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BACKGROUND INFORMATION DOCUMENT TO SUPPORT NESHAPS RULEMAKING ON NUCLEAR POWER REACTORS

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A. Colli
Work Assignment Manager

Prepared for

U.S. Environmental Protection Agency
Office of Radiation Programs
401 M Street, S.W.
Washington, DC 20460

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PREFACE

In the *Federal Register* notice dated March 13, 1991, the Administrator of the Environmental Protection Agency announced his intention, pursuant to the 1990 amendments to the Clean Air Act (CAA), to rescind the National Emission Standard for Hazardous Air Pollutants (NESHAP) promulgated on October 31, 1989, as it applies to commercial nuclear power reactors (40 CFR 61, Subpart I). The purpose of this Background Information Document (BID) is to present information relevant to the Administrator's reconsideration of Subpart I.

The 1990 amendments to the CAA allow the Administrator of EPA (the Administrator) to decide not to regulate NRC-licensed facilities under Section 112 of the CAA if the Administrator determines that NRC's existing programs for regulating these facilities assure that the public's health is being protected with an ample margin of safety.

Should the Administrator determine that an ample margin of safety exists for commercial nuclear power reactors, he may decide to withdraw Subpart I of the NESHAP, as it applies to commercial nuclear power reactors.

Copies of the BID are available to all interested persons; an announcement of the availability appears in the *Federal Register*. For additional information, contact Al Colli at (703) 308-8787 or write to:

Director, Criteria and Standards Division
Office of Radiation Programs (ANR-460)
Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

LIST OF PREPARERS

Various staff members from EPA's Office of Radiation Programs contributed to the development and preparation of the BID:

Albert Colli	Environmental Scientist	Reviewer
Craig Conklin	Health Physicist	Reviewer
Dale Hoffmeyer	Health Physicist	Reviewer

An EPA contractor, S. Cohen & Associates, Inc., McLean, VA, provided significant technical support in the preparation of the BID.

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Chapter 1

INTRODUCTION AND EXECUTIVE SUMMARY

1.1 STATEMENT OF PURPOSE

In the *Federal Register* notice dated March 13, 1991, the Administrator of the Environmental Protection Agency (EPA) announced his intention, pursuant to the 1990 amendments to the Clean Air Act (CAA), to rescind the National Emission Standard for Hazardous Air Pollutants (NESHAP) promulgated on October 31, 1989, as it applies to commercial nuclear power reactors (40 CFR 61, Subpart I). The purpose of this Background Information Document (BID) is to present information relevant to the Administrator's reconsideration of the need for a NESHAP to control radionuclides emitted to the air from commercial nuclear power reactors.

The 1990 amendments to the CAA allow the Administrator of EPA (the Administrator) to decide that no regulation of NRC-licensed facilities is needed under Section 112 of the CAA if the Administrator determines that NRC's existing programs for regulating these facilities ensure that the public's health is being protected with an ample margin of safety.

Should the Administrator determine that an ample margin of safety exists for commercial nuclear power reactors, he may decide to withdraw Subpart I of the NESHAP, as it applies to commercial nuclear power reactors.

1.2 SCOPE

This BID presents information on the relevant portions of the regulatory framework that NRC has implemented for nuclear power plant licensees, under the authority of the Atomic Energy Act, as amended, to protect the public's health and safety. To provide context, it summarizes the rulemaking history for Subpart I. It then describes NRC's regulatory program for routine atmospheric emissions of radionuclides and evaluates the doses caused by actual airborne emissions from nuclear power plants, including releases resulting from anticipated operational occurrences.

Specifically, the NRC programs in the following areas are summarized:

- Airborne Emissions Controls - the basis for establishing gaseous effluent limits;

- Licensing - the criteria for establishing reactor design, construction, and operating limits for airborne emissions, and the procedures used to provide reasonable assurance that as-built reactors are consistent with the licensing basis provided by the design criteria;

- Airborne Emissions Monitoring - the requirements for monitoring reactor effluents and environmental media to ensure that plant airborne emissions conform with the licensing basis;

- Inspection - the combination of special (regional) and onsite inspections for ensuring that each reactor's licensing basis for allowable airborne effluents is being maintained; and,

- Enforcement - the mechanisms available to ensure that licensees correct any deviations from design bases and operating limits.

An inherent part of comparing plant performance with the licensing basis is the evaluation of the likelihood that NRC's policies and practices will continue to maintain or improve the plants' level of effectiveness. Therefore, additional information is presented on NRC's programs to detect and correct deficiencies (or make improvements) in plant design, construction, and operation.

The BID also evaluates airborne emissions from civilian power reactors plus those of the Federal power authorities. Doses to the most exposed individuals and the populations residing within 80 kilometers of each operable nuclear power station in the United States are estimates based on actual emissions data and the CAP-88 computer codes. The trend in airborne emissions over the last 15 years is also evaluated. Appendix D presents a list of all commercial reactors (and their status -- whether operating, under construction, or no longer in service) considered in this study.

1.3 ORGANIZATION OF THE BID

The remainder of this report is organized as follows: Chapter 2 summarizes the history of the NESHAPs rulemaking as it pertains to power reactors; Chapter 3 discusses NRC's programs intended to protect the public's health and safety; and Chapter 4 presents the methodology and results of the evaluations made of airborne emissions from all operable nuclear power reactors and the trend of airborne emissions over the last 15 years.

1.4 SUMMARY AND CONCLUSIONS

NRC's regulatory program has been reviewed, and those elements pertinent to the control of routine emissions of radioactive material from operations have been described. Additionally, actual radioactive airborne emissions from over 100 power reactors at 69

reactor sites were obtained and the resulting doses to nearby individuals and the populations residing within 80 kilometers of the sites were evaluated using the CAP-88 computer codes.

The major findings of this study include:

1. The doses received by any member of the public from airborne emissions of radionuclides from operable reactors, as estimated using the CAP-88 computer codes, are less than 1 millirem per year effective dose equivalent (mrem/yr ede). The doses being received by the members of the public at greatest risk are lower than the NESHAP standard (10 mrem/yr ede with not more than 3 mrem/yr ede caused by radioiodines) established by the Administrator.

2. While the doses received by members of the public are expected to vary from year to year at any given reactor site, the trend for all reactors shows a decline in the collective population dose over the past 15 years.

3. NRC begins to consider doses received by the public from radioactive effluents early in the licensing process and continues to evaluate doses throughout a plant's lifetime. Each applicant must provide evaluations of the proposed reactor design and effluent controls against the ALARA design criteria in Appendix I of 10 CFR 50.

4. The results of the Appendix I evaluations are reflected in the allowable radioactive releases incorporated into each operating plant's Radiological Effluent Technical Specifications (RETS).

5. Each plant is required to perform effluent monitoring, with results submitted to the NRC semiannually, to provide assurance that actual effluents are within the limits established by the RETS.

6. Each plant is required to calculate doses to the most exposed individuals residing near the plants on a semiannual basis to confirm that the ALARA objectives of Appendix I are being achieved.

7. Each plant is required to monitor environmental media to confirm that the assumptions used in the calculation of offsite doses are appropriate for the site.

8. NRC conducts an extensive inspection program, including onsite resident inspectors, specialized regional inspectors, and independent environmental monitoring, to confirm that the plants are operating in conformance with their regulations and limits.

Chapter 2

SUMMARY OF THE RADIONUCLIDE NESHAP RULEMAKINGS FOR NRC-LICENSED AND URANIUM FUEL CYCLE FACILITIES

2.1 RULEMAKINGS UNDER THE CLEAN AIR ACT AMENDMENTS OF 1977

Pursuant to the 1977 amendments to the Clean Air Act (CAA), on December 29, 1979, the Administrator listed radionuclides as a hazardous air pollutant under Section 112 of the Act (44 *FR* 76738). The Administrator then initiated studies to determine what source categories of facilities emit radionuclides to the air in quantities sufficient to warrant establishing a NESHAP (National Emission Standard for Hazardous Air Pollutants) to limit emissions to levels providing an ample margin of safety to protect the public health.

On April 6, 1983, EPA published a *FR* notice proposing radionuclide NESHAPs for four source categories and announced its finding that NESHAPs were not required for seven of the source categories that it had investigated (48 *FR* 15076). NESHAPs were proposed to limit emissions of radionuclides from elemental phosphorus plants, Department of Energy (DOE) facilities, certain non-fuel cycle facilities licensed by the NRC, and underground uranium mines. Uranium fuel cycle facilities were one of the seven source categories that the Administrator determined did not require a NESHAP.

In October 1984, acting pursuant to a court order to take final action on the proposed NESHAPs, the Administrator published a *FR* notice announcing that the proposed standards for elemental phosphorus plants, DOE facilities, and certain NRC-licensed facilities were being withdrawn (49 *FR* 43906). The decision to withdraw the proposed standards was based on the Administrator's finding that control practices already in effect for those source categories provide an ample margin of safety. The *FR* notice also made final the Administrator's decision not to issue NESHAPs for the other seven source categories.

The decision to withdraw the proposed NESHAPs was immediately challenged in court, and on December 11, 1984, the U.S. District Court for the Northern District of California found the Administrator in contempt of its earlier order directing the Administrator to promulgate final standards or to make a finding that radionuclides are not a hazardous air pollutant. EPA complied with the court's December decision by issuing NESHAPs for elemental phosphorus plants, DOE facilities, and certain NRC-licensed facilities on February 6, 1985 (50 *FR* 7280).

The Environmental Defense Fund (EDF), the Natural Resources Defense Council (NRDC), and the Sierra Club filed petitions with the court to review the final decisions not to regulate certain source categories (including the uranium fuel cycle) and the

February 1985 standards. On July 28, 1987, while these petitions were pending, the U.S. Court of Appeals for the District of Columbia remanded to the Agency the NESHAP for vinyl chlorides (a nonradioactive hazardous air pollutant). In that decision, the court concluded that the Agency had improperly considered cost and technological feasibility in determining the level of the standard without first making a determination based exclusively on the risk to the public.

Given the court's decision on vinyl chloride, EPA determined that its radionuclide NESHAPs should also be reconsidered and petitioned the court for a voluntary remand of standards. In its petition, EPA also moved that the pending litigation on all issues relating to its radionuclide NESHAPs be placed in abeyance during the rulemaking and agreed to reexamine all issues raised by the parties to that litigation. The court granted EPA's petition on December 8, 1987, and EPA began to revisit its earlier decision under a court-imposed schedule.

The Administrator's final decisions on the radionuclide NESHAPS were published in the *Federal Register* on December 15, 1989 (54 *FR* 51654). The final NESHAP for the NRC-licensed facilities (40 CFR 61, Subpart I) included facilities that are part of the uranium fuel cycle and established a standard of 10 mrem/yr ede to any member of the public, with no more than 3 mrem/yr ede caused by emissions of radioiodines. In explaining his decision to promulgate a NESHAP that included the uranium fuel cycle facilities previously unregulated under the CAA, the Administrator explained that the standard would insure that the current levels of emissions do not increase.

The December 15, 1989, *FR* notice also announced that the Administrator was granting a reconsideration of the NESHAP for NRC-licensed facilities (40 CFR 61, Subpart I). The reason for the reconsideration was to allow assessment of information received late in the rulemaking process from NRC and the National Institutes of Health (NIH) regarding the impacts of duplicative regulations on licensees and the potential for the NESHAP to discourage the use of radioisotopes in medical and experimental therapies. In granting the reconsideration, the Administrator also stayed the effective date of Subpart I for 3 months. This stay was subsequently extended until March 1991.

2.2 RULEMAKINGS UNDER THE CLEAN AIR ACT AMENDMENTS OF 1990

While Subpart I was under reconsideration, the Congress passed the 1990 amendments to the CAA. The amendments include a new Section 112(d)(9) which states, in part:

> No standard for radionuclide emissions from any category or subcategory of facilities licensed by the Nuclear Regulatory Commission (or an Agreement State) is required to be promulgated under this section if the Administrator determines, by rule, and after consultation with the Nuclear Regulatory Commission, that the regulatory program established by the Nuclear

Regulatory Commission pursuant to the Atomic Energy Act for such category or subcategory provides an ample margin of safety to protect the public health.

In March 1991, EPA issued an Advance Notice of Proposed Rulemaking (ANPR), announcing its intention to proceed with the rulemaking, pursuant to Section 122(d)(9), to rescind Subpart I of 40 CFR 61, as it applies to nuclear power reactors (56 *FR* 10524). Concurrent with the ANPR, EPA published a *FR* notice proposing to stay the effectiveness of Subpart I for power reactors until the conclusion of the rulemaking on recision (56 *FR* 10523).

Chapter 3

THE NRC's REGULATORY PROGRAM

To determine whether the NRC's regulatory program is comprehensive, the following questions were asked:

- Has the NRC established airborne effluent limits or design objectives consistent with the level of protection provided by the NESHAPs?
- Has the NRC's program for imposing design, construction, and operational performance limits on reactors resulted in reasonable assurance that as-built designs would be consistent with their design criteria and performance objectives?
- Does the NRC's program for monitoring reactor operations ensure that plant airborne emissions conform with the licensing basis?
- Does the NRC's program for periodic independent reviews in the operational period result in reasonable assurance that airborne emissions are kept as low as reasonably achievable?
- Does the NRC's enforcement policy provide incentive for the licensees to meet their regulatory obligations?

3.1 SETTING AIRBORNE EMISSION CONTROLS

Current regulations limiting routine radionuclide airborne emissions from commercial light water reactors are set forth in 10 CFR 20, Appendix I to 10 CFR 50, and 40 CFR 190. Part 20 establishes "Standards for Protection Against Radiation." The recent revisions to Part 20 establish a new limit of 100 mrem/yr ede for members of the public. The 100 mrem/yr limit covers doses from both gaseous and liquid effluents and considers exposures from all sources. Part 20 also imposes the requirement that exposures be as low as reasonably achievable (ALARA). Licensees may demonstrate compliance with this limit using the effluent concentrations set forth in Table 2 of Appendix B of 10 CFR Part 20. The values in Table 2 for air are based on 50 mrem/yr.

Appendix I to Part 50 establishes "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion *As Low as is Reasonably Achievable* for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents." The Appendix I design objectives require an applicant for a permit to construct a nuclear power reactor to describe how radionuclide releases to unrestricted areas will be kept ALARA. The applicant satisfies the design objectives, in part, by

demonstrating that the gaseous radionuclide releases to the atmosphere from each light water reactor on site will not result in an estimated average annual air dose in excess of 10 mrads for gamma exposure and 20 mrads for beta exposure. These limits, applicable to any unrestricted location that can be occupied, pertain only to external exposure to noble gases.

Lower radionuclide release rates may be required to satisfy the design objectives if the releases are likely to result in an estimated annual external dose from airborne effluents in excess of 5 mrem/yr. Alternatively, higher release rates may be acceptable if the applicant can provide reasonable assurance that the external dose to any individual in unrestricted areas will not exceed 5 mrem/yr to the whole body and 15 mrem/yr to the skin. The applicant must also demonstrate that the calculated annual total quantity of all radioiodines and radioactive particulates to be released to the atmosphere from each light water reactor will not cause exposures to any individual in unrestricted areas in excess of 15 mrem to any organ.

The limiting conditions of operation (LCOs) set forth in Appendix I complement the design objectives. They provide guidance to ensure that, during operation, the facility maintains radionuclide releases and offsite exposures as low as reasonably achievable and consistent with the design objectives.

EPA's environmental radiation standards for nuclear power operations are set forth in 40 CFR Part 190. 40 CFR Part 190 requires, in part, that the radiation doses to real individuals from all uranium fuel-cycle sources, including all gaseous and liquid effluent pathways and direct radiation, should not exceed 25 mrem/yr to the whole body or any organ, except the thyroid. The dose limit to the thyroid is established at 75 mrem/yr.

The guidelines set forth in Appendix I to 10 CFR Part 50 and the standards set forth in 40 CFR 190 together establish a regulatory framework assuring that the routine airborne radioactive emissions from commercial light water reactors will not result in exposures in excess of 10 mrem/yr ede. Specifically, the principal radionuclides routinely released in the airborne effluents from commercial light water reactors are noble gases and radioiodines. The whole-body dose from noble gas emissions per reactor is limited to 5 mrem/yr by 10 CFR 50, Appendix I. The organ doses from radioiodines and particulates are limited to 15 mrem/yr per reactor. For the thyroid gland, which is the critical organ for radioiodines, a dose of 15 mrem/yr yields an ede of less than 1 mrem/yr. Therefore, the NRC's design objectives set forth in Appendix I limit the allowable dose to 6 mrem/yr ede, which is consistent with the NESHAP.

3.2 LICENSING PROGRAM

Compliance with Appendix I and 40 CFR 190 is ensured by the Limiting Conditions of Operation (LCOs) and Radiological Effluent Technical Specifications (RETS)

established in accordance with 10 CFR Part 50.36a. The LCOs and their associated RETS require that the licensee take action if the quantity of radioactive materials actually released in airborne emissions to unrestricted areas in any calendar quarter is such that the resulting radiation exposure would exceed one-half the annual design objectives. The licensee is required to investigate the cause of the exceedance, define and initiate a program of corrective action, and report these actions to the NRC within 30 days from the end of the quarter during which the release occurred.

To assist licensees in complying with the LCOs and preparing their RETS, the NRC's staff has issued dozens of guidance documents. These documents provide highly detailed standard RETS and procedures for implementing the RETS. Guidance is also provided on ensuring compliance with 40 CFR 190.

3.3 AIRBORNE EMISSIONS MONITORING

The LCOs and RETS require the licensee to initiate airborne emissions and environmental monitoring programs to provide data on (1) the quantities of radionuclides released, (2) the levels of radiation and radioactive materials in the environment, and (3) changes in land use and demography in the vicinity of the site that pertain to compliance with the LCOs. If the monitoring data reveal that the relationship between the quantities of radioactive materials released and the doses to individuals in unrestricted areas is significantly different than that assumed in the calculations used to assess compliance with the design objectives, the NRC's staff can require modifications of the RETS.

Licensees are required to submit results of their monitoring programs to the NRC semiannually. In addition, the NRC conducts a program in which the direct radiation in the sectors surrounding each nuclear power facility is measured independently by NRC's dosimeters located in the same areas as the licensee's dosimeters.

The NRC also provides guidance documents on periodic reporting requirements pertaining to the LCOs.

3.4 INSPECTION PROGRAM

In accordance with the NRC's "Inspection Manual," regional NRC inspectors inspect each facility about two times per year. In conjunction with the plant's required reports, the inspections determine the degree to which each plant is complying with its license and technical specifications, including its RETS. If problems are identified, followup inspections are scheduled in order to ensure that deficiencies are corrected. If a facility appears to have persistent problems in particular areas, inspections are performed more frequently.

The periodic inspections of the RETS include a review of records and procedures, interviews with plant personnel, and an audit of airborne emissions and the environmental measurements program. The measurements program consists of the independent collection of airborne emissions and environmental samples by NRC personnel and sample analysis using an NRC mobile laboratory.

Each plant also has a full-time NRC Senior Resident Inspector who provides continual health and safety oversight of plant operations. If problems arise pertaining to compliance with the RETS, NRC's inspector may request a special inspection. Areas of noncompliance are punishable by both civil and criminal penalties.

3.5 ENFORCEMENT PROGRAM

A license or a construction permit may be revoked, suspended, or modified, in whole or in part, for failure to follow any of the terms and provisions of the Atomic Energy Act (AEA), regulations, license, permit, or orders of the Commission.

Additionally, the NRC may obtain an injunction or other court order prohibiting any violation of its rules, regulations, or orders, including the payment of civil penalties. Willful violations may be punished by fine or imprisonment or both, as provided by law.

More information on the NRC and its programs is presented in Appendix A. Appendix B lists selected regulatory guides pertaining to power reactors. Guides applicable to power plant airborne emissions are highlighted.

Chapter 4

EVALUATION OF AIRBORNE EMISSIONS AND DOSES FROM POWER REACTORS

4.1 PURPOSE

Nearly all of the radioactive airborne emissions released from power reactors are the result of planned releases from normal operation or from anticipated operational occurrences (NRC 89c). The latter include unplanned releases of radioactive materials from miscellaneous actions such as equipment failure, operator error, or procedure error. For normal operations, factors such as fuel cladding defects, design features of plant waste treatment systems, operational occurrences, and equipment performances strongly affect releases.

To evaluate the NRC's regulatory program, evidence of its effectiveness was obtained by calculating the doses to the members of the public residing near operable nuclear power reactors. The trend in annual population doses is also presented to allow projections of likely future results.

Exposure estimates are presented for 69 nuclear reactor sites representing over 100 power reactors. Using site-specific data, exposures to the maximally exposed individuals and members of the public residing within a 50-mile (80-kilometer) radius were calculated for each of the 69 nuclear reactor sites.

This chapter discusses the results of the evaluation and includes a description of the methodology used. The computer code data input sheets used in this analysis are provided in Appendix C. Key assumptions are discussed in the text.

4.2 METHODOLOGY

4.2.1 General Approach

Doses to nearby individuals and populations within 0 to 50 miles are estimated for all operable nuclear power plants using the CAP-88 methodology described in detail in Volume 1 of EPA 520/1-89-005 (EPA 89). In addition, trends in reactor performance are evaluated for the years since the enactment of Appendix I to 10 CFR 50.

Brookhaven National Laboratory, an NRC contractor, provided airborne emissions data for calendar year 1988 (NUREG/CR-2907, Volume 8) (NRC 89c). Complete sets of tabulated data, as reported by the power plants to the NRC, are not yet available for 1989 or 1990.

The data provided by Brookhaven were augmented as needed to provide a complete and representative set. Since not all power reactors operate in a given year, or they operate at low power levels or for relatively short periods of time, any given year's data for airborne emissions can be less than normal. To assure representative data, airborne emissions data from other years were obtained for all operable plants that had below normal airborne emissions in 1988. If 1989 or 1990 data were not available, prior years were researched until a complete year of data could be obtained. Appendix D identifies all plants analyzed and their operating status in 1990.

The airborne emissions data were combined with other site-specific data and were input to the CAP-88 computer codes used in this evaluation.

4.2.2 Computer Codes

Radioactive releases from a nuclear power plant may contribute to radiation exposure through several external and internal exposure pathways. External exposures may result from direct cloud immersion or from radionuclides deposited on the ground. Internal exposure may result from inhalation of airborne radioactivity or from ingestion of contaminated food products. The magnitude of public exposure from a power reactor site is largely determined by the quantity of specific radionuclides contained in the airborne emissions and by a complex set of atmospheric dispersion and deposition processes.

Computer codes are commonly used to model dispersion and deposition processes which determine human exposure. The EPA has developed a set of computer programs that estimate doses and health risk due to radionuclide emissions to the air. The computer software, referred to as the Clean Air Act Assessment Package - 1988 (abbreviated as CAP-88), estimates dose and health risks from the inhalation, ingestion, air immersion, and ground surface irradiation pathways and tabulates results for the maximally exposed individuals and populations at varying locations around a reactor site.

The computer code that models environmental dispersion and transport in CAP-88 is AIRDOS-EPA. This code uses a modified version of the standard Gaussian plume dispersion equation to compute radionuclide concentrations in air, rates of deposition on ground surfaces, concentrations in foods, and human intake rates resulting from inhalation and ingestion of contaminated air and food products. Modeling of internal dose resulting from ingestion of contaminated food products requires estimates of (1) radionuclide concentrations in food and (2) the quantity of foods consumed. Estimates of the radionuclide concentrations in produce, milk, and meat are made by coupling the AIRDOS-EPA atmospheric transport model data with input parameters defined by NRC Regulatory Guide 1.109 for the terrestrial food chain (NRC 77a).

4.2.3 Site-Specific Data

To estimate doses more accurately around each of the 69 power reactor sites, site-specific data were used when possible to replace average or computer-code default values. The following site-specific input parameters were determined for each of the 69 nuclear facilities:

- Airborne Emissions Data - Annual airborne effluent releases, by radionuclide, were obtained from all operable nuclear reactors for the latest year (typically 1988) for which data were readily available.

- Release Height - The stack height (i.e., the airborne emissions release point) for each reactor was obtained. Since data on discharge velocity and heat content could not be obtained readily, plume rise is not accounted for in the modeling.

- Meteorological Data - Meteorological data involving seasonal temperatures and precipitation were obtained from the National Climatic Data Center based on records for the 30-year period 1951 to 1980, inclusive. Joint frequency distributions, wind speed, and wind direction by stability class were obtained from the nearest airport.

- Population Distribution - Two separate sources of information were used to establish population distribution within each of 16 sectors within a 50-mile radius of the plant site. For distances greater than 5 miles, the SECPOP data base, which contains 1980 Census data, was used. For radii of less than 5 miles, SECPOP was not considered sufficiently accurate due to the widely varying size of the census enumeration districts. Population distributions for distances of less than 5 miles were obtained from Final Safety Analysis Reports (FSARs) filed by utilities as part of the NRC's licensing process. Invariably, FSARs contain projected population distributions, typically in 10-year increments. In most instances, 1990 population data within 5 miles of the power reactor site were used to supplement the SECPOP data.

- Nearest Resident - Because the nearest residents are often the maximally exposed, and because their locations are subject to change, the most current and accurate data were sought. Therefore, for each site, the most recent semiannual Radiological Environmental Monitoring Program (REMP) report was consulted to find the distance to the nearest resident in each of the 16 sectors.

- Regional Food Consumption - The computer code (PREPAR) was used to input data to CAP-88 regarding local consumption of food products. PREPAR integrates data concerning regional agricultural productivity, population distribution, meteorological data, and information concerning the fraction of food

assumed to be home-grown, produced within the assessed 50-mile radius of a facility, and imported from outside the 50-mile assessed area.

4.3 SUMMARY OF RESULTS

4.3.1 Recent Airborne Emissions and Doses

The doses to the population within a 50-mile radius and the person at maximum individual risk (MIR) that were estimated for each of 69 licensed nuclear reactor sites are presented in alphabetical order for pressurized water reactors (PWRs) and boiling water reactors (BWRs) in Tables 4-1 and 4-2, respectively. These tables also present the effective dose equivalent values attributable to exposure to radioiodines and the number of persons within the 50-mile radii.

