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# INTRODUCTION

At this date, Commonwealth Edison Company has the largest nuclear commitment of any utility in the United States. It has 7,400,000 kilowatts of nuclear capacity in operation or under construction. Commonwealth Edison has pioneered in commercial nuclear power. It's Dresden Unit 1 was the world's first privately-financed, full-scale, commercial nuclear power unit. Since going into service in 1960, this 200,000 kilowatt unit has generated over 9 billion kilowatthours of electricity.

An important reason for Edison's large commitment to nuclear power is the fact that nuclear generating stations are safe, clean and quiet. They are good neighbors and have a minimum impact on the environment.

In 1965 Commonwealth Edison committed to the construction of two additional nuclear units at the Dresden site, which is located in Grundy County Illinois at the point where the Kankakee and DesPlaines Rivers merge to form the Illinois River. Unit 2 is scheduled for commercial service this summer (1970).

On October 14, 1966, Edison was issued a construction permit for Dresden Unit 3 (CPPR-22) by the United States Atomic Energy Commission. It is expected that Dresden Unit 3 will be in commercial service in the spring of 1971.

Commonwealth Edison has been requested by Dr. Peter A. Morris, Director, Division of Reactor Licensing of the United States Atomic Energy Commission, to provide to the Commission a detailed statement concerning the possible affect of Dresden Nuclear Power Unit 3, on the environment as required by the National Environmental Policy Act.

This statement is responsive to this request as outlined in Dr. Morris' letter of May 7, 1970.

# ENVIRONMENTAL STATEMENT

## A. THE EFFECT OF DRESDEN UNIT 3 ON THE ENVIRONMENT

### 1. General Statement

Dresden Unit 3 will have a minimum effect on the environment. The warmed condenser waters used by the unit will be withdrawn from the Kankakee River and passed through a specially constructed cooling lake to dissipate much of the heat. The cooled water, which when returned to the Illinois River, will adhere to the conservative temperature standards promulgated by the Sanitary Water Board of the State of Illinois. The radioactive discharges from the unit will be only a small fraction of the limits set by the AEC. The small quantities of chemicals discharged into the Illinois River will be within the standards set by the Sanitary Water Board. In the best judgment of Commonwealth Edison Company and its consultants, all of the discharges will meet current environmental standards and they will have no deleterious effect upon the environment.

### 2. Radiation Effects

#### a. Statement

The United States Public Health Service recently completed an extensive radiological survey of the environs of Dresden Station.(1) Dresden Unit 1, a 200,000 kilowatt boiling-water reactor, has been in operation for over ten years. On the basis of this survey the Public Health

(1) Radiological Surveillance Studies at a Boiling Water Nuclear Power Reactor, BRH/DER 70-1, U.S. Dept. of Health, Education, and Welfare, March 1970.

Service concluded, "exposure to the surrounding population through consumption of food and water from radionuclides released at Dresden was not measurable." The Public Health Service also stated, "External exposure from radioactive gases discharged from the Dresden stack was detectable, but it was only a small fraction of the natural radiation background over an extended period of time and well within Federal Radiation Council guidance."

Dresden Unit 3 is designed so it also will have a negligible radiological effect on the environment. The vast bulk of the radioactive waste materials produced during the operation of Dresden Unit 3 will be safely contained in the fuel assemblies. After the fuel is depleted, these fuel assemblies will be shipped in Department of Transportation approved shipping casks for reprocessing, where the radioactive materials will be removed from the reusable portion of the fuel and safely stored.

The relatively small amount of radioactive material not removed with the fuel will be treated by efficient waste handling facilities. These facilities will reduce the radioactivity in both the air and water discharges from the station to a level that will only be a small fraction of those specified by the USAEC in 10 CFR 20. Based upon 10 years experience with the operation of Dresden 1, where the presence of Dresden Unit 1 is barely distinguishable against background radiation, the small release of radioactive material from Dresden Unit 3 will have no effect on either the land or water environment.

b. Radioactive Waste Control Systems

(1) Gaseous Radioactive Wastes

The purposes of the off-gas handling system are: 1) to provide effective control of process off-gases to prevent releases over limits prescribed in 10 CFR 20, 2) to minimize radioactive particle release to the atmosphere, 3) to provide sufficient time for operator decision and action when continuous monitoring indicates development of off-standard conditions, 4) to minimize the release of the normally occurring activation radiogases by suitable short-term decay.

Major sources of gaseous waste activity will be the effluent from condenser air ejector and the steam packing exhaust system. Other sources contribute very little activity in comparison to the major sources. The radioactive gases entering the off-gas system are held up to allow decay of the short-lived isotopes before being discharged to the atmosphere through the 310-foot stack. The gases from the main condenser air ejectors are delayed a minimum of 30 minutes in shielded piping before entering the filter system. The filter system, which is located just before the stack, consists of two parallel sets of full-flow, high-efficiency, particulate filters. The spare set of filters provides backup and assures availability of filtration. These filters are designed to remove 99.97% of the particulates in the off-gas greater than 0.3 microns in size. The small quantity of radioactive gases released by way of the gland seal off-gas system does not require a long decay time. A minimum holdup time of 1.75 minutes in shielded piping is used for decay of the major activation gases (N-16 and O-19).

The activation gases listed below (principally N-13) are released from the stack at the rate of approximately 250 μCi/sec per unit during operation at 2527 MWt. The rate of release of these gases is proportional to the thermal output of the reactor and the holdup time in the system before release at the stack. For Units 2 and 3, the combined release rate is 500 μCi/sec.

The fission product gases may arise from minor amounts of tramp uranium on the surface of the fuel cladding, from imperfections, or from perforations which might develop in the fuel cladding. The principal gaseous isotopes from this source discharged from the stack are shown in the following tabulation.

TYPICAL OFF-GAS COMPOSITION FOR A SINGLE UNIT

(Data must be doubled for Units 2 and 3 Combined Maximum Release Rates)

| | Isotope | Half-Life | Emission Rate μCi/sec |
|---|---|---|---|
| Activation Gases | N-17 | 14. sec | $1 \times 10^{0}$ |
| | N-16 | 7.35 sec | $1 \times 10^{0}$ |
| | O-19 | 29 sec | $1 \times 10^{0}$ |
| | N-13 | 10 min | $2 \times 10^{2}$ |
| | Ar-41 | 1.83 hr | $6 \times 10^{0}$ |
| | Ar-37 | 34.3 day | $2 \times 10^{-4}$ |
| | H-3 | 12.36 yr | $1 \times 10^{-3}$ |

| | Isotope | Half-Life | Emission Rate µCi/sec |
|---|---|---|---|
| Noble Gases | Short half-life | 1-41 sec | $1 \times 10^{0}$ |
| | Kr-89 | 3.2 min | $3 \times 10^{0}$ |
| | Xe-137 | 3.8 min | $9 \times 10^{0}$ |
| | Xe-135 | 15 min | $8 \times 10^{1}$ |
| | Xe-138 | 17 min | $3 \times 10^{2}$ |
| | Kr-87 | 1.3 hr | $2 \times 10^{2}$ |
| | Kr-83m | 1.86 hr | $2 \times 10^{1}$ |
| | Kr-85m | 4.4 hr | $6 \times 10^{1}$ |
| | Xe-135 | 9.2 hr | $1 \times 10^{2}$ |
| | Xe-133m | 2.3 day | $2 \times 10^{0}$ |
| | Xe-133 | 5.27 day | $5 \times 10^{1}$ |
| | Xe-131m | 12.0 day | $2 \times 10^{-1}$ |
| | Kr-85 | 10.4 yr | $7 \times 10^{-2}$ |

In the absence of fuel rod leaks, N-13 from the air ejector off-gases and the N-16, O-19 from the gland seal system are the principal contributors to environs radiation dose. The aggregate of these three corresponds to a radiation dose of less than 0.1 mrem/year. If fuel rod leaks do occur the noble radioactive gases, Xe and Kr become the principal contributors.

The solid daughter products of the noble gases are removed in the filter of the off-gas system before release of gases to the 310 foot stack.

The 30 minute holdup of the condenser air ejector off-gas provides sufficient time between detection and isolation of the holdup line to prevent release of fission product gases in excess of ten times the annual average stack release rate limit. When such a release rate is detected, the holdup line is automatically isolated after a 15 minute delay.

