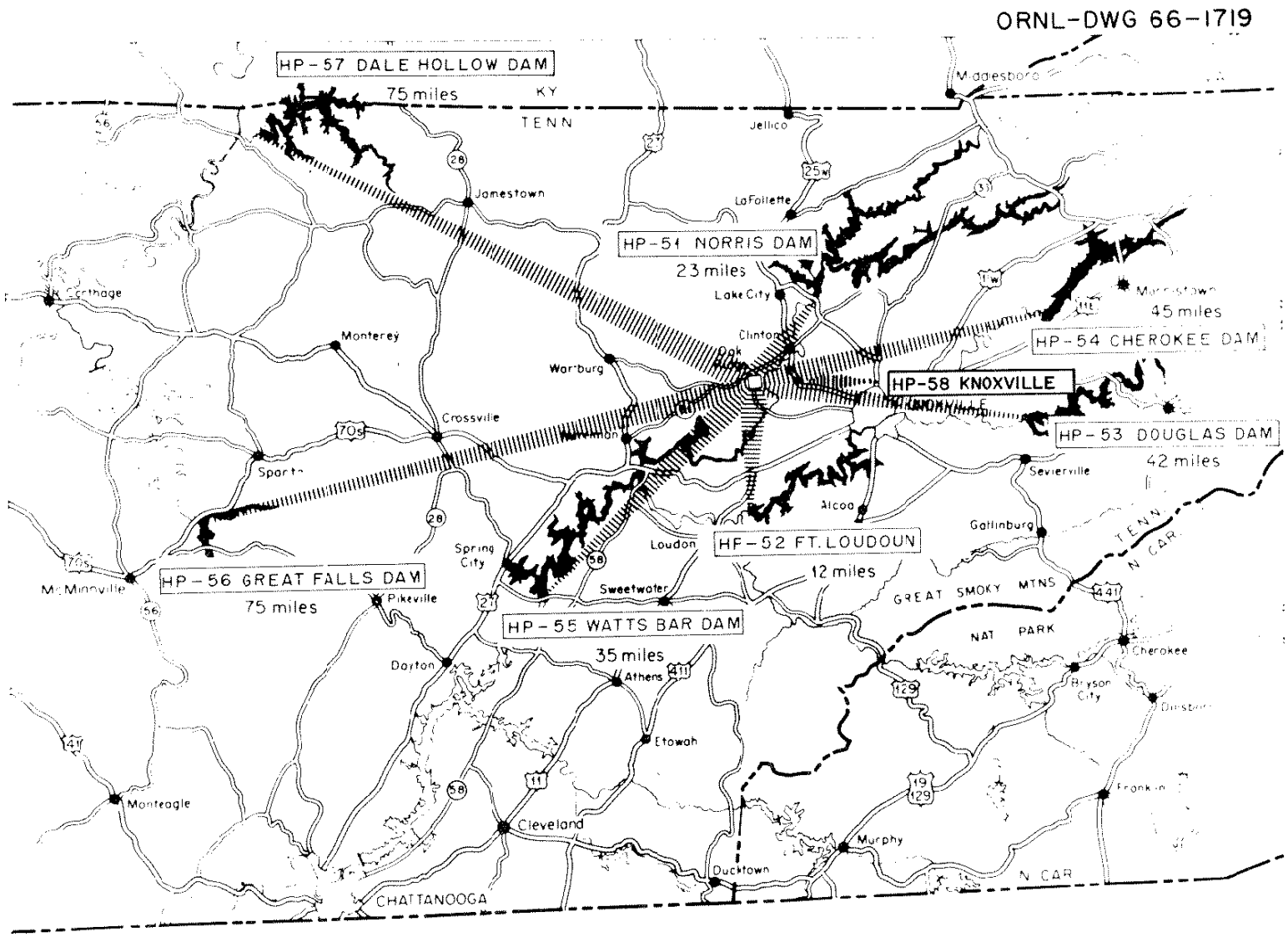

Figure 2

STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Air sampling locations for the determination of reactive sulfur are indicated by S-1 through S-11, Figure 1. The lead peroxide candle technique is used for the collection of reactive sulfur (oxides). Each sampling station consists of a stand, a louvered shelter, and a prepared lead peroxide candle. Candles are exposed to the atmosphere for a period of one month. Sulfur oxides react with the lead peroxide to form lead sulfate. The analytical procedure is a gravimetric method and results are calculated as mg SO_3/100 cm^2/day.

Dustfall concentrations are determined at points D-1, D-2, D-3, and D-7 through D-11, Figure 1. The sampling stations consist of a stand and a collection container. Samples are collected for a period of one month and analyzed by the standard gravimetric method of analysis for dustfall. Results are calculated as gm/m^2/30-day period.

Suspended particulates are measured at locations SP-1 through SP-4, Figure 1. The method for the determination of suspended particulates is the high volume method. Particles are collected by drawing air through weighed filter paper. The filter paper is allowed to equilibrate in a humidity controlled atmosphere and the filter is reweighed. From the weight of particulates, the sampling time, and the air flow rate, the particulate concentration in micrograms per cubic meter is calculated. The sampling period is 24 hours.

Air monitoring data for fluorides, reactive sulfur, dustfall, and suspended particulates are presented in Tables 6 through 9, respectively. These data indicate that the average environmental concentrations in each case did not exceed the applicable standard[3] for calendar year 1973.

Steam plant operations were in compliance with State emission limits except for the ORGDP steam plant which was out of compliance with respect to particulates, visible emissions, and sulfur dioxide during the winter months when coal was used as a supplemental fuel. Engineering studies are being conducted to evaluate potential corrective measures.

Water Monitoring

Radioactive - Water samples are collected in the Clinch River for radioactivity analyses at Melton Hill Dam (Station C-2) 2.3 miles above White Oak Creek outfall, at the ORGDP sanitary water intake (Station C-3) 6.3 miles downstream from the entry of White Oak Creek, at the ORGDP recirculating water intake (Station C-4) downstream from the Poplar Creek outfall, and at Center's Ferry (Station C-5) near Kingston, Tennessee, Figure 3. Samples are collected continuously at all locations except for Station C-5 which are collected on a grab-sample basis daily. Samples are composited for monthly or quarterly analysis depending upon location.