Average population doses were calculated by dividing the collective effective dose equivalent by the total number of individuals residing within the area bounded by a 50-mile radius from the plant site.

Tables 4-1 and 4-2 also provide a power reactor capacity factor extracted from the Licensed Operating Reactors - Status Summary Report (NRC 89d). This number is obtained by dividing the net electrical energy generated in 1988 by the designed electrical rating and multiplied by the total number of hours in the year. The capacity factor values provide an approximate means of estimating doses for conditions of maximum power generation.

4.3.1.1 Summary. Estimated doses cited in Tables 4-1 and 4-2 are analyzed and summarized in Tables 4-3 and 4-4 which provide the range, median, and distribution of the effective dose equivalents for PWRs and BWRs. The following conclusions are drawn from the estimated doses:

1. The highest dose to the maximally exposed individual at any of the facilities is estimated to be approximately 1 mrem/yr, or 10 percent of the 10 mrem/yr NESHAP limit. The average dose to an individual residing within a 50-mile radius of a nuclear power facility was less than 0.0012 mrem/yr.

2. Estimated doses for PWR facilities are comparable to those for BWR facilities.

3. Radioiodines contributed a very small fraction to the effective dose equivalent of the maximally exposed individuals. Radioiodine exposures to the thyroid gland were well below the NESHAP limit of 3 mrem/yr.

Table 4-1. CAP-88 results for 1988[1] airborne emissions from pressurized water reactors (PWR)

REACTOR SITE	STATION CAPACITY FACTOR (%)	MIR EDE (ALL NUCLIDES) (mrem/year)	MIR EDE (IODINES) (mrem/year)	COLLECTIVE DOSE (person-rem/year)	POPULATION W/IN 50 MILES	AVERAGE IND. DOSE (mrem/year)
Alvin W. Vogtle 1 & 2[2]	71.6	3.E-3	5.E-7	5.E-2	526,623	1.E-4
Arkansas Nuclear One 1 & 2	59.7	9.E-3	1.E-5	6.E-2	200,820	3.E-4
Beaver Valley 1 & 2	79.3	7.E-4	3.E-6	6.E-2	3,562,306	1.E-5
Braidwood 1 & 2	74.3	4.E-4(L)	1.E-5	3.E-2	4,813,692	6.E-6(L)
Byron 1 & 2	64.8	2.E-3	1.E-4	8.E-2	935,515	9.E-5
Calloway	90.8	4.E-3	6.E-7	3.E-2	350,743	1.E-4
Calvert Cliffs 1 & 2	81.2	3.E-2	6.E-3(H)	1.E+0	2,513,028	4.E-4
Catawba 1 & 2	69.6	6.E-3	1.E-5	1.E-1	1,419,084	1.E-4
Crystal River 3	80.0	7.E-4	1.E-6	2.E-2	384,023	6.E-5
Davis-Besse	15.4(L)	6.E-4	4.E-6	9.E-2	1,789,403	5.E-5
Diablo Canyon 1 & 2	60.6	9.E-4	5.E-6	4.E-2	269,576	1.E-4
Donald C. Cook 1 & 2	54.2	2.E-3	1.E-4	4.E-2	1,110,161	3.E-5
Fort Calhoun	62.6	2.E-3	1.E-5	4.E-2	742,481	6.E-5
H. B. Robinson 2	54.4	6.E-3	1.E-4	5.E-2	670,611	8.E-5
Haddam Neck	62.6	2.E-2	1.E-3	5.E-1	3,385,414	1.E-4
Indian Point 2 & 3	79.9	1.E-1(H)	1.E-4	2.E+0	15,215,971(H)	1.E-4
Joseph M. Farley 1 & 2	91.0	1.E-2	2.E-5	1.E-1	336,357	4.E-4
Kewaunee	88.6	5.E-4	4.E-6	1.E-2	601,485	2.E-5
Maine Yankee	70.5	4.E-4	1.E-5	1.E-2(L)	579,421	2.E-5
McQuire 1 & 2	77.9	7.E-3	8.E-5	2.E-1	1,583,564	1.E-4
Millstone 1, 2 & 3[4]	82.9	3.E-3	1.E-4	2.E-1	2,525,597	9.E-5
North Anna 1 & 2	92.5	1.E-2	2.E-4	3.E-1	1,037,163	3.E-4
Oconee 1, 2 & 3	83.9	5.E-2	8.E-4	9.E-1	918,009	1.E-3
Palisades	53.6	4.E-3	2.E-4	8.E-2	1,080,138	8.E-5
Palo Verde 1, 2 & 3	41.6	2.E-2	4.E-4	1.E+0	886,595	1.E-3
Point Beach 1 & 2	88.4	3.E-3	1.E-5	1.E-1	596,702	1.E-4
Prairie Island 1 & 2	87.5	1.E-3	3.E-8	4.E-1	2,125,846	2.E-4
R. E. Ginna	85.6	3.E-3	6.E-6	3.E-1	1,182,809	2.E-4
Rancho Seco	36.7	6.E-3	4.E-6	3.E-1	1,811,338	1.E-4
Salem 1 & 2	68.9	3.E-3	3.E-6	2.E+0(H)	4,693,004	5.E-4
San Onofre 1, 2 & 3	65.6	1.E-2	3.E-4	1.E+0	4,730,036	4.E-4
Sequoyah 1 & 2[3]	73.5	4.E-2	3.E-5	1.E+0	810,824	1.E-3(H)
Shearon Harris	70.5	1.E-2	1.E-9(L)	2.E-1	1,279,315	2.E-5
South Texas Project 1 & 2[2]	72.1	6.E-2	6.E-5	1.E-1	193,540(L)	7.E-4
St Lucie 1 & 2	92.7(H)	4.E-2	8.E-4	7.E-1	536,404	1.E-3
Surry 1 & 2	45.6	6.E-3	3.E-4	3.E-1	1,697,490	2.E-4
Three Mile Island 1	79.4	7.E-3	3.E-5	3.E-1	2,056,038	1.E-4
Trojan	65.9	1.E-3	4.E-5	1.E-1	1,353,571	9.E-5
Turkey Point 3 & 4	57.4	5.E-3	4.E-5	1.E+0	2,146,801	5.E-4
Virgil C. Summer	65.0	3.E-3	1.E-4	2.E-2	814,083	3.E-5
Waterford 3	69.2	2.E-2	8.E-5	1.E+0	1,809,591	1.E-3
Wolf Creek	67.2	1.E-2	6.E-6	1.E-1	498,606	3.E-4
Yankee	76.1	3.E-3	8.E-7	8.E-2	1,512,433	5.E-5
Zion 1 & 2	63.4	4.E-3	6.E-6	1.E+0	6,963,054	2.E-4

(1) 1988 emissions data were used in calculating offsite doses for all power plants except as designated by footnotes (2) and (3).
(2) 1990 emissions data used in calculating offsite doses.
(3) 1983 emissions data used in calculating offsite doses.
(4) Millstone Unit 1 is a BWR; however, the emissions data were combined with that for Units 2 and 3 which are PWRs.
(L) indicates lowest value within the column.
(H) indicates highest value within the column.

Table 4-2. CAP-88 results for 1988[1] airborne emissions from boiling water reactors (BWR)

NUCLEAR POWER PLANT	STATION CAPACITY FACTOR (%)	MIR EDE (ALL NUCLIDES) (mrem/year)	MIR EDE (IODINES) (mrem/year)	COLLECTIVE DOSE (person-rem/year)	POPULATION W/IN 50 MILES	AVERAGE IND. DOSE (mrem/year)
Big Rock Point	63.9	1.E-1	4.E-5	1.E-1	156,984(L)	7.E-4
Browns Ferry 1, 2 & 3[2]	49.8	9.E-1(H)	4.E-4	1.E+1(H)	691,349	2.E-2(H)
Brunswick 1 & 2	60.4	9.E-3	1.E-4	9.E-2	221,157	4.E-4
Clinton	71.7	2.E-3	5.E-6	3.E-2	871,185	4.E-5
Cooper	62.6	1.E-2	3.E-4	1.E-2	176,268	8.E-5
Dresden 2 & 3	62.5	8.E-3	6.E-4	7.E-1	6,377,923	1.E-4
Duane Arnold	68.8	4.E-3	3.E-5	1.E-1	580,018	2.E-4
Edwin I. Hatch 1 & 2	62.5	9.E-3	5.E-5	1.E-1	292,839	3.E-4
Fermi 2	45.0	8.E-4	1.E-5	6.E-2	5,058,443	1.E-5
Grand Gulf	95.6	4.E-3	1.E-6	2.E-3(L)	251,084	1.E-5
Hope Creek	74.8	1.E-3	0.E+0	5.E-1	5,356,435	9.E-5
James A. Fitzpatrick	63.5	1.E-2	4.E-5	2.E-1	841,917	2.E-4
LaSalle County 1 & 2	61.0	2.E-2	4.E-4	3.E-1	1,068,100	3.E-4
Limerick 1	72.0	3.E-3	2.E-4	6.E-1	6,849,011(H)	9.E-5
Monticello	97.1	2.E-2	3.E-4	3.E-1	2,111,208	1.E-4
Nine Mile Point 1 & 2[3]	33.3	1.E-3	1.E-5	5.E-2	841,367	6.E-5
Oyster Creek	65.0	4.E-2	4.E-4	1.E+0	3,428,989	5.E-4
Peach Bottom 2 & 3[3]	77.8	2.E-4	7.E-6	7.E-2	4,342,379	1.E-5
Perry 1	68.4	1.E-2	3.E-3	1.E-1	2,401,506	7.E-5
Pilgrim[4]	91.5	2.E-2	2.E-4	9.E-1	4,231,393	2.E-4
Quad Cities 1 & 2	72.8	6.E-3	2.E-4	9.E-2	697,505	1.E-4
River Bend	88.2	1.E-4(L)	1.E-5	5.E-3	723,760	7.E-6(L)
Susquehanna 1 & 2	78.9	5.E-4	1.E-5	4.E-2	1,534,873	3.E-5
Vermont Yankee	92.9(H)	4.E-3	3.E-5	1.E-1	1,310,563	9.E-5
Washington Nuclear Project 2	62.4	5.E-3	4.E-4	2.E-1	249,129	8.E-4

(1) 1988 emissions data were used in calculating offsite doses for all power plants except as designated by footnotes (2), (3), and (4).
(2) 1983 emissions data used in calculating offsite doses.
(3) 1990 emissions data used in calculating offsite doses.
(4) 1985 emissions data used in calculating offsite doses.
(L) indicates lowest value within the column.
(H) indicates highest value within the column.

4.3.1.2 Uncertainties. In making these dose estimates, EPA has tried to give best estimates of radionuclide concentrations in the environment and in specific tissues in arriving at effective dose equivalent values. EPA's CAP-88 computer programs are well established and have been shown to agree well with experimental data. In addition to airborne emissions data reported by individual facilities, site-specific data including stack height, meteorology, population distribution, and agricultural productivity were used. Nevertheless, uncertainties exist regarding all dose estimates. The level of uncertainty can be assumed to be greatest in the estimate of the maximum individual at risk. For population dose estimates, variabilities in the parameter producing the uncertainties tend to cancel out.

The average estimate of dose when all facilities are considered is not likely to differ significantly from year to year. Comparisons of average annual station capacity factors for the past 16 years (Table 4-5) show that the overall capacity factor for the entire nuclear power plant industry is relatively consistent.

4.3.2 Trends for Airborne Emissions and Doses

Although population doses have not been documented for all previous years, collective population doses for every facility have been estimated for the years 1975 through 1987 (NRC 90c). Because plant emissions directly affect offsite doses, annual trends in emissions and population doses can serve as indicators of dose to the average individual as well as to the maximally exposed individual. Therefore, reductions in emissions and/or collective population doses imply a reduction in individual doses, including the MIR.

Figures 4-1 through 4-4 depict annual airborne emission trends from 1975 through 1986 associated with (1) fission and activation gases and (2) iodines and particulates for PWRs and BWRs. Annual collective population dose trends are presented in figures 4-5 and 4-6, respectively, for PWR and BWR sites for the years 1975 through 1987. Since at many of these sites, station capacity factors have increased and the total population within 50 miles has increased in proportion to national average values (about 1 percent per year), the associated reductions in population exposures suggest a parallel and perhaps even stronger trend in individual exposures.

The generic trend in emissions and collective dose reductions since 1975 is likely the result of improved fuel performance and plant operations. For BWRs, the reduction in the amount of airborne effluents released since the mid-1970's is due largely to the installation of augmented off-gas (AOG) systems, many of which were required to meet the provisions of Appendix I to 10 CFR 50, promulgated by NRC in May 1975.

Table 4-3. Statistical summary of effective dose equivalents for PWR nuclear generating stations

Effective Dose Equivalents	Range		
	Low	High	Overall Average ± 1 SD
MIR - all nuclides (mrem)	0.0004	0.103	0.013 ± 0.021
MIR - iodines (mrem)	1.21E-9	0.006	0.0003 ± 0.0010
Population Dose (person-rem)	0.0124	2.440	0.470 ± 0.657
Average Individual Dose (mrem)	0.00002	0.001	0.0003 ± 0.0004

Table 4-4. Statistical summary of effective dose equivalents for BWR nuclear generating stations

Effective Dose Equivalents	Range		
	Low	High	Overall Average ± 1 SD
MIR - all nuclides (mrem)	0.0001	0.989	0.053 ± 0.0196
MIR - iodines (mrem)	0.0	0.004	0.0003 ± 0.0007
Population Dose (person-rem)	0.0026	1.840	0.241 ± 0.393
Average Individual Dose (mrem)	0.000003	0.0009	0.0002 ± 0.0002

Table 4-5. Annual average station capacity factors*

Year	Capacity Factor (%)
1973	60.3
1974	55.7
1975	64.1
1976	62.3
1977	68.2
1978	70.4
1979	63.4
1980	61.4
1981	62.4
1982	60.0
1983	59.2
1984	60.2
1985	62.9
1986	60.1
1987	63.7
1988	65.1

* Data for 1973 - 1987 were taken from reference NRC 90d. Data for 1988 were taken from reference NRC 89d.

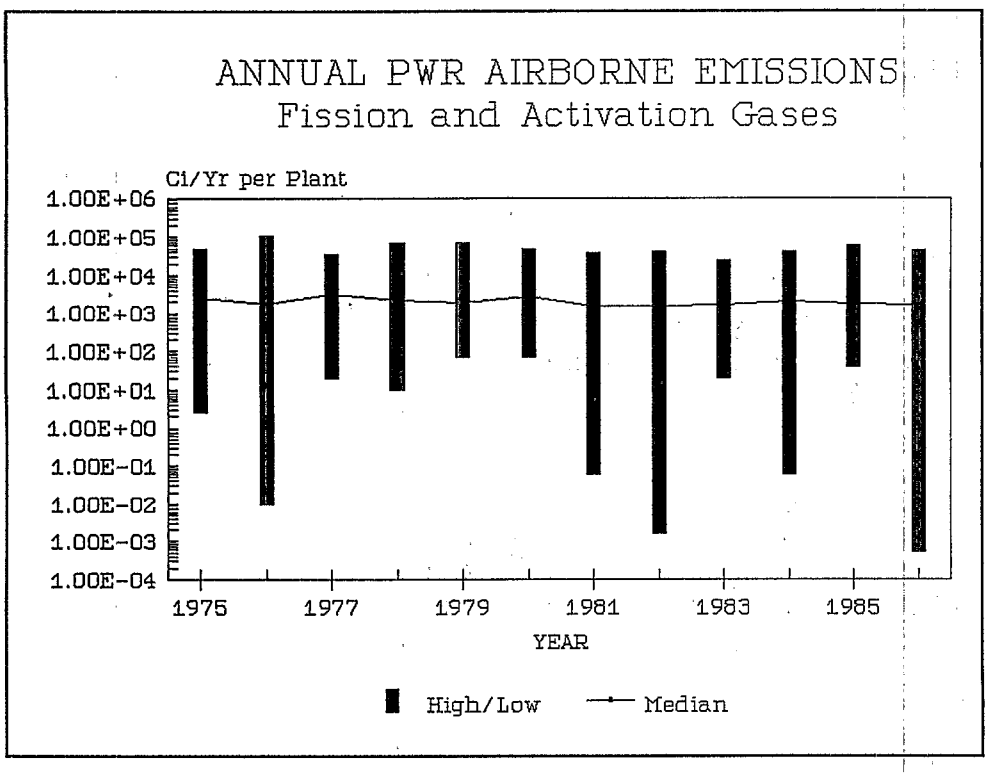
ANNUAL PWR AIRBORNE EMISSIONS
Fission and Activation Gases
Ci/Yr per Plant
1.00E+06
1.00E+05
1.00E+04
1.00E+03
1.00E+02
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1975
1977
1979
1981
1983
1985
YEAR
High/Low
Median

Figure 4-1

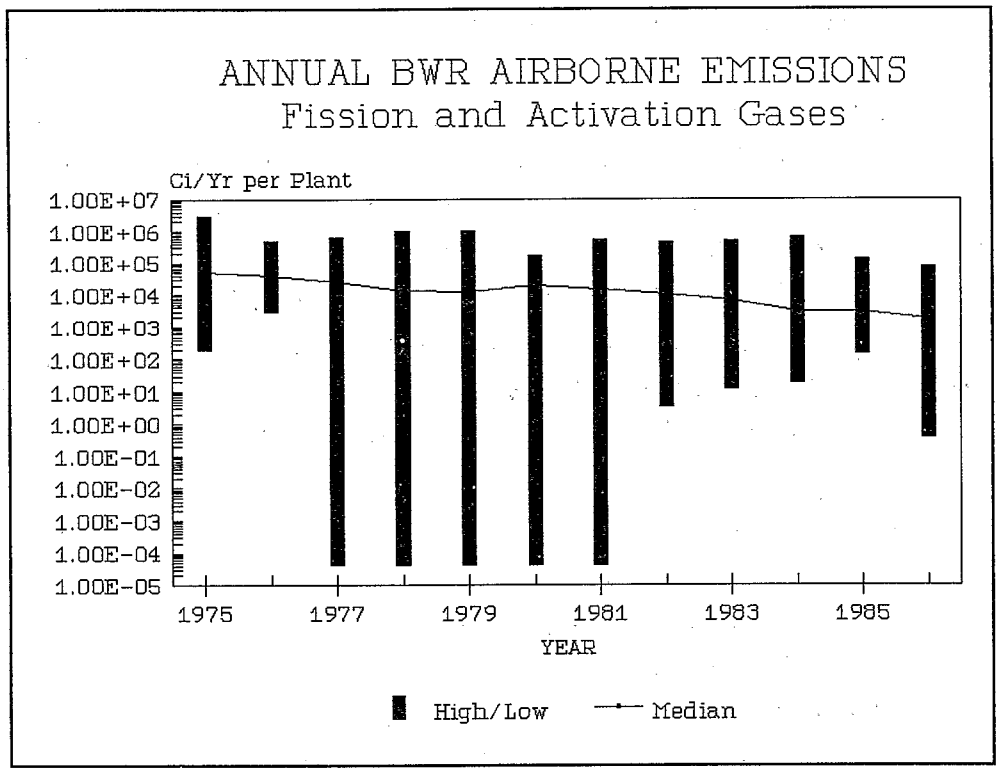
ANNUAL BWR AIRBORNE EMISSIONS
Fission and Activation Gases
Ci/Yr per Plant
1.00E+07
1.00E+06
1.00E+05
1.00E+04
1.00E+03
1.00E+02
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
1975
1977
1979
1981
1983
1985
YEAR
High/Low
Median

Figure 4-2

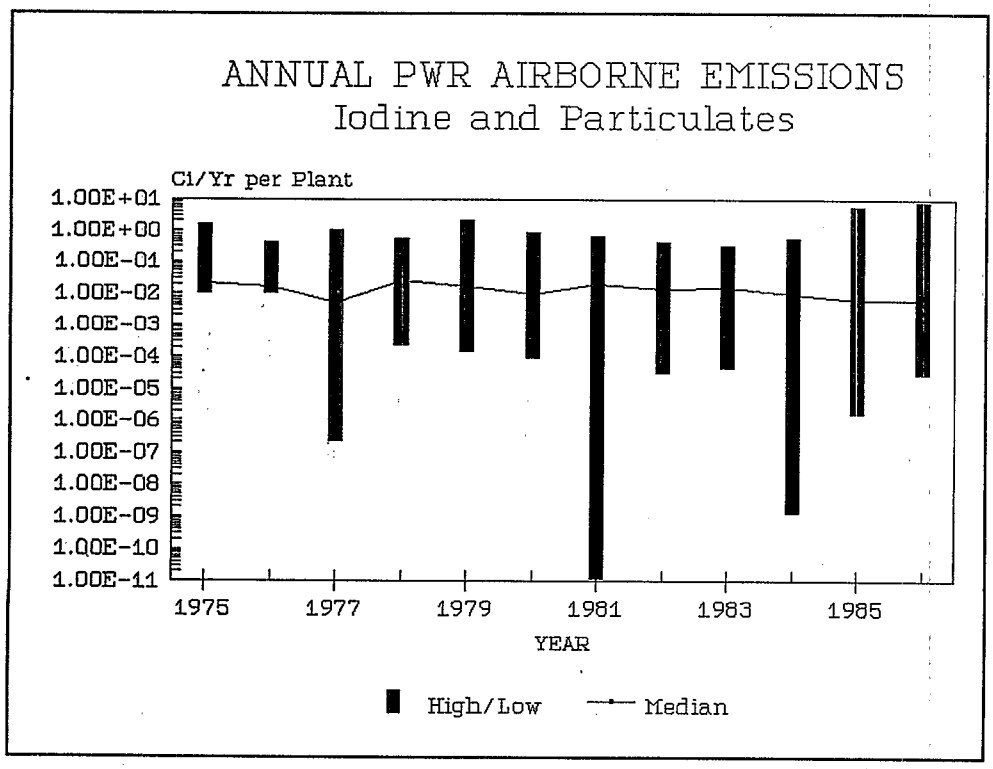
ANNUAL PWR AIRBORNE EMISSIONS
Iodine and Particulates
Ci/Yr per Plant
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
1.00E-06
1.00E-07
1.00E-08
1.00E-09
1.00E-10
1.00E-11
1975
1977
1979
1981
1983
1985
YEAR
High/Low
Median

Figure 4-3

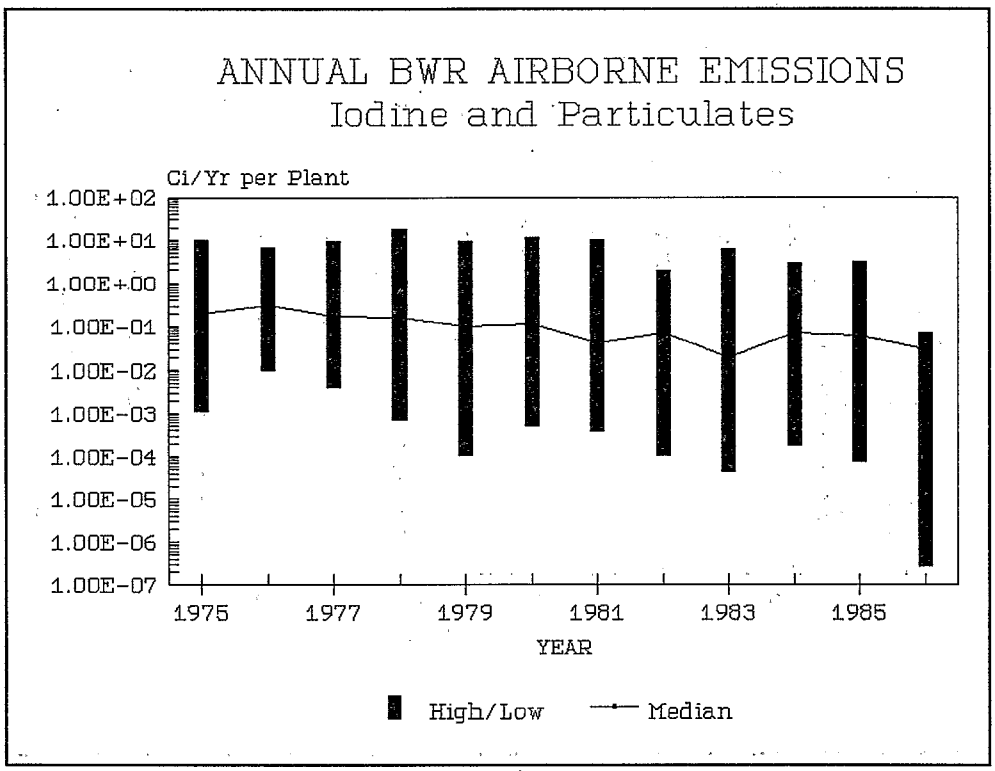
ANNUAL BWR AIRBORNE EMISSIONS
Iodine and Particulates
Ci/Yr per Plant
1.00E+02
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
1.00E-06
1.00E-07
1975
1977
1979
1981
1983
1985
YEAR
High/Low
Median