This time interval is provided to permit corrective action to be taken to obviate plant shutdown. The 30 minute holdup time is established to provide for decay of short half-lived noble gases to reduce stack release.

Similarly the 1.75 holdup time for the gland seal off-gas system is chosen to provide sufficient decay of the activation gases. The shorter holdup time is because the activity present in this system is three orders of magnitude less than that from the condenser air ejector. The short holdup time allows decay of N-16 and O-19 with half lives on the order of seconds.

The off-gas system provides ample monitoring and control to ensure that limits set forth in 10 CFR 20 are not exceeded. The off-gas holdup, effluent sampling, calibrating of the off-gas monitors, particulate filtering, and excessive release alarm are all protection measures taken to meet standards set by the 10 CFR 20.

The design includes several specific features or effects which minimize the amounts of radioactive materials released to the environment. These include:

(a) Use of high-integrity Zircaloy-clad fuel rods to contain fission products within the fuel.

(b) The water to steam partition, retaining halogens in the coolant.

(c) The provision of 30-minute holdup of the off-gas to allow decay of short half-lived activities before discharge. This reduces the potential radiation effects on the order of a factor of ten as compared to no holdup.

(d) The provisions for monitoring the air ejector off-gas stream and initiating automatic isolation of the holdup piping when the radioactivity level exceeds ten times to the allowable annual average release rate. The 30 minute holdup provides ample time to prevent release of fission product gases in excess of the instantaneous permissible release rate limits.

(e) High efficiency filters at the end of the holdup piping to remove particulate radioisotopes formed by the decay of the noble gas radioisotopes in the holdup pipe.

(f) Elevated release from the 310 foot stack, which is approximately 1-1/2 times the height of nearby structures, to reduce direct radiation dose rates on the ground and to maximize the atmospheric dispersion of the gas plume before it reaches ground level.

(g) Continuous monitoring of the stack effluent with appropriate alarms as a backup to the air ejector monitors.

Natural dispersion of gases into the atmosphere is achieved in an efficient manner by discharge through the stack. The combination of its height, the exit velocity of the effluent, and the buoyancy of the exit gases promotes favorable plume behavior for efficient dispersal. The height of the stack assures that diffusion of the plume will not be influenced by the eddy currents occurring around the station structures. Based upon diffusion characteristics of the gases, considering the meteorological characteristics of the site and surroundings, it is calculated that release from the top of the 310 foot stack contributes to a reduction in off-site dose by a factor of approximately 100 as compared with release of the gaseous wastes at ground level.

(2) Liquid Radioactive Wastes

The liquid radioactive waste control system collects, treats, stores and disposes of all radioactive liquid wastes. Liquid wastes are collected in sumps and drain tanks in the various buildings, then transferred to the appropriate tanks in the Radwaste Building for further treatment, temporary storage, and disposal. Wastes to be discharged from the system are handled on a batch basis with each batch being analyzed and handled appropriately. Final dispostion of processed liquid wastes consists of return to the condensate system, storage awaiting solidification and disposition off-site as solid wastes, or disposal through the discharge canal.

Those batches whose radioactivity concentrations are sufficiently low as to allow disposal in the Illinois River are released into the discharge canal through a distribution pipe, in a manner to provide good mixing, and are diluted with effluent condenser circulating water in order to achieve a discharge concentration below the limits of 10 CFR 20 and State of Illinois Regulations at the point of entry into the river. The design provides for dewatering and solidification of liquid wastes, sludges and resins to facilitate storage and disposal off-site as solid wastes.

Figure 1, page 11, details the flow paths of the liquid radioactive waste control system, estimated quantities of both liquid and solid wastes, and tank and sump capacities.

Radioactive materials are removed from the liquid waste streams by various mechanisms before the waste streams are released to the discharge canal. Filters are utilized to remove particulate materials after treatment in the radwaste chemical waste tank or collection in the floor drain collection tank. A filter and demineralizer process wastes in the

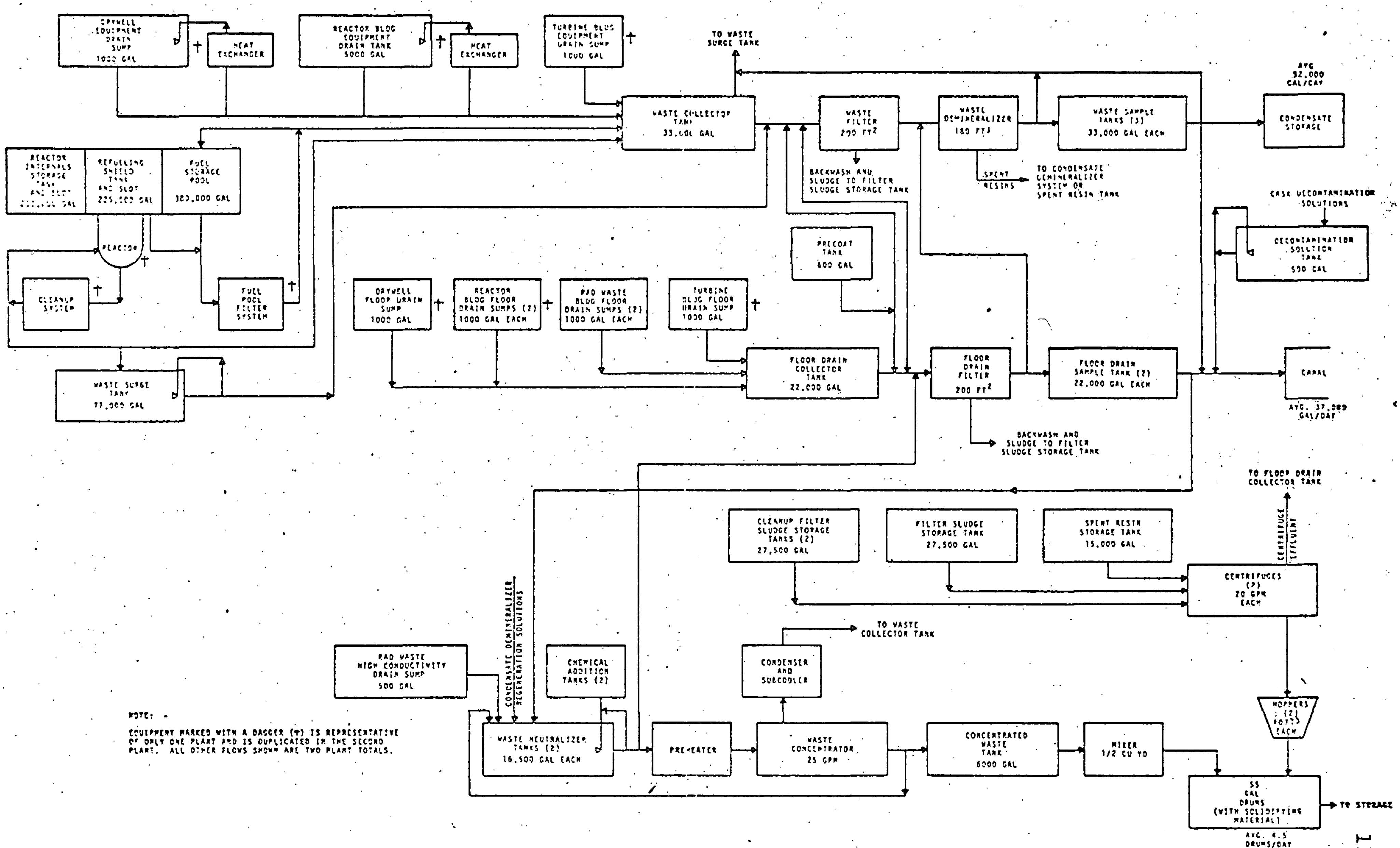


Figure 1 Process Flow Diagram - Radioactive Waste Control System Rev. 3-22-68

waste collector sub-system to remove both soluble and insoluble materials. The filter sludges and spent resins are dewatered in a centrifuge and the solids from this operation are placed in drums and solidified, and the liquids are returned to the waste collector tank for further processing. In passing through the various tanks of the radioactive waste control system, the wastes are subjected to a holdup time which varies from approximately 1/2 to 1 day, which permits decay of the numerous short half-life constituents.