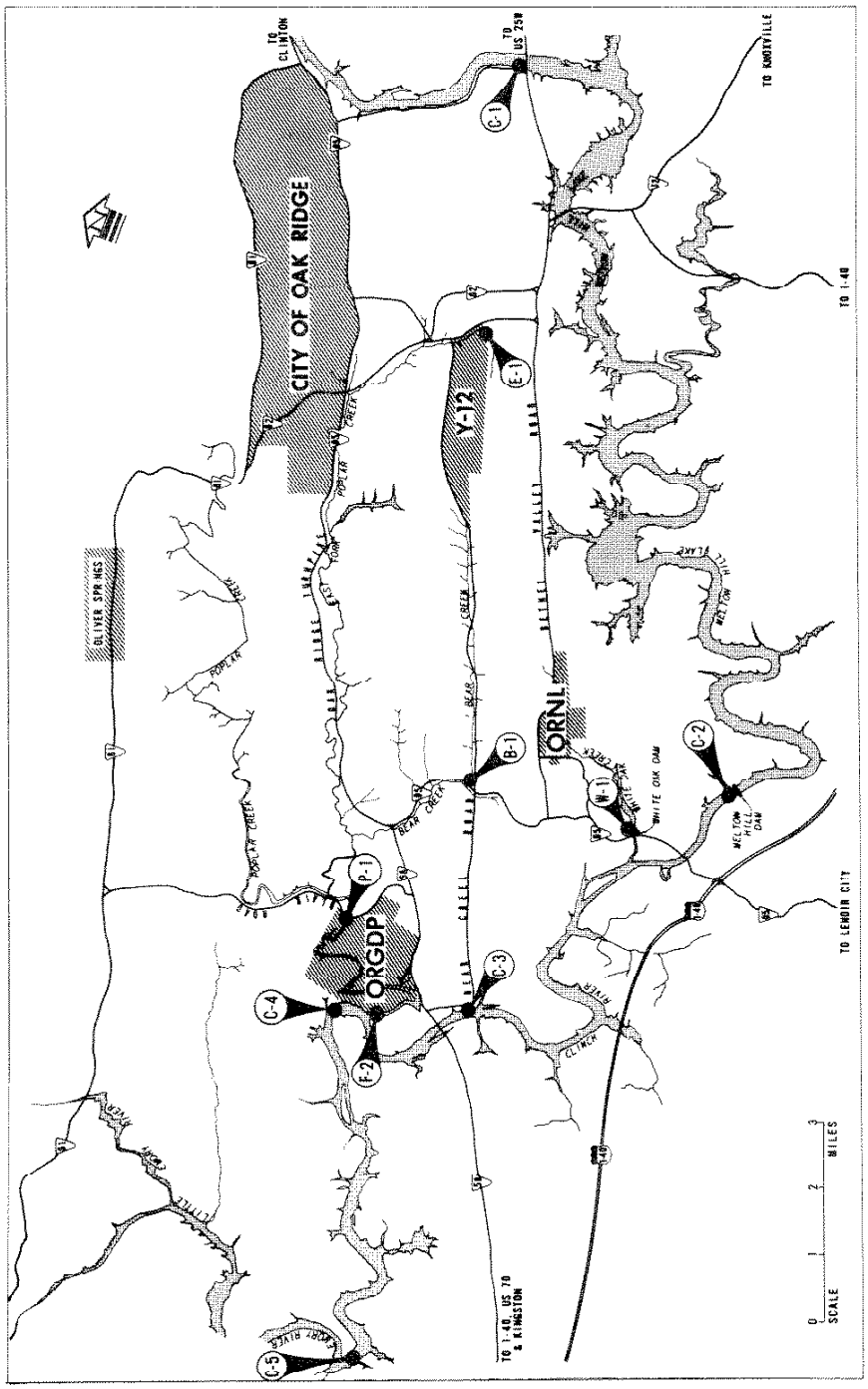

Figure 3
LOCATIONS OF STREAM MONITORING STATIONS

Water samples also are collected for radioactivity analyses at White Oak Dam (Station W-1), at the outlet of New Hope Pond on East Fork Poplar Creek (Station E-1), in Bear Creek (Station B-1), and in Poplar Creek (Stations P-1 and P-2), Figure 3. The samples collected at Stations W-1, E-1, and B-1 are continuous proportional samples. Samples collected at Stations P-1 and P-2 are weekly grab samples. All samples are composited for monthly analysis.

The concentrations of fission product radionuclides present in detectably significant amounts are determined by specific radionuclide analysis and gamma spectrometry. Uranium analysis is by the fluorometric method. The concentration of each radionuclide is compared with its respective concentration guide (CG) value as specified in the AEC Manual, Appendix 0524, and percent of concentration guide for a known mixture of radionuclides is calculated in accordance with the method given in Appendix 0524.

Data on the concentrations of radionuclides in surface streams and the quantities released to surface streams are given in Tables 10 through 12. The average concentrations of specific radionuclides in surface streams at all points of measurement were less than 1% of the applicable concentration guides for uncontrolled areas. The average concentration of transuranic alpha emitters in the Clinch River at CRM 20.8 was 7.5×10^{-12} μCi/ml, which is less than 0.01% of the concentration guide for water containing an unknown mixture of radionuclides.*

Nonradioactive - Water samples are collected for the analysis of nonradioactive substances at the same locations discussed previously under radioactive water sampling. All samples are composited for monthly analysis. Samples are analyzed for a variety of anions and cations related to process release potential and background information needs by analytical procedures recommended by the Environmental Protection Agency.

Temperature, pH, and dissolved oxygen (DO) measurements are made continuously at the outfall of White Oak Dam (Station W-1) and continuous pH measurements are made at the outfall of New Hope Pond (Station E-1). Dissolved oxygen measurements are made weekly at Station E-1 with a direct reading instrument.

Data on the concentrations of various anions and cations in surface streams are given in Tables 13 through 20. The average concentrations of all substances analyzed were in compliance with the "standards" [4] except for chromium at Stations W-1 and E-1; nitrates at Station B-1; and fluorides at Station P-2. Environmental protection control projects are under way to reduce the concentrations of these substances to levels below the "standards". The concentrations of phenols are indicated as approximately equal to the "standard", but the sensitivity of the analytical method for phenols is inadequate to provide reliable data at the level of the drinking water standard.