Figure 4-4

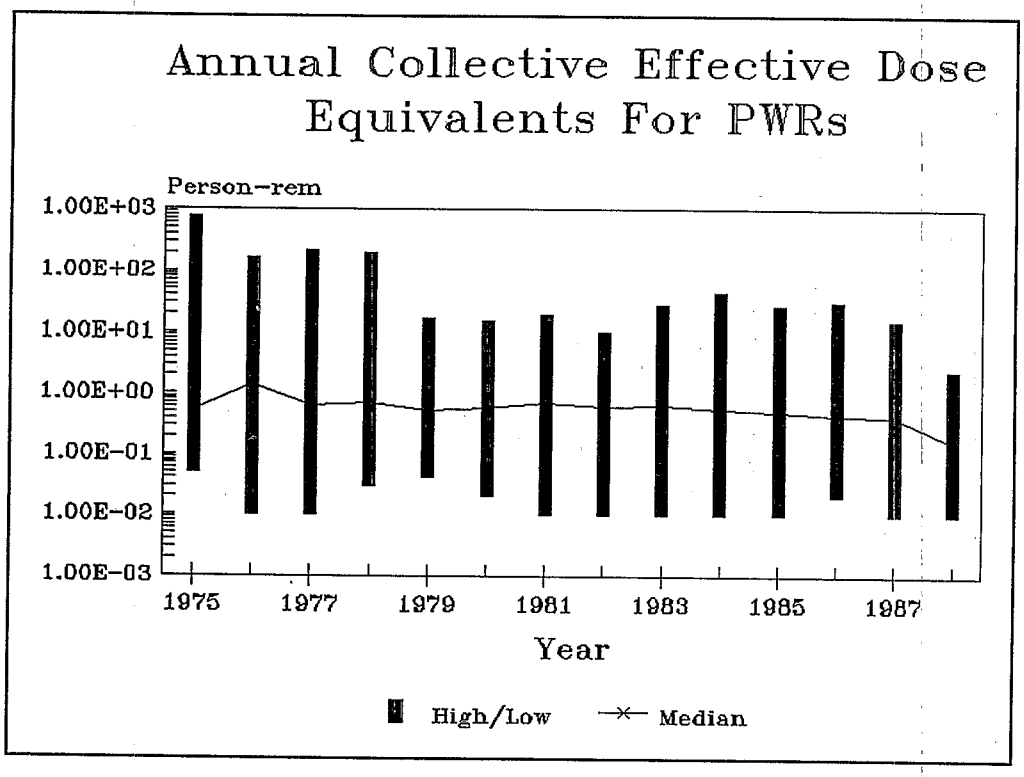
Annual Collective Effective Dose Equivalents For PWRs
Person-rem
1.00E+03
1.00E+02
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1975
1977
1979
1981
1983
1985
1987
Year
High/Low
Median

Figure 4-5

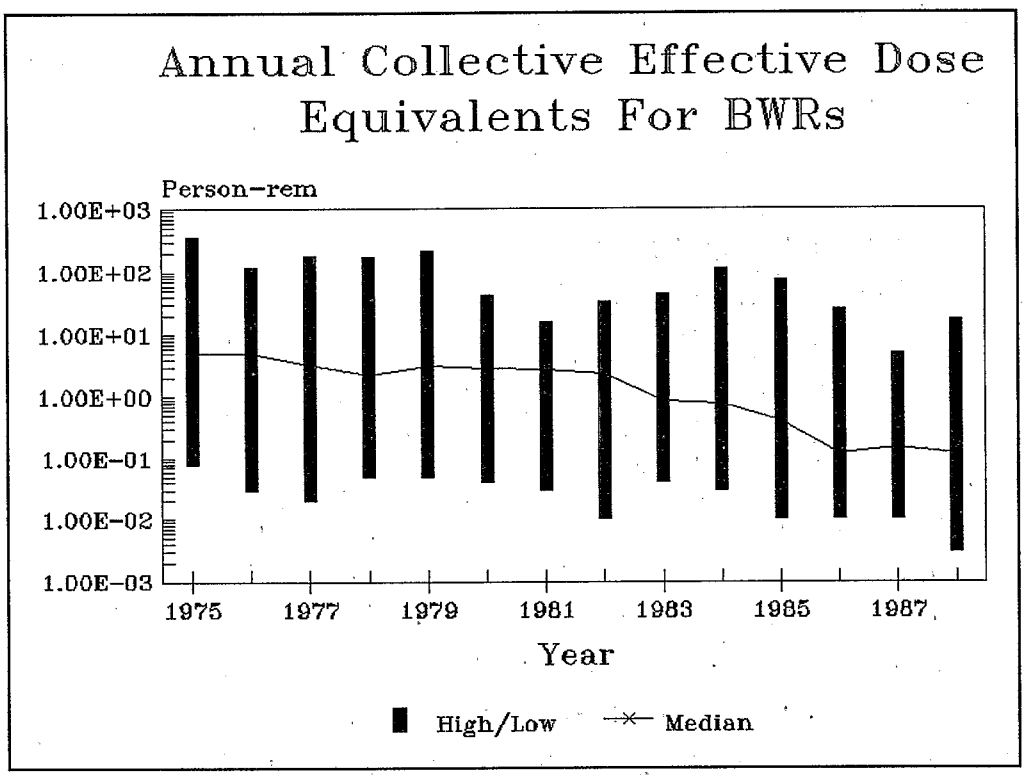
Annual Collective Effective Dose Equivalents For BWRs
Person-rem
1.00E+03
1.00E+02
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1975
1977
1979
1981
1983
1985
1987
Year
High/Low
Median

Figure 4-6

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APPENDIX A

NRC's ORGANIZATION, REGULATIONS, AND CONTROLS

A.1 ORGANIZATION AND RESPONSIBILITIES OF NRC

The origins of the present NRC lie in the early days of the Manhattan Project in 1942. Over time, the NRC's responsibilities have evolved from overseeing the post-war regulation and development of uses of atomic energy to the current licensing and regulation of nuclear facilities and materials under the authority of the Atomic Energy Act (AEA)(EEI 86).

The NRC regulates the civilian uses of source, byproduct, and special nuclear materials in the United States. This mission is accomplished through the development and implementation of controls (i.e., rules, regulations, guidance, etc.) governing licensed activities; licensing of nuclear facilities (i.e., issuance of permits and licenses) and the possession, use, and disposal of nuclear materials; and inspection and enforcement activities to ensure compliance with these controls and the conditions imposed through permits and licenses.

A.1.1 Basic Functions

The NRC's responsibilities include protecting public health and safety; protecting the environment; protecting and safeguarding materials and plants in the interest of national security; and ensuring conformity with antitrust laws. During fiscal year 1990, the NRC had approximately 3,200 employees and a budget of over $400 million to carry out three basic functions: regulatory research and standards development, licensing, and inspection and enforcement.

As part of its regulatory research and standards development function, the NRC is mandated by law to conduct an extensive confirmatory research program in the areas of safety, safeguards, and environmental assessment. The Commission establishes regulations, standards, and guidelines governing the various licensed uses of nuclear facilities and materials.

In its licensing function, the agency reviews and issues licenses for the construction and operation of nuclear power plants and other nuclear facilities, and it licenses the possession and use of nuclear materials for medical, industrial, educational, research, and other purposes. Regulatory authority for certain nuclear materials licensing has been transferred to certain states under the Agreement States Program authorized by the AEA. However, NRC retains authority for licensing and regulating nuclear power plants.

NRC's inspection and enforcement activities include various kinds of inspections and investigations designed to ensure that licensed activities are conducted in compliance with its regulations and other requirements. NRC enforces compliance as necessary.

A.1.2 Organization

A.1.2.1 The Commission. The Commission is composed of five members, appointed by the President and confirmed by the Senate, one of whom the President designates as Chairman. The Chairman is the principal executive officer of, and the official spokesman for the NRC, as mandated by the Reorganization Plan No. 1 of 1980 (NRC 90b). The Advisory Committee on Reactor Safeguards (ACRS), which was assigned a statutory role by Congress, independently reviews and reports on safety studies and applications for construction permits and operating licenses. The ACRS advises the Commission with regard to hazards at proposed or existing reactor facilities and the adequacy of proposed reactor safety studies. On its own initiative, the ACRS may review specific generic matters or nuclear facility safety issues.

A.1.2.2 NRC Offices. The NRC reorganized in 1987 to reflect progressively less involvement with the construction of large, complex nuclear facilities and increased involvement with the operation and maintenance of these facilities.

Office of Nuclear Reactor Regulation (NRR). The primary responsibilities of this office are to conduct the inspection and licensing activities associated with operating power reactors, including contractors and suppliers for such facilities. The Office also is responsible for evaluating applications to build and operate new power reactors, for inspection and licensing activities related to the construction and operation of research and test reactors, and for licensing reactor operators. In addition, the Office is responsi-

ble for inspecting NRC-licensed activities under its jurisdiction to ensure that they comply with all NRC regulations and requirements. NRR identifies and takes action regarding conditions and licensee performance that may adversely affect public health and safety or the environment, and assesses and recommends or takes action regarding incidents and accidents. Project Directorates within NRR monitor daily operations for all power reactors.

Important elements of this program, as it applies to the construction and operation of nuclear power plants, include the Resident Inspection and Systematic Assessment of Licensee Performance (SALP) programs.

With respect to power plant air emissions, this Office is responsible for reviewing design data for effluent control and monitoring equipment and operating procedures.

Office of Nuclear Material Safety and Safeguards (NMSS). This Office has no responsibilities for power plant air emissions.

Office of Nuclear Regulatory Research (RES). This Office has three primary responsibilities: (1) to plan, recommend, and implement programs of nuclear regulatory research, standards development, and resolution of safety issues of nuclear power plants and other facilities regulated by NRC; (2) to develop and promulgate all technical regulations; and (3) to coordinate research activities within and outside the agency including appointment of staff to committees and conferences.

With respect to power plant air emissions, this Office is responsible for the promulgation and revision of regulations affecting emissions, such as 10 CFR Part 50, Appendix I, and 10 CFR Part 20. Additionally, the Office manages the development of regulatory guides.

Office for Analysis and Evaluation of Operational Data (AEOD). This Office independently analyzes and evaluates operational safety data associated with NRC-licensed activities to identify issues that require action at the NRC or industry. Its other responsibilities include the reactor performance indicators program and the management and direction of programs for diagnosing evaluations and investigations of significant operational events.

This Office evaluates semiannual plant airborne emissions data and unusual events that contribute to airborne emissions.

Office of Enforcement. This Office develops policies and programs for enforcement of NRC's requirements. It manages major enforcement actions and assesses the effectiveness and uniformity of enforcement actions taken by the Regional Offices. Enforcement powers include notices of violation, fines, and orders for license modification, suspension, or revocation.

Regional Offices. The NRC's five regional offices execute the established NRC policies and assigned programs relating to inspection, enforcement, licensing, state agreements, state liaison, and emergency response within each region. Each regional Division of Reactor Projects inspects and evaluates assigned NRC programs for power reactors and implements the NRC's Resident Inspector Program and related enforcement actions for assigned facilities. The Division of Radiation Safety and Safeguards performs inspections and evaluations in radiological safety and environmental monitoring.

With respect to airborne emissions, the Office of Nuclear Reactor Regulation administers and conducts the national NRC Thermoluminescent Dosimeter Program, in which the direct radiation in the sectors surrounding each nuclear power facility is measured independently by NRC's dosimeters located in the same areas as the licensee's dosimeters. The results of measurements for each reactor site from this NRC monitoring network are published quarterly in NRC documents available to the public.

A.2 CONTROLS APPLICABLE TO LICENSEES - GENERAL

A.2.1 Establishing Airborne Emission Controls

This section describes the NRC's procedures for setting nuclear power plant controls to protect the health and safety of the public. These controls may take several forms: rules and regulations; regulatory guides; generic letters, bulletins, and information notices; and NRC reports. The first two categories of controls for nuclear power plants are administered by the Office of Nuclear Regulatory Research (RES); the others are administered by the Office of Nuclear Reactor Regulation (NRR).

A.2.1.1 Rulemaking and Regulatory Guides. The term rulemaking actually covers the establishment of two kinds of regulatory documents - the regulations of NRC contained in Title 10 of the Code of Federal Regulations (10 CFR) and regulatory guides. The decision to move forward with either a rule or a regulatory guide is based upon the results of a regulatory analysis [itself based upon a Technical Findings Document (e.g., NUREG)]. Thereafter, both types of documents, rules and guides, are developed in a process that provides for internal and external (public) review and comment. The entire process is repeated again for the final rule or guide developed in light of comments received from the public.

Both types of documents are prepared in a two-step process. In the first step, a draft is produced for public comment. RES usually develops such drafts in consultation with and on behalf of NRR, NMSS, or both. The drafts are developed at a technical staff level, coordinated up through parallel management chains of the affected offices, reviewed by the appropriate advisory committee (usually the ACRS except for waste management matters which now have their own advisory committee), reviewed by a senior management review group called the Committee for the Review of Generic Requirements (CRGR), and then presented to the appropriate decisionmaker(s) for action.

When the development of a rule or a guide reaches the point where it is presented to the decisionmakers, the process diverges. Substantive rules can be issued for public comment only by a majority vote of the five NRC Commissioners. Therefore, proposed rulemakings are recommended for action by RES, with the concurrence of the affected program office, through the NRC's Executive Director for Operations, to the Commission. The Commission requests input from the appropriate advisory committees and the CRGR to assist in its decision.

Once the Commission has decided to issue a proposed rule for public comment, a notice of the proposed action is issued in the *Federal Register;* the notice also identifies the time allowed for comments and may specify particular questions on which the Commission desires input. These particular questions often involve the matters treated in the regulatory analysis performed for the proposed rule; e.g., the anticipated costs and other impacts of imposing the new rule.

The RES staff, in consultation with the affected program office, evaluates public comments received on a proposed rule. The Commission has used both rulemaking hearings, which are formal adjudicatory proceedings, and public meetings, which are less formal, to further discussion and obtain additional information concerning a proposed rule. Once the additional information has been received and evaluated, the staff modifies the rule as necessary, repeats the entire review process followed for the proposed rule, and returns the rulemaking package to the Commission for final action. When the Commission makes its final decision on the rule, it is issued as "effective" with a notice in the *Federal Register*. The rule then becomes a part of Title 10 of the *Code of Federal Regulations*.

The process followed by the RES in developing a draft and then a final regulatory guide is essentially the same as that for a rule, except that the Executive Director for Operations and the Commission are not involved. Rather, the final decision authority for issuing regulatory guides, either in draft form for public comment or in final form, is the Director of the Office of RES.

A.2.1.2 Generic Letters, Bulletins and Information Notices. Generic letters, bulletins, and information notices are written NRC notifications sent to groups of licensees that identify specific problems, developments, or other matters of interest to the licensees. In some cases the NRC is calling for or recommending that the licensees take specific steps.

A.2.1.3 NRC Reports. NRC reports (usually referred to generically as NUREGs) are prepared by the NRC's staff, contractors, or national laboratories and provide the technical basis for decisionmaking. Special categories of such reports include Safety Evaluation Reports (SERs), Environmental Impact Statements (EISs), and Standard Review Plans (SRPs). The NRC issues the first two categories of reports to establish the conditions under which the license to construct or operate will be issued. The SRPs are issued to disseminate information about the regulatory licensing process and to improve the general public's and the nuclear industry's understanding of the staff's review process.

Standard Review Plans address the responsibilities of the persons performing the review, the matters that are reviewed, the Commission's regulations and acceptance criteria necessary for the review, how the review is accomplished, the conclusions that are appropriate, and the implementation requirements.

A.2.2 Licensing Program

Licensing programs utilize a system of controls, compliance guidance, and independent review to establish (with reasonable assurance) the ability of a facility to meet performance requirements. Of particular relevance is the NRC's ability to establish and maintain an acceptable level of performance through (1) independent review to verify that regulatory criteria were correctly translated into design, construction, and operations documents and (2) monitoring of operating data.

The licensing process begins with the filing of a license application, consisting of general information, an Environmental Report, and a Safety Analysis Report (SAR). The general content requirements of the SAR are contained in 10 CFR 50.34.

The NRC initiates a comprehensive technical review of the license application and any supporting documents after initial acceptance review and docketing. During this period, the NRC's staff and the Advisory Committee on Reactor Safeguards (ACRS) conduct independent technical reviews of the license application, resulting in the issuance of a Safety Evaluation Report (SER) by the NRC's staff and a formal letter of recommendation from the ACRS to the Chairman of the NRC.

In determining whether to grant a construction permit, the NRC holds an adjudicatory public proceeding conducted by the Atomic Safety and Licensing Board (ASLB). At the end of the adjudicatory proceeding, the ASLB renders a decision supported by a written opinion. A decision of the ASLB could be appealed to an Atomic Safety and Licensing Appeal Board (ASLAB). The Commissioners, may also consider the matter upon a petition requesting such review. After all avenues of administrative appeal have been exhausted and if the ASLB's initial decision prevails, the Director of Nuclear Reactor Regulation issues a letter authorizing construction to begin.

At least 18 months prior to anticipated completion of construction, the applicant submits an updated license application to the NRC in support of obtaining a license to operate. The NRC's staff and the ACRS again conduct technical reviews which, if favorable, result in the issuance of a Safety Evaluation Report by the NRC's staff and a formal letter of recommendation from the ACRS to the Chairman of the NRC.

A.2.3 Programs for Control During Design and Construction

As noted earlier, a primary responsibility of the NRC's Office of Nuclear Reactor Regulation (NRR) is to evaluate applications to build new power reactors. The following regulations and guidance have been developed to control that process during the design and construction phase. Portions pertaining to anticipated airborne emissions are highlighted.

A.2.3.1 Technical Contents of Application (10 CFR 50.34). The NRC requires each applicant to submit Preliminary and Final Safety Analysis Reports (PSAR/FSAR) to provide the most current, design-related, technical information for independent review. The NRC's review emphasizes the following areas:

(1) Safety assessment of the site including those site features affecting facility design, particularly the site evaluation factors identified in 10 CFR 100, "Reactor Site Criteria." For airborne emissions, such factors include (a) population density and distribution, (b) meteorological conditions at the site and surrounding area (e.g., wind speed, direction, and dispersion), and (c) the use characteristics of the site environs (e.g., local food chain);

(2) Description of the design and operating characteristics of the facility;

(3) Facility design, including the principal design criteria, the design bases and the relation of the design bases to the principal design criteria, and information about materials of construction, general arrangement, and approximate dimensions, sufficient to provide reasonable assurance that the design will conform to the design bases with adequate margin of safety;

(4) 10 CFR Part 50, Appendix A, "General Design Criteria"

- Principal design criteria establish the necessary (but minimum) design, fabrication, construction, testing, and performance requirements for components to ensure safe operation. All departures from the General Design Criteria (GDC) must be identified and justified.

- The GDC are divided into six categories, the last of which, "Fuel and Radioactivity Control," provides criteria for effluent controls. Specifically, Criterion 60, "Control of Releases of Radioactive Materials to the Environment," and Criterion 64, "Monitoring Radioactivity Releases," apply to airborne effluents:

  - Criterion 60 requires that the "...design shall include means to control ... the release of radioactive materials in gaseous ... effluents ... during normal reactor operation including anticipated operational occurrences."

  - Criterion 64 requires that "Means shall be provided for monitoring ... effluent discharge paths, and the plant environs for radioactivity that may be released from normal operations, including anticipated operational occurrences...."

  - Additionally, Criterion 1 (Quality Standards and Records) in GDC Category I (Overall Requirements) requires that (a) a quality assurance program be established and (b) that appropriate records be maintained throughout the life of the unit;

(5) Analysis and evaluation of the design and performance of the components of the facility including a determination of margins of safety during normal operations and transient conditions anticipated during the life of the facility;

(6) Identification of the kinds and quantities of radioactive materials expected to be produced in the operation and the means for controlling and limiting radioactive effluents. NRC's regulations limiting airborne radionuclide emissions from commercial light-water reactors are set forth in 10 CFR 20 and Appendix I to 10 CFR 50.

- 10 CFR Part 20, "Standards for Protection Against Radiation," specifies the release limits for radioactive material to unrestricted areas.

- 10 CFR 34a, "Design Objectives for Equipment to Control Releases of Radioactive Material in Effluents - Nuclear Power Reactors"

  - Section 50.34a requires licensees to describe equipment to be installed and procedures to maintain control over radioactive materials in gaseous effluents produced during normal reactor operations, including expected operational occurrences. In addition, licensees must identify the design objectives and the means for keeping levels of radioactive material in effluents as low as reasonably achievable (ALARA). Numerical guidance for achieving ALARA releases is specified in 10 CFR Part 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As Is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents."

  - Section 50.34a also requires licensees to estimate the quantity of each of the principal radionuclides of the gases, halides, and particulates expected to be released annually;

(7) An identification and justification for the selection of those variables, conditions, or other items which are subjects of technical specifications;

(8) The technical qualifications of the applicant, including personnel qualification requirements, and a plan for the training of personnel;

(9) Plans for the conduct of normal operations, including maintenance, surveillance, and periodic testing;

(10) Managerial and administrative controls to ensure safe operation;

(11) A description of the quality assurance program

- 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants" (refer to Appendix E for a complete list and synopsis of QA program criteria)

- Quality assurance (QA) comprises all those planned and systematic actions necessary to ensure that a component will perform satisfactorily in service. This program must be documented by written policies, procedures, or instructions and must be carried out throughout the plant life. The QA program provides control over activities affecting the quality of components to an extent consistent with their importance to safety. The program must provide for the indoctrination and training of personnel performing activities affecting quality.

- Criterion XII, "Control of Measuring and Test Equipment," requires that measurements that affect the quality of work related to the accomplishment of the performance objectives and the design bases are taken only with instruments, tools, gauges, or other measuring devices that are accurate, controlled, calibrated, and adjusted at predetermined intervals to maintain accuracy within necessary limits.

- Criterion XVII, "Quality Assurance Records," requires that: "Sufficient records be maintained to furnish evidence of activities affecting quality. The records must include at least the following: Operating logs and the results of reviews, inspections, tests, audits, monitoring of work performance, and materials analysis. The records must also include closely related data such as qualifications of personnel, procedures, and equipment. Inspection and test records must, as a minimum, identify the inspector or data recorder, the type of observation, the results, the acceptability, and the action taken in connection with any deficiencies noted. Records must be identifiable and retrievable. Consistent with applicable regulatory requirements, the applicant must establish requirements concerning record retention, such as duration, location, and assigned responsibility";

(12) The plan for coping with emergencies, including unplanned air releases.

A.2.3.2 Conditions of Construction Permits (10 CFR 50.55). During the construction period, the licensee is subject to various terms and conditions to ensure that construction activities are conducted in accordance with the design bases and performance objectives agreed to in the PSAR. The NRC uses both active (NRC-initiated) and passive (licensee-initiated) regulatory requirements to maintain control during the construction phases.

Paragraph 50.55(e) requires the holder of the construction permit to notify the NRC of each deficiency found in design and construction, which, were it to remain uncorrected, could adversely affected the safety of operations.

A.2.3.3 Hearings and the ACRS (10 CFR 50.58). Each application for a construction permit (or operating license) is referred to the Advisory Committee on Reactor Safeguards (ACRS) for an independent review and report. The ACRS is a statutory body of scientists and engineers who advise the Commission on nuclear safety matters.

In addition to the views of the ACRS, the NRC seeks the views of the public and other interested parties by holding hearings on each application for a construction permit. Public hearings on each application for an operating license may also be held.

A.2.4 Programs for Control During Operation

During the period of operation, the licensee is subject to various terms and conditions to ensure that activities are conducted in accordance with the design bases and performance objectives agreed to in the FSAR. As in the construction phase, the NRC uses both NRC-initiated and licensee-initiated regulatory requirements to maintain control during operations.

A.2.4.1 Effluent Technical Specifications (10 CFR 50.36a). To keep releases of radioactive materials to unrestricted areas during normal reactor operations, including expected operational occurrences, as low as reasonably achievable, paragraph (a)(2) requires licensees to submit a semiannual report specifying the quantity of each of the principal radionuclides released to unrestricted areas in gaseous effluents during the previous 6-month period. This allows the Commission to estimate maximum potential annual radiation doses to the public resulting from releases. If releases are significantly above

design objectives, the Commission may require the licensee to take action as the Commission deems appropriate.

A.2.4.2 Changes, Tests, and Experiments (10 CFR 50.59). Once a license to operate has been issued, the NRC allows changes in facility design, operational procedures, and activities unless the proposed change involves a modification to the technical specifications or an unreviewed safety question. The licensee is required to maintain records and to report all changes in facility descriptions or procedures contained in the FSAR.

A.2.4.3 Inspections (10 CFR 50.70). Each licensee (and holder of a construction permit) must permit NRC to inspect its records, premises, and activities. The licensee is required to provide office space onsite for a full-time NRC resident inspector. The resident inspector is afforded immediate unfettered access, equivalent to that allowed regular plant employees.

A.2.4.4 Records and Reports (10 CFR 50.71). Each licensee and each holder of a construction permit is required to maintain records and make reports in accordance with the conditions established in the license or permit, or by the rules, regulations, and orders of the Commission. Record of power plant airborne emissions are maintained for the life of the facility.

In addition, each licensee is required to submit an annual update of its Final Safety Analysis Report (FSAR) to bring current (within 6 months) the material upon which the license was based.

A.2.4.5 Notification Requirements (10 CFR 50.72). The NRC requires its licensees to notify it (sometimes immediately) in the event of certain occurrences. In addition to emergencies, there are notification requirements for non-emergency events. The following events require telephone notification followed by written reports:

(1) Any event or condition that alone could have prevented the fulfillment of the safety function of a component that controls the release of radioactive material;

(2) Any airborne radioactive release that exceeds 2 times the applicable concentration limits specified by regulation in unrestricted areas when averaged over a time period of 1 hour; and

(3) Any event or situation, related to the health and safety of the public (or onsite personnel), or protection of the environment.

A.2.4.6 Licensee Event Report System (10 CFR 50.73). The holder of an operating license for a nuclear power plant is required by regulation to submit a Licensee Event Report (LER) within 30 days of the discovery of certain events. Events that may pertain to airborne emissions include:

(1) Any operation or condition prohibited by the plant's technical specifications;

(2) Any event that results in a condition outside the design basis of the plant; and

(3) Those events described in the preceding section dealing with notification requirements.

A.2.4.7 Backfitting (10 CFR 50.109). The Commission may require backfitting of a facility if it finds that such action is necessary to protect public health and safety or that it will provide substantial, additional protection at a justifiable cost.

A.2.4.8 Other Programs. The Systematic Assessment of Licensee Performance (SALP) program is a principal and regular source of data used for judging licensee performance. Under the SALP program, the performance of each nuclear power reactor licensee is evaluated through the periodic, comprehensive examination of all available data for each facility, including airborne emissions. The SALP review is intended to direct the NRC's and the licensee's management resources toward those areas that can most affect safety and that need improvement.

The SALP assessment includes a review of the past year's licensee event reports, inspection reports, enforcement history, and licensing safety issues. Also taken into

account are evaluations by the NRC's resident and regionally based inspectors, licensing project managers, and senior managers. The SALP program supplements the normal regulatory processes. It is intended to provide meaningful guidance to utility management regarding the NRC's concerns about quality and safety in plant operation and construction (NRC 89a).