Liquid wastes are classified as either low conductivity, high conductivity, chemical or miscellaneous. Low conductivity liquid wastes from piping and equipment drains are collected in the drywell equipment drain sump, the reactor building equipment, drain tank, and the turbine building clean sump (or condensate drip tank). Such wastes from piping and equipment drains are transferred to the waste collector tank in the radwaste building which will also serve to collect low conductivity wastes from the condensate demineralizer regeneration system waste concentrator distillate and centrifuge effluent. These wastes are processed through a pressure type filter (Waste Collector Filter) and a mixed-bed waste demineralizer and then collected in one of the three waste sample tanks. After these wastes are sampled and analyzed, they normally are discharged to the condensate storage system for reuse in the plant.

High conductivity liquid waste (primarily from floor drains) are collected in: (a) the radwaste facility sumps; (b) the reactor building floor sump; (c) the turbine building floor drain sump and the drywell floor drain sump. Such high conductivity waste will be transferred to the floor drain collector tank in the radwaste building. These wastes will be processed through a pressure precoat type filter (floor drain filter) and then collected in one of two floor drain sample tanks. After these wastes are sampled and analyzed, they will normally be discharged to the circulating water discharge canal system.

Chemical wastes of high conductivity from the condensate demineralizer regeneration system are collected in the waste neutralizer tank in the radwaste building. The waste neutralizer tank also collects shop decontamination wastes and other high conductivity, variable activity wastes. These wastes are sampled and neutralized as required and then processed in one of two ways depending upon the radioactivity concentrations in the wastes. If radioactivity concentrations are sufficient to permit off-site discharge, the wastes are processed through the floor drain sample tanks. After sampling and analysis, this waste is released to the discharge canal. The wastes having radioactivity concentrations too high for off-site discharge are pumped to the waste concentrator for treatment. The distillate from the waste concentrator is condensed and collected in the waste collector tank for treatment with low conductivity wastes and the concentrate is collected in the concentrated waste storage tank. This concentrated waste is then transferred to the drum-filling system where it is loaded into 55 gallon steel drums and stored as solid waste for future shipment off site for disposal.

Other liquid wastes, including primary system water resulting from refueling and startup, are processed according to their classification as either low conductivity wastes, high conductivity wastes, detergent wastes or chemical wastes.

Overall control of the system is exercised from a local control room situated in the radwaste building. A main panel in this room contains the instruments, controls, and alarms for the operation of the system. This panel also carried valve position and other indicating lights to show whether or not the various sump pumps which transfer effluents from the other station buildings to the radwaste building are running. Various radwaste system alarm signals are also received in the radwaste control room as well as a radwaste common trouble alarm.

Performance Analysis

Activity released with the liquid wastes is difficult to define since liquid wastes come from a number of sources and the quantities of activity is a strong function of plant operation, including holdup time. The total amount of activity and the relative quantities of each isotope will vary significantly from day to day with varying power levels and leakage from fuel elements.

The following list shows the most significant isotopes which may be present in the combined liquid waste discharge off-site. Unless there are significant fuel leaks, only Co-58 and Co-60 are present.

| Isotope | Half-life | Release Rate $\mu$Ci/day |
|---|---|---|
| Sr-89 | 54 day | $3.0 \times 10^{3}$ |
| Sr-90 | 28 yr | $2.0 \times 10^{1}$ |
| Sr-91 | 9.7 hr | $1.5 \times 10^{4}$ |
| Cs-137 | 28 yr | $3.0 \times 10^{1}$ |
| Ba-140 | 12.8 day | $8.0 \times 10^{3}$ |
| I-131 | 8.05 day | $2.0 \times 10^{3}$ |
| I-133 | 20.8 hr | $3.0 \times 10^{3}$ |
| Cu-64 | 12.8 hr | $2.0 \times 10^{2}$ |
| Co-58 | 72 day | $7.0 \times 10^{4}$ |
| Co-60 | 5.27 yr | $9.0 \times 10^{3}$ |

The above information is based on data obtained from operation of Dresden Unit 1 in the presence of significant fuel leaks adjusted wherever necessary to conform to the combined discharge from Units 2 and 3.

The liquid radioactive wastes from the Units 2 and 3 are diluted in the condenser cooling water discharge canal flowing at 940,000 gpm. This dilution of the liquid radioactive wastes lowers the concentration to a level which is in accord with the limits prescribed by 10 CFR 20 and the State of Illinois regulations at the time of discharge. The expected average annual activity discharge is actually less than one-fourth that permissible under 10 CFR 20. This estimation assumes that the activity discharged consists only of radioisotopes Sr-90 and Pb-210 which overstates the actual contribution to the environs radioactivity.

The liquid radioactive discharge concentration from the Station will meet the requirements of 10 CFR 20 and the State of Illinois regulations. Since no Ra-226 or Ra-229 of Station origin will be present, the discharge concentration for an otherwise unidentified mixture is set at a fixed maximum. However, if certain other radioisotopes which, when determined by the methods set forth in 10 CFR 20, Appendix B, Paragraph 5, are considered absent, then higher permissible concentrations may be used for discharge. Waste discharges are averaged for the calendar year. Since additional dilution of wastes by the normal river flow further reduces radioactivity, concentrations of waste activity actually in the river are of the order of one-thousandth of the maximum permissible concentration per 10 CFR 20 for the mixtures generally discharged.

Protection against accidental discharge is provided by design redundance, instrumentation for detection and alarm of abnormal conditions, and procedural controls. The arrangement of the radwaste building and the methods of waste processing provide a substantial degree of immobility of the wastes within the Station. This is to assure that in the event of a failure of any of the liquid waste equipment, or errors in operation of the system, the potential for inadvertent release of liquids is small. For example, the waste collector tanks, filter and demineralizers, centrifuges and other equipment within the radwaste building are contained within cells so that leakage is contained within the building. The waste surge tank, waste sample tanks and the floor drain sample tanks are located on a concrete pad outside the building. The pad is provided with a retention curb and a sump to confine the contents of a tank if it should fail or leak.

To prevent spread of radioactivity to the grounds or other areas outside the confines of the Station, those tanks, equipment and piping, which contain liquid radioactive wastes are enclosed within the radwaste building or pipe trenches. Consequently, in the vent of leaks, spills, and overflows from such equipment, control of the liquid radioactive waste is assured. Sumps and pumps collect such wastes and return them to the appropriate system for processing.

(3) Solid Radioactive Wastes

The purpose of the solid radioactive waste control system is to process, package and provide shielded facilities for solid wastes and to allow for radioactive decay and/or temporary storage prior to shipment from the station for off-site disposal. These solid radioactive wastes are prepared for shipment off-site and subsequent disposal by vehicles with suitable shielding either common or contract carriers in compliance and ICC Regulations.

The processing, packaging and handling, prior and subsequent to storage, are performed in facilities and by procedures, the objectives of which are to minimize personnel radiation exposure and prevent spillage of radioactive wastes, while simultaneously providing for necessary cleanup and for maintenance of equipment.

The reactor wastes such as spent control rod blades and fuel channels, are stored to allow decay in the fuel storage pool, packaged and transferred to permanent disposal off-site in suitable approved shipping containers.

The maintenance wastes such as contaminated clothing and tools, are compressed into bales to reduce volume and are packaged for disposal.

The process wastes such as filter sludges and spent resins, are collected intanks, dewatered, solidified in 55 gallon containers and stored awaiting shipment. The drum filling equipment is operated with remote equipment, mirrors, and conveyors that transport the drums through the drum filling line and within the storage areas.

The following are typical of solid radioactive wastes:

(a) Filter sludges and spent resins.

(b) Concentrated wastes.

(c) Air filters from off-gas and radioactive ventilation systems.

(d) Contaminated clothing, tools, and small pieces of equipment which cannot be economically decontaminated.

(e) Miscellaneous paper, rags, etc., from contaminated area.

(f) Used reactor equipment such as spent control rod blades, temporary control curtains, fuel channels, and in-core ion chambers.