* CG is 1×10^{-7} μCi/ml - AEC Manual, Appendix 0524. [1]

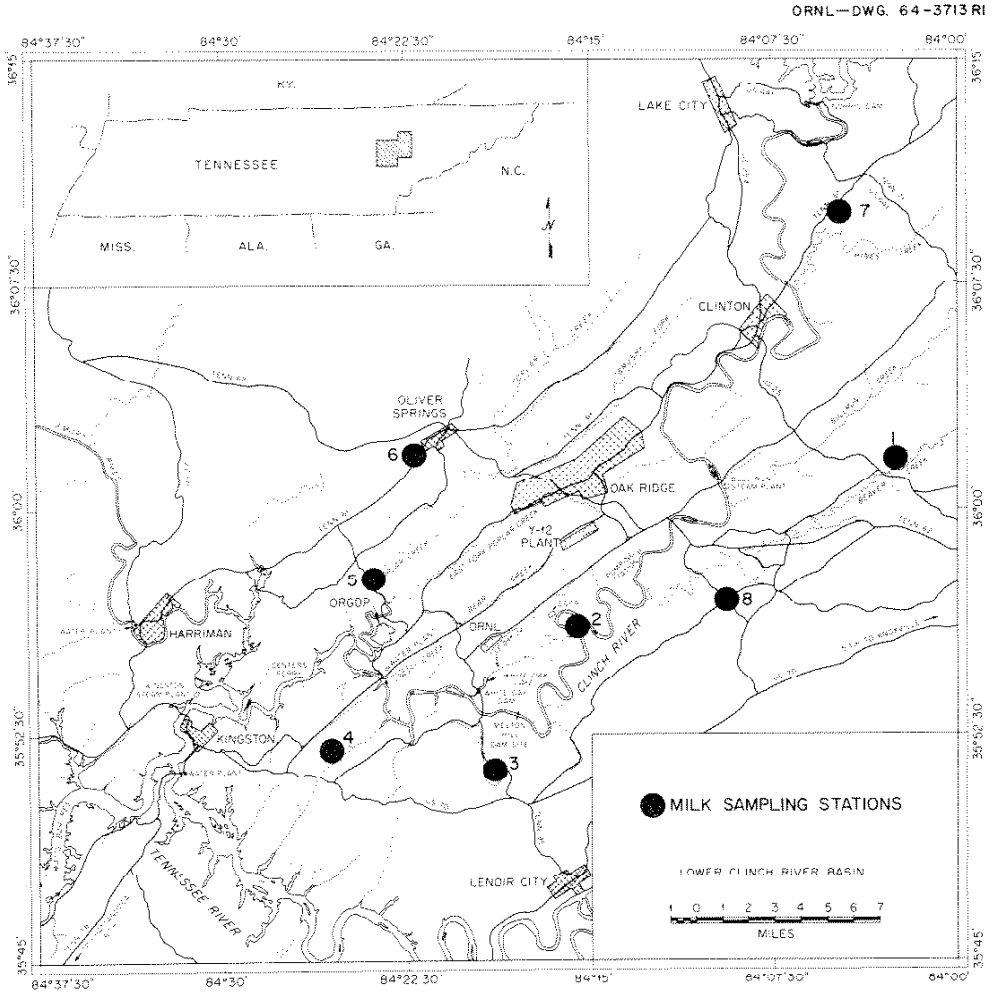

Figure 4
LOCATIONS OF MILK SAMPLING STATIONS

Measurements of dissolved oxygen and pH at White Oak Dam (Station W-1) indicated DO values ranging from 4 mg/1 - > 15 mg/1 and pH values ranging from 6.5 - 8.9. Measurement of these same parameters at the outfall of New Hope Pond (Station E-1) indicated a DO range of 2.5 mg/1 - 8.5 mg/1 and a pH range of 6.1-8.3. Dissolved oxygen at White Oak Dam was out of compliance with the State standard[5] of 5 mg/1 minimum for fish and aquatic life streams on six occasions and pH was out of compliance with the State standard range of 6.5 - 8.5 or 1 pH unit change per 24 hours on only one occasion. The low DO values at White Oak Dam were the result of natural changes and unrelated to ORNL operations. Dissolved oxygen at the outfall of New Hope Pond was out of compliance on 22 occasions and pH was out of compliance on 8 occasions. A project has been approved to provide aeration at the outfall of New Hope Pond to increase the DO level. Decaying algae and sediment were dredged from New Hope Pond in 1973. The dredging has increased the holdup time from 8 to 24 hours and the larger storage volume created should improve the pH compliance. An inplant pH control project is also near completion. The pH variation described above, however, would not be expected to produce any significant impact on the receiving streams.

Sewage treatment plants at ORNL and ORGDP currently do not meet the new Federal secondary treatment requirements. Projects to provide secondary treatment at these facilities are expected to be completed during the next fiscal year.

Food Sources

Milk Monitoring - Raw milk is monitored for ^{131}I and ^{90}Sr by the collection and analysis of samples from 12 sampling stations located within a radius of 50 miles of Oak Ridge. Samples are collected weekly at each of eight stations located near the Oak Ridge area. Four stations, located more remotely with respect to Oak Ridge Operations, are sampled at a rate of one station each week. Milk sampling locations for the eight stations near the Oak Ridge area are shown in Figure 4. Samples are analyzed by ion exchange techniques and results are compared to intake guides specified by the Federal Radiation Council (FRC).[6]

The average concentrations of ^{131}I and ^{90}Sr in raw milk are given in Tables 21 and 22. If one assumes the average intake of milk per individual to be one liter per day, the average concentration of ^{131}I in the milk in both the immediate environs of the Oak Ridge area and in the environs remote from Oak Ridge was within FRC Range I. The average concentrations of ^{90}Sr in milk from both the immediate and remote environs were within the FRC Range I. The average concentrations measured in the Oak Ridge area do not differ significantly from the values in the southeastern United States reported by the Environmental Protection Agency's Pasteurized Milk Sampling Network.

Fish Sampling - Two species of fish from the Clinch River are sampled during the spring and summer of each year. The fish are prepared for radiochemical

analysis in a manner analogous to human utilization. Ten fish of each species are composited for each sample and the samples are analyzed by gamma spectrometry and radiochemical techniques for the critical radionuclides contributing significantly to the potential radiation dose to man. An estimate of man's intake of radionuclides from eating Clinch River fish is made by assuming an annual rate of fish consumption of 14 lbs.,[7] and the estimated percentage of maximum permissible intake is calculated by assuming a maximum permissible intake of radionuclides from eating fish to be comparable to a daily intake of 2.2 liters[8] of water containing the concentration guide of the radionuclides in question for a period of one year.