A.2.5 Inspection Programs

Inspection programs use a system of unannounced and pre-planned visits to licensee and vendor facilities to permit personal observations of compliance with the licensing basis. In addition, for power plant licensees, a resident inspector program has been established.

Inspection is a basic element in the NRC's program. Inspections of licensed facilities determine the state of reactor safety, check that operations comply with the provisions of the license, and ascertain whether any unsafe conditions exist that would warrant corrective action. Both the NRC's headquarters and regional offices participate in inspections of operating reactors. The regional offices conduct most of the required inspections, using both regionally based and resident inspectors. In general, the regionally based inspectors are specialists, while resident inspectors are generalists. The Office of Nuclear Reactor Regulation is responsible for developing inspection policies and procedures and for monitoring and assessing the effectiveness and uniformity of the programs carried out by the headquarters and regional offices.

In addition to the routine or planned program of inspections, the NRC conducts a program (called "reactive" inspections) to deal with unsafe or potentially unsafe events or conditions at individual plant sites. In these inspections, the NRC seeks to determine the root cause of the event or condition; evaluates the licensee management's response to it, including action to prevent recurrence; and decides whether the problem is one that could occur at other facilities. The NRC then takes appropriate action.

A.2.5.1 Inspection of Licensees. In accordance with the NRC's "Inspection Manual," each facility receives approximately two inspections per year that focus on reactor effluents. Specialist inspectors from the regional offices conduct these inspections. Considered with the plants' reporting requirements, the inspections determine the extent

to which each plant is complying with its license and technical specifications, including its RETS. If problems are identified, followup inspections are scheduled to ensure that deficiencies are corrected. If a facility appears to have persistent problems in particular areas, inspections are performed more frequently and the resident staff may be increased.

The periodic inspections of the RETS include a review of records and procedures, interviews with plant personnel, and an effluent and environmental measurements program. The measurements program consists of the independent collection of effluent and environmental samples by NRC personnel from devices located offsite and usually adjacent to the licensees' instrumentation. Samples can be analyzed relatively quickly using an NRC mobile laboratory.

Each plant has a full-time NRC senior resident inspector who provides continual health and safety oversight of plant operations. Multiple reactor facilities may have more than one resident inspector. The resident inspector acts as the primary onsite evaluator for NRC's inspection efforts related to licensee incidents. If a problem arises within a particular area, the regional administrator can order a reactive inspection to investigate the area in detail (NRC 89a). If problems arise pertaining to compliance with the RETS, the NRC's resident inspector may request a special inspection or increase the frequency of inspections.

Areas of noncompliance are punishable by both civil and criminal penalties.

A.2.5.2 Inspection of Contractor and Vendor Programs. Much of the overall power plant design and construction effort is delegated to contractors and vendors.[1] To ensure proper inspection of such activities, the NRC requires licensees to establish an element of control over the products supplied to it by contractors and vendors.

The Vendor Inspection Program, which is centralized in NRC's headquarters, is principally a reactive program structured to respond to vendor and licensee reports of deviations or defects in vendor-supplied products, equipment, materials, and services. NRC conducted 90 such vendor inspections in fiscal year 1989. The inspections dealt

[1] "Contractor" is a term usually reserved for an entity that supplies services (e.g., design or construction). "Vendor" is a term usually reserved for an entity that supplies materials or finished products (e.g., pumps, valves, or concrete).

with a range of vendor activities involving plant operation, maintenance, procurements, and modifications. Inspections of licensees, vendors, and contractors were triggered by information from a number of sources, such as licensee construction deficiency and operating reactor event reports, vendor reports of product defects, reports of events from the regional offices, allegations from members of the public concerning vendor activities, and vendor issues identified by NRC in its inspection programs.

Control is exerted primarily through the NRC's requirements in 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plant and Fuel Reprocessing Plants."

A.2.6 Enforcement Programs

The objective of the NRC's enforcement programs is to protect the public health and safety by ensuring that licensees comply with regulatory requirements. The NRC's enforcement policy, contained in 10 CFR Part 2, Appendix C, calls for strong enforcement measures to ensure full compliance and is designed to prohibit operations by any licensees who fail to achieve adequate levels of protection.

NRC's enforcement action has several levels of severity. The level of severity used in a given situation varies with the seriousness of the matter and the licensee's previous compliance record. The levels include:

- Written Notices of Violation -- used in all instances of noncompliance with the NRC's requirements.

- Civil penalties -- considered for licensees who evidence significant or repetitive instances of noncompliance, especially if a previous Notice of Violation has not been effective in achieving the expected corrective action. Civil penalties may also be imposed in the case of a particularly significant first-of-a-kind violation.

- Orders to "cease and desist" operations, or for modification, suspension, or revocation of licenses -- used in situations where licensees have not responded to

civil penalties or where violations pose a significant threat to public health and safety or the common defense and security.

In fiscal year 1989, 75 enforcement cases resulted in civil penalty actions against power reactor licensees (NRC 89a). One of these cases involved the imposition of a civil penalty of $100,000 on a power reactor licensee. The violations included failure to implement technical specification requirements to preclude release of liquid effluents containing radioactivity in amounts exceeding the dose criteria set forth in 10 CFR Part 50, Appendix I, and failure to maintain and implement procedures and report the release of radioactive material in effluents as prescribed in the facility Technical Specifications (NRC 89b). These violations were revealed during an inspection of the facility.

The following regulatory requirements are specific to power reactors:

- Revocation, Suspension, Modification of Licenses and Construction Permits for Cause (10 CFR 50.100). A license or a construction permit may be revoked, suspended, or modified, in whole or in part, for any material false statement in the application for license; or the revelation of new, adverse information; or for failure to construct or operate a facility in accordance with the terms of the construction permit or license; or for violation of, or failure to observe, any of the terms and provisions of the Act, regulations, license, permit, or orders of the Commission.

- Violations (10 CFR 50.110). The NRC may obtain an injunction or other court order prohibiting any violation of its rules, regulations, or orders. Court orders may include the payment of civil penalties. Additionally, any person who willfully violates any of the Commission's provisions may be guilty of a crime and, upon conviction, may be punished by fine or imprisonment or both, as provided by law.

A.3 CONTROLS APPLICABLE TO AIRBORNE EMISSIONS

The NRC regulations limiting airborne radionuclide emissions from commercial light-water reactors are set forth in 10 CFR 20 and Appendix I to 10 CFR 50. Part 20 establishes "Standards for Protection Against Radiation," which are health-based

standards and apply to all NRC-licensed facilities, not just reactors. Appendix I to Part 50 establishes "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion *As Low as is Reasonably Achievable* for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents." These are ALARA standards that reflect explicit consideration of both cost and benefits.[2]

A.3.1 10 CFR 20.

The portions of Part 20 that apply to airborne radionuclide emissions from licensed facilities are Part 20.1105, which sets permissible levels of radiation (in mrem per unit time) in unrestricted areas, and Part 20.1106, which establishes limits (in curies released to the environment) on radioactivity in effluents to unrestricted areas. Part 20.1105 states that the Commission will approve an application for a license to possess or use radioactive materials and any other source of radiation if the applicant can demonstrate that radionuclide releases are not likely to cause any individual in an unrestricted area to receive a dose to the whole body in excess of 100 mrem/yr. Part 20.1105 also requires that no individual in an unrestricted area receive a dose in excess of 2 mrem in any 1 hour or 100 mrem in any 7 consecutive days.

Part 20.1106 limits, in part, the release of radioactive material to unrestricted areas to levels that will not result in average annual radionuclide concentrations in air and water in excess of the limits set forth in Table 2 of Appendix B of Part 20. This is a secondary standard designed to provide a level of assurance that the primary health-based standard of 100 mrem/yr ede is not exceeded.

In 1981, Part 20 was amended to adopt EPA standards set forth in 40 CFR Part 190. Part 190 requires, in part, that the radiation doses to real individuals from all uranium fuel cycle sources, including all gaseous and liquid effluent pathways and direct radiation, should not exceed 25 mrem/yr to the whole body or any organ, except the thyroid, which is limited to 75 mrem/yr.

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[2] It should be noted that, since its promulgation in 1975, Appendix I to 10 CFR Part 50 establishes the most restrictive limits on the airborne effluents from light-water reactors. Theoretically, under some conditions, such as multiple reactor sites, the limits set forth in 40 CFR Part 190 for the nuclear fuel cycle could be more restrictive. However, in practice, Appendix I has been the limiting regulation. Appendix I and 40 CFR 190 are compared later in this section.

In addition to these numerical standards, Part 20 requires that each licensee make every reasonable effort to maintain radiation exposures, and releases of radioactive material in effluents to unrestricted areas, as low as is reasonably achievable. The term "as low as is reasonably achievable," as defined in the Glossary of 10 CFR Part 20, means "as low as is reasonably achievable taking into account the state of technology, and the economics of improvement in relation to benefits to the public health and safety, and other societal and socioeconomic considerations in relation to the utilization of atomic energy in the public interest." Thus, the explicit consideration of cost is intended.

On January 9, 1986, major revisions to Part 20 (51 FR 1092) were proposed to keep pace with changes in the scientific knowledge underlying radiation protection that have occurred since Part 20 was originally issued more than 30 years ago. The revised rule implements the 1987 Presidential Guidance on occupational radiation protection and the recommendations of scientific organizations to establish risk-based limits and a system of dose limitation in accordance with the guidance published by the International Committee on Radiation Protection. At the time this report was prepared, the final revisions to Part 20 had just been promulgated, so it was necessary to base this summary on a pre-publication version of the rule, current as of March 1991.

Revised Part 20 requires that (1) the total effective dose equivalent to individual members of the public shall not exceed 100 mrem/yr, and 2 mrem in any 1 hour for external exposures, and (2) a licensee or applicant may apply for prior NRC authorization to operate up to an annual limit for an individual member of the public of 500 mrem. Part 20 also requires appropriate surveys to ensure that the dose limits are not exceeded. In addition, Table 2 of the revised Part 20 presents Derived Air Concentrations (DACs) that licensees may use to demonstrate compliance with the limits. The values for air concentrations are derived to assure that doses will be less than 50 mrem/yr. The revised rule retains the requirement for uranium fuel cycle facilities to comply with the standards set forth in 40 CFR 190.

A.3.2 Appendix I to 10 CFR 50.

Appendix I to Part 50, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion *As Low as is Reasonably Achievable* for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," establishes (a)

numerical ALARA design objectives that apply during the design and licensing of a new facility and (b) limiting conditions of operation that apply to operating plants.

The Appendix I design objectives require applicants for a permit to construct a nuclear power reactor to describe how radionuclide releases to unrestricted areas will be kept as low as is reasonably achievable. The applicant satisfies the design objectives, in part, by demonstrating that the gaseous radionuclide releases to the atmosphere from each light-water reactor on site will not result in an estimated average annual air dose in excess of 10 mrad for gamma exposure and 20 mrad for beta exposure. These limits, applicable to any unrestricted location that can be occupied, pertain only to external exposure to noble gases. Lower radionuclide release rates may be required to satisfy the design objectives if the releases are likely to result in an estimated annual external dose from gaseous effluents in excess of 5 mrem/yr. Alternatively, higher release rates may be acceptable if the applicant can provide reasonable assurance that the external dose to any individual in unrestricted areas will not exceed 5 mrem/yr to the whole body and 15 mrem/yr to the skin. The applicant must also demonstrate that the calculated annual total quantity of all radioiodines and radioactive particulates to be released to the atmosphere from each light-water reactor will not cause exposures to any individual in unrestricted areas in excess of 15 mrem to any organ.

There are no criteria regarding total whole-body dose from both external and internal exposures from radionuclides released to the atmosphere. The 5 and 15 mrem criteria are for external exposures to noble gases. Nevertheless, some nuclear utilities employ dose calculation procedures that include the calculation of internal whole-body dose using the whole-body dose conversion factors provided in the NRC's guidance (NRC 77a) and assess these doses against a 5 and 15 mrem/yr limit.

In addition to these numerical limits for individual exposures, Appendix I also requires the applicant to demonstrate that all cost-effective items of reasonably demonstrated technology have been incorporated into the radwaste system design, including effluent controls. A cost-effective technology is defined as any technology that can reduce the cumulative offsite dose by 1 person rem at a cost of no more than $1,000.

To assist applicants in assessing and demonstrating compliance with the design objectives of Appendix I, the NRC's staff developed a series of regulatory guides

providing acceptable methods for calculating the pre-operational estimates of effluent releases, dispersion of effluents in the environment, and associated doses to members of the public. The methodologies were selected to be "conservatively realistic"; that is, to ensure that the doses are neither significantly underestimated nor unrealistically overestimated.

(1) The Source Term

The first step in determining compliance with the Appendix I design objectives is the calculation of the anticipated radionuclide release rate during normal plant operations, including anticipated operational occurrences. To assist applicants with these calculations, the NRC's staff developed the PWR and BWR Gaseous and Liquid Effluent code, referred to as the PWR and BWR GALE code. Detailed descriptions of the codes, along with their user's manuals and listing, are available (NRC 76a, b, and c).

The codes are designed to model the buildup of radionuclides in various systems and compartments in the plants and estimate the radionuclide release rates to the environment in liquid and gaseous effluents during normal operation, including anticipated operational occurrences. The code can model a broad range of plant parameters and radwaste systems designs.

In the 1970's, the off-gas treatment systems of most BWRs were redesigned to increase greatly the holdup time of noble gases, resulting in large reductions in effluents. Other modifications included the more widespread use of charcoal filtration systems on building exhausts to remove radioiodines, special provisions to control steam leakage from steam line valves, and the use of clean steam, as opposed to turbine steam, to limit air in-leakage through the turbine shaft seal.

(2) Atmospheric Dispersion and Deposition

Once the source term is estimated, in units of Ci/yr of individual radionuclides, the next step in the assessment process is modeling the atmospheric dispersion and deposition of radionuclides in the environment. The purpose of this calculation is to determine the radionuclide concentrations in air and on soil at actual and potential offsite receptor locations. To assist applicants with these calculations, the NRC's staff

developed the computer code X/QD/Q. The NRC's guidance pertaining to the use of this code is provided in references NRC 72, 77b, and 77c.

The code uses meteorological data obtained from an onsite meteorological tower to generate joint frequency data and calculates annual average atmospheric dispersion factors (X/Q values) and deposition factors (D/Q values). Together with the source term, the X/Q and D/Q values are used to estimate the average annual radionuclide concentrations in air and on soil offsite.

The design, installation, testing, and reliability of the meteorological tower used to obtain the input data to X/QD/Q are governed by NRC's quality assurance regulations. Specific guidance pertaining to the meteorological program is provided in Regulatory Guide 1.23 (NRC 72).

(3) Dose Calculations

The final step in assessing compliance with the Appendix I design objectives is the calculation of the doses to members of the general public. To assist applicants with the gaseous effluent dose calculations, NRC's staff has provided the computer code GASPAR. A detailed description of the code and its users manual is provided in Regulatory Guide 1.109 (NRC 77a).

GASPAR uses the source terms from GALE and the atmospheric dispersion and deposition factors from X/QD/Q as input, along with site-specific demographic and land use factors, to calculate the annual average dose to real or hypothetical individuals at specified offsite locations (mrem/yr) and to the population within 50 miles of the site (person rem/yr).

The exposure pathways included in GASPAR are:

- External exposure from the passing plume,
- Internal exposure from inhalation of airborne radionuclides,
- External exposure to deposited radionuclides, and

- Internal exposure from the ingestion of vegetables, beef, and milk contaminated as a result of deposited radionuclides.

The results of the mrem/yr calculations are used to assess compliance with the 5 and 15 mrem/yr design objectives of Appendix I for the maximally exposed individual. The result of the person-rem/yr calculation is used as input into the assessment of the $1,000 per man rem criteria of Appendix I. To assist applicants in assessing compliance with the cost-benefit criteria, the NRC's staff issued Regulatory Guide 1.110 (NRC 76d). This guide provides equipment cost information and guidance on calculation of annualized cost, which is used, along with the annual person rem doses, to obtain a cost-benefit ratio.

Application of these codes after promulgation of Appendix I led to significant redesign and backfitting of improved effluent control systems at both PWRs and BWRs. For the older BWRs, the basic design of the gaseous radwaste treatment systems has changed considerably. The original design of the off-gas treatment systems for older BWRs was limited to a 30-minute delay line and often included a fully elevated release to enhance atmospheric dilution. The radionuclide effluents from these systems were relatively large but were acceptable under the standards applicable at that time. Modifications to the gaseous radwaste management systems of PWRs include:

- more extensive use of charcoal filtration on effluent release points,
- increased gas decay tank capacity,
- more widespread use of systems to eliminate gaseous emissions associated with steam generator blowdown,
- venting the gaseous emissions from the mechanical vacuum pump to the condenser, which virtually eliminates this source of radioiodine emission, and
- special provisions to control steam leakage from steam line valves.

The limiting conditions of operation (LCOs) set forth in Appendix I complement the design objectives by providing guidance to ensure that, during operation, the facility maintains radionuclide releases and offsite exposures ALARA and consistent with the design objectives. At the same time, the LCOs provide for flexibility of operation, compatible with considerations of public health and safety, to ensure a dependable source of power even under unusual operating conditions.

Compliance with the LCOs is established through Radiological Effluent Technical Specifications (RETS) in accordance with Part 50.36a. The LCOs and their associated RETS require that, if the quantity of radioactive materials actually released in effluents to unrestricted areas in any calendar quarter is such that the resulting radiation exposure, calculated on the same basis as the design objectives, exceeds one-half the annual design objectives, the licensee is required to investigate the cause of the exceedance, define and initiate a program of corrective action, and report these actions to the NRC within 30 days from the end of the quarter during which the release occurred.

The LCOs and RETS also require the licensee to initiate effluent and environmental monitoring programs to provide (1) data on the quantities of radionuclides released, (2) the levels of radiation and radioactive materials in the environment, and (3) changes in land use and demography in the vicinity of the site that pertain to compliance with the LCOs. If the monitoring data reveal that the relationship between the quantities of radioactive materials released and the doses to individuals in unrestricted areas is significantly different than that assumed in the calculations used to assess compliance with the design objectives, the NRC's staff may require a modification of the RETS.

To assist licensees in complying with the LCOs and preparing their RETS, the NRC's staff issued several guidance documents (NRC 83a and b, NRC 78). In addition, NRC also provides guidance on periodic reporting requirements pertaining to the LCOs (NRC 74). These documents provide highly detailed standard RETS and procedures for implementing the RETS.

Guidance is also provided on ensuring compliance with 40 CFR 190, which establishes limits on the total doses from all radionuclides (except radon) and all pathways of 25 mrem/yr to the whole body, 75 mrem/yr to the thyroid, and 25 mrem/yr to any organ. Accordingly, the Appendix I doses must be carefully summed to use them

for assessing compliance with 40 CFR 190. In addition, since liquid and gaseous pathways must be summed, the maximum individuals may differ. Further, the limits in 40 CFR 190 are for exposure to the fuel cycle and not to a single power plant. This has significance for plants with more than one reactor. NUREG-0133 (NRC 78) provides guidance to utilities for calculating doses for the purpose of assessing compliance with 40 CFR 190.

A complete listing of the NRC's Regulatory Guides is presented in Appendix B.

REFERENCES

EEI 86 Edison Electric Institute. "A Report on the Management Structure of the Nuclear Regulatory Commission Prepared for the Edison Electric Institute." June 1986.

NRC 72 U.S. Nuclear Regulatory Commission. "Onsite Meteorological Programs." Regulatory Guide 1.23. March 1972.

NRC 74 U.S. Nuclear Regulatory Commission. "Measuring, Evaluating, and Reporting Radioactivity in Solid Waste and Releases of Radioactive Material in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants." Regulatory Guide 1.21, Revision 1. June 1974.

NRC 76a U.S. Nuclear Regulatory Commission. "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors." Regulatory Guide 1.112. April 1976.

NRC 76b U.S. Nuclear Regulatory Commission. "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors (PWR-GALE Code)." NUREG-0017. April 1976.

NRC 76c U.S. Nuclear Regulatory Commission. "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Boiling Water Reactors (BWR-GALE Code)." NUREG-0016. April 1976.

NRC 76d U.S. Nuclear Regulatory Commission. "Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Nuclear Power Reactors." Regulatory Guide 1.110. March 1976.

NRC 77a U.S. Nuclear Regulatory Commission. "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I." Regulatory Guide 1.109, Revision 1. October 1977.

NRC 77b U.S. Nuclear Regulatory Commission. "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Power Reactors." Regulatory Guide 1.111, Revision 1. July 1977.

NRC 77c U.S. Nuclear Regulatory Commission. "XOQDOQ, Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations." Report - 0324. September 1977.

NRC 78 U.S. Nuclear Regulatory Commission. "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants." NUREG-0133. October 1978.

NRC 83a U.S. Nuclear Regulatory Commission. "Standard Radiological Effluent Technical Specifications for PWRs." NUREG-0472. January 1983.

NRC 83b U.S. Nuclear Regulatory Commission. "Standard Radiological Effluent Technical Specifications for BWRs." NUREG-0473. January 1983.

NRC 89a U.S. Nuclear Regulatory Commission. "The 1989 NRC Annual Report." NUREG-1145, Vol. 6. July 1989.

NRC 89b U.S. Nuclear Regulatory Commission. "John B. Martin, NRC Regional Administrator, Region V, to Sacramento Municipal Utility District, Docket No. 50-312." EA 86-110. January 8, 1989.

NRC 90b U.S. Nuclear Regulatory Commission. "U. S. Nuclear Regulatory Commission Functional Organization Charts." NUREG-0325, Revision 14. August 15, 1990.

NRC 83a U.S. Nuclear Regulatory Commission. "Standard Radiological Effluent Technical Specifications for PWRs." NUREG-0472. January 1983.

NRC 83b U.S. Nuclear Regulatory Commission. "Standard Radiological Effluent Technical Specifications for BWRs." NUREG-0473. January 1983.

NRC 89a U.S. Nuclear Regulatory Commission. "The 1989 NRC Annual Report." NUREG-1145, Vol. 6. July 1989.

NRC 89b U.S. Nuclear Regulatory Commission. "John B. Martin, NRC Regional Administrator, Region V, to Sacramento Municipal Utility District, Docket No. 50-312." EA 86-110. January 8, 1989.

APPENDIX B

SELECTED NRC REGULATORY GUIDES

This appendix provides a list of the regulatory guides published by the NRC. Guides that are particularly relevant to airborne effluent are denoted by an asterisk and boldface type.