The general procedure for handling is to store temporarily on-site all solid wastes in fiber cartons or steel drums (shielded as necessary). Ultimate disposal is by shipment to off-site storage. The sludges resulting from filter backwashing are received in a sludge tank and routed periodically, on a programmed basis, to one of two centrifuges so that the separation by radiation level is maintained. The centrifuge dewaters the sludge to produce a moist solid which has no free water present. The solids are discharged to a hopper beneath each centrifuge. Centrifuge overflow returns to the waste collector tank for processing and recovery.

Solids collected in the hoppers are remotely loaded into 55 gallon drums and mixed with a solidifying material. These drums are called into position beneath valved loading pipes by a conveyor system. After loading, the drums are then moved to storage, on the conveyor system where they are accumulated in accordance with the radiation level of the solids to await off-site shipment. Used reactor equipment is first stored for sufficient time inthe fuel storage pool to obtain decay of the short-lived isotopes before removal for off-site shipment.

The activity of most other categories of solid wastes is low enough to permit handling of packages by contact. These wastes are collected in containers located in appropriate zones around the plant, as dictated by the volume of wastes generated during operating and maintenance. The containers are then sealed and moved to a controlled-access, enclosed storage area for temporary storage. Compressible wastes are compacted by a hydraulic press-baling machine to reduce their volume and then packaged and stored. Ventilation is provided to maintain control of contaminated particles when operating packaging equipment. Compacted and non-compressible wastes are eventually shipped to an approved off-site facility for storage or burial.

Equipment too large to be handled in this way will require special procedures. Since the need for handling of large equipment is quite infrequent, providing storage facilities in advance is not justified. Handling of such equipment depends upon the radiation level, transportation facilities, and available storage sites. Suitable procedures for decontamination, shielding, shipment, and storage of such items will be developed as necessary.

The solid radioactive waste control system is basically a series of mechanical operations that are designed to process the solid wastes remotely with a minimum of personal handling and exposure. The handling and processing will be capable of being performed without exceeding established exposure limits.

Ample shielding of the processing and storage areas has been provided to assure personnel safety during operation. Viewing mirrors are provided in all locations where visible control is required in a radioactive area. In addition, ventilation is provided for contamination control during maintenance and clean-up.

3. Thermal Effects

Edison is constructing a 1275 acre cooling lake adjacent to the Dresden site. Condenser cooling water taken from the Kankakee River for Dresden Unit 3 will be discharged into the lake, where it will be cooled before it is either recycled through the plant or returned to the Illinois River.

The State of Illinois Sanitary Water Board has designated the Illinois River in the vicinity of Dresden as an Industrial Water Supply Sector. The Board's temperature standards for this section of the river, which have been approved by the U.S. Department of the Interior, require that the temperature of the discharge water shall not exceed 93°F at any time, that controlled changes in temperature shall not exceed 2°F per hour, and that there shall be no more than a 5°F cumulative change from the natural water temperature. These standards are to be met based upon the minimum weekly flow which occurs once in ten years. The discharges will meet all standards, including temperature requirements, promulgated by the State of Illinois Sanitary Water Board, and it is expected that a certification by the appropriate State agency will be obtained as required and within the time permitted by the Water Quality Improvement Act of 1970.

Ecological studies indicate that Dresden Unit 1, which has been operating for ten years and discharges warmed condenser water directly to the Illinois River, has had no effect on the condition of the Illinois River. There has been no change in biotic communities or water chemistry that can be related to the operation of Dresden Unit 1.

The Illinois River has received sewage and industrial wastes from the Chicago area since the 1900's when the direction of the Chicago River was reversed to flow away from Lake Michigan. This flushed the effluent from the Chicago area southward through a canal and river system into the Illinois River. As a result, the Illinois River in the vicinity of Dresden contains sewage and industrial wastes.

In the best opinion of Commonwealth Edison and its consultants, the discharge of water from the Dresden cooling lake into the Illinois River will not have any deleterious effect upon the present river environment nor will it hinder any efforts to upgrade this water.

4. Other Effects

Dresden Unit 3 is located on the Illinois waterway, which is rapidly developing into a highly industrial area. An oil refinery, chemical plants, a sulfur terminal, a nuclear fuel reprocessing facility, and an aluminum mill are a few examples of the diversified type of industrial activity carried out along the waterway up and downstream from Dresden Station. The physical presence of Dresden Station does not adversely affect the industrial character of the waterway area.

Dresden Unit 3 will discharge small amounts of ordinary chemicals into the waterway, primarily originating from the chlorination of the condenser water and regeneration of demineralizers. The amounts of these discharges are regulated by the Rules and Regulations of the State of Illinois Sanitary Water Board, which have been approved by the U.S. Department of the Interior. Our discharges will comply with these standards.

The Dresden Station sewage treatment plant, which was recently enlarged to accommodate the increase in personnel required to operate Dresden Units 2 and 3, has primary and secondary treatment and the effluent is chlorinated. The plant is licensed by the State of Illinois and is under the supervision of a licensed sewage plant operator. The quality of the effluent from the plant equals or exceeds that required by the standards of the State of Illinois Sanitary Water Board.

## B. POSSIBLE ADVERSE, UNAVOIDABLE ENVIRONMENTAL EFFECTS

No adverse environmental effects are anticipated because of the construction and operation of Dresden Unit 3. The unit was constructed and will be operated to conform with all Federal and State of Illinois regulations designed to protect the environment.

Mention might be made of two possible problems which may develop with the cooling lake. Because the lake will be fed by river water containing relatively high levels of nutrients and organic materials, there is the possibility of excessive growth of algae and rooted aquatic vegetation. The decomposition of these plants may present a local problem. However, the situation will be closely watched and corrective action will be taken should the need arise.

Low-lying fog may be present under certain atmospheric conditions over the cooling lake. With favorable atmospheric conditions, there is a tendency for fog to form above water surfaces. However, experience has shown that with smaller bodies of water the fog tends to remain in the vicinity of the water and generally does not spread far into the surrounding areas. However, it is expected that the fogging effects from the lake will be considerably less than those that would have been experienced if cooling towers had been installed for cooling the warm condenser water.

## C. ALTERNATIVES TO DRESDEN UNIT 3

### 1. Alternative Power Supplies

At this date, there are no practical alternatives to Dresden Unit 3 for an adequate supply of electricity. The unit will be required, beginning in 1971, to supply the electrical power requirements of the people who live and work in the service territory of Commonwealth Edison Company. Through interconnections, it also will be available to supply electricity to other midwest utilities should the need arise.

Even though Dresden Unit 3 is expected to be available for service in the summer of 1971, additional sources of power will be required to meet the anticipated 1971 summer peak on the Edison system.

Two hundred megawatts of firm power for the summer has been purchased from three utility companies. In addition, 228 megawatts of new fast-start peaking units are scheduled to be in service by the summer of 1971. There is not sufficient time to install additional fast-start peaking units to meet the 1971 summer peak. Also, there is not enough additional firm power available for purchase during the summer of 1971 to cover the non operation of Dresden Unit 3, although some short-term emergency power may be available.

In addition to helping meet summer demands for electricity, Dresden Unit 3 will be equally important the rest of the year when demands for electricity are less.

It is during this period that generating units must be taken out of service for maintenance and overhauled. Dresden Unit 3 will be needed to supply power during these periods.

2. <u>Alternative Cooling Systems</u>

In 1965 when Dresden 3 was committed, the plant was designed to meet all existing State of Illinois water quality standards as promulgated by the Illinois Sanitary Water Board. However, in 1960 the water temperature standards were changed, and the original Dresden Unit 3 design for cooling no longer is adequate to meet these new temperature standards without a supplemental cooling system.

After engineering, environmental, and economic evaluations of alternative cooling systems, a 1275 acre cooling lake was selected as the best cooling system. The evaluation included consideration of mechanical draft cooling towers, natural draft cooling towers, and the cooling lake. Although the evaluation indicated that mechanical draft towers would be the most economical to own and operate, a cooling lake was selected for environmental reasons.

Cooling towers of the size required would produce significant fogging under certain atmospheric conditions in the Illinois River valley, the site of Dresden Unit 3. Since the Illinois River is a navigable waterway bearing heavy traffic, the fogging was considered to be a hazard to navigation which could cause serious accidents. Moreover, it would be undesirable to a larger number of person in the vicinity of the site than any fog created by the cooling lake.