Data on the concentrations of radionuclides in Clinch River fish are given in Table 23. The levels measured were less than 1% of that required to obtain an estimated maximum permissible intake.

Flora and Soil

Radioactive - Soil samples are collected annually from near the Perimeter Air Monitoring Stations, Figure 1. Nine samples, approximately three inches in diameter and one centimeter thick, are collected in a one-square-meter area at each location, composited, and analyzed radiochemically for uranium and plutonium content to determine background information for future comparison in event of an accidental release.

Data on uranium and plutonium concentrations in soil are given in Table 24.

Nonradioactive - Samples of pine needles and grass are normally collected quarterly from five sampling stations (K-1 through K-5, Figure 1) and analyzed for fluorides. These samples were not taken in 1973, thus, no data are available. Sampling will be resumed in 1974, and data on fluorides in vegetation will be included in future reports.

Three random samples of grass were collected near the Y-12 Plant during the year and analyzed for fluorides. Results ranged from < 6 ppm to 13 ppm. These levels would have no significant effect upon the environment.[9]

Calculation of Potential Radiation Dose to the Public

Potential radiation doses resulting from plant effluents were calculated for a number of dose reference points within the Oak Ridge environs. All significant sources and modes of exposure were examined and a number of general assumptions were used in making the calculations.

The site boundary for the Oak Ridge complex was defined as the perimeter of the AEC-controlled area.

For dispersion calculations of airborne material, it was assumed that the Gaussian Plume model was everywhere valid, that the meteorological data collected at the ORNL Tower Shielding Facility hold for all facilities, and that the monitored emission rates are representative of the actual situation. Dispersion calculations were made using a computer program developed by Reeves, Fowler, and Cowser.[10]

Dose factors used in the calculations were taken from EXREM and INREM computer codes developed by Turner, Kaye, and Rohwer[11] and the EXREM II computer code developed by Turner.[12]

Maximum Potential Exposure at the Site Boundary - The point of maximum potential exposure to an individual on the site boundary is located at the mouth of White Oak Creek where it enters the Clinch River. The source of the exposure is primarily the radioactive material deposited in the bottom sediments and on the bank of the creek as a result of past liquid effluent releases. A maximum potential whole body exposure of 130 mrem/year was calculated for this location assuming that an individual remained in a position two feet above the bank of the creek for 24 hrs/day for the entire year. The calculated maximum potential exposure is 26% of the allowable standard.[1] This is an atypical exposure location and the probability of an exposure of the magnitude calculated is considered remote since access to the creek is only by boat via the Clinch River and the mouth of the creek is blocked by a barrier chain and warning sign.

The whole body dose to a "hypothetical maximum exposed individual" at the same location was calculated using a more realistic residence time of 240 hrs/year. The calculated dose under these conditions was 2.5 mrem/year which is 0.5% of the allowable standard[1] and represents what is considered a probable upper limit of exposure. The probable dose to a fisherman in a fishing boat with the bow on the bank would be much less.

A more probable exposure potential might be considered to occur at other locations on the site boundary as a result of airborne effluent releases. The calculated maximum potential exposure to an individual from this pathway was 0.48 mrem/year to the whole body and 17.8 mrem to the lung assuming the individual was in constant residence at the maximum exposure location. These levels are 0.09% and 1.2%, respectively, of the allowable standard.[1]

Dose to the Population - The Oak Ridge population received the largest average individual whole body dose as a population group. The maximum potential exposure to an Oak Ridge resident was calculated to be 0.17 mrem/year to the whole body and 4.8 mrem to the lung. These calculated exposures are 0.03% and 0.3%, respectively, of the allowable standard.[1] The average exposure to an Oak Ridge resident was estimated to be 0.1 mrem/year as compared to approximately 100 mrem/year from natural background radiation.

The cumulative whole body dose to the population within a 50-mile radius of the Oak Ridge facilities resulting from plant effluents was calculated to be 14 man-rem. This dose may be compared to an estimated 72,000 man-rem to the same population resulting from natural background radiation.

Table 1

CONTINUOUS AIR MONITORING DATA

Long-Lived Gross Beta Activity of Particulates in Air

1973

STATION NUMBER	LOCATION	NUMBER OF SAMPLES TAKEN	UNITS OF 10^{-13} μCi/ml			% CG[c]
			MAXIMUM[a]	MINIMUM[b]	AVERAGE	
		Perimeter Stations[d]				
HP-31	Kerr Hollow Gate	52	0.8	0.09	0.26 ± 0.02	0.03
HP-32	Midway Gate	52	0.7	0.07	0.31 ± 0.02	0.03
HP-33	Gallaher Gate	52	0.6	0.03	0.25 ± 0.01	0.03
HP-34	White Oak Dam	52	0.6	0.07	0.27 ± 0.02	0.03
HP-35	Blair Gate	52	0.7	0.05	0.34 ± 0.02	0.03
HP-36	Turnpike Gate	52	1.3	0.08	0.36 ± 0.03	0.04
HP-37	Hickory Creek Bend	52	0.5	0.03	0.24 ± 0.01	0.02
HP-38	East of EGCR	52	0.4	0.03	0.25 ± 0.01	0.02
HP-39	Townsite	52	0.6	0.04	0.29 ± 0.01	0.03
Average			0.7	0.05	0.29 ± 0.01	0.03
		Remote Stations[e]				
HP-51	Norris Dam	52	0.5	0.08	0.27 ± 0.01	0.03
HP-52	Loudon Dam	50	0.5	0.03	0.27 ± 0.01	0.03
HP-53	Douglas Dam	52	0.5	0.03	0.28 ± 0.02	0.03
HP-54	Cherokee Dam	52	0.5	0.05	0.28 ± 0.02	0.03
HP-55	Watts Bar Dam	50	0.5	0.09	0.29 ± 0.01	0.03
HP-56	Great Falls Dam	51	0.5	0.06	0.26 ± 0.01	0.03
HP-57	Dale Hollow Dam	52	0.5	0.06	0.25 ± 0.01	0.03
HP-58	Knoxville	49	0.6	0.06	0.25 ± 0.01	0.03
Average			0.5	0.06	0.27 ± 0.01	0.03

[a]Maximum weekly average concentration.

[b]Minimum weekly average concentration - minimum detectable level is 5×10^{-6} μCi per sample.

[c]CG is 10^{-10} μCi/ml for unidentified radionuclides (AEC Manual, Appendix 0524, Annex A, Table II).