NO.	TITLE	REV	DATE
	DIVISION 1 - POWER REACTORS		
1.1	Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal System Pumps	-	11/70
1.2	Thermal Shock to Reactor Pressure Vessels	-	11/70
1.3	Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss-of-Coolant Accident for Boiling Water Reactors	- 1 2	11/70 06/73 06/74
1.4	Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss-of-Coolant Accident for Pressurized Water Reactors	- 1 2	11/70 06/73 06/74
1.5	Assumptions Used for Evaluating the Potential Radiological Consequences of a Steam Line Break Accident for Boiling Water Reactors	-	03/71
1.6	Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems	-	03/71
1.7	Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant Accident	- 1 2	03/71 09/76 11/78

1.8	Qualification and Training of Personnel for Nuclear Power Plants	- 1 1-R 2	03/71 09/75 05/77 04/87
1.9	Selection, Design, and Qualification of Diesel-Generator Units Used as Standby (Onsite) Electric Power Systems at Nuclear Power Plants	- 1 2	03/71 11/78 12/79
1.10	Withdrawn		07/81
1.11	Instrument Lines Penetrating Primary Containment Supplement to Safety Guide 11	-	03/71 02/72
1.12	Instrumentation for Earthquakes	- 1	03/71 04/74
1.13	Spent Fuel Storage Facility Design Basis	- 1	03/71 12/75
1.14	Reactor Coolant Pump Flywheel Integrity	- 1	10/71 08/75
1.15	Withdrawn		07/81
1.16	Reporting of Operating Information - Appendix A Technical Specifications	- 1 2 3 4	10/71 10/73 09/74 01/75 08/75
1.17	Protection of Nuclear Power Plants Against Industrial Sabotage	- 1	10/71 06/73
1.18	Withdrawn		07/81
1.19	Withdrawn		07/81

1.20	Comprehensive Vibration Assessment Program for Reactor Internals During Pre-operational and Initial Start-up Testing	- 1 2	12/71 06/75 05/76
1.21*	**Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants**	**-** **1**	**12/71** **06/74**
1.22	Periodic Testing of Protection System Actuation Functions	-	02/72
1.23*	**Onsite Meteorological Programs**	**-**	**03/72**
1.24	Assumptions Used for Evaluating the Potential Radiological Consequences of a Pressurized Water Reactor Gas Storage Tank Failure	-	03/72
1.25	Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors	-	03/72
1.26	Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants	- 1 2 3	03/72 09/74 06/75 02/76
1.27	Ultimate Heat Sink for Nuclear Power Plants	- 1 2	03/72 03/74 01/76
1.28	Quality Assurance Program Requirements	- 1 2 3	06/72 03/78 02/79 08/85

1.29	Seismic Design Classification	- 1 2 3	06/72 08/73 02/76 09/78
1.30	Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment	-	08/72
1.31	Control of Ferrite Content in Stainless Steel Weld Metal	- 1 2 3	08/72 06/73 05/77 04/78
1.32	Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants	- 1 2	08/72 03/76 02/77
1.33	Quality Assurance Program Requirements (Operation)	- 1 2	11/72 02/77 02/78
1.34	Control of Electroslag Weld Properties	-	12/72
1.35	Inservice Inspection of Ungrouted Tendons in Pre-stressed Concrete Containment Structures	- 1 2 3	02/73 06/74 01/76 08/90
	1.35.1 Determining Prestressing Forces for Inspection of Prestressed Concrete Containments	-	08/90
1.36	Nonmetallic Thermal Insulation for Austenitic Stainless Steel	-	02/73
1.37	Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants	-	03/73

1.38	Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants	- 1 2	03/73 10/76 05/77
1.39	Housekeeping Requirements for Water-Cooled Nuclear Power Plants	- 1 2	03/73 10/76 09/77
1.40	Qualification Tests of Continuous-Duty Motors Installed Inside the Containment of Water-Cooled Nuclear Power Plants	-	03/73
1.41	Pre-operational Testing of Redundant On-Site Electric Power Systems To Verify Proper Load Group Assignments	-	03/73
1.42	Withdrawn		03/76
1.43	Control of Stainless Steel Welds Cladding of Low-Alloy Steel Components	-	05/73
1.44	Control of the Use of Sensitized Stainless Steel	-	05/73
1.45	Reactor Coolant Pressure Boundary Leakage Detection Systems	-	05/73
1.46	Withdrawn		03/85
1.47	Bypassed and Inoperable Status Indication for Nuclear Plant Safety Systems	-	05/73
1.48	Withdrawn		03/85
1.49	Power Levels of Nuclear Power Plants	- 1	05/73 12/73
1.50	Control of Preheat Temperature for Welding Low-Alloy Steel	-	05/73
1.51	Withdrawn		07/75

1.52	Design, Testing, and Maintenance Criteria for Post-accident Engineered-Safety-Feature Atmosphere Clean-up System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants	- 1 2	06/73 07/76 03/78
1.53	Application of the Single-Failure Criterion to Nuclear Power Plant Protection Systems	-	06/73
1.54	Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants	-	06/73
1.55	Withdrawn		07/81
1.56	Maintenance of Water Purity in Boiling Water Reactors	- 1	06/73 07/78
1.57	Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components	-	06/73
1.58	Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel	- 1	08/73 09/80
1.59	Design Basis Floods for Nuclear Power Plants	- 1 2	08/73 04/76 08/77
1.60	Design Response Spectra for Seismic Design of Nuclear Power Plants	- 1	10/73 12/73
1.61	Damping Values for Seismic Design of Nuclear Power Plants	-	10/73
1.62	Manual Initiation of Protective Actions	-	10/73
1.63	Electric Penetration Assemblies in Containment Structures for Nuclear Power Plants	- 1 2 3	10/73 05/77 07/78 02/87

1.64	Quality Assurance Requirements for the Design of Nuclear Power Plants	- 1 2	10/73 02/75 06/76
1.65	Materials and Inspections for Reactor Vessel Closure Studs	-	11/73
1.66	Withdrawn		10/77
1.67	Withdrawn		04/83
1.68	Initial Test Programs for Water-Cooled Nuclear Power Plants	- 1 2	11/73 01/77 08/78
	1.68.1 Pre-operational and Initial Startup Testing of Feedwater and Condensate Systems for Boiling Water Reactor Plants	- 1	12/75 01/77
	1.68.2 Initial Startup Test Program to Demonstrate Remote Shutdown Capability for Water-Cooled Nuclear Power Plants	- 1	01/77 07/78
	1.68.3 Pre-operational Testing of Instrument and Control Air Systems	-	04/82
1.69	Concrete Radiation Shields for Nuclear Power Plants	-	12/73
1.70	Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants	- 1 2 3	02/72 10/72 09/75 11/78
1.71	Welder Qualification for Areas of Limited Accessibility	-	12/73
1.72	Spray Pond Piping Made from Fiberglass-Reinforced Thermosetting Resin	- 1 2	12/73 01/78 11/78
1.73	Qualification Tests of Electric Valve Operators Installed Inside the Containment of Nuclear Power Plants	-	01/74

1.74	RESERVED		
1.75	Physical Independence of Electric Systems	- 1 2	02/74 01/75 09/78
1.76	Design Basis Tornado for Nuclear Power Plants	-	04/74
1.77	Assumptions Used for Evaluating a Control Rod Ejection Accident for Pressurized Water Reactors	-	05/74
1.78	Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release	-	06/74
1.79	Pre-operational Testing of Emergency Core Cooling Systems for Pressurized Water Reactors	- 1	06/74 09/75
1.80	Withdrawn		05/82
1.81	Shared Emergency and Shutdown Electric Systems for Multi-Unit Nuclear Power Plants	- 1	06/74 01/75
1.82	Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident	- 1	06/74 11/85
1.83	Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes	- 1	06/74 07/75
1.84	Design and Fabrication Code Case Acceptability - ASME Section III, Division 1	- 27	06/74 11/90
1.85	Materials Code Case Acceptability - ASME Section III, Division 1	- 27	06/74 11/90
1.86	Termination of Operating Licenses for Nuclear Reactors	-	06/74
1.87	Guidance for Construction of Class 1 Components in Elevated-Temperature Reactors	- 1	06/74 06/75

1.88	Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records	- 1 2	08/74 12/75 10/76
1.89	Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants	- 1	11/74 08/77
1.90	Inservice Inspection of Prestressed Concrete Containment Structures with Grouted Tendons	- 1	11/74 08/77
1.91	Evaluations of Explosions Postulated To Occur on Transportation Routes Near Nuclear Power Plants	- 1	01/75 02/78
1.92	Combining Modal Responses and Spatial Components in Seismic Response Analysis	- 1	12/74 02/76
1.93	Availability of Electric Power Sources	-	12/74
1.94	Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants	- 1	04/75 04/76
1.95	Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release	- 1	02/75 01/77
1.96	Design of Main Steam Isolation Valve Leakage Control Systems for Boiling Water Nuclear Power Plants	- 1	05/75 06/76
1.97	Instrumentation for Light-Water-Cooled Nuclear Power Plants To Assess Plant and Environs Conditions During and Following an Accident	- 1 2 3	12/75 08/77 12/80 05/83
1.98	Assumptions Used for Evaluating the Potential Radiological Consequences of a Radioactive Offgas System Failure in a Boiling Water Reactor	-	03/76
1.99	Radiation Embrittlement of Reactor Vessel Materials	- 1 2	07/75 04/77 05/88

1.100	Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants	- 1 2	03/76 08/77 06/88
1.101	Emergency Planning and Preparedness for Nuclear Power Reactors	- 1 2	11/75 03/77 10/81
1.102	Flood Protection for Nuclear Power Plants	- 1	10/75 09/76
1.103	Withdrawn		07/81
1.104	Withdrawn		08/79
1.105	Instrument Setpoints for Safety-Related Systems	- 1 2	11/75 11/76 02/86
1.106	Thermal Overload Protection for Electric Motors on Motor-Operated Valves	- 1	11/75 03/77
1.107	Qualifications for Cement Grouting for Prestressing Tendons in Containment Structures	- 1	11/75 02/77
1.108	Periodic Testing of Diesel Generator Units as Onsite Electric Power Systems at Nuclear Power Plants	- 1	08/76 08/77
1.109*	**Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I**	**- 1**	**03/76 10/77**
1.110*	**Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Nuclear Power Reactors**	**-**	**03/76**
1.111*	**Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors**	**- 1**	**03/76 07/77**

1.112	Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors	- O-R	04/76 05/77
1.113	Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I	- 1	05/76 04/77
1.114	Guidance to Operators at the Controls and to Senior Operators in the Control Room of a Nuclear Power Unit	- 1 2	02/76 11/76 05/89
1.115	Protection Against Low-Trajectory Turbine Missiles	- 1	03/76 07/77
1.116	Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems	- O-R	06/76 05/77
1.117	Tornado Design Classification	- 1	06/76 05/77
1.118	Periodic Testing of Electric Power and Protection Systems	- 1 2	06/76 11/77 06/78
1.119	Withdrawn		06/77
1.120	Fire Protection Guidelines for Nuclear Power Plants	- 1	06/76 11/77
1.121	Bases for Plugging Degraded PWR Steam Generator Tubes	-	08/76
1.122	Development of Floor Design Response Spectra for Seismic Design of Floor-Supported Equipment or Components	- 1	09/76 02/78
1.123	Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants	- 1	10/76 07/77

1.124	Service Limits and Loading Combinations for Class 1 Linear-Type Component Supports	- 1	11/76 01/78
1.125	Physical Models for Design and Operation of Hydraulic Structures and Systems for Nuclear Power Plants	- 1	03/77 10/78
1.126	An Acceptable Model and Related Statistical Methods for the Analysis of Fuel Densification	- 1	03/77 03/78
1.127	Inspection of Water-Control Structures Associated with Nuclear Power Plants	- 1	04/77 03/78
1.128	Installation Design and Installation of Large Lead Storage Batteries for Nuclear Power Plants	- 1	04/77 10/78
1.129	Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Nuclear Power Plants	- 1	04/77 02/78
1.130	Service Limits and Loading Combinations for Class 1 Plate-and-Shell-Type Component Supports	- 1	07/77 10/78
1.131	Qualification Tests of Electric Cables, Field Splices, and Connections for Light-Water-Cooled Nuclear Power Plants	-	08/77
1.132	Site Investigations for Foundations of Nuclear Power Plants	- 1	09/77 03/79
1.133	Loose-Part Detection Program for the Primary System of Light-Water-Cooled Reactors	- 1	09/77 05/81
1.134	Medical Evaluation of Licensed Personnel for Nuclear Power Plants	- 1 2	09/77 03/79 04/87
1.135	Normal Water Level and Discharge at Nuclear Power Plants	-	09/77
1.136	Materials, Construction, and Testing of Concrete Containments	- 1 2	11/77 10/78 06/81

1.137	Fuel-Oil Systems for Standby Diesel Generators	- 1	01/78 10/79
1.138	Laboratory Investigations of Soils for Engineering Analysis and Design of Nuclear Power Plants	-	04/78
1.139	Guidance for Residual Heat Removal	-	05/78
1.140*	**Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants**	**- 1**	**03/78 10/79**
1.141	Containment Isolation Provisions for Fluid Systems	-	04/78
1.142	Safety-Related Concrete Structures for Nuclear Power Plants (Other than Reactor Vessels and Containment)	- 1	04/78 10/81
1.143*	**Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants**	**- 1**	**07/78 10/79**
1.144	Auditing of Quality Assurance Programs for Nuclear Power Plants	- 1	01/79 09/80
1.145	Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants	- 1	08/79 11/82
1.146	Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants	-	08/80
1.147	Inservice Inspection Code Case Acceptability - ASME Section XI, Division 1	- 8	02/81 11/90
1.148	Functional Specification for Active Valve Assemblies in Systems Important to Safety in Nuclear Power Plants	-	03/81
1.149	Nuclear Power Plant Simulation Facilities for Use in Operator License Examinations	- 1	04/81 04/87
1.150	Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations	- 1	06/81 02/83

1.151	Instrument Sensing Lines	-	07/83
1.152	Criteria for Programmable Digital Computer System Software in Safety-Related Systems of Nuclear Power Plants	-	11/85
1.153	Criteria for Power, Instrumentation, and Control Portions of Safety Systems	-	12/85
1.154	Format and Content of Plant-Specific Pressurized Thermal Shock Safety Analysis Reports for Pressurized Water Reactors	-	01/87
1.155	Station Blackout	-	08/88
1.156	Environmental Qualification of Connection Assemblies for Nuclear Power Plants	-	11/87
1.157	Best-Estimate Calculations of Emergency Core Cooling System Performance	-	05/89
1.158	Qualification of Safety-Related Lead Storage Batteries for Nuclear Power Plants	-	02/89
1.159	Assuring the Availability of Funds for Decommissioning Nuclear Reactors	-	09/90
	DIVISION 4 - ENVIRONMENTAL AND SITING		
4.1*	**Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants**	**- 1**	**01/73 04/75**
4.2	Preparation of Environmental Reports for Nuclear Power Stations	- 1 2	02/71 01/75 07/76
4.3	Withdrawn		12/76
4.4	Reporting Procedure for Mathematical Models Selected to Predict Heated Effluent Dispersion in Natural Water Bodies	-	05/74

4.5	Measurements of Radionuclides in the Environment - Sampling and Analysis of Plutonium in Soil	-	05/74
4.6	Measurements of Radionuclides in the Environment - Strontium-89 and Strontium-90 Analyses	-	05/74
4.7	General Site Suitability Criteria for Nuclear Power Stations	- 1	09/74 11/75
4.8*	**Environmental Technical Specifications for Nuclear Power Plants**	**-**	**12/75**
4.9	Preparation of Environmental Reports for Commercial Uranium Enrichment Facilities	- 1	12/74 10/75
4.10	Withdrawn		11/77
4.11	Terrestrial Environmental Studies for Nuclear Power Stations	- 1	07/76 08/77
4.12	(Not Published)	-	-
4.13	Performance, Testing, and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Applications	- 1	11/76 07/77
4.14	Radiological Effluent and Monitoring at Uranium Mills	- 1	06/77 04/80
4.15*	**Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment**	**- 1**	**12/77 02/79**
4.16	Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluents from Nuclear Fuel Reprocessing and Fabrication Plants and Uranium Hexaflouride Production Plants	- 1	03/78 12/85
4.17	Standard Format and Content Guide of Site Characterization Plans for High-Level-Waste Geologic Repositories	- 1	07/82 03/87

4.18	Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste	-	06/83
4.19	Guidance for Selecting Sites for Near-Surface Disposal of Low-Level Radioactive Waste	-	08/8
	DIVISION 8 - OCCUPATIONAL HEALTH		
8.1	Radiation Symbol	-	02/73
8.2	Guide for Administrative Practices in Radiation Monitoring	-	02/73
8.3	Film Badge Performance Criteria	-	02/73
8.4	Direct-Reading and Indirect-Reading Pocket Dosimeters	-	02/73
8.5	Criticality and Other Interior Evacuation Signals	- 1	02/73 03/81
8.6	Standard Test Procedure for Geiger-Muller Counters	-	05/73
8.7	Occupational Radiation Exposure Records System	-	05/73
8.8*	**Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable**	**- 1 2 3**	**07/73 09/75 03/77 06/78**
8.9	Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program	-	09/73
8.10*	**Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable**	**- 1 1-R**	**04/74 09/75 05/77**
8.11	Applications of Bioassay for Uranium	-	06/74
8.12	Criticality Accident Alarm Systems	- 1 2	12/74 01/81 10/88

8.13	Instruction Concerning Prenatal Radiation Exposure	- 1 2	03/75 11/75 12/87
8.14	Personnel Neutron Dosimeters	- 1	06/76 08/77
8.15	Acceptable Programs for Respiratory Protection	-	10/76
8.16	(Not Issued)	-	-
8.17	(Not Issued)	-	-
8.18	Information Relevant to Ensuring that Occupational Radiation Exposures at Medical Institutions Will Be As Low As Reasonably Achievable	- 1	12/77 10/82
8.19	Occupational Radiation Dose Assessment in Light-Water Reactor Power Plants - Design Stage Man-Rem Estimates	- 1	05/78 06/79
8.20	Applications of Bioassay for I-125 and I-131	- 1	04/78 09/79
8.21	Health Physics Surveys for Byproduct Material at NRC-Licensed Processing and Manufacturing Plants	- 1	05/78 10/79
8.22	Bioassay at Uranium Mills	- 1	07/78 08/88
8.23	Radiation Safety Surveys at Medical Institutions	- 1	02/79 01/81
8.24	Health Physics Surveys During Enriched Uranium-235 Processing and Fuel Fabrication	- 1	11/78 10/79
8.25	Calibration and Error Limits of Air Sampling Instruments for Total Volume of Air Sampled	-	08/80
8.26	Applications of Bioassay for Fission and Activation Products	-	09/80

8.27	Radiation Protection Training for Personnel at Light-Water-Cooled Nuclear Power Plants	-	03/81
8.28	Audible-Alarm Dosimeters	-	08/81
8.29	Instruction Concerning Risks from Occupational Radiation Exposure	-	07/81
8.30	Health Physics Surveys in Uranium Mills	-	06/83
8.31	Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills Will Be As Low As Reasonably Achievable	-	05/83
8.32	Criteria for Establishing a Tritium Bioassay Program	-	07/88

* Applicable to power plant effluents.

APPENDIX C

CAP-88 INFORMATION SHEETS

Pressurized Water Reactors (PWRs)

CAP-88 INFORMATION SHEET

Date: May 1991 Source Category: Reactors

Facility: Vogtle Units 1 and 2
Address: Waynesboro, GA

____ Population Assessment JCL File Name: VOGTLE
____ Array attached
Latitude: 33° 8' 30"
Longitude: 81° 45' 52" Pop. File Name: VOGTLE

____ Individual Assessment JCL File Name: ____

Distances (meters):

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10,000	15,000	20,000	30,000	40,000	50,000	60,000	80,000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.700	.300	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: AGS1018

WBAN: 03820
Header: 1018
Code: ____
Set No: ____

Temperature: 16 °C
Lid Height: 950 meters
Rainfall: 123 cm/yr

	1	2	3	4	5	6
____ STACK Source:						
Height (m):	72					
Diameter (m):						
____ AREA Source Diameter (m^2):						
____ BUOYANT cal/sec						
____ MOMENTUM m/s						
X ENTERED Rise	0	0	0	0	0	0	0 meters
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Augusta Met Data approximately 25 miles N of plant (5-year)

File Name: VOGTLE

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW									3		
NW									3		6
WNW									3	11	44
W									11	17	11
WSW							6				
SW									3	17	11
SSW											
S											
SSE											
SE											6
ESE											
E											
ENE											
NE											
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW	11								
WNW	38								
W	49								
WSW	33								
SW	49								
SSW	11								
S	21								
SSE	6								
SE	27								
ESE									
E									
ENE									
NE									
NNE									

INSTALLATION: VOGTLE 1 & 2
LOCATION: 25 MI SSE OF AUGUSTA, GA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-424
THERMAL POWER (MWH): 2.18E+07
COMMERCIAL OPERATION: 06/01/87
LICENSEE: GEORGIA POWER
LICENSED POWER (MWT): 3.41E+03
NET ELECTRIC POWER (MWH): 6.79E+06
INITIAL CRITICALITY: 03/09/87
COOLING WATER SOURCE: SAVANNAH RIVER

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
BE-7	6.58E-06
AR-41	3.55E+01
CO-57	3.46E-08
CO-58	1.49E-06
KR-85	3.38E-04
KR-85M	1.39E-01
KR-88	3.79E-04
SR-90	9.94E-08
I-131	1.52E-05
XE-131M	3.08E-05
I-133	7.93E-05
XE-133	1.19E+02
XE-133M	5.44E-02
XE-135	1.13E+01
TOTAL AIRBORNE TRITIUM RELEASE	1.08E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: ~~April 1991~~ Source Category: Reactors

Facility: Arkanas Nuclear One, Units 1 & 2
Address: Russelville, AR

____ Population Assessment JCL File Name: ARKANAS
____ Array attached
Latitude: 35° 18' 36"
Longitude: 93° 13' 50" Pop. File Name: ARKANSAS

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: LIT0516

WBAN: 13963
Header: 516
Code: ____
Set No: ____

Temperature: 17 °C
Lid Height: 1050 meters
Rainfall: 125 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	55					
Diameter (m):						

____ AREA Source
Diameter (m²): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

x ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Met data 1955-1964 Little Rock 60 miles SE of plant

File Name: ARKANSAS

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								19	62	71	180
NNW								19	146	212	300
NW								3	585	850	888
WNW								3	13	27	112
W								13	13	13	19
WSW								5	5	5	90
SW								5	5	19	112
SSW								13	13	32	32
S								13	13	13	69
SSE								5	5	5	13
SE								19	27	90	167
ESE										217	780
E										27	146
ENE								48	89	146	345
NE								19	81	222	246
NNE							3		98	162	210

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	230								
NNW	368								
NW	989								
WNW	168								
W	27								
WSW	485								
SW	132								
SSW	62								
S	260								
SSE	41								
SE	328								
ESE	2280								
E	160								
ENE	470								
NE	271								
NNE	230								

INSTALLATION: ARKANSAS ONE 1
LOCATION: 6 MI WNW RUSSELLVILLE, AR

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-313
THERMAL PWR (MWH): 1.24E+07
COMMERCIAL OPERATION: 12/19/74
COOLING WATER SOURCE: DARDANELLE RESERVOIR

LICENSEE: ARKANSAS P&L
LICENSED PWR (MWT): 2.57E+03
NET ELECTRIC PWR (MWH): 3.95E+06
INITIAL CRITICALITY: 08/06/74

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
K-40	5.96E-06
CO-58	1.74E-05
CO-60	7.07E-06
KR-85	3.22E+00
KR-85M	3.70E+00
SR-89	8.89E-06
SR-90	9.34E-08
NB-97	1.01E-06
AG-110M	1.27E-06
SN-113	9.44E-07
I-131	8.13E-04
XE-131M	1.67E+00
I-132	4.19E-06
I-133	2.99E-05
XE-133	1.16E+03
XE-133M	1.01E+00
CS-134	1.73E-06
XE-135	8.01E+01
CS-137	1.76E-04

TOTAL AIRBORNE TRITIUM RELEASE 3.46E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: ARKANSAS ONE 2
LOCATION: 6 MI WNW RUSSELVILLE, AR

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-368
THERMAL PWR (MWH): 1.58E+07
COMMERCIAL OPERATION: 03/26/80
COOLING WATER SOURCE: DARDANELLE RESERVOIR

LICENSEE: ARKANSAS P&L
LICENSED PWR (MWT): 2.82E+03
NET ELECTRIC PWR (MWH): 4.95E+06
INITIAL CRITICALITY: 12/05/78

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
ALPHA	1.69E-06
AR-41	1.98E-02
CR-51	5.61E-06
CO-57	2.18E-07
CO-58	5.89E-05
CO-60	2.17E-05
KR-85	1.78E-02
KR-85M	2.45E-01
KR-87	1.15E-02
KR-88	8.67E-02
RB-88	2.96E-05
SR-89	1.43E-06
SR-90	2.92E-08
SR-92	1.74E-06
NB-95	3.58E-06
ZR-95	4.24E-06
NB-97	1.04E-06
ZR-97	8.09E-07
RU-103	3.47E-07
AG-110M	1.51E-05
SN-113	5.56E-07
I-131	2.65E-04
XE-131M	3.84E+01
I-132	2.06E-06
I-133	3.85E-05
XE-133	1.79E+03
XE-133M	2.25E+00
XE-135	3.30E+02
CS-137	2.81E-05
BI-214	2.84E-04
PB-214	1.37E-05
RA-226	2.36E-06
TH-228	1.08E-05

TOTAL AIRBORNE TRITIUM RELEASE 5.00E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991

Source Category: Reactors

Facility: Beaver Valley, Units 1 & 2

Address: Shippingport, PA

____ Population Assessment

____ Array attached

Latitude: 40° 37' 18"

Longitude: 80° 26' 2"

JCL File Name: BEAVER

Pop. File Name: BEAVER

____ Individual Assessment

JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban

____ Rural

WEATHER DATA:

____ Array attached

STAR File Name: AGC1210

WBAN: 14762

Header: 1210

Code: AGC

Set No: ____

Temperature: 10 °C

Lid Height: 900 meters

Rainfall: 92 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	155					
Diameter (m):						

____ AREA Source

Diameter (m^2): ____

____ BUOYANT cal/sec

____ MOMENTUM m/s

X ENTERED Rise

Pasquill Category:	A	B	C	D	E	F	G
meters	0	0	0	0	0	0	0

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: 1-yr met data for Pittsburgh

File Name: BEAVER

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								16	16	96	380
NNW								190	420	40	50
NW								330	5800	1200	340
WNW								4	32	16	344
W										24	48
WSW									8	140	48
SW									20	344	136
SSW								8	24	52	72
S				0					16	100	48
SSE									12	24	36
SE								16	48	52	48
ESE								8	80	60	132
E									32	400	160
ENE								40	68	60	152
NE					108				144	490	1100
NNE									320	180	180

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	104								
NNW	270								
NW	540								
WNW	600								
W	58								
WSW	88								
SW	44								
SSW	40								
S	132								
SSE	136								
SE	44								
ESE	200								
E	32								
ENE	88								
NE	266								
NNE	144								

INSTALLATION: BEAVER VALLEY
LOCATION: SHIPPINGPORT, PA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-334
THERMAL PWR (MWH): 1.64E+07
COMMERCIAL OPERATION: 10/01/76
COOLING WATER SOURCE: OHIO RIVER

LICENSEE: DUQUESNE LIGHT
LICENSED PWR (MWT): 2.66E+03
NET ELECTRIC PWR (MWH): 4.98E+06
INITIAL CRITICALITY: 05/10/76

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-412
THERMAL PWR (MWH): 2.13E+07
COMMERCIAL OPERATION: 11/17/87
COOLING WATER SOURCE: OHIO RIVER

LICENSEE: DUQUESNE LIGHT
LICENSED PWR (MWT): 2.66E+03
NET ELECTRIC PWR (MWH): 6.48E+06
INITIAL CRITICALITY: 08/04/87

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	3.02E-01
MN-54	1.46E-07
CO-58	1.26E-05
CO-60	1.25E-04
KR-85	4.72E-01
KR-85M	2.43E-06
SR-90	9.73E-09
MO-99	2.79E-08
I-131	1.56E-04
XE-131M	1.79E-01
I-133	1.59E-04
XE-133	2.32E+00
I-135	2.13E-05
XE-135	4.44E-01
XE-135M	2.35E-02
CS-137	1.37E-06

TOTAL AIRBORNE TRITIUM RELEASE 4.33E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: BEAVER VALLEY 1
LOCATION: SHIPPINGPORT, PA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-334
THERMAL PWR (MWH): 1.64E+07
COMMERCIAL OPERATION: 10/01/76
COOLING WATER SOURCE: OHIO RIVER

LICENSEE: DUQUESNE LIGHT
LICENSED PWR (MWT): 2.66E+03
NET ELECTRIC PWR (MWH): 4.98E+06
INITIAL CRITICALITY: 05/10/76

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
CO-58	9.13E-04
CO-60	4.05E-04
KR-85	5.00E+01
I-131	1.70E-03
XE-131M	3.73E+00
I-133	1.16E-05
XE-133	2.03E+01
XE-133M	2.90E-02
CS-134	2.05E-06
XE-135	1.42E+00
CS-137	8.83E-05
CE-141	4.60E-06

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: BEAVER VALLEY 2
LOCATION: SHIPPINGPORT, PA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-412
THERMAL PWR (MWH): 2.13E+07
COMMERCIAL OPERATION: 11/17/87
COOLING WATER SOURCE: OHIO RIVER