In summary, it is the opinion of Commonwealth Edison and its consultants that the cooling lake presently under construction and designed in full compliance with all existing applicable Illinois State rules and regulations will have little, if any, effect upon the local environment. Authority to construct the lake has been obtained from the appropriate local authorities.

## D. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY.

Electrical energy is a prime factor in the high economic achievement of the United States. It is vital to the health and welfare of the nation. Electricity in ever increasing amounts is needed to pump water, dispose of wastes, provide food, heat, light and cool, and manufacture goods. It is an essential part of the innumerable and necessary services and products required for modern civilization.

The Federal Power Commission has stated, "the electric utility industry has filled, and must continue to fill an important role in channeling the nation's productive resources into more efficient uses. As an auxiliary and, indeed, a breeder of economic growth, the industry has furnished a rising proportion of the country's energy requirements as manual effort has been replaced by inanimate energy ... The expanding use of energy-consuming capital equipment has been a principal source of improvement of national productivity and a stimulus to economic progress. ...Electricification has had an enormous and far-reaching impact on other industries and on the living standard of people in every walk of life."

Commonwealth Edison has the responsibility of providing electricity to one quarter of the geographic area of Illinois. Within this area live 7.8 million people, 70% of the population of the state and 4% of the population of the country. Long ago Commonwealth Edison had recognized it has the obligation to provide the amounts of electricity needed by the people it serves where they need it and when they need it while at the same time minimizing the impact of Edison's activities upon the environment.

The 953 acres on which Dresden Station is located was dedicated for use for installation of nuclear generating units in 1955 when Dresden 1 was committed. In 1956, the Illinois Commerce Commission issued to Commonwealth Edison a Certificate of Public Convenience and Necessity for the construction, operation and maintenance of Dresden Unit 1 and additional generating units as required. At public hearings held in the vicinity prior to issuance of construction permits for Dresden 2 and 3, several local agencies, including the Board of Supervisors of Grundy County, the Board of Trustees of the Village of Morris, Illinois, the Illinois Department of Health, and the Illinois Atomic Energy Legislative Committee, urged on the record that the construction of these units be authorized.

Dresden Unit 3 is needed so that Commonwealth Edison can fulfill its obligations to the public it serves. Nuclear generating stations are good neighbors. They are clean, quiet, emit no products of combustion, and have a minimum impact upon the environment. Dresden Unit 3 not only will help supply essential electric service to the residents of Northern Illinois, but also to virtually the entire midwest through Edison's interconnections with other electric utility companies.

In the opinion of Commonwealth Edison, Dresden Unit 3 will enhance the long-term productivity with no adverse environmental effects.

## E. IRRETRIEVABLE AND IRREVERSIBLE COMMITMENTS OF RESOURCES

The construction and operation of Dresden Unit 3 will require no unusual commitments of resources. The irretrievable and irreversible commitments of resources required by the unit will be small compared to the benefits obtained from the electricity produced by it. Electrical energy is a prime factor in the country's high economic achievement.

The unit will convert raw energy to electricity as any other electric generating unit. However, unlike fossil fueled generating units, the consumption of fuel by a nuclear unit, such as Dresden Unit 3, is accompanied by the production of a new type of fuel (plutonium) and many other potentially valuable materials. In addition, nuclear units conserve fossil fuel reserves. Oil and natural gas, which now supply 73% of our nation's total requirements for raw energy, are the fuels for which there are the smallest known potential reserves. All three fossil fuels; oil, natural gas, and coal, should be preserved for preferred uses such as conversion to petro-chemicals.

Based upon a 70% capacity factor, Dresden Unit 3 will consume about 400 kilograms of uranium -235 per year. However, about 120 kilograms of fissile plutonium will be recovered from the fuel per year. If used in a light water reactor, this plutonium is equivalent to the uranium-235 contained in about 20 tons of yellow cake ($U_3O_8$). With the development of the fast-breeder reactor, the plutonium will have a much greater energy potential. Moreover, a number of potentially valuable by-products are created in nuclear fuel. These include, among others, the precious metals, rhodium, palladium, and ruthenium; xenon, a rare gas; heat sources such a americium-241 and curium-242; heat and radiation sources such as krypton-85, strontium-90 and cesium-137; and neptunium-237, which is a precurser of plutonium-238, an energy source of proven value. Except for neptunium the technology to economically recover most of these materials from spent reactor fuel has not been perfected. However, it is expected that in the future these substances will be recovered and will provide a valuable contribution to the national resources.

At the end of the useful life of the unit, all of the land committed to the unit can be applied to a useful purpose. To state what useful purpose this land will be put to in the 21st Century would be sheer speculation. However, there is no intrinsic reason why all of the land, including the cooling lake, cannot be used for any number of purposes including recreation. Upon decommissioning, much of the building materials and equipment can be recycled for further use either as scrap or salvageable materials.

It is the opinion of Commonwealth Edison that the construction and operation of Dresden Unit 3 will not adversely affect the environment in terms of the irretrievable and irreversible commitment of resources.

## F. ENVIRONMENTAL STUDIES

The environmental studies being conducted by Commonwealth Edison at the Dresden site include radiological, aquatic-thermal, and meteorological monitoring programs.

Commonwealth Edison has provided a monitoring program of radioactivity in the environs of the Dresden site since 1958. The major part of the program is conducted by expert, qualified, independent contractors.

The natural and man-made radioactivity of the environs of the Dresden site is also surveyed by the U.S. Public Health Service, Argonne National Laboratory, and the State of Illinois Department of Public Health. The State of Illinois Department of Public Health has an air particulate monitoring station near the environs monitoring station operated by Commonwealth northwest of the station, near Channahon, Illinois.

Data from the Commonwealth environs monitoring program are consistent with the data reported by other agencies for corresponding periods and geographical area. No significant trends, unusual values which can be correlated from one type of sample to another, or significant increase in a specific nuclide were observed except for the normal fluctuations in results due to varying climatological conditions. This was confirmed by a recent extensive survey of the Dresden environs made by the U.S. Public Health Service.

All data obtained from the Commonwealth environmental monitoring program indicate that the control measures taken at the Dresden Nuclear Power Station have been effective in minimizing contributions to the radioactivity in its environs.

An aquatic-thermal monitoring program at Dresden has been underway since June, 1969. It includes collection and analysis of physical, chemical, and biological data in the aquatic vicinities of the site. Physical data include temperature, current, weather, turbidity, and bottom characteristics. Chemical data include dissolved oxygen, organics, nutrients and chlorides. Altogether, 19 chemical parameters important to the aquatic environment are being monitored. Biological data include samples of bottom organisms, plankton, periphyton, and fish. The study also includes identification of specific food chains. The analysis will concentrate on establishing statistically valid relationships among physical, chemical, and biological parameters for projecting and determining ecological effects of the thermal discharge. While no adverse ecological effects are anticipated, this program is designed so that corrective action, if needed, can be taken prior to any adverse effect.

This aquatic-thermal monitoring program was recommended by Drs. Beer and Pipes (A Practical Approach to the Preservation of the Aquatic Environment: The Effects of Discharge of Condenser Water into the Illinois River, June L, 1969, p. 11, item 4). Based on samples of physical, chemical, and biological data taken in the fall of 1968, that study concluded that a cooling lake would be required to meet water quality criteria and to properly protect the ecological environment with the operation of Dresden Unit 3.

A meteorological monitoring program has been underway at Dresden since December, 1967. It provides data on wind speed and direction at four elevations up to 400 feet, air temperature, ground level concentrations of total air borne emissions, amounts and duration of precipitation, and analysis of stability conditions. (From 1958 through 1967, data on wind speed and direction at one elevation were collected.) This program is of specific importance to the radiological monitoring program.

G. PLANNED RECREATION

Dresden Unit 3 will not impair or damage any recreation uses of the area. The chief aquatic recreation in the immediate area of the station is boating. Because of the degraded water quality of the Illinois River fishing is poor. The construction and operation of Dresden Unit 3 will not interfere with any aquatic recreation. The Dresden site was originally largely farm land. A portion of the site is still being used for this purpose. Some recreational activity in the form of hunting is permitted on the site outside the security fenced areas during legally prescribed seasons. No further recreation uses are planned for the site in the immediate future.