[d]See Figure 1.

[e]See Figure 2.

Table 2

CONTINUOUS AIR MONITORING DATA

Long-Lived Gross Alpha Activity of Particulates in Air

1973

STATION NUMBER	LOCATION	NUMBER OF SAMPLES TAKEN	UNITS OF 10^{-15} μCi/ml			%
			MAXIMUM[a]	MINIMUM[b]	AVERAGE	CG[c]
		Perimeter Stations[d]				
HP-31	Kerr Hollow Gate	52	6.7	1.1	1.7 ± 0.18	0.04
HP-32	Midway Gate	52	6.1	1.3	2.6 ± 0.19	0.07
HP-33	Gallaher Gate	52	4.1	1.1	1.6 ± 0.09	0.04
HP-34	White Oak Dam	52	5.8	1.0	1.8 ± 0.13	0.05
HP-35	Blair Gate	52	17.4	1.0	2.3 ± 0.34	0.06
HP-36	Turnpike Gate	52	7.8	1.1	2.1 ± 0.20	0.06
HP-37	Hickory Creek Bend	52	4.2	0.9	1.4 ± 0.08	0.04
HP-38	East of EGCR	52	5.3	1.0	1.9 ± 0.13	0.05
HP-39	Townsite	52	5.6	1.1	1.8 ± 0.12	0.05
Average			7.0	1.1	1.9 ± 0.06	0.05
		Remote Stations[e]				
HP-51	Norris Dam	52	4.8	0.9	1.8 ± 0.13	0.05
HP-52	Loudoun Dam	50	4.4	0.8	1.5 ± 0.09	0.04
HP-53	Douglas Dam	52	3.3	1.0	1.6 ± 0.08	0.04
HP-54	Cherokee Dam	52	5.1	1.0	1.7 ± 0.11	0.05
HP-55	Watts Bar Dam	50	5.0	1.2	1.9 ± 0.12	0.05
HP-56	Great Falls Dam	51	3.6	0.6	1.5 ± 0.09	0.04
HP-57	Dale Hollow Dam	52	4.3	0.9	1.5 ± 0.10	0.04
HP-58	Knoxville	49	6.5	0.7	1.8 ± 0.14	0.04
Average			4.6	0.9	1.7 ± 0.04	0.04

[a]Maximum weekly average concentration.

[b]Minimum weekly average concentration - minimum detectable level is 2×10^{-6} μCi per sample.

[c]CG is 40×10^{-13} μCi/ml for a mixture of Uranium Isotopes. (AEC Manual, Appendix 0524, Annex A, Table II).

[d]See Figure 1.

[e]See Figure 2.

Table 3
CONCENTRATION OF ^{131}I IN AIR
AS MEASURED BY THE PERIMETER AIR MONITORING STATIONS[a]
1973

NUMBER OF SAMPLES	UNITS OF 10^{-14} μCi/ml			% CG[c]
	MAXIMUM	MINIMUM[b]	AVERAGE	
468	4.6	<0.3	<1.1 ± 0.1	<0.01

[a]See Figure 1.
[b]Minimum detectable amount of ^{131}I is 10×10^{-6} μCi per sample.
[c]CG is 1×10^{-10} μCi/ml (AEC Manual, Appendix 0524, Annex A, Table II).

Table 4
DISCHARGES OF RADIOACTIVITY TO THE ATMOSPHERE
1973

RADIONUCLIDE	CURIES DISCHARGED
Uranium[a]	0.44
^{131}I	2.2
^{3}H	9010
^{133}Xe[b]	< 68,600
^{85}Kr[b]	< 14,000
Pu[c]	4×10^{-6}

[a]Uranium of varying enrichments - curie quantities calculated using the appropriate specific activity for material released.

[b]Upper limit values based on direct radiation instrument measurements in the stack gas stream and an assumed mixture of noble gases.

[c]Mixture of all isotopes.

Table 5
AMBIENT RADIATION BACKGROUND
1973

STATION NUMBER	LOCATION	BACKGROUND μR/hr
	Perimeter Stations[a]	
HP-31	Kerr Hollow Gate	8.6
HP-32	Midway Gate	10.7
HP-33	Gallaher Gate	7.7
HP-34	White Oak Dam	12.7
HP-35	Blair Gate	7.0
HP-36	Turnpike Gate	7.5
HP-37	Hickory Creek Bend	6.7
HP-38	East of EGCR	6.8
	Remote Stations[b]	
HP-51	Norris Dam	5.4
HP-52	Loudoun Dam	7.2
HP-53	Douglas Dam	6.9
HP-54	Cherokee Dam	6.7
HP-55	Watts Bar Dam	5.9
HP-56	Great Falls Dam	6.6
HP-57	Dale Hollow Dam	7.3
HP-58	Knoxville	11.1

[a]See Figure 1.

[b]See Figure 2.

Table 6

AIR MONITORING DATA - FLUORIDES

1973

LOCATION[a]	NUMBER OF SAMPLES[b]	CONCENTRATION, ppb			% STD.[c]
		MAXIMUM	MINIMUM	AVERAGE	
F-1	51	7.1	<0.2	<0.9 ± 0.3	<60
F-2	51	3.8	<0.2	<0.8 ± 0.2	<53
F-3	50	2.1	<0.2	<0.8 ± 0.2	<53
F-4	49	3.2	<0.2	<0.7 ± 0.2	<47
F-5	52	1.9	<0.2	<0.7 ± 0.1	<47
F-6	49	1.9	<0.2	<0.7 ± 0.1	<47

[a]See Figure 1.

[b]Sample duration - 24 hours.

[c]Tennessee Air Pollution Control Regulations -

4.5 ppb for 12 hr. averaging interval
3.5 ppb for 24 hr. averaging interval
2.0 ppb for 7 day averaging interval
1.5 ppb for 30 day averaging interval

All values are maximum - not to be exceeded more than once per year.
Percent standard calculated using the average value and the 30 day standard.