LICENSEE: DUQUESNE LIGHT
LICENSED PWR (MWT): 2.66E+03
NET ELECTRIC PWR (MWH): 6.48E+06
INITIAL CRITICALITY: 08/04/87

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
CO-58	3.12E-05
CO-60	7.48E-05
KR-85	1.30E+01
MO-99	8.45E-07
I-131	1.18E-05
I-133	7.00E-06
XE-133	5.39E-01
XE-135	1.53E+00
CE-141	3.83E-07
CE-144	7.73E-06

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Braidwood Station, Units 1 & 2
Address: Braidwood, IL

____ Population Assessment JCL File Name: BRAIDWOO
____ Array attached
Latitude: 41° 16' 5"
Longitude: 88° 12' 47" Pop. File Name: BRAIDWOO

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	3000	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.700	.300	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: ORD0452

WBAN: 94846
Header: 452
Code: ____
Set No: ____

Temperature: 10 °C
Lid Height: 950 meters
Rainfall: 85 cm/yr

		1	2	3	4	5	6
____	STACK Source:						
	Height (m):	61					
	Diameter (m):	2.8					
____	AREA Source						
	Diameter (m²):						
____	BUOYANT cal/sec						
____	MOMENTUM m/s						
X	ENTERED Rise	0	0	0	0	0	0	0 meters
	Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Met data Chicago/ohare 50 miles NE of plant

File Name: BRAIDWOO

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N							3				
NNW											950
NW						3					
WNW				3						1012	
W	0					1592		572		158	2283
WSW				3							
SW						3			1239	322	842
SSW							3				
S								3			
SSE									193		
SE								26			
ESE											
E										1101	
ENE							3				
NE											
NNE											331
							3				

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW	571								
WNW	1720								
W									
WSW									
SW	721								
SSW									
S									
SSE									
SE									
ESE									
E	1817								
ENE	1930								
NE	2331								
NNE									

INSTALLATION: BRAIDWOOD 1
LOCATION: 24 MI SSW OF JOLIET, IL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-456
THERMAL PWR (MWH): 1.04E+07
COMMERCIAL OPERATION: 07/29/88
COOLING WATER SOURCE: KANKAKEE RIVER

LICENSEE: COMMONWEALTH EDISON
LICENSED PWR (MWT): 3.41E+03
NET ELECTRIC PWR (MWH): 3.42E+06
INITIAL CRITICALITY: 05/29/87

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	3.31E-01
CO-58	1.20E-07
CO-60	1.90E-07
KR-85	1.78E-01
KR-85M	1.87E-02
KR-87	6.38E-04
KR-88	1.63E-02
I-131	3.22E-04
XE-131M	5.33E-01
I-133	1.27E-04
XE-133	4.02E+01
XE-133M	2.70E-01
I-134	2.40E-02
XE-135	3.81E-01
TOTAL AIRBORNE TRITIUM RELEASE	2.73E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: BRAIDWOOD 2
LOCATION: 24 MI SSW OF JOLIET, IL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-457
THERMAL PWR (MWH): 4.08E+06
COMMERCIAL OPERATION: 10/17/88
COOLING WATER SOURCE: KANKAKEE RIVER

LICENSEE: COMMONWEALTH EDISON
LICENSED PWR (MWT): 3.41E+03
NET ELECTRIC PWR (MWH): 1.35E+06
INITIAL CRITICALITY: 03/08/88

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	7.84E-01
KR-85	1.45E-02
KR-85M	1.19E-02
KR-87	9.60E-05
KR-88	5.66E-04
I-131	7.61E-05
XE-131M	8.85E-01
I-133	1.58E-05
XE-133	3.65E+01
XE-133M	1.09E-01
I-135	3.26E-06
XE-135	3.73E-02

TOTAL AIRBORNE TRITIUM RELEASE 2.66E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Byron Station Units 1 & 2
Address: Byron, IL

___ Population Assessment JCL File Name: BYRON
___ Array attached
Latitude: 42 ° 7 ' 48 "
Longitude: 89 ° 15 ' 17 " Pop. File Name: BYRON

___ Individual Assessment JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

___ Urban
___ Rural

WEATHER DATA:
___ Array attached STAR File Name: MLI0269

WBAN: 14923
Header: 269
Code: MLI
Set No: ___

Temperature: 10 °C
Lid Height: 950 meters
Rainfall: 85 cm/yr

		1	2	3	4	5	6
___	STACK Source:						
	Height (m):	61					
	Diameter (m):						
___	AREA Source Diameter (m^2):						
___	BUOYANT cal/sec						
___	MOMENTUM m/s						
X	ENTERED Rise	0	0	0	0	0	0	0 meters
	Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Moline/Quad Cities met data 80 miles SW of plant

File Name: BYRON

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									4	18	87
NNW									11	11	74
NW									250	124	18
WNW								4	4	7	18
W							0		7	45	15
WSW								4	22	56	60
SW								11	15	26	55
SSW							26		18	7	43
S							4		7	19	16
SSE								8	31	8	45
SE									24	16	20
ESE								4	12	32	28
E			0						16	20	41
ENE									20	41	28
NE									28	49	53
NNE								4	4	45	1181

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	796								
NNW	12								
NW	40								
WNW	4								
W	34								
WSW	45								
SW	1223								
SSW	1231								
S	159								
SSE	20								
SE	49								
ESE	17								
E	28								
ENE	178								
NE	106								
NNE	766								

INSTALLATION: BYRON
LOCATION: 3 MI SW BYRON, IL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-454
THERMAL PWR (MWH): 1.99E+07
COMMERCIAL OPERATION: 09/16/85
COOLING WATER SOURCE: ROCK RIVER

LICENSEE: COMMONWEALTH EDISON
LICENSED PWR (MWT): 3.41E+03
NET ELECTRIC PWR (MWH): 6.29E+06
INITIAL CRITICALITY: 02/02/85

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-455
THERMAL PWR (MWH): 2.04E+07
COMMERCIAL OPERATION: 08/21/87
COOLING WATER SOURCE: ROCK RIVER

LICENSEE: COMMONWEALTH EDISON
LICENSED PWR (MWT): 3.41E+03
NET ELECTRIC PWR (MWH): 6.36E+06
INITIAL CRITICALITY: 01/09/87

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	6.57E-01
KR-85	1.06E+01
KR-85M	3.97E-01
KR-87	5.57E-03
KR-88	2.53E-01
I-131	1.28E-02
XE-131M	6.72E+00
I-132	4.45E-04
I-133	3.72E-03
XE-133	1.73E+03
XE-133M	1.25E+01
I-134	2.52E-05
I-135	1.12E-03
XE-135	1.71E+01
CS-137	2.32E-05
BA-LA-140	1.78E-05

TOTAL AIRBORNE TRITIUM RELEASE 1.62E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Callaway Plant, Unit 1
Address: Fulton, MI

____ Population Assessment JCL File Name: CALLAWAY
____ Array attached
Latitude: 38° 45' 42"
Longitude: 91° 47' 52" Pop. File Name: CALLAWAY

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: CGM0670

WBAN: 13825
Header: 670
Code: CGM
Set No: ____

Temperature: 13 °C
Lid Height: 900 meters
Rainfall: 86 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	64					
Diameter (m):						

____ AREA Source
Diameter (m²): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:							

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: VERIFY LAT & LONG Met data 5-yr Columbus, MS 80 miles S of plant

File Name: CALLAWAY

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									7	2	
NNW									2	10	
NW									5	12	
WNW									10	2	49
W								2	20		37
WSW								2	5	7	
SW										17	2
SSW										7	20
S								2	2	7	5
SSE								2	2	5	8
SE								2	2	7	7
ESE										5	2
E									2		5
ENE								5		5	2
NE								5		7	8
NNE								5	5	5	5

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW	87								
NW	36								
WNW	87								
W	43								
WSW	33								
SW	24								
SSW	55								
S	7								
SSE	2								
SE	69								
ESE	20								
E	2								
ENE	7								
NE	32								
NNE	4								

INSTALLATION: CALLAWAY
LOCATION: 10 MI SE FULTON, MO

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-483
THERMAL PWR (MWH): 2.76E+07
COMMERCIAL OPERATION: 12/19/84
COOLING WATER SOURCE: MISSOURI RIVER

LICENSEE: UNION ELECTRIC
LICENSED PWR (MWT): 3.57E+03
NET ELECTRIC PWR (MWH): 8.94E+06
INITIAL CRITICALITY: 10/02/84

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
ALPHA	2.38E-06
AR-41	6.10E-01
KR-85	8.20E+01
KR-85M	2.50E+00
KR-88	7.28E-01
RB-88	8.30E-02
I-131	1.87E-05
XE-131M	2.40E+00
XE-133	5.60E+02
XE-133M	2.56E+00
XE-135	3.73E+01

TOTAL AIRBORNE TRITIUM RELEASE 1.53E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Calvert Cliffs, Units 1 & 2
Address: Lusby, MD

___ Population Assessment JCL File Name: CALVERT
___ Array attached
Latitude: 38° 26' 4"
Longitude: 76° 26' 30" Pop. File Name: CALVERT

___ Individual Assessment JCL File Name: ___

Distances (meters)

~~200~~	~~300~~	~~400~~	500	600	~~800~~	~~1200~~	~~1600~~	~~3200~~	~~4800~~
~~6400~~	~~8000~~	~~10000~~	~~15000~~	~~20000~~	~~30000~~	~~40000~~	~~50000~~	~~60000~~	~~80000~~

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.700	.300	.000

___ Urban
___ Rural

WEATHER DATA:
___ Array attached STAR File Name: NHK1306

WBAN: 13721
Header: 1306
Code: ___
Set No: ___

Temperature: 12 °C
Lid Height: 600 meters
Rainfall: 99 cm/yr

___ STACK Source:

	1	2	3	4	5	6
Height (m):	48					
Diameter (m):						

___ AREA Source
Diameter (m^2):

___ BUOYANT cal/sec
___ MOMENTUM m/s

x ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:							

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Met data Paxuxent River 1-yr

File Name: CALVERT

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											
NW									3	684	129
WNW									9	186	40
W									44	4	49
WSW									27	18	44
SW									44	18	71
SSW									36	18	93
S									40	58	16
SSE								85	9	27	142
SE								85	140		
ESE											
E											
ENE											
NE											
NNE											

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW	4								
WNW	92								
W	67								
WSW	60								
SW	18								
SSW	58								
S	160								
SSE	62								
SE	497								
ESE									
E									
ENE									
NE									
NNE									

INSTALLATION: CALVERT CLIFFS
LOCATION: 45 MI SE WASHINGTON, D.C.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR LICENSEE: BALTIMORE G&E
DOCKET NO.: 50-317 LICENSED PWR (MWT): 2.70E+03
THERMAL PWR (MWH): 1.62E+07 NET ELECTRIC PWR (MWH): 5.16E+06
COMMERCIAL OPERATION: 05/08/75 INITIAL CRITICALITY: 10/07/74
COOLING WATER SOURCE: CHESAPEAKE BAY

UNIT NUMBER: 2 TYPE: PWR LICENSEE: BALTIMORE G&E
DOCKET NO.: 50-318 LICENSED PWR (MWT): 2.70E+03
THERMAL PWR (MWH): 2.07E+07 NET ELECTRIC PWR (MWH): 6.60E+06
COMMERCIAL OPERATION: 04/01/77 INITIAL CRITICALITY: 11/30/76
COOLING WATER SOURCE: CHESAPEAKE BAY

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
BE-7	5.46E-06
AR-41	6.08E-02
CO-57	4.97E-07
CO-58	2.10E-05
CO-60	2.80E-06
KR-85	3.14E+02
KR-85M	4.46E+01
KR-87	9.08E+00
KR-88	4.46E+00
I-131	1.25E-01
XE-131M	2.55E+01
TE-132	6.82E-07
I-133	1.17E-01
XE-133	4.88E+03
XE-133M	3.89E+01
CS-134	2.04E-05
I-135	8.97E-05
XE-135	3.74E+02
XE-135M	3.26E-03
CS-137	1.17E-02
CE-144	9.86E-06

TOTAL AIRBORNE TRITIUM RELEASE 3.13E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Catawba Nuclear Station, Units 1 & 2
Address: Lake Wylie, SC

____ Population Assessment JCL File Name: CATAWBA
____ Array attached
Latitude: 34° 59' 41"
Longitude: 81° 14' 42" Pop. File Name: CATAWBA

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: CLT0682

WBAN: 13881
Header: 682
Code: ____
Set No: ____

Temperature: 37 °C
Lid Height: 1000 meters
Rainfall: 110 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	38					
Diameter (m):						

____ AREA Source
Diameter (m²): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Met data 5-yr Charlotte, NC 20 miles NE of plant

File Name: CATAWBA

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N							10		65	190	1750
NNW								4	44	27	138
NW									88	31	48
WNW									87	28	86
W								6	26	31	74
WSW								3	20	50	48
SW						0	12		20	82	66
SSW								10	55	231	286
S								22	33	121	330
SSE							7		33	330	451
SE									37	558	997
ESE								24	115	1556	1298
E							3		30	334	434
ENE							4		60	30	130
NE							7		90	81	150
NNE							7		48	301	578

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	825								
NNW	110								
NW	275								
WNW	97								
W	98								
WSW	55								
SW	110								
SSW	347								
S	440								
SSE	782								
SE	443								
ESE	130								
E	362								
ENE	200								
NE	177								
NNE	590								

INSTALLATION: CATAWBA 1
LOCATION: 6 MI NNW OF ROCK HILL, SC

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-413
THERMAL PWR (MWH): 2.29E+07
COMMERCIAL OPERATION: 06/29/85
COOLING WATER SOURCE: LAKE WYLIE

LICENSEE: DUKE PWR CO
LICENSED PWR (MWT): 3.41E+03
NET ELECTRIC PWR (MWH): 7.63E+06
INITIAL CRITICALITY: 01/07/85

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
F-18	3.18E-03
NA-24	1.38E-06
AR-41	5.99E+00
CR-51	6.34E-07
MN-54	2.85E-06
MN-56	7.97E-08
CO-58	1.52E-05
CO-60	6.81E-06
BR-80M	1.06E-06
BR-82	1.28E-06
KR-85	2.08E+00
KR-85M	9.23E-01
KR-87	1.31E-01
KR-88	1.03E+00
RB-88	7.96E-05
RB-89	1.57E-08
SR-90	3.26E-07
NB-95	7.70E-08
ZR-95	4.15E-10
TC-99M	3.79E-09
RU-106	3.53E-08
AG-108M	2.38E-09
SB-126	1.04E-08
I-131	7.62E-04
TE-131M	1.09E-08
XE-131M	1.22E+01
I-132	2.30E-06
I-133	4.50E-04
XE-133	1.51E+03
XE-133M	1.55E+01
CS-134	3.41E-08
I-134	1.44E-06
I-135	1.88E-06
XE-135	1.80E+01
XE-135M	5.68E-03
CS-137	5.74E-08
CS-138	1.13E-06
XE-138	3.60E-03
BA-139	4.72E-08
BA-140	8.32E-10

INSTALLATION: CATAWBA 1

W-187	5.26E-08
TOTAL AIRBORNE TRITIUM RELEASE	3.03E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: CATAWBA 2
LOCATION: 6 MI NNW OF ROCK HILL, SC

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-414
THERMAL PWR (MWH): 1.88E+07
COMMERCIAL OPERATION: 08/19/86
COOLING WATER SOURCE: LAKE WYLIE

LICENSEE: DUKE PWR CO
LICENSED PWR (MWT): 3.41E+03
NET ELECTRIC PWR (MWH): 6.17E+06
INITIAL CRITICALITY: 05/08/86

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
F-18	3.18E-03
NA-24	1.38E-06
AR-41	5.99E+00
CR-51	6.34E-07
MN-54	2.85E-06
MN-56	7.97E-08
CO-58	1.52E-05
CO-60	6.81E-06
BR-80M	1.06E-06
BR-82	1.28E-06
KR-85	2.08E+00
KR-85M	9.23E-01
KR-87	1.31E-01
KR-88	1.03E+00
RB-88	7.96E-05
RB-89	1.57E-08
SR-90	3.26E-07
NB-95	7.70E-08
ZR-95	4.15E-10
TC-99M	3.79E-09
RU-106	3.53E-08
AG-108M	2.38E-09
SB-126	1.04E-08
I-131	7.62E-04
TE-131M	1.09E-08
XE-131M	1.22E+01
I-132	2.30E-06
I-133	4.50E-04
XE-133	1.51E+03
XE-133M	1.55E+01
CS-134	3.41E-08
I-134	1.44E-06
I-135	1.88E-06
XE-135	1.80E+01
XE-135M	5.68E-03
CS-137	5.74E-08
CS-138	1.13E-06
XE-138	3.60E-03
BA-139	4.72E-08
BA-140	8.32E-10

INSTALLATION: CATAWBA 2

W-187	5.26E-08
TOTAL AIRBORNE TRITIUM RELEASE	3.03E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Crystal River 3
Address: Red River, FL

____ Population Assessment JCL File Name: CRYSTAL
____ Array attached
Latitude: 28 ° 57 ' 25 "
Longitude: 82 ° 41 ' 56 " Pop. File Name: CRYSTAL

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: TPA0662

WBAN: 12842
Header: 662
Code: TPA
Set No: ____

Temperature: 22 °C
Lid Height: 1100 meters
Rainfall: 134 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	55					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Tampa met data 5-yr ~70 miles S of plant

File Name: CRYSTAL

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											
NW											
WNW											
W											
WSW											
SW											
SSW											
S											
SSE											3
SE											
ESE											
E											50
ENE											20
NE									0		10
NNE											3

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	40								
NNW	40								
NW									
WNW									
W									
WSW									
SW									
SSW									
S									
SSE									
SE									
ESE	500								
E	75								
ENE	100								
NE	35								
NNE	30								

INSTALLATION: CRYSTAL RIVER
LOCATION: 70 MI N TAMPA, FL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 3 TYPE: PWR
DOCKET NO.: 50-302
THERMAL PWR (MWH): 1.78E+07
COMMERCIAL OPERATION: 03/13/77
COOLING WATER SOURCE: GULF OF MEXICO

LICENSEE: FLORIDA PWR
LICENSED PWR (MWT): 2.45E+03
NET ELECTRIC PWR (MWH): 5.77E+06
INITIAL CRITICALITY: 01/14/77

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
KR-85	2.45E+01
KR-85M	6.88E+00
SR-89	6.78E-07
SR-90	2.69E-07
I-131	9.87E-04
XE-131M	4.29E+01
I-133	7.27E-05
XE-133	3.26E+03
XE-133M	4.05E+00
CS-134	2.56E-05
XE-135	7.22E+01
CS-137	5.08E-05
CS-138	2.96E-07
UNIDENTIFIED	1.40E-04
TOTAL AIRBORNE TRITIUM RELEASE	9.93E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Davis-Bessie Unit 1
Address: Oak Harbor, OH

___ Population Assessment JCL File Name: DAVIS
___ Array attached
Latitude: 41° 35' 49"
Longitude: 87° 5' 11" Pop. File Name: DAVIS

___ Individual Assessment JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

___ Urban
___ Rural

WEATHER DATA:
___ Array attached STAR File Name: TOL099o

WBAN: 94830
Header: 990
Code: TOL
Set No: ___

Temperature: 13 °C
Lid Height: 900 meters
Rainfall: 90 cm/yr

	1	2	3	4	5	6
___ STACK Source:						
Height (m):	76					
Diameter (m):						
___ AREA Source Diameter (m^2):						
___ BUOYANT cal/sec						
___ MOMENTUM m/s						
X ENTERED Rise	0	0	0	0	0	0	0 meters
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Toledo 5 year met data, approximately 25 miles NW of the plant.

File Name: DAVIS

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N							11				
NNW								67	19		
NW								4	149	43	
WNW									33	169	0
W							19		62	36	57
WSW									10	10	43
SW								16		35	59
SSW							21		43	43	64
S								9	47	71	59
SSE									47	52	85
SE											
ESE											
E											
ENE											
NE							4				
NNE							30				

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW									
WNW									
W	91								
WSW	60								
SW	65								
SSW	92								
S	89								
SSE	81								
SE	107								
ESE									
E									
ENE									
NE									
NNE									

INSTALLATION: DAVIS-BESSE
LOCATION: 21 MI E TOLEDO, OH

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR

LICENSEE: TOLEDO EDISON & CLEVELAND ELEC. ILLUM.

DOCKET NO.: 50-346
THERMAL PWR (MWH): 3.91E+06
COMMERCIAL OPERATION: 07/31/78
COOLING WATER SOURCE: LAKE ERIE

LICENSED PWR (MWT): 2.77E+03
NET ELECTRIC PWR (MWH): 1.16E+06
INITIAL CRITICALITY: 08/12/77

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
KR-85	4.94E+00
KR-88	9.96E-01
SR-89	<8.22E-07
SR-90	<5.12E-07
I-131	4.76E-04
XE-131M	1.93E-02
I-133	1.64E-04
XE-133	1.02E+02
XE-133M	1.59E-01
XE-135	1.12E+00

TOTAL AIRBORNE TRITIUM RELEASE 4.99E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Diablo Canyon Units 1 & 2
Address: Diablo Canyon, CA

____ Population Assessment JCL File Name: DIABLO
____ Array attached
Latitude: 35° 12' 39"
Longitude: 120° 51' 7" Pop. File Name: DIABLO

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: SBA0313

WBAN: 23190
Header: 313
Code: SBA
Set No: ____

Temperature: 19 °C
Lid Height: 600 meters
Rainfall: 31 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	69					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Santa Barbara met data 5-yr 30 miles SSW of plant

File Name: DIABLO

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW									4		
NW										2	8
WNW											
W											
WSW											
SW											
SSW											
S											
SSE											
SE											
ESE											10
E											
ENE											
NE											
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW	6								
NW									
WNW									
W									
WSW									
SW									
SSW									
S									
SSE									
SE									
ESE	40								
E	0								
ENE	6								
NE									
NNE									

INSTALLATION: DIABLO CANYON
LOCATION: 12 MI WSW OF SAN LUIS OBISPO

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-275
THERMAL PWR (MWH): 1.66E+07
COMMERCIAL OPERATION: 05/07/85
COOLING WATER SOURCE: PACIFIC OCEAN
LICENSEE: PACIFIC G&E
LICENSED PWR (MWT): 3.34E+03
NET ELECTRIC PWR (MWH): 5.26E+06
INITIAL CRITICALITY: 04/29/84

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-323
THERMAL PWR (MWH): 1.98E+07
COMMERCIAL OPERATION: 03/13/86
COOLING WATER SOURCE: PACIFIC OCEAN
LICENSEE: PACIFIC G&E
LICENSED PWR (MWT): 3.41E+03
NET ELECTRIC PWR (MWH): 6.23E+06
INITIAL CRITICALITY: 08/19/85

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	2.07E+00
CR-51	4.75E-06
MN-54	2.34E-04
CO-58	2.28E-04
CO-60	3.18E-05
KR-85	8.99E+00
KR-85M	1.03E-01
KR-87	1.58E-03
KR-88	1.16E-01
ZR-95	1.20E-05
I-131	6.99E-04
XE-131M	1.56E+01
I-133	3.61E-04
XE-133	2.88E+02
XE-133M	9.16E-01
CS-134	4.73E-05
XE-135	1.17E+01
XE-135M	4.45E-03
CS-137	2.98E-05
XE-138	9.76E-04

TOTAL AIRBORNE TRITIUM RELEASE 6.53E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: D.C. Cook Units 1 & 2
Address: Bridgman, MI

___ Population Assessment JCL File Name: COOK
___ Array attached
Latitude: 41° 58' 33"
Longitude: 86° 33' 59" Pop. File Name: COOK

___ Individual Assessment JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

___ Urban
___ Rural

WEATHER DATA:
___ Array attached STAR File Name: SBN0257

WBAN: 14848
Header: 0257
Code: SBN
Set No: 2

Temperature: 9 °C
Lid Height: 950 meters
Rainfall: 85 cm/yr

___ STACK Source:

	1	2	3	4	5	6
Height (m):	49					
Diameter (m):						

___ AREA Source
Diameter (m^2):

___ BUOYANT cal/sec
___ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Benton Harbor DAYTIME met data 1-yr 10 miles N of plant. Berry states above met data cannot be used. He will use South Bend, IN 5-yr data (1967-1971)

File Name: COOK

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											
NW											
WNW											
W											
WSW											
SW											
SSW							12		142	182	205
S							27		73	692	547
SSE								7	246	1088	302
SE							3		126	141	172
ESE									214	231	240
E									197	186	199
ENE									284	143	297
NE							49		39	267	1321
NNE						12			30	66	196

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW									
WNW									
W									
WSW									
SW									
SSW	715								
S	1654								
SSE	1986								
SE	715								
ESE	1421								
E	820								
ENE	1159								
NE	2279								
NNE	758								

INSTALLATION: DONALD C. COOK
LOCATION: 11 MI SSW ST. JOSEPH, MI

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-315
THERMAL PWR (MWH): 2.42E+07
COMMERCIAL OPERATION: 08/27/75
COOLING WATER SOURCE: LAKE MICHIGAN

LICENSEE: INDIANA MICHIGAN PWR
LICENSED PWR (MWT): 3.25E+03
NET ELECTRIC PWR (MWH): 7.47E+06
INITIAL CRITICALITY: 01/18/75

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-316
THERMAL PWR (MWH): 7.41E+06
COMMERCIAL OPERATION: 07/01/78
COOLING WATER SOURCE: LAKE MICHIGAN

LICENSEE: INDIANA MICHIGAN PWR
LICENSED PWR (MWT): 3.39E+03
NET ELECTRIC PWR (MWH): 2.32E+06
INITIAL CRITICALITY: 03/10/78

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	3.90E-01
MN-54	3.39E-06
CO-58	6.83E-05
CO-60	3.42E-07
KR-85	1.52E+00
KR-85M	1.45E-01
KR-87	1.27E-01
KR-88	7.04E-01
NB-95	1.34E-07
ZR-95	3.33E-06
CD-109	3.49E-05
I-131	6.79E-03
XE-131M	8.08E-01
I-133	8.13E-04
XE-133	2.45E+02
XE-133M	1.25E+00
CS-134	3.40E-04
I-135	6.64E-05
XE-135	8.12E+00
XE-135M	1.35E-01
CS-137	8.04E-04
XE-138	1.04E-01
CE-139	4.92E-08