The Dresden cooling lake, most likely, will not be immediately suitable for recreation purposes. The water for the lake will be taken from the rivers adjacent to the station and will be of poor quality. The polluted water coupled with the elevated temperature of the cooling lake probably will result in an environment that is not compatible with most desirable aquatic life.

If the quality of the river water which feeds the lake improves, the possibility of other beneficial uses of the lake will be enhanced. In the future, it may be possible to utilize the lake for recreational purposes such as sport fishing or a wild life preserve similar to the use now made of our Kincaid Station cooling lake located near Springfield, Illinois.

## H. POLLUTION CONTROL MEASURES WHICH WERE INSTITUTED DURING CONSTRUCTION OF DRESDEN UNIT 3

During construction of Dresden Units 2 and 3 special sanitary facilities (primarily chemical toilets) were installed for the construction forces at the site. A number of these were placed throughout the site at the start of construction. The sanitary facilities were expanded to accommodate the needs of the increased work force as construction progressed. An addition to the permanent sewage treatment facilities at Dresden Station was constructed to accommodate the increase in station personnel required for the new units. The addition is in operation and complies fully with current State of Illinois Sanitary Water Board requirements.

During construction, roads to the site have been oiled to reduce dust and have been kept under constant repair. In conjunction with the construction of the cooling lake, Dresden Road and County Line Road are being completely rebuilt. Mutually agreeable plans have been developed with the local governmental bodies concerned.

Docks have been constructed on the site for receipt of materials. A docking facility at the river was builts for receiving materials, primarily sand and gravel. This docking facility will be removed after construction of the generating stations is complete. A docking facility at the station end of the discharge canal also was constructed. This facility was used for unloading the reactor vessels. At this time, it has not been determined whether this facility will be removed after completion of construction.

No dikes have been constructed at the station other than those being used for the cooling lake. Dikes will be constructed around the perimeter of the lake except for a small portion on the southeast end of the lake -- 85% of the lake perimeter is diked.

# I. STATE AND LOCAL AGENCY APPROVALS

The following approvals, relating to environmental matters, have been obtained from various state and local agencies.

## A. State of Illinois

1. Sanitary Water Board - Construction and operation of liquid radioactive waste and sewage treatment facilities.
2. Department of Public Works & Buildings, Division of Waterways - Dredging and maintenance of intake and discharge flumes.
3. Department of Aeronautics - Construction of meteorological survey tower and gaseous radwaste chimney.
4. Commerce Commission - Certificate of Public Convenience and Necessity.

## B. Local Agencies

1. Grundy County - Construction permits
2. Will County - Construction permits

# III

# BACKGROUND INFORMATION ON SITE AND SURROUNDING AREA

## A. INTRODUCTION

The Dresden Nuclear Power Station was thoroughly investigated as a site for a nuclear power reactor and found to be suitable by the AEC in 1956 when the construction permit (AEC Docket 50-10) for Dresden Unit 1 was issued. The successful operation of Unit 1 since 1960 and the environs monitoring program carried on by Commonwealth, the State of Illinois and the Argonne National Laboratory have confirmed such findings.

More recently, in order to be assured that there had been no changes in the site characteristics or development in the site environs, new studies and investigations were conducted to determine that the Dresden Station is suitable as a site for Units 2 and 3. Studies and investigations by independent, qualified expert firms in the areas of meteorology, geology, seismology and hydrology and further evaluation of population densities and land usage in the site environs were prepared and submitted for review in AEC Dockets 50-237 and 50-249. On the basis of such studies and the reviews by the AEC Staff and other governmental agencies it was concluded in the proceedings in such dockets that the Dresden Station satisfies the site criteria contained in 10 CFR 100 and that Unit 2 and Unit 3 could be constructed at that site without undue risk to the health and safety of the public.

## B. SITE SIZE AND LOCATION

The site for Dresden Nuclear Power Station consists of a tract of land of approximately 953 acres located in Grundy County, Illinois and is owned by Commonwealth Edison Company. The site boundaries generally follow the Illinois River to the north, the Kankakee River to the east, a country road from Divine extended eastward to the Kankakee River on the south and the Elgin, Joliet and Eastern Railway right-of-way on the west as shown in Figure 2, page 42.

In addition to ownership of the 953 acre tract, Commonwealth also leases approximately 17 acres in two narrow strips of river frontage located near the northeast corner of the site from the State of Illinois. The terms of the lease provide that these "buffer" strips shall remain idle.

A 1275 acre cooling lake is being constructed to the south and east of the station site. The lake extends generally north of Lorenzo Road from Dresden (Pequat) Road, to the Santa Fe R.R. Right-of-way, to a line about 250 feet south of the Kankakee River, as shown in Figure 3, page 43.