Table 7

AIR MONITORING DATA - REACTIVE SULFUR

1973

LOCATION[a]	NUMBER OF SAMPLES	CONCENTRATION mg SO_3/100 cm^2/day			% STD.[b]
		MAXIMUM	MINIMUM	AVERAGE	
S-1	12	0.21	0.00	0.09 ± 0.04	11
S-2	12	0.17	0.00	0.05 ± 0.03	7
S-3	12	0.74	0.01	0.26 ± 0.12	33
S-4	12	0.53	0.01	0.25 ± 0.10	31
S-5	11	0.46	0.12	0.26 ± 0.07	32
S-6	12	0.38	0.00	0.20 ± 0.08	25
S-7	12	0.19	0.00	0.09 ± 0.03	12
S-8	12	0.39	0.01	0.21 ± 0.07	26
S-9	12	0.35	0.01	0.19 ± 0.06	24
S-10	12	0.34	0.00	0.18 ± 0.07	23
S-11	12	0.36	0.00	0.20 ± 0.07	25

[a]See Figure 1.

[b]Tennessee Air Pollution Control Regulations for Land Area Classification "A": 0.8 mg SO_3/100 cm^2/day.

Table 8
AIR MONITORING DATA - DUSTFALL
1973

LOCATION[a]	NUMBER OF SAMPLES	CONCENTRATION gm /m^2/30-day period			% STD.[b]
		MAXIMUM	MINIMUM	AVERAGE	
D-1	12	1.0	0.1	0.4 ± 0.2	4[c]
D-2	12	3.2	0.2	0.9 ± 0.6	10[c]
D-3	12	0.8	0.08	0.4 ± 0.2	4[c]
D-7	12	0.7	0.05	0.3 ± 0.1	3[c]
D-8	11	1.7	0.1	1.0 ± 0.4	11[c]
D-9	11	1.5	0.3	0.8 ± 0.2	9[c]
D-10	12	5.4	0.6	2.0 ± 1.0	22[c]
D-11	12	2.0	0.5	1.0 ± 0.3	11[c]

[a]See Figure 1.

[b]Tennessee Air Pollution Control Regulations for Land Area Classification "A": 9-18 gm/m^2/30-day period. The lower limit of nine should not be exceeded more than 50% of the time during any 12-month period. The upper limit of 18 is not to be exceeded during any 30-day period.

[c]Calculated by using the average value and lower limit of nine.

Table 9

AIR MONITORING DATA - SUSPENDED PARTICULATES

1973

LOCATION[a]	NUMBER OF SAMPLES	CONCENTRATION, $\mu g/m^3$			% STD.[b]
		MAXIMUM	MINIMUM	AVERAGE	
SP-1	33	112.5	15.5	53.6 ± 8.7	71
SP-2	34	86.3	10.3	44.8 ± 6.4	60
SP-3	34	77.4	8.0	41.2 ± 6.1	55
SP-4	32	85.5	18.7	47.5 ± 6.6	63

[a]See Figure 1.

[b]Tennessee Air Pollution Control Regulations - Primary standard based on annual geometric mean is 75.0 $\mu g/m^3$.

Table 10

RADIONUCLIDES IN THE CLINCH RIVER

1973

LOCATION	NUMBER SAMPLES	RANGE	CONCENTRATION OF RADIONUCLIDES OF PRIMARY CONCERN Units of 10^{-9} μCi/ml				%
			^{90}Sr	^{137}Cs	^{106}Ru	^{3}H	CG[c]
C-2 CRM 23.1[a]	4	Max.	1.1	1.1	0.5	2070	
		Min.	0.3	0.04	0.3	<1000	
		Avg.	0.5 ± 0.1	0.3 ± 0.05	0.3 ± 0.05	<1080 ± 300	<0.24
W-1 CRM 20.8[b]	12	Max.	1.7	0.9	0.2	4248	
		Min.	0.3	<0.1	<0.1	812	
		Avg.	1.0 ± 0.2	<0.1 ± 0.04	<0.1 ± 0.02	2134 ± 400	<0.49
C-3 CRM 14.5[a]	4	Max.	1.8	0.7	0.9	3100	
		Min.	0.5	0.2	0.1	<1000	
		Avg.	1.2 ± 0.2	0.5 ± 0.1	0.5 ± 0.1	<2030 ± 400	<0.47
C-5 CRM 4.5[a]	4	Max.	2.5	0.7	0.7	1890	
		Min.	0.6	0.2	0.5	<1000	
		Avg.	1.7 ± 0.2	0.4 ± 0.1	0.5 ± 0.06	<1530 ± 300	<0.62

[a]Measured values.

[b]Values given for this location are calculated values based on the concentrations measured at White Oak Dam and the dilution afforded by the Clinch River. They do not include radioactive materials (e.g., fallout) that may enter the river upstream of White Oak Creek outfall (CRM 20.8).

[c]Applicable concentration guides and the method for calculating percent of concentration guide for a known mixture of radionuclides are given in AEC Manual, Appendix 0524, Annex A. (1)

Table 11

URANIUM CONCENTRATION IN SURFACE STREAMS

1973

STATION NUMBER[a]	LOCATION	NUMBER OF SAMPLES	Units of 10^{-8} μCi/ml			% CG[b]
			MAXIMUM	MINIMUM	AVERAGE	
P-1	Poplar Creek	12	1.3	0.2	0.6 ± 0.2	<0.1
P-2	Poplar Creek	12	0.7	0.2	0.4 ± 0.1	<0.1
C-3	Clinch River	12	0.5	<0.1	<0.2 ± 0.1	<0.1
C-4	Clinch River	12	0.5	0.1	0.2 ± 0.1	<0.1
E-1	East Fork Poplar Creek	11	20.0	2.5	8.5 ± 3.5	0.3
B-1	Bear Creek	11	9.5	1.5	3.5 ± 1.5	0.1

[a]See Figure 3.

[b]CG is 3×10^{-5} μCi/ml for a mixture of uranium isotopes (AEC Manual, Appendix 0524, Annex A, Table II).

Table 12

DISCHARGES OF RADIOACTIVITY TO SURFACE STREAMS

1973

RADIONUCLIDE	CURIES DISCHARGED
^{140}Ba	0.09
^{144}Ce	0.2
^{137}Cs	1.1
^{60}Co	2.3
^{3}H	15,040
^{131}I	0.5
^{106}Ru	0.7
^{90}Sr	6.7
^{95}Zr - ^{95}Nb	0.05
Uranium[a]	2.3
^{232}Th	<0.01
Transuranics[b]	0.08

[a]Uranium of varying enrichments - curie quantities calculated using the appropriate specific activity for material released.

[b]Value based on gross transuranic alpha emitter analysis.