TOTAL AIRBORNE TRITIUM RELEASE 6.04E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Fort Calhoun
Address: Fort CAlhoun, NB

____ Population Assessment JCL File Name: FORT
____ Array attached
Latitude: 41 ° 31 ' 14 "
Longitude: 96 ° 4 ' 36 " Pop. File Name: FORT

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: OMA0991

WBAN: 14942
Header: 991
Code: ____
Set No: ____

Temperature: 10 °C
Lid Height: 900 meters
Rainfall: 77 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	36					
Diameter (m):						

____ AREA Source
Diameter (m²):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Omaha/Eppley 10-yr met data ~15 miles S of plant

File Name: FORT

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									2		
NNW										65	7
NW										81	375
WNW										202	6292
W									16	38	292
WSW								6	17	12	180
SW								13	12	15	10
SSW								12	13	8	12
S							6		8	13	16
SSE								20	52	10	9
SE									51	8	14
ESE											
E											
ENE											
NE									6		24
NNE									6	15	8

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW	23								
NW	23								
WNW	1378								
W	34								
WSW	49								
SW	32								
SSW	21								
S	108								
SSE	111								
SE	120								
ESE	6								
E	3								
ENE	3								
NE	8								
NNE	6								

INSTALLATION: FORT CALHOUN
LOCATION: 19 MI N OMAHA, NE

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-285
THERMAL PWR (MWH): 8.34E+06
COMMERCIAL OPERATION: 06/20/74
COOLING WATER SOURCE: MISSOURI RIVER

LICENSEE: OMAHA PUBLIC PWR
LICENSED PWR (MWT): 1.50E+03
NET ELECTRIC PWR (MWH): 2.63E+06
INITIAL CRITICALITY: 08/06/73

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
ALPHA	4.08E-05
AR-41	1.73E+00
KR-85	6.07E+00
KR-85M	7.41E-03
SR-89	1.35E-07
SR-90	6.46E-08
I-131	3.07E-04
XE-131M	1.71E+01
I-133	2.29E-03
XE-133	7.55E+02
XE-133M	3.40E+00
XE-135	1.62E+00
CS-137	2.45E-06

TOTAL AIRBORNE TRITIUM RELEASE 3.85E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: H.B. Robinson Unit 2

Address: Hartsville, SC

___ Population Assessment JCL File Name: ROBINSON

___ Array attached

Latitude: 34° 29' 8"

Longitude: 80° 9' 30" Pop. File Name: ROBINSON

___ Individual Assessment JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.700	.300	.000

___ Urban

___ Rural

WEATHER DATA:

___ Array attached STAR File Name: FL0600

WBAN: 13744

Header: 600

Code: FLO

Set No: ___

Temperature: 19 °C

Lid Height: 800 meters

Rainfall: 110 cm/yr

___ STACK Source:

	1	2	3	4	5	6
Height (m):	42					
Diameter (m):						

___ AREA Source

Diameter (m^2):

___ BUOYANT cal/sec

___ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:							

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Florence/Gilbert 5-yr met data 30 miles SE of plant

File Name: Robinson

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N										9	
NNW									13	65	9
NW									35	60	39
WNW							117		13	4	
W						117			13	17	30
WSW						117			143	295	75
SW						74			222	153	40
SSW				96					199	35	16
S				28						71	50
SSE									13	317	514
SE									31	236	772
ESE									167	296	347
E									79	304	590
ENE									40	203	219
NE									50	66	50
NNE									93	177	204

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	87								
NNW									
NW	39								
WNW	34								
W	21								
WSW	45								
SW	111								
SSW	78								
S	50								
SSE	474								
SE	1470								
ESE	1990								
E	1390								
ENE	197								
NE	58								
NNE	82								

INSTALLATION: H.B.ROBINSON
LOCATION: 4.5 MI WNW HARTSVILLE, SC

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-261
THERMAL PWR (MWH): 1.06E+07
COMMERCIAL OPERATION: 03/07/71
LICENSEE: CAROLINA P&L
LICENSED PWR (MWT): 2.30E+03
NET ELECTRIC PWR (MWH): 3.18E+06
INITIAL CRITICALITY: 09/20/70
COOLING WATER SOURCE: ROBINSON IMPOUNDMENT

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	4.75E+00
CR-51	8.02E-07
MN-54	5.20E-08
CO-57	5.13E-09
CO-58	2.39E-06
CO-60	2.22E-05
KR-85	1.15E+02
KR-85M	4.65E+00
KR-87	1.56E-01
KR-88	2.76E-01
NB-95	4.63E-08
ZR-95	2.63E-08
I-131	1.07E-03
XE-131M	4.48E+00
I-133	6.82E-04
XE-133	8.38E+02
XE-133M	6.59E+00
CS-134	1.87E-08
XE-135	6.04E+01
XE-135M	7.77E-02
CS-137	2.06E-06

TOTAL AIRBORNE TRITIUM RELEASE 7.66E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Haddam Neck
Address: Haddam Neck, CT

____ Population Assessment JCL File Name: HADDAM
____ Array attached
Latitude: 41° 28' 54"
Longitude: 72° 29' 57" Pop. File Name: HADDAM

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: BDL1262

WBAN: 14740
Header: 1262
Code: BDL
Set No: ____

Temperature: 10 °C
Lid Height: 700 meters
Rainfall: 113 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	41					
Diameter (m):						

____ AREA Source
Diameter (m²): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Hartford met data 5-yr 25 miles NW of plant

File Name: HADDAM

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N							356		149	391	107
NNW								6	125	139	186
NW							3		120	120	44
WNW							3		23	208	828
W									438	368	377
WSW								65	131	6	239
SW								8	223	59	1434
SSW								135	29	112	157
S								106	33	1690	
SSE								70	129	412	36
SE									201	558	99
ESE									48	184	224
E								9	67	186	81
ENE									323	346	295
NE									192	632	584
NNE									290	163	185

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	126								
NNW	209								
NW	69								
WNW	692								
W	289								
WSW	115								
SW	252								
SSW									
S	44								
SSE	293								
SE	139								
ESE	51								
E	169								
ENE	265								
NE	198								
NNE	40								

INSTALLATION: HADDAM NECK
LOCATION: 9.5 MI SE MIDDLETOWN, CT

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-213
THERMAL PWR (MWH): 1.06E+07
COMMERCIAL OPERATION: 01/01/68
COOLING WATER SOURCE: CONNECTICUT RIVER

LICENSEE: CONN YANKEE ATOMIC PWR
LICENSED PWR (MWT): 1.82E+03
NET ELECTRIC PWR (MWH): 3.31E+06
INITIAL CRITICALITY: 07/24/67

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
ALPHA	1.86E-06
AR-41	7.14E-01
CO-60	3.54E-04
KR-85	1.94E+02
KR-85M	3.38E+00
KR-87	3.07E+00
KR-88	4.55E+00
SR-90	8.70E-06
I-131	3.64E-02
XE-131M	4.05E+00
I-133	2.55E-03
XE-133	2.27E+03
XE-133M	7.69E+00
CS-134	6.11E-06
I-135	3.89E-02
XE-135	5.42E+01
XE-135M	5.45E-01
CS-137	1.50E-04
XE-137	3.65E-01
XE-138	1.36E+00

TOTAL AIRBORNE TRITIUM RELEASE 9.20E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Indian Point 2 & 3
Address: Buchanan, NY

____ Population Assessment JCL File Name: INDIAN
____ Array attached
Latitude: 41 ° 16 ' 17 "
Longitude: 73 ° 57 ' 8 " Pop. File Name: INDIAN

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat.	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: SWF0185

WBAN: 14714
Header: 185
Code: ____
Set No: ____

Temperature: 12 °C
Lid Height: 900 meters
Rainfall: 112 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	1.0					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Newburgh met data 5-yr 15 miles NNW of plant

File Name: INDIAN

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N										158	280
NNW									30	280	305
NW										595	1155
WNW										98	
W									420	504	0
WSW									300	350	560
SW								3	10	840	1505
SSW							3		910	263	1610
S							14		680	53	105
SSE							210		1470	1068	595
SE						14		140	910	683	1190
ESE						7	546	62	630	298	1085
E								280	630	263	980
ENE								18	1470	1890	1855
NE									1050	2880	2135
NNE									1568	840	875

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	525								
NNW	1260								
NW	840								
WNW	875								
W	630								
WSW	560								
SW	945								
SSW	2415								
S	245								
SSE	385								
SE	1190								
ESE	385								
E	875								
ENE	2100								
NE	2660								
NNE	2240								

INSTALLATION: INDIAN POINT 1-2
LOCATION: 3 MI SW PEEKSKILL, NY

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR LICENSEE: CONSOLIDATED EDISON
DOCKET NO.: 50-3 LICENSED PWR (MWT): 6.15E+02
THERMAL PWR (MWH): 0.00E+00 NET ELECTRIC PWR (MWH): 0.00E+00
COMMERCIAL OPERATION: INITIAL CRITICALITY: 08/02/62
COOLING WATER SOURCE: HUDSON RIVER

UNIT NUMBER: 2 TYPE: PWR LICENSEE: CONSOLIDATED EDISON
DOCKET NO.: 50-247 LICENSED PWR (MWT): 2.76E+03
THERMAL PWR (MWH): 1.95E+07 NET ELECTRIC PWR (MWH): 6.06E+06
COMMERCIAL OPERATION: 08/01/74 INITIAL CRITICALITY: 05/22/73
COOLING WATER SOURCE: HUDSON RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	7.40E-01
MN-54	1.56E-03
FE-55	3.14E-06
CO-58	1.52E-04
CO-60	5.65E-03
NI-63	6.14E-07
KR-85M	2.16E-01
KR-87	4.57E-02
KR-88	2.85E-01
SR-90	1.09E-08
I-131	4.02E-05
I-133	2.97E-03
XE-133	2.05E+02
XE-133M	4.34E-01
XE-135	1.13E+01
XE-135M	4.99E-01
CS-137	1.77E-03
XE-138	3.52E-03

TOTAL AIRBORNE TRITIUM RELEASE 1.69E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: INDIAN POINT 3
LOCATION: 3 MI SW PEEKSKILL, NY

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 3 TYPE: PWR
DOCKET NO.: 50-286
THERMAL PWR (MWH): 2.14E+07
COMMERCIAL OPERATION: 08/30/76
COOLING WATER SOURCE: HUDSON RIVER

LICENSEE: PWR AUTH - STATE OF NY
LICENSED PWR (MWT): 2.76E+03
NET ELECTRIC PWR (MWH): 6.71E+06
INITIAL CRITICALITY: 04/06/76

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	3.58E-01
CO-58	8.69E-06
KR-85	3.26E+00
KR-85M	1.46E-01
KR-87	5.92E-02
KR-88	2.08E-01
I-131	3.41E-03
XE-131M	8.32E+00
I-133	5.47E-04
XE-133	2.87E+02
XE-133M	2.02E+00
CS-134	1.49E-06
XE-135	8.24E+00
XE-135M	1.32E-02
CS-137	2.40E-06
XE-138	3.30E-03

TOTAL AIRBORNE TRITIUM RELEASE 4.56E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Joseph M. Farley Units 1 & 2
Address: Dothan, AL

___ Population Assessment JCL File Name: FARLEY
___ Array attached
Latitude: 31° 13' 30"
Longitude: 85° 6' 45" Pop. File Name: FARLEY

___ Individual Assessment JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

___ Urban
___ Rural

WEATHER DATA:
___ Array attached STAR File Name: TLH0663

WBAN: 93805
Header: 663
Code: TLH
Set No: ___

Temperature: 20 °C
Lid Height: 850 meters
Rainfall: 164 cm/yr

	1	2	3	4	5	6
___ STACK Source:						
Height (m):	44					
Diameter (m):						
___ AREA Source						
Diameter (m^2):						
___ BUOYANT cal/sec						
___ MOMENTUM m/s						
X ENTERED Rise	0	0	0	0	0	0	0 meters
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Tallahassee, FL 5-yr met data 75 miles SW of plant

File Name: FARLEY

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N										6	28
NNW										32	37
NW									5	16	32
WNW										11	42
W								17	17	11	52
WSW								5			79
SW									17	21	32
SSW										11	74
S											21
SSE											
SE										43	74
ESE											86
E											31
ENE										23	
NE										6	12
NNE										44	49

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	971								
NNW	79								
NW	121								
WNW	47								
W	47								
WSW	52								
SW	37								
SSW	74								
S	129								
SSE	37								
SE	129								
ESE									
E									
ENE	37								
NE	55								
NNE	147								

INSTALLATION: JOSEPH M. FARLEY 1
LOCATION: DOTHAN, AL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR LICENSEE: ALABAMA PWR
DOCKET NO.: 50-348 LICENSED PWR (MWT): 2.65E+03
THERMAL PWR (MWH): 1.92E+07 NET ELECTRIC PWR (MWH): 5.91E+06
COMMERCIAL OPERATION: 12/01/77 INITIAL CRITICALITY: 08/09/77
COOLING WATER SOURCE: CHATAHOOCHEE RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	2.63E+01
CR-51	2.40E-04
MN-54	2.85E-05
CO-58	7.47E-05
FE-59	1.45E-05
CO-60	4.06E-05
ZN-65	1.30E-05
KR-85	6.86E+02
KR-85M	6.11E-01
KR-87	6.27E-02
KR-88	2.02E-01
I-131	1.18E-03
XE-131M	1.15E+00
I-133	1.30E-06
XE-133	1.83E+02
XE-133M	2.18E+00
CS-134	1.48E-08
XE-135	6.03E+01
XE-135M	2.58E-07
CS-137	1.28E-06
XE-138	8.21E-02
CE-141	3.00E-07
CE-144	1.45E-07

TOTAL AIRBORNE TRITIUM RELEASE 1.16E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: JOSEPH M. FARLEY 2
LOCATION: DOTHAN, AL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-364
THERMAL PWR (MWH): 2.29E+07
COMMERCIAL OPERATION: 07/30/81
LICENSEE: ALABAMA PWR
LICENSED PWR (MWT): 2.65E+03
NET ELECTRIC PWR (MWH): 7.17E+06
INITIAL CRITICALITY: 05/05/81
COOLING WATER SOURCE: CHATAHOOCHEE RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	3.56E+01
KR-85	4.58E+02
I-131	2.36E-06
I-133	5.00E-09
XE-133	7.41E+01
XE-133M	1.90E-01
CS-134	9.36E-09
XE-135	2.38E+01
CS-137	1.46E-07
XE-138	5.32E-02

TOTAL AIRBORNE TRITIUM RELEASE 5.96E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Kewaunee
Address: Carlton, WI

____ Population Assessment JCL File Name: KEWAUNEE
____ Array attached
Latitude: 44 ° 20 ' 35 "
Longitude: 87 ° 32 ' 9 " Pop. File Name: KEWAUNEE

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	3000	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: ERB0776

WBAN: 74898
Header: 776
Code: ERB
Set No: ____

Temperature: 8 °C
Lid Height: 850 meters
Rainfall: 79 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	100					
Diameter (m):						

____ AREA Source
Diameter (m²): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0

Pasquill Category: A B C D E F G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Green Bay 10-yr met data ~25 WNE of plant

File Name: KEWAUNEE

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									16	31	53
NNW								8	20	26	47
NW									11	47	84
WNW									16	58	79
W								4	27	26	53
WSW									37	84	42
SW								4	16	21	53
SSW								4	16	79	126
S										5	26
SSE											
SE											
ESE											
E											
ENE											
NE											
NNE									16	26	42

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	79								
NNW	79								
NW	74								
WNW	63								
W	68								
WSW	500								
SW	79								
SSW	94								
S	47								
SSE									
SE									
ESE									
E									
ENE									
NE									
NNE	21								

INSTALLATION: KEWAUNEE
LOCATION: 27 MI ESE GREEN BAY, WI

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR LICENSEE: WISCONSIN PUB. SER.
DOCKET NO.: 50-305 LICENSED PWR (MWT): 1.65E+03
THERMAL PWR (MWH): 1.22E+07 NET ELECTRIC PWR (MWH): 3.91E+06
COMMERCIAL OPERATION: 06/16/74 INITIAL CRITICALITY: 03/07/74
COOLING WATER SOURCE: LAKE MICHIGAN

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	7.57E-02
FE-55	<4.24E-05
CO-58	1.59E-05
CO-60	1.27E-05
AS-76	4.08E-08
KR-85	1.88E-01
KR-85M	1.80E-03
SR-89	<4.83E-05
SR-90	<9.25E-06
MO-TC-99M	6.50E-08
RU-103	2.01E-08
TC-104	1.02E-06
I-131	3.45E-04
XE-131M	1.47E-03
I-132	5.29E-03
I-133	2.51E-05
XE-133	6.42E+00
XE-133M	1.43E-02
XE-135	4.97E-02
CS-137	5.39E-07
UNIDENTIFIED	<2.23E+01

TOTAL AIRBORNE TRITIUM RELEASE <7.15E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Maine Yankee
Address: Wiscasset, ME

____ Population Assessment JCL File Name: MAINE
____ Array attached
Latitude: 43 ° 57 ' 2 "
Longitude: 69 ° 41 ' 45 " Pop. File Name: MAINE

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10:00	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: NHZ0180

WBAN: 14611
Header: 180
Code: ____
Set No: ____

Temperature: 7 °C
Lid Height: 600 meters
Rainfall: 111 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	53					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Brunswick lo-yr met data 15 miles SW of plant

File Name: MAINE

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								18	43	108	131
NNW							3		58	43	
NW				0				6	104	52	9
WNW						0			48	48	37
W									49	76	104
WSW							0		23	52	43
SW								3		39	3
SSW									22	13	40
S								9	16	16	125
SSE							9		24	23	63
SE						5			10	37	30
ESE								15	15	12	71
E							11		37	20	129
ENE							9		13	48	118
NE								3	2	18	420
NNE									43	86	517

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	49								
NNW									
NW	57								
WNW	104								
W	261								
WSW	37								
SW	6								
SSW	66								
S	267								
SSE	57								
SE	106								
ESE	37								
E	24								
ENE	27								
NE	617								
NNE	260								

INSTALLATION: MAINE YANKEE
LOCATION: 3.9 MI S WICASSETT, ME

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-309
THERMAL PWR (MWH): 1.67E+07
COMMERCIAL OPERATION: 12/28/72
COOLING WATER SOURCE: BACK RIVER

LICENSEE: MAINE YANKEE ATOMIC PWR
LICENSED PWR (MWT): 2.63E+03
NET ELECTRIC PWR (MWH): 5.02E+06
INITIAL CRITICALITY: 10/23/72

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
CO-58	2.76E-06
CO-60	1.85E-05
KR-85	1.56E+00
KR-85M	3.52E-03
KR-88	7.00E-05
CD-109	1.70E-06
I-131	4.44E-04
XE-131M	9.04E-02
I-133	1.08E-04
XE-133	6.71E+01
XE-133M	4.94E-01
XE-135	2.73E+00
CS-137	2.80E-07

TOTAL AIRBORNE TRITIUM RELEASE 6.42E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: McGuire 1&2
Address: Cowans Ford Dam, NC

____ Population Assessment JCL File Name: MCGUIRE
____ Array attached
Latitude: 35° 25' 55"
Longitude: 80° 56' 53" Pop. File Name: MCGUIRE

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: CLT0682

WBAN: 13881
Header: 682
Code: ____
Set No: ____

Temperature: 13. °C
Lid Height: 1000 meters
Rainfall: 110 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	40					
Diameter (m):						

____ AREA Source
Diameter (m^2): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise	0	0	0	0	0	0	0 meters
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Charlotte 5-yr met data ~20 miles SSE of plant

File Name: MCGUIRE

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											29
NNW									32.	41	57
NW									22	67	137
WNW									3	115	57
W								6	115	19	38
WSW									29	48	115
SW									10	0	3
SSW										19	16
S									13		45
SSE									16	26	29
SE									22	64	93
ESE								19	80	38	54
E										128	29
ENE									0	67	153
NE										41	32
NNE										38	10

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	26								
NNW	191								
NW	73								
WNW	26								
W									
WSW	166								
SW	309								
SSW	10								
S	41								
SSE	89								
SE	115								
ESE	35								
E	93								
ENE	57								
NE	160								
NNE	99								

INSTALLATION: MCGUIRE 1
LOCATION: 17 MI N OF CHARLOTTE, NC

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-369
THERMAL PWR (MWH): 2.26E+07
COMMERCIAL OPERATION: 12/01/81
COOLING WATER SOURCE: LAKE NORMAN

LICENSEE: DUKE PWR
LICENSED PWR (MWT): 3.41E+03
NET ELECTRIC PWR (MWH): 7.39E+06
INITIAL CRITICALITY: 08/08/81

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
NA-24	1.60E-09
CL-38	6.07E-08
K-40	2.64E-05
AR-41	8.77E+00
CR-51	1.88E-06
MN-54	8.25E-07
CO-57	1.93E-06
CO-58	6.48E-05
CO-60	7.28E-05
BR-82	9.58E-08
KR-85	3.69E+01
KR-85M	4.92E+00
KR-87	7.05E-01
KR-88	4.64E+00
RB-88	1.70E-04
SR-89	1.03E-06
SR-92	4.63E-08
NB-95	5.58E-10
TC-99M	2.31E-08
RU-103	1.20E-07
I-131	5.58E-03
XE-131M	1.07E+01
I-132	1.20E-03
I-133	1.83E-03
XE-133	1.79E+03
XE-133M	2.44E+01
CS-134	4.73E-05
I-134	1.12E-07
I-135	6.91E-07
XE-135	7.09E+01
XE-135M	1.39E-02
CS-136	8.52E-06
CS-137	1.11E-04
CS-138	6.41E-07
XE-138	1.08E-03
BA-139	4.04E-07
CE-141	2.55E-10
PB-212	3.64E-07
BI-214	4.13E-05
PB-214	1.27E-05

INSTALLATION: MCGUIRE 1

TOTAL AIRBORNE TRITIUM RELEASE 2.40E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: MCGUIRE 2
LOCATION: 17 MI N OF CHARLOTTE, NC

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-370
THERMAL PWR (MWH): 2.41E+07
COMMERCIAL OPERATION: 03/01/84
COOLING WATER SOURCE: LAKE NORMAN

LICENSEE: DUKE PWR
LICENSED PWR (MWT): 3.41E+03
NET ELECTRIC PWR (MWH): 8.05E+06
INITIAL CRITICALITY: 05/08/83

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
NA-24	1.60E-09
CL-38	6.07E-08
K-40	2.64E-05
AR-41	8.77E+00
CR-51	1.88E-06
MN-54	8.25E-07
CO-57	1.93E-06
CO-58	6.48E-05
CO-60	7.28E-05
BR-82	9.58E-08
KR-85	3.69E+01
KR-85M	4.92E+00
KR-87	7.05E-01
KR-88	4.64E+00
RB-88	1.70E-04
SR-89	1.03E-06
SR-92	4.63E-08
NB-95	5.58E-10
TC-99M	2.31E-08
RU-103	1.20E-07
I-131	5.58E-03
XE-131M	1.07E+01
I-132	1.20E-03
I-133	1.83E-03
XE-133	1.79E+03
XE-133M	2.44E+01
CS-134	4.73E-05
I-134	1.12E-07
I-135	6.91E-07
XE-135	7.09E+01
XE-135M	1.39E-02
CS-136	8.52E-06
CS-137	1.11E-04
CS-138	6.41E-07
XE-138	1.08E-03
BA-139	4.04E-07
CE-141	2.55E-10
PB-212	3.64E-07
BI-214	4.13E-05
PB-214	1.27E-05

INSTALLATION: MCGUIRE 2

TOTAL AIRBORNE TRITIUM RELEASE 2.40E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Millstone Units 1, 2 & 3
Address: Waterford, CT

___ Population Assessment JCL File Name: MILLSTON
___ Array attached
Latitude: 41 ° 18 ' 30 "
Longitude: 72 ° 10 ' 5 " Pop. File Name: MILLSTON

___ Individual Assessment JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

___ Urban
___ Rural

WEATHER DATA:
___ Array attached STAR File Name: BDR0558

WBAN: 94702
Header: 558
Code: BDR
Set No: ___

Temperature: 11 °C
Lid Height: 700 meters
Rainfall: 98 cm/yr

___ STACK Source:

	1	2	3	4	5	6
Height (m):	110					
Diameter (m):						

___ AREA Source
Diameter (m^2):

___ BUOYANT cal/sec
___ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0

Pasquill Category: A B C D E F G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Bridgeport met data (both near Long Island Sound 60 miles WSW of plant 5-yr

File Name: MILLSTON

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								174	1500	771	770
NNW						357			876	541	541
NW									1124	527	527
WNW									1712	834	834
W									958	727	727
WSW									1560	127	128
SW									33	53	52
SSW											
S											
SSE											
SE											
ESE									146		
E						421			1029	649	649
ENE								306	590	1738	1737
NE						375			1436	450	449
NNE								14	1363	1125	1125

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	156								
NNW	970								
NW	561								
WNW	119								
W	542								
WSW	998								
SW									
SSW									
S									
SSE									
SE									
ESE									
E	1076								
ENE	4338								
NE	18147								
NNE	701								

INSTALLATION: MILLSTONE 1
LOCATION: 3.2 MI WSW NEW LONDON, CT

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-245
THERMAL PWR (MWH): 1.70E+07
COMMERCIAL OPERATION: 03/01/71
COOLING WATER SOURCE: LONG ISLAND SOUND

LICENSEE: NORTHEAST NUC.ENERGY
LICENSED PWR (MWT): 2.01E+03
NET ELECTRIC PWR (MWH): 5.54E+06
INITIAL CRITICALITY: 10/26/70

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
CR-51	7.28E-04
MN-54	6.01E-05
CO-58	4.03E-05
FE-59	6.00E-06
CO-60	8.83E-04
ZN-65	1.62E-03
KR-85	1.99E+02
KR-85M	4.82E+00
KR-87	3.15E+01
KR-88	2.51E+00
SR-89	5.79E-04
SR-90	3.67E-06
I-131	2.97E-03
I-133	1.45E-02
XE-133	4.05E+02
XE-135	5.32E+01
XE-135M	3.60E+01
CS-137	1.01E-04
XE-138	1.46E+02
BA-140	5.62E-04
LA-140	1.73E-04