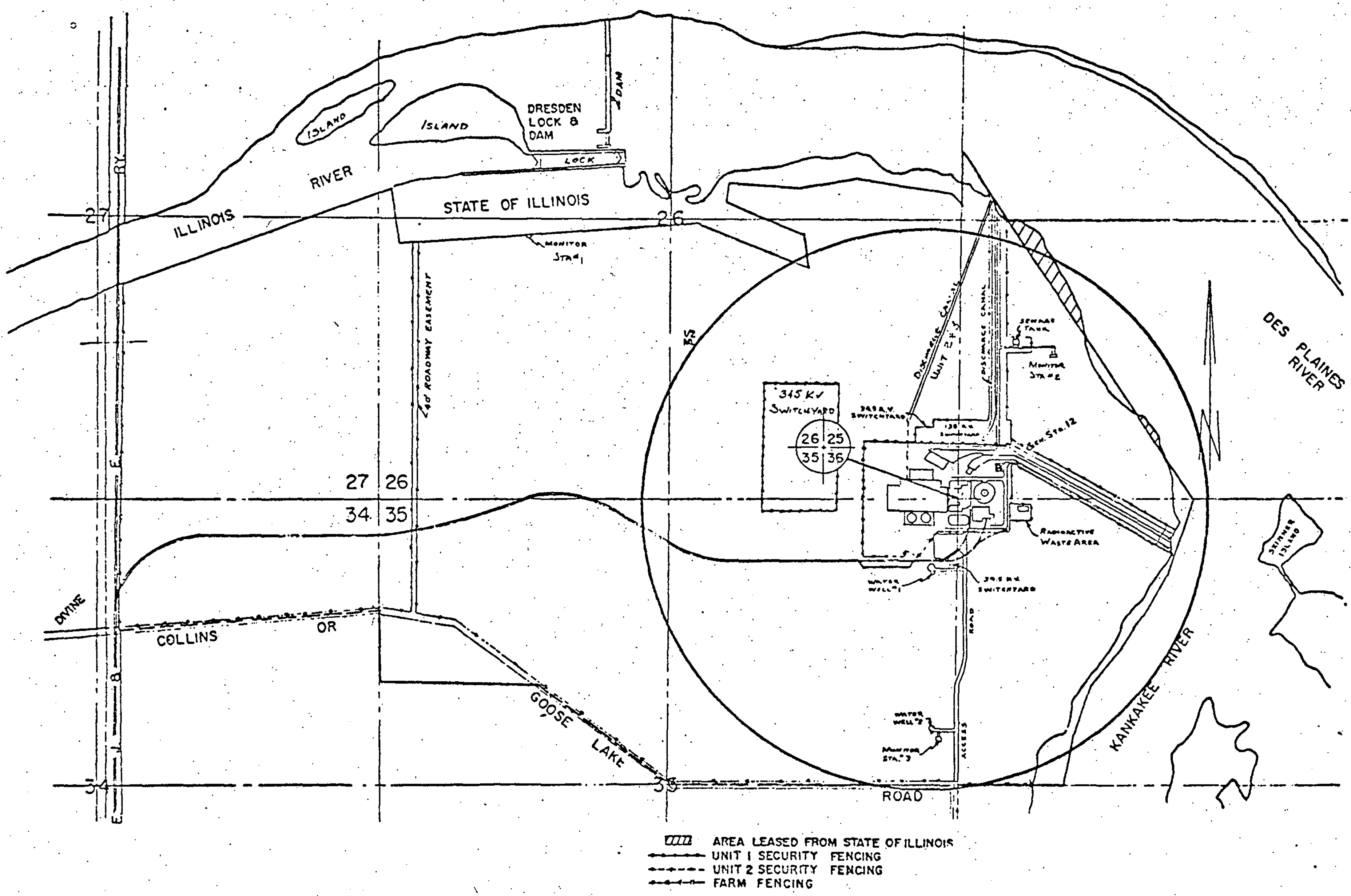


Figure 2 Station Property Plan

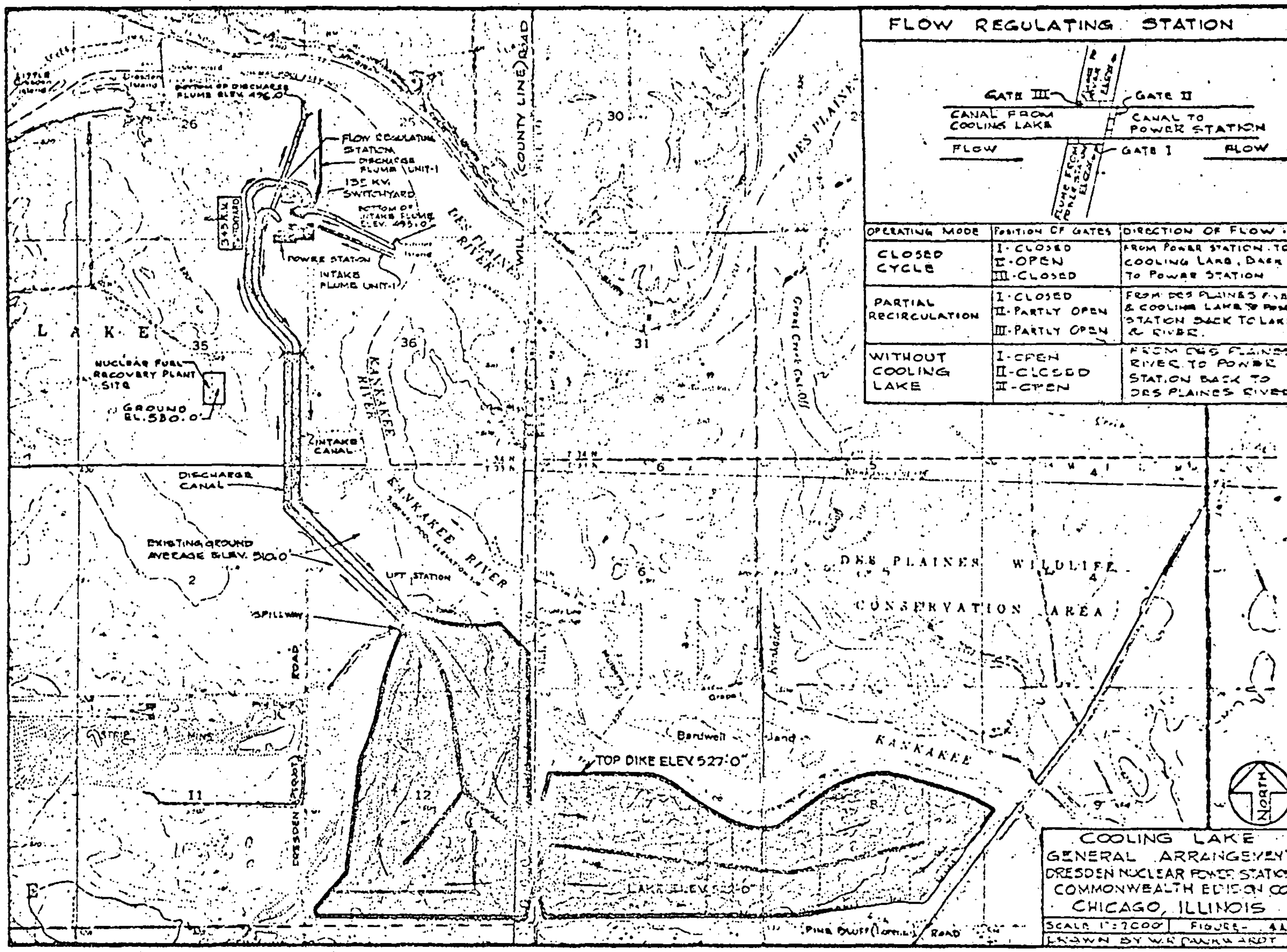


FIGURE 3 COOLING LAKE GENERAL ARRANGEMENT

## C. LOCATION OF THE UNITS ON THE SITE

Unit 1 is located in the northeast quadrant of the site with an intake canal extending west from the Kankakee River and a discharge canal extending north to the Illinois River. Unit 2 is located on the site immediately to the west of and adjacent to Unit 1. The location of Unit 3 is immediately to the west of and adjacent to Unit 2. At this location, the units will be situated approximately 0.5 mile from the south boundary of the site, 0.5 mile south of the center of the navigation channel in the Illinois River, and approximately one mile from the west boundary of the site.

## D. OTHER ACTIVITIES ON THE SITE

Portions of the 953 acre tract outside the area occupied by the Station are leased to a neighboring farmer for cattle grazing and field crops. Approximately 150 acres are used for grazing with appropriate fencing provided to control the approximately 75 head of cattle that may be present during the pasturage growing season. Field crop cultivation generally occupies about 300 acres.

A 350 foot, guyed, structural steel micro-wave relay tower, owned by the Bell System, is located approximately 1000 feet west-southwest of the reactor building. The equipment installed on the tower and in the small adjacent control building is automatically controlled, and requires infrequent visits to the facility by Bell System maintenance personnel.

No activities other than those enumerated are currently contemplated for the future. There are no residences on the site.

## E. POPULATION IN ADJACENT AREAS

Residential occupancy in the immediate vicinity of the Dresden site is low. Within a one mile radius there are several residences at the Dresden Dam about 0.8 mile northwest of the location of the units, a few homes about the same distance on top of the bluffs on the opposite shore of the river to the northeast, and several farm residences at 0.8 mile to 1.0 mile to the south and southwest. In addition, there is a cluster of about 20 cottages on the west shore of the Kankakee River about 0.7 mile from the unit locations. Most of these are occupied only part-time for recreational purposes.

The population within a radius of five miles from the site is approximately 2,600. The largest village in this zone is Channahon (population 1,200) which is located 3-1/2 miles to the northeast.

The total population within a 10-mile radius is about 25,000. The largest community in this area is the city of Morris, county seal of Grundy County. Morris is located approximately 8 miles west of the site and has a population of about 8,000. Braidwood, located 9 miles, southeast of the site, has a population of about 6,900. The increase in total population within the 10-mile zone was about 70% in the 1950-1065 census interval. This trend will probably continue in the foreseeable future.

The population in the 10-25 mile zone is estimated to be 225,000. There are two population centers within this zone, the closest being Joliet, centered 14 miles northeast of the site, with a population of about 75,000. The city of Aurora, 25 miles to the north, is the other population center and has a population of about 64,000. It is estimated on the basis of the 35% growth pattern in the 1950-1960 census interval that the population of the 10-25 mile zone will have increased to approximately 300,000 by 1970.

## F. LAND USAGE IN ADJACENT AREAS

The land to the north and west of the site is used principally for agriculture. Directly to the south and adjacent to the site is the Nuclear Power Plant Training Center which the General Electric Company has constructed and equipped with a reactor training simulator. General Electric Company also is constructing in the same adjacent area its Midwest Fuel Recovery Plant. Just west of the fuel recovery plant, Reichold Chemicals Company is constructing a basic chemicals plant. Other activities within three miles south of the site are those of the Illinois Clay Products Company (refractories and brick products), some agricultural operations. An abandoned strip mine area used for primarily recreational purposes and the newly created Goose Lake Prairie State Park are also located in this area. The nearest boundary of the large (36,000 acres) Joliet Arsenal is located approximately two miles east of the site and adjacent to a recreational area of about 2500 acres owned by the State of Illinois.