Table 13

NONRADIOACTIVE WATER MONITORING DATA - WHITE OAK DAM

(Location W-1, Figure 3)

1973

SUBSTANCE	NUMBER OF SAMPLES	CONCENTRATION, mg/l				% STD.
		MAXIMUM	MINIMUM	AVERAGE	STD.	
Cr	11	0.23	0.063	0.13 ± 0.016	0.05[a]	260
Zn	11	0.023	<0.005	<0.008 ± 0.002	5.0[a]	< 0.2
NO_3	11	11.5	0.62	3.9 ± 0.21	45[a]	8.7
Hg	11	0.0047	<0.0001	<0.001 ± 0.0005	0.005[b]	< 20
Phenols	11	0.003	<0.001	<0.001 ± 0.0002	0.001[a]	<100

[a]U. S. Public Health Service Drinking Water Standards.

[b]Proposed EPA Standard.[13]

NOTE: Stream not a source of drinking water. Drinking water standards used for water quality comparison only.

Table 14

NONRADIOACTIVE WATER MONITORING DATA - MELTON HILL DAM

(Location C-2, Figure 3)

1973

SUBSTANCE	NUMBER OF SAMPLES	CONCENTRATION, mg/l				% STD.
		MAXIMUM	MINIMUM	AVERAGE	STD.	
Cr	10	0.030	<0.005	<0.010 ± 0.003	0.05[a]	< 20
Zn	10	0.024	<0.005	<0.007 ± 0.002	5.0[a]	< 0.1
NO_3	10	10.0	0.13	2.7 ± 0.24	45[a]	6
Hg	10	0.003	<0.0001	<0.0004 ± 0.0005	0.005[b]	< 8
Phenols	10	0.002	<0.001	<0.001 ± 0.0002	0.001[a]	<100

[a]U. S. Public Health Service Drinking Water Standards.

[b]Proposed EPA Standard. (13)

Table 15

NONRADIOACTIVE WATER MONITORING DATA - ORGDP SANITARY WATER PUMPING STATION

(Location C-3, Figure 3)

1973

SUBSTANCE	NUMBER OF SAMPLES	CONCENTRATION, mg/l				% STD.
		MAXIMUM	MINIMUM	AVERAGE	STD.[a]	
Cd	12	<0.005	< 0.005	<0.005*	0.01	< 50
Cl^-	12	10	< 2	<4.3 ± 1.6	250	< 2
Cr	12	0.02	< 0.005	<0.007 ± 0.003	0.05	< 14
CN	12	0.004	< 0.0005	<0.001 ± 0.001	0.01	< 10
F^-	12	2.5	0.3	1 ± 0.4	1.2	83
NO_3^-	12	2.83	0.53	1.8 ± 0.5	45	< 1
Pb	12	<0.02	< 0.02	<0.02*	0.05	< 40
Phenols	11	0.002	< 0.001	<0.001 ± 0.0002	0.001	<100
$SO_4^=$	12	7	4	5.1 ± 0.6	250	2
T.D.S.	12	510	80	175 ± 72	500	35
Zn	12	0.5	0.01	0.1 ± 0.1	5	2

[a]U. S. Public Health Service Drinking Water Standards.

*All values below limit of detection.

Table 16

NONRADIOACTIVE WATER MONITORING DATA - ORGDP RECIRCULATING WATER PUMPING STATION

(Location C-4, Figure 3)

1973

SUBSTANCE	NUMBER OF SAMPLES	CONCENTRATION, mg/l				% STD.
		MAXIMUM	MINIMUM	AVERAGE	STD.[a]	
Cd	12	<0.005	<0.005	<0.005*	0.01	< 50
Cl^-	12	12	2	4.9 ± 1.7	250	2
Cr	11	0.05	<0.005	<0.01 ± 0.009	0.05	< 20
CN	12	0.009	<0.0005	<0.003 ± 0.002	0.01	< 30
F^-	12	2.6	0.13	1 ± 0.5	1.2	83
NO_3^-	12	12.4	2.3	5.1 ± 1.8	45	1
Pb	12	<0.02	<0.02	<0.02*	0.05	< 40
Phenols	12	0.003	<0.001	<0.001 ± 0.0004	0.001	<100
$SO_4^=$	12	9	4	5.6 ± 0.9	250	2
T.D.S.	12	226	76	142 ± 28	500	28
Zn	12	0.4	<0.005	<0.08 ± 0.08	5	< 2

[a]U. S. Public Health Service Drinking Water Standards.

*All values below limit of detection.

Table 17

NONRADIOACTIVE WATER MONITORING DATA - EAST FORK POPLAR CREEK

(Location E-1, Figure 3)

1973

SUBSTANCE	NUMBER OF SAMPLES	CONCENTRATION, mg/l				% STD.
		MAXIMUM	MINIMUM	AVERAGE	STD.	
Cd	11	0.01	< 0.005	<0.007 ± 0.001	0.01[c]	< 70
Cl^-	12	15	7	10 ± 1.5	250[a]	4
Cr	12	0.27	0.02	0.13 ± 0.05	0.05[c]	260
F^-	12	1.6	< 0.1	<1.05 ± 0.3	1.2[a]	< 88
Hg	12	0.001	0.0003	0.0005 ± 0.0001	0.005[b]	10
NO_3^-	12	15	< 0.9	<7.8 ± 3.4	45[a]	< 17
Pb	12	0.03	< 0.02	<0.02 ± 0.0001	0.05[a]	< 40
$SO_4^=$	12	74	46	54 ± 6	250[a]	22
T.D.S.	12	218	142	185 ± 15	500[a]	37
Zn	12	0.95	0.03	0.2 ± 0.2	5[a]	4

[a]U. S. Public Health Service Drinkirg Water Standards.

[b]Proposed EPA Standard.[13]

NOTE: Stream not a source of drinking water. Drinking water standards used for water quality comparison only.

Table 18

NONRADIOACTIVE WATER MONITORING DATA - BEAR CREEK

(Location B-1, Figure 3)

1973

SUBSTANCE	NUMBER OF SAMPLES	CONCENTRATION, mg/l				% STD.
		MAXIMUM	MINIMUM	AVERAGE	STD.[a]	
Cd	11	0.009	<0.005	<0.006 ± 0.0008	0.01	< 60
Cl^-	12	8	2.6	4.3 ± 1.1	250	2
F^-	12	0.8	<0.1	<0.4 ± 0.2	1.2	< 33
NO_3^-	12	216	14	64 ± 43	45	142
$SO_4^=$	12	25	<1.5	<20 ± 4.3	250	< 8
Zn	12	0.15	0.01	0.05 ± 0.03	5	1

[a]U. S. Public Health Service Drinking Water Standards.