## G. GEOLOGY

A study of the geology of the Dresden site was made in 1965 by Dames and Moore, Consultants in Applied Earth Sciences, Soil Mechanics, Engineering Geology, Geophysics. The geological characteristics of the site, which were previously studied and determined to be suitable for Dresden 1, have been confirmed by the 1965 study. The load bearing capability of the rock formation is significantly in excess of that necessary for the support of the proposed units. The topographic (elevations) characteristics of the Dresden Station, particularly that proposed for location of the new units, preclude possible movements (slides), either of the plant structures into the Illinois River or earth slides from adjacent higher elevations on to the units.

## H. HYDROLOGY

The Harza Engineering Company, Chicago, Consulting Engineers - River Projects made a study in 1965 of the characteristics of the river systems of interest. The Dresden site at the confluence of the Des Plaines and Kankakee Rivers is at the location considered to divide the upper and lower parts of the Illinois River system. The normal pool elevation controlled at the adjacent Dresden Island Lock and Dam is 505 feet, with a maximum historical flood elevation of 506.4 feet. Nominal ground elevation is about 516 feet at the location of the principal structures of Units 2 and 3. Consequently the probability of flooding critical areas of the site is remote. Spillway capacity at the Dresden Island Lock and Dam is well in excess of the estimated maximum instantaneous flow of the Illinois River (100,000 cfs. based on the assumption that maximum flows for all contributory streams occur simultaneously). The site elevation is well above the vast valley storage area upstream from the dam.

River system flow data applicable to the Dresden site for the years 1961-1964 show that river flow exceeds 3,000 cubic feet per second (cfs) on 98% of the days, 3,600 cfs on 93% of the days, 4,000 cfs on 87% of the days, 5,000 cfs on 63%of the days, and 6,000 cfs on 48% of the days. Such flows are more than adequate to assure the availability of sufficient quantities of water for dilution of all radioactive liquid wastes discharged into the Illinois River within the limits in 10 CFR 20, and to reduce concentrations to approximately 1/1000 of the Maximum Permissible Concentration in the river below the point of discharge from the Station.

The closest point downstream of Dresden Station where the Illinois River is used as a source of domestic water is at Peoria, 100 river miles downstream from the Station. At this point the combined effects of dilution, mixing, radioactive decay and deposition on river bottom of the radioactivity will have rendered the contribution of radioactivity by Dresden Station negligible in relation to that present in the Illinois River from other sources.

The principal usages of the water of the Des Plaines River and the Illinois River in the area of Dresden Station are for navigation, sewage disposal and dilution, and condenser cooling water for power plants. The Kankakee River, upstream from Dresden Station, is not navigable and is used for domestic supply and recreation.

## I. REGIONAL AND SITE METEOROLOGY

Murray and Trettel, Certified Consulting Meteorologists, Northfield, Illinois, studied the regional meteorological characteristics applicable to the Dresden site. The site is located in rolling prairie terrain typical of much of Illinois. Lake Michigan is the only topographical feature which could have some effect on the local meteorology. However, being about 45 miles to the northeast, this large body of water is considered to have an insignificant effect on the dispersive characteristics around the site. The normal annual precipitation in the area is 33.18 inches. A 24-hour maximum rainfall of 6.24 inches has been recorded. The average annual snowfall since 1929 is 37.1 inches. The maximum snowfall from 1929 through mid-1967 was 66.4 inches, recorded in the winter of 1951-1952. Maximum temperature in the area, based on the July, 1949 - June, 1955 Argonne National Laboratory data, was 97°F, and the minimum was -19°F.

In the 50 year period, 1914 - 1963, four tornadoes have been reported in Grundy County. Within the state, a total of 140 were reported with 52 being classified as "destructive" i.e., causing $50,000 damage or more and/or at least one death. A tornado covers an average area of about 8 square miles once it touches down. Widths of tornado paths range from about 100 feet to a maximum of about 4 miles. Tornadoes have been known to touch down repetitively in erratic patterns. Path Lengths, however, range from about 1 mile to the longest recorded, 163 miles. Two tornadoes were reported near the Dresden site since 1965. On November 12, 1965 a tornado passed 4 miles west of the site while moving toward the east-northeast at approximately 70 mph. Several electrical transmission lines to the site were interrupted and as a result Unit 1 was shut down for about 24 hours. The second tornado, on May 24, 1966, passed near the site, resulting in one transmission line being lost. However, the load was carried by other electrical transmission lines with Unit 1 operating normally.

Thom(2) divides the United States into one degree squares and determines the tornado frequency for any point within each square. Using data from 1953-1962, Thom records 17 tornadoes occurring within a 1° square (about 2.3 million acres) encompassing the site. A mean recurrence interval for a tornado striking a point was calculated to be 760 years using Thom's method. Even though the occurrence of a tornado touching down at the Dresden site may be considered very remote, each unit at Dresden Station has been designed so it can be shut down and maintained in a safe shutdown condition if such an event were to occur.

Annual wind frequencies show a rather uniform distribution of wind direction which is typical of mid-continent

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(2) Thom, H.C.S. (1963) "Tornado Probabilities," Monthly Weather Review, U.S. Weather Bureau, Washington, D.C., October-December 1963, pp. 730-736.

locations. The most frequent wind directions are from the west and south sectors. (A sector is defined as 22-1/2°.) The highest velocity of wind officially reported at various locations around the site area is 87 mph at Chicago and 75 mph at Peoria. Higher gusts are reported unofficially, up to 109 mph during heavy thunderstorms and scattered tornadic activity. A structural design capable of withstanding wind loadings of 110 mph is considered appropriate for withstanding sustained winds which can be reasonably anticipated. Hourly wind direction variability at the site shows that an average direction range (angular change in direction) is 120° in a 1-hour period, for all wind speed conditions combined. During 0-3 mph wind speeds, the average range in direction is 100°. Approximately 87% of the time when the wind speed is 0-3 mph (or 98.3% of all wind speeds) the wind direction range is 60° or more, which corresponds to a value of the diffusion parameter of 20°-mph or 0.16 radian-meters/second.

It is concluded that from a meteorological standpoint the site is suitable for the combined operation of Units 1, 2 and 3. The environmental surveys of the site and surrounding areas conducted by Commonwealth Edison, Argonne National Laboratory and the State of Illinois demonstrate that meteorological diffusion characteristics provide a means for dispersion of gaseous wastes emitted during normal operation to a degree that they are almost undetectable in the environs of the site. There is nothing in the meteorological or topographical data which indicate that the diffusion mechanism would not be operative during assumed hypothetical accident conditions. The hourly wind direction variability of 60° for more than 98.3% of the time at all wind speeds provides evidence that the concentration of any accidental release of radioactive gaseous products would be rapidly diluted and dispersed.

## J. SEISMOLOGY

The Dresden site area is placed in Zone 1 (zone of minor damage) on the seismic probability map of the 1958 Uniform Building Code. The August 1958 Seismic Regionalization map by Richter gives general predictions of probably maximum intensity, and, recognizing that lines between the areas of differing intensity are approximations only, shows the Dresden region as Modified Mercalli (MM) 7 to 8.

Only a few earthquakes of significant intensity in northern Illinois have been reported since 1800, and none has been accompanied by clear-cut surface faulting. A quake on May 26, 1909 caused moderate damage in Aurora, Bloomington, Chicago, and Joliet, and may have been of intensity MM7 in the Dresden area. A quake on January 2, 1912, had a reported intensity of MM6 at Aurora, Yorkville, and Morris, and probably was of similar intensity at the Dresden site location.

The engineering consulting firm of John A. Blume and Associates, San Francisco, has been retained for advice on seismology, and they have consulted Dr. Perry Byerly, Oakland, California, on the seismicity of the site region.

The seismological studies indicate that the area of northern Illinois and the actual Dresden site are seismically suitable. Nevertheless, it has been considered appropriate to adopt a design approach which will assure the safety of Units 2 and 3 so as to preserve the ability to maintain the units in a safe, shutdown condition in the event of a strong earthquake having a ground acceleration of 0.2g.

REGULATORY DOCKET FILE COPY

50-249



EXHIBIT I

Environmental Statement

Dresden Nuclear Power Station

Unit 3



Commonwealth Edison Company Docket No. 50-249

July 24, 1970



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