NOTE: Stream not a source of drinking water. Drinking water standards used for water quality comparison only.

Table 19

NONRADIOACTIVE WATER MONITORING DATA - POPLAR CREEK ABOVE BLAIR BRIDGE

(Location P-1, Figure 3)

1973

SUBSTANCE	NUMBER OF SAMPLES	CONCENTRATION, mg/l				% STD.
		MAXIMUM	MINIMUM	AVERAGE	STD.[a]	
Cd	12	< 0.005	< 0.005	<0.005*	0.01	< 50
Cl^-	12	12	4	6.2 ± 1.8	250	2
Cr	12	0.06	< 0.005	<0.01 ± 0.01	0.05	< 20
CN	12	0.005	< 0.0005	<0.002 ± 0.001	0.01	< 20
F^-	12	2.6	0.2	0.9 ± 0.4	1.2	75
NO_3^-	12	22.6	0.41	5.2 ± 4.6	45	1
Pb	12	< 0.02	< 0.02	<0.02*	0.05	< 40
Phenols	12	0.001	< 0.001	<0.001*	0.001	<100
$SO_4^{=}$	12	19	5	8.8 ± 2.3	250	4
T.D.S.	12	258	92	149 ± 35	500	30
Zn	12	0.4	0.02	0.08 ± 0.07	5	2

[a]U. S. Public Health Service Drinking Water Standards.

*All values at or below limit of detection.

NOTE: Stream not a source of drinking water. Drinking water standards used for water quality comparison only.

Table 20

NONRADIOACTIVE WATER MONITORING DATA - POPLAR CREEK NEAR CLINCH RIVER

(Location P-2, Figure 3)

1973

SUBSTANCE	NUMBER OF SAMPLES	CONCENTRATION, mg/l				% STD.
		MAXIMUM	MINIMUM	AVERAGE	STD.[a]	
Cd	12	< 0.005	< 0.005	<0.005*	0.01	< 50
Cl^-	12	20	4	7.7 ± 3.5	250	3
Cr	12	0.04	< 0.005	<0.016 ± 0.007	0.05	< 32
CN	12	0.004	< 0.0005	<0.002 ± 0.001	0.01	< 20
F^-	12	3.5	0.2	1.6 ± 0.7	1.2	133
NO_3^-	12	11.5	0.32	2.4 ± 1.9	45	< 1
Pb	12	0.03	< 0.02	<0.02 ± 0.002	0.05	< 40
Phenols	12	0.002	< 0.001	<0.001 ± 0.0002	0.001	<100
$SO_4^{=}$	12	20	7	10.3 ± 2.7	250	4
T.D.S.	12	308	62	164 ± 49	500	33
Zn	12	0.3	< 0.005	<0.08 ± 0.05	5	< 2

[a]U. S. Public Health Service Drinking Water Standards.

*All values below limit of detection.

NOTE: Stream not a source of drinking water. Drinking water standards used for water quality comparison only.

Table 21
CONCENTRATION OF ^{131}I IN RAW MILK
1973

LOCATION	NUMBER SAMPLES	Units of 10^{-9} μCi/ml			COMPARISON WITH STANDARD[b]
		MAXIMUM	MINIMUM[a]	AVERAGE	
Immediate Environs[c]	312	11.4	<10	<10 ± 0.74	FRC Range I
Remote Environs	40	10	<10	<10 ± 0.72	FRC Range I

[a]Minimum detectable concentration of ^{131}I is 10×10^{-9} μCi/ml.

[b]Applicable FRC standard, assuming 1 liter per day intake:

Range I 0 to 1×10^{-8} μCi/ml - Adequate surveillance required to confirm calculated intakes.

Range II 1×10^{-8} μCi/ml to 1×10^{-7} μCi/ml - Active surveillance required.

Range III 1×10^{-7} μCi/ml to 1×10^{-6} μCi/ml - Positive control action required.

Note: Upper limit of Range II can be considered the concentration guide.

[c]See Figure 4.

Table 22
CONCENTRATION OF ^{90}Sr IN RAW MILK
1973

LOCATION	NUMBER SAMPLES	Units of 10^{-9} μCi/ml			COMPARISON WITH STANDARD[b]
		MAXIMUM	MINIMUM[a]	AVERAGE	
Immediate Environs[c]	312	21	2.4	8.1 ± 0.5	FRC Range I
Remote Environs	40	12	2.0	6.1 ± 0.4	FRC Range I

[a]Minimum detectable concentration of ^{90}Sr in milk is 2×10^{-9} μCi/ml.

[b]Applicable FRC Standard, assuming 1 liter per day intake:

Range I 0 to 2×10^{-8} μCi/ml - Adequate surveillance required to confirm calculated intakes.

Range II 2×10^{-8} μCi/ml to 2×10^{-7} μCi/ml - Active surveillance required.

Range III 2×10^{-7} μCi/ml to 2×10^{-6} μCi/ml - Positive control action required.

Note: Upper limit of Range II can be considered the concentration guide.

[c]See Figure 4.

Table 23
RADIONUCLIDE CONTENT OF CLINCH RIVER FISH
1973

SPECIES	NUMBER SAMPLES[a]	pCi/kg Wet Weight		ESTIMATED % MPI[b]
		^{90}Sr	^{137}Cs	
White Crappie	1	60	1500	0.28
Carp	1	140	540	0.45

[a]Composite of ten fish in each species.

[b]Maximum Permissible Intake - Assumes intake of radionuclides from eating fish to be comparable to a daily intake of 2.2 liters of water containing the concentration guide level of the radionuclides in question.

Table 24

SOIL SAMPLES FROM NEAR
PERIMETER AIR MONITORING STATIONS
1973

SAMPLING[a] LOCATION	NUMBER SAMPLES[b]	DRY SOIL[c] Units of 10^{-8} μCi/g	
		PLUTONIUM (α)	URANIUM (α)
HP-31	1	1.4	64
HP-32	1	6.7	77
HP-33	1	2.0	18
HP-34	1	4.7	21
HP-35	1	3.0	70
HP-36	1	1.2	15
HP-37	1	1.4	16
HP-38	1	1.4	19
HP-39	1	4.9	28

[a]See Figure 1.

[b]Nine samples, approximately three inches in diameter and one centimeter thick, collected in a one-square-meter area at each location and composited for analysis.

[c]Applicable guides for soil contamination have not been established.

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