TOTAL AIRBORNE TRITIUM RELEASE 7.21E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: MILLSTONE 2
LOCATION: 3.2 MI WSW NEW LONDON, CT

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-336
THERMAL PWR (MWH): 1.81E+07
COMMERCIAL OPERATION: 12/26/75
COOLING WATER SOURCE: LONG ISLAND SOUND

LICENSEE: NORTHEAST NUC. ENERGY
LICENSED PWR (MWT): 2.70E+03
NET ELECTRIC PWR (MWH): 5.73E+06
INITIAL CRITICALITY: 10/17/75

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
ALPHA	<5.56E-07
CR-51	5.98E-06
MN-54	6.34E-06
CO-58	3.73E-04
CO-60	4.61E-05
KR-85	4.25E+00
KR-85M	1.56E-05
SR-89	<8.22E-07
SR-90	<4.82E-08
I-131	5.08E-02
XE-131M	2.45E+00
I-133	2.61E-02
XE-133	7.32E+02
XE-133M	1.71E+00
CS-134	1.29E-05
XE-135	1.29E+02
CS-137	1.62E-05

TOTAL AIRBORNE TRITIUM RELEASE 1.04E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: MILLSTONE 3
LOCATION: 3.2 MI WSW OF NEW LONDON, CT

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 3 TYPE: PWR
DOCKET NO.: 50-423
THERMAL PWR (MWH): 2.33E+07
COMMERCIAL OPERATION: 04/23/86
COOLING WATER SOURCE: LONG ISLAND SOUND

LICENSEE: NORTHEAST NUC. ENERGY
LICENSED PWR (MWT): 3.41E+03
NET ELECTRIC PWR (MWH): 7.67E+06
INITIAL CRITICALITY: 01/23/86

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
ALPHA	<8.73E-06
MN-54	5.27E-07
CO-58	3.11E-04
CO-60	1.56E-05
KR-85M	2.14E-03
Y-88	6.31E-07
SR-89	<6.96E-06
SR-90	<4.21E-06
I-131	9.45E-03
XE-131M	2.03E-01
I-133	4.45E-03
XE-133	7.77E+01
XE-133M	5.02E-01
XE-135	5.96E+00
CS-137	1.63E-05
ND-147	7.94E-05

TOTAL AIRBORNE TRITIUM RELEASE 7.16E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: North Anna Units 1&2
Address: Mineral, VA

____ Population Assessment JCL File Name: NORTHANN
____ Array attached
Latitude: 38 ° 3 ' 38 "
Longitude: 77 ° 47 ' 26 " Pop. File Name: NORTHANN

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
~~6400~~	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.608	.000
Veg	.700	.300	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: GVE0824

WBAN: 13732
Header: 824
Code: ____
Set No: ____

Temperature: 14 °C
Lid Height: 800 meters
Rainfall: 112 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	48					
Diameter (m):						

____ AREA Source
Diameter (m^2): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Gordonsville 5-yr met data 15 miles NW of plant

File Name: NORTHANN

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								27		128	85
NNW								6		32	21
NW									9	26	
WNW									5	31	31
W									9	9	9
WSW									40	9	14
SW									17	22	52
SSW									9		35
S									9	22	9
SSE									9	14	35
SE									14	9	5
ESE									11		11
E									3	27	27
ENE									3	102	17
NE								3		38	59
NNE								6		53	181

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	123								
NNW	17								
NW	11								
WNW	14								
W	22								
WSW	52								
SW	40								
SSW	62								
S	31								
SSE	5								
SE	14								
ESE	81								
E	6								
ENE	43								
NE	17								
NNE	102								

INSTALLATION: NORTH ANNA
LOCATION: 40 MI NW RICHMOND, VA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-338
THERMAL PWR (MWH): 2.20E+07
COMMERCIAL OPERATION: 06/06/78
COOLING WATER SOURCE: LAKE ANNA

LICENSEE: VIRGINIA ELECTRIC & PWR
LICENSED PWR (MWT): 2.89E+03
NET ELECTRIC PWR (MWH): 6.90E+06
INITIAL CRITICALITY: 04/05/78

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-339
THERMAL PWR (MWH): 2.50E+07
COMMERCIAL OPERATION: 12/14/80
COOLING WATER SOURCE: LAKE ANNA

LICENSEE: VIRGINIA ELECTRIC &PWR
LICENSED PWR (MWT): 2.89E+03
NET ELECTRIC PWR (MWH): 7.88E+06
INITIAL CRITICALITY: 06/12/80

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	8.56E-04
MN-54	2.07E-06
FE-55	7.38E-06
CO-58	7.61E-06
CO-60	7.04E-05
KR-85	3.64E+00
KR-85M	2.96E-02
KR-87	3.71E-04
KR-88	4.80E-04
RB-88	4.07E-06
NB-95	5.75E-10
AG-110M	1.44E-07
SB-122	1.92E-05
I-131	1.56E-03
TE-131M	5.33E-09
XE-131M	1.95E+00
I-132	6.65E-06
I-133	1.21E-02
XE-133	4.74E+02
XE-133M	5.83E-01
CS-134	1.54E-04
I-135	1.20E-05
XE-135	2.60E+00
CS-137	4.94E-04
CS-138	9.19E-05
CE-143	1.32E-06

TOTAL AIRBORNE TRITIUM RELEASE 9.44E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Oconee 1, 2 & 3
Address: Seneca, SC

____ Population Assessment JCL File Name: OCONEE
____ Array attached
Latitude: 34 ° 47 ' 30 "
Longitude: 82 ° 53 ' 54 " Pop. File Name: OCONEE

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: GSP0528

WBAN: 03870
Header: 528
Code: ____
Set No: ____

Temperature: 13 °C
Lid Height: 1000 meters
Rainfall: 125 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	61					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0

Pasquill Category: A B C D E F G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Greenville/Sparta 5-yr met data ~35 miles NE of plant

File Name: OCONEE

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N										35	123
NNW									297	374	884
NW									311	515	465
WNW									26	53	65
W									21	90	84
WSW									12	79	30
SW									31	99	37
SSW									48	137	12
S									10	12	36
SSE									12	18	26
SE									10	27	22
ESE									18	34	14
E									22	44	68
ENE									18	38	81
NE									15	33	76
NNE									35	215	46

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	27								
NNW	44								
NW	78								
WNW	58								
W	81								
WSW	79								
SW	28								
SSW	6								
S	203								
SSE	133								
SE	66								
ESE	97								
E	308								
ENE	142								
NE	89								
NNE	8								

INSTALLATION: OCONEE
LOCATION: 30 MI W GREENVILLE, SC

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR LICENSEE: DUKE PWR
DOCKET NO.: 50-269 LICENSED PWR (MWT): 2.57E+03
THERMAL PWR (MWH): 2.21E+07 NET ELECTRIC PWR (MWH): 7.19E+06
COMMERCIAL OPERATION: 07/15/73 INITIAL CRITICALITY: 04/19/73
COOLING WATER SOURCE: KEOWEE LAKE

UNIT NUMBER: 2 TYPE: PWR LICENSEE: DUKE PWR
DOCKET NO.: 50-270 LICENSED PWR (MWT): 2.57E+03
THERMAL PWR (MWH): 1.72E+07 NET ELECTRIC PWR (MWH): 5.54E+06
COMMERCIAL OPERATION: 09/09/74 INITIAL CRITICALITY: 11/11/73
COOLING WATER SOURCE: KEOWEE LAKE

UNIT NUMBER: 3 TYPE: PWR LICENSEE: DUKE PWR
DOCKET NO.: 50-287 LICENSED PWR (MWT): 2.57E+03
THERMAL PWR (MWH): 1.80E+07 NET ELECTRIC PWR (MWH): 5.97E+06
COMMERCIAL OPERATION: 12/16/74 INITIAL CRITICALITY: 09/05/74
COOLING WATER SOURCE: KEOWEE LAKE

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
NA-24	1.05E-07
AR-41	5.12E+00
CR-51	4.28E-05
MN-54	8.00E-06
CO-57	2.87E-07
CO-58	1.19E-04
CO-60	2.06E-04
KR-85	1.69E+03
KR-85M	9.65E+00
KR-87	1.53E+00
KR-88	8.79E+00
RB-88	5.67E-02
RB-89	1.35E-05
SR-89	1.50E-02
SR-90	3.03E-07
SR-92	1.33E-06
NB-95	2.49E-06
ZR-95	9.26E-07
NB-97	3.91E-06
TC-99M	2.45E-06
RU-103	3.33E-05
RU-106	3.48E-05
AG-110M	8.48E-06
SB-122	3.51E-07
SB-125	4.67E-06
I-131	8.29E-02
XE-131M	3.72E+02
I-132	1.46E-03

INSTALLATION: OCONEE

I-133	1.91E-02
XE-133	2.34E+04
XE-133M	1.87E+02
CS-134	5.90E-04
I-134	1.87E-04
I-135	4.70E-03
XE-135	1.87E+02
XE-135M	1.26E+00
CS-136	6.82E-06
CS-137	2.10E-03
CS-138	4.82E-03
LA-140	1.33E-08
CE-141	2.02E-07
CE-143	3.78E-05
CE-144	6.84E-06
TOTAL AIRBORNE TRITIUM RELEASE	4.60E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Palisade
Address: South Haven, MI

____ Population Assessment JCL File Name: PALISADE
____ Array attached
Latitude: 42 ° 19' 19"
Longitude: 86 ° 18' 55" Pop. File Name: PALISADE

____ Individual Assessment JCL File Name: _____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: MKG0251

WBAN: 14840
Header: 251
Code: MKG
Set No: _____

Temperature: 9 °C
Lid Height: 950 meters
Rainfall: 79 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	58.1					
Diameter (m):						

____ AREA Source
Diameter (m^2): _____

____ BUOYANT cal/sec
____ MOMENTUM m/s

	1	2	3	4	5	6	7	
X ENTERED Rise	0	0	0	0	0	0	0	meters
Pasquill Category:	A	B	C	D	E	F	G	

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Muskegon Co met data 5-yr 50 miles N of plant

File Name: PALISADE

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											
NW											
WNW											
W											
WSW											
SW											
SSW								3	8	309	29
S							19		8		54
SSE								6	21	23	100
SE								8	73	148	408
ESE								8	65	159	94
E								3	31	96	125
ENE									26	160	145
NE									57	189	189
NNE									205	307	245

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW									
WNW									
W									
WSW									
SW									
SSW	56								
S	107								
SSE	109								
SE	75								
ESE	82								
E	52								
ENE	78								
NE	316								
NNE	1593								

INSTALLATION: PALISADES
LOCATION: 5 MI S SOUTH HAVEN, MI

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR LICENSEE: CONSUMERS PWR
DOCKET NO.: 50-255 LICENSED PWR (MWT): 2.53E+03
THERMAL PWR (MWH): 1.14E+07 NET ELECTRIC PWR (MWH): 3.44E+06
COMMERCIAL OPERATION: 12/31/71 INITIAL CRITICALITY: 05/24/71
COOLING WATER SOURCE: LAKE MICHIGAN

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	9.10E-01
CR-51	1.74E-05
MN-54	5.71E-06
CO-58	6.88E-05
CO-60	9.62E-05
SE-75	2.42E-04
KR-85	2.65E+00
KR-85M	8.06E-01
KR-87	1.79E+00
KR-88	2.07E+00
SR-89	2.47E-06
SR-90	2.30E-06
NB-95	4.84E-06
I-131	2.02E-02
XE-131M	6.95E-01
I-132	7.10E-04
I-133	4.64E-03
XE-133	2.40E+03
XE-133M	7.14E-01
CS-134	1.05E-07
I-135	5.04E-04
XE-135	4.84E+00
XE-135M	6.55E+00
CS-137	9.90E-06
XE-138	4.44E+00
UNIDENTIFIED	2.67E-05
TOTAL AIRBORNE TRITIUM RELEASE	4.17E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Palo Verde Units 1 , 2 & 3
Address: Wintersburg, AZ

___ Population Assessment JCL File Name: PALO
___ Array attached
Latitude: 33 ° 25 ' 11 "
Longitude: 112 ° 52 ' 5 " Pop. File Name: PALO

___ Individual Assessment JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

___ Urban
___ Rural

WEATHER DATA:
___ Array attached STAR File Name: PNX0309

WBAN: 23183
Header: 309
Code: PNX
Set No: ___

Temperature: 22 °C
Lid Height: 1800 meters
Rainfall: 18 cm/yr

___ STACK Source:

	1	2	3	4	5	6
Height (m):	45	45	45			
Diameter (m):						

___ AREA Source
Diameter (m^2):

___ BUOYANT cal/sec
___ MOMENTUM m/s

x ENTERED Rise	0	0	0	0	0	0	0 meters
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Phoenix met data 10-yr 40 miles E of plant

File Name: PALO

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								7		65	32
NNW										24	7
NW										7	
WNW											
W											
WSW											
SW											
SSW											7
S											
SSE											32
SE											
ESE											16
E										7	
ENE										7	
NE								7		7	7
NNE								7		24	56

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	24								
NNW									
NW	7								
WNW									
W									
WSW									
SW									
SSW									
S	16								
SSE	24								
SE									
ESE									
E									
ENE	24								
NE	24								
NNE	56								

INSTALLATION: PALO VERDE 1
LOCATION: 36 MI W OF PHOENIX, ARIZONA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-528
THERMAL PWR (MWH): 2.03E+07
COMMERCIAL OPERATION: 01/28/86
COOLING WATER SOURCE: SEWAGE TREATMENT

LICENSEE: ARIZONA NUC. PWR PROJ.
LICENSED PWR (MWT): 3.80E+03
NET ELECTRIC PWR (MWH): 6.67E+06
INITIAL CRITICALITY: 05/25/85

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	5.63E-01
MN-54	7.64E-06
CO-58	4.63E-05
FE-59	2.04E-06
CO-60	8.75E-05
BR-82	5.16E-05
KR-85	2.58E+01
KR-85M	4.26E-01
KR-87	7.21E-04
KR-88	3.49E-02
RB-88	4.21E-03
NB-95	7.33E-06
ZR-95	1.82E-06
RU-103	1.15E-06
SN-117M	1.23E-06
SB-124	2.41E-05
I-131	1.56E-03
XE-131M	6.99E+00
I-133	5.07E-04
XE-133	1.57E+03
XE-133M	6.22E+00
CS-134	2.31E-05
I-135	6.97E-04
XE-135	6.87E+01
CS-137	4.23E-05
CS-138	2.33E-03
XE-138	1.59E+02
BA-140	5.54E-06
CE-144	8.50E-06

TOTAL AIRBORNE TRITIUM RELEASE 4.23E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: PALO VERDE 2
LOCATION: 36 MI W OF PHOENIX, ARIZONA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR LICENSEE: ARIZONA NUC. PWR PROJ.
DOCKET NO.: 50-529 LICENSED PWR (MWT): 3.80E+03
THERMAL PWR (MWH): 2.07E+07 NET ELECTRIC PWR (MWH): 6.75E+06
COMMERCIAL OPERATION: 09/19/86 INITIAL CRITICALITY: 04/18/86
COOLING WATER SOURCE: SEWAGE TREATMENT

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	1.73E+00
CR-51	4.02E-05
MN-54	9.01E-06
CO-58	3.54E-04
CO-60	1.16E-04
BR-82	1.10E-04
KR-85	4.39E+01
KR-85M	1.00E+00
KR-87	1.80E-02
KR-88	2.50E+00
RB-88	4.89E-02
SR-89	5.19E-08
NB-95	5.23E-05
ZR-95	1.93E-05
MO-99	4.26E-08
RU-103	1.13E-05
SB-122	3.97E-07
SB-124	5.56E-04
I-131	4.54E-02
XE-131M	5.50E+01
I-132	2.76E-06
I-133	6.67E-04
XE-133	2.81E+03
XE-133M	1.11E+01
CS-134	3.98E-05
I-135	1.14E-05
XE-135	4.16E+01
CS-137	4.93E-05
CS-138	4.36E-04
XE-138	4.04E-02
BA-139	1.95E-06
CE-141	7.19E-05
CE-144	2.52E-08

TOTAL AIRBORNE TRITIUM RELEASE 2.81E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: PALO VERDE 3
LOCATION: 36 MI W OF PHOENIX, ARIZONA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 3 TYPE: PWR
DOCKET NO.: 50-530
THERMAL PWR (MWH): 3.03E+07
COMMERCIAL OPERATION: 01/08/88
COOLING WATER SOURCE: SEWAGE TREATMENT

LICENSEE: ARIZONA NUC. PWR PROJ.
LICENSED PWR (MWT): 3.80E+03
NET ELECTRIC PWR (MWH): 3.55E+04
INITIAL CRITICALITY: 10/25/87

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	7.86E+00
CR-51	9.58E-07
BR-82	8.59E-05
KR-85	6.60E-02
KR-85M	1.09E-01
KR-88	3.08E-02
RB-88	2.20E-02
SB-122	7.59E-07
I-131	1.23E-04
XE-131M	2.43E-01
I-132	6.81E-06
I-133	1.28E-04
XE-133	1.23E+02
XE-133M	1.11E-01
I-135	1.11E-05
XE-135	4.15E+00
CS-138	2.55E-03
XE-138	1.82E-04

TOTAL AIRBORNE TRITIUM RELEASE 3.80E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Point Beach Units 1 & 2
Address: Two Rivers, WI

____ Population Assessment JCL File Name: POINT
____ Array attached
Latitude: 44 ° 16 ' 50 "
Longitude: 87 ° 32 ' 9 " Pop. File Name: POINT

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: ERB0776

WBAN: 14898
Header: 776
Code: ERB
Set No: ____

Temperature: 8 °C
Lid Height: 850 meters
Rainfall: 79 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	43					
Diameter (m):						

____ AREA Source
Diameter (m^2): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Green Bay 10-yr met data ~35 miles NWof plant

File Name: POINT

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											23
NNW								11	22	53	53
NW									11	84	21
WNW								11	32	32	32
W								6	27	37	68
WSW									32	37	27
SW								11	27	21	32
SSW								6	32	42	53
S								6	11	42	32
SSE								6	58	27	84
SE											
ESE											
E											
ENE											
NE											
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	32								
NNW	46								
NW	79								
WNW	58								
W	58								
WSW	68								
SW	53								
SSW	68								
S	37								
SSE	25								
SE									
ESE									
E									
ENE									
NE									
NNE									

INSTALLATION: POINT BEACH
LOCATION: 15 MI N MANITOWOC, WI

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR LICENSEE: WISCONSIN ELECTRIC PWR
DOCKET NO.: 50-266 LICENSED PWR (MWT): 1.52E+03
THERMAL PWR (MWH): 1.17E+07 NET ELECTRIC PWR (MWH): 3.83E+06
COMMERCIAL OPERATION: 12/21/70 INITIAL CRITICALITY: 11/02/70
COOLING WATER SOURCE: LAKE MICHIGAN

UNIT NUMBER: 2 TYPE: PWR LICENSEE: WISCONSIN ELECTRIC PWR
DOCKET NO.: 50-301 LICENSED PWR (MWT): 1.52E+03
THERMAL PWR (MWH): 1.14E+07 NET ELECTRIC PWR (MWH): 3.72E+06
COMMERCIAL OPERATION: 10/01/72 INITIAL CRITICALITY: 05/30/72
COOLING WATER SOURCE: LAKE MICHIGAN

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
ALPHA	5.11E-06
F-18	3.87E-05
NA-24	4.29E-04
AR-41	1.96E+00
MN-54	4.86E-05
CO-57	1.13E-08
CO-58	3.59E-05
CO-60	3.64E-04
ZN-65	9.27E-06
KR-85	9.84E-01
KR-85M	7.31E-01
KR-87	1.48E+00
KR-88	1.69E+00
RB-88	4.00E-06
SR-89	3.70E-06
SR-90	4.30E-06
NB-95	6.25E-08
ZR-95	3.56E-09
NB-97	1.60E-08
MO-99	2.71E-08
TC-99M	2.20E-07
AG-110M	2.31E-07
SN-113	4.80E-10
SB-125	9.39E-08
I-131	5.43E-04
I-132	4.78E-04
TE-132	3.07E-06
I-133	1.53E-03
XE-133	6.04E+01
XE-133M	3.35E-01
CS-134	7.27E-05
I-135	9.18E-05
XE-135	3.53E+00
XE-135M	2.54E+00

INSTALLATION: POINT BEACH

CS-137	6.74E-04
CS-138	1.26E-07
XE-138	7.19E+00
TOTAL AIRBORNE TRITIUM RELEASE	1.26E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Prairie Island 1 & 2
Address: Red Wing, MN

___ Population Assessment JCL File Name: PRAIRIE
___ Array attached
Latitude: 44° 37' 18"
Longitude: 92° 87' 59" Pop. File Name: PRAIRIE

___ Individual Assessment JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

___ Urban
___ Rural

WEATHER DATA:
___ Array attached STAR File Name: MSP0267

WBAN: 14822
Header: 267
Code: ___
Set No: ___

Temperature: 7 °C
Lid Height: .850 meters
Rainfall: 67 cm/yr

	1	2	3	4	5	6
___ STACK Source:						
Height (m):	60					
Diameter (m):						
___ AREA Source Diameter (m^2):						
___ BUOYANT cal/sec						
___ MOMENTUM m/s						
X ENTERED Rise	0	0	0	0	0	0	0 meters
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Minneapolis/St. Paul 5-yr met data 40 miles NW of plant

File Name: PRAIRIE

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									133	18	32
NNW										5	14
NW								34			4
WNW							0	9	25	25	18
W								25	25	13	22
WSW								17		30	43
SW								4		43	43
SSW								4		25	56
S										18	34
SSE							13		4	9	69
SE									13		
ESE									5	5	102
E									11	42	37
ENE										23	23
NE									23	18	32
NNE									91	18	42

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	32								
NNW	14								
NW	9								
WNW	22								
W	18								
WSW	25								
SW	25								
SSW	22								
S	81								
SSE	510								
SE	51								
ESE	120								
E	37								
ENE	60								
NE	55								
NNE	42								

INSTALLATION: PRAIRIE ISLAND
LOCATION: 26 MI SE MINNEAPOLIS, MN

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR LICENSEE: NORTHERN STATES PWR
DOCKET NO.: 50-282 LICENSED PWR (MWT): 1.65E+03
THERMAL PWR (MWH): 1.23E+07 NET ELECTRIC PWR (MWH): 3.82E+06
COMMERCIAL OPERATION: 12/16/73 INITIAL CRITICALITY: 12/01/73
COOLING WATER SOURCE: MISSISSIPPI RIVER

UNIT NUMBER: 2 TYPE: PWR LICENSEE: NORTHERN STATES PWR
DOCKET NO.: 50-306 LICENSED PWR (MWT): 1.65E+03
THERMAL PWR (MWH): 1.26E+07 NET ELECTRIC PWR (MWH): 3.89E+06
COMMERCIAL OPERATION: 12/21/74 INITIAL CRITICALITY: 12/17/74
COOLING WATER SOURCE: MISSISSIPPI RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
K-40	1.88E-05
CO-58	3.79E-08
CO-60	2.22E-06
KR-85	1.23E-01
SR-89	6.60E-05
SR-90	2.40E-06
CD-109	4.81E-06
I-131	1.20E-06
I-133	2.00E-05
XE-133	1.89E-02
XE-133M	6.36E-06
XE-135	5.14E-04
CS-137	6.97E-07

TOTAL AIRBORNE TRITIUM RELEASE 1.51E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: APRIL 1991

Source Category: Reactors

Facility: R.E. Ginna

Address: Ontario, NY

___ Population Assessment

___ Array attached

JCL File Name: GINNA

Latitude: 43° 16' 40"

Longitude: 77° 18' 32"

Pop. File Name: GINNA

___ Individual Assessment

JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

___ Urban

___ Rural

WEATHER DATA:

___ Array attached

STAR File Name: ROC0598

WBAN: 14768

Header: 598

Code: ___

Set No: ___

Temperature: 9 °C

Lid Height: 950 meters

Rainfall: 96 cm/yr

___ STACK Source:

	1	2	3	4	5	6
Height (m):	42					
Diameter (m):						

___ AREA Source

Diameter (m^2):

___ BUOYANT cal/sec

___ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Rochester 10-yr met data 15 miles W of plant

File Name: GINNA

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											
NW											
WNW											
W								168	285	560	262
WSW							39		145	85	312
SW						55			55	200	220
SSW					19				55	295	860
S				20					125	135	905
SSE					7				40	350	1686
SE					17				110	670	203
ESE							28		40	153	156
E							18		250	291	263
ENE											
NE											
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW									
WNW									
W	345								
WSW	842								
SW	1004								
SSW	500								
S	428								
SSE	1246								
SE	359								
ESE	275								
E	326								
ENE									
NE									
NNE									

INSTALLATION: R.E.GINNA
LOCATION: 16 MI NE ROCHESTER, NY

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-244
THERMAL PWR (MWH): 1.10E+07
COMMERCIAL OPERATION: 07/01/70
COOLING WATER SOURCE: LAKE ONTARIO

LICENSEE: ROCHESTER G&E
LICENSED PWR (MWT): 1.52E+03
NET ELECTRIC PWR (MWH): 3.53E+06
INITIAL CRITICALITY: 11/08/69

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
C-14	1.77E+00
AR-41	1.19E+00
KR-85M	9.83E-02
KR-87	1.60E-01
KR-88	2.15E-01
I-131	4.33E-05
XE-131M	1.97E-01
I-133	2.80E-03
XE-133	3.46E+01
XE-133M	2.82E-02
XE-135	1.26E+01
XE-135M	1.77E+00
XE-138	6.48E-01
UNIDENTIFIED	1.36E-05

TOTAL AIRBORNE TRITIUM RELEASE 1.68E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Rancho Seco
Address: Clay Station, CA

___ Population Assessment JCL File Name: RANCHO
___ Array attached
Latitude: 38 ° 20 ' 39 "
Longitude: 121 ° 7 ' 12 " Pop. File Name: RANCHO

___ Individual Assessment JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

___ Urban
___ Rural

WEATHER DATA:
___ Array attached STAR File Name: SAC0320

WBAN: 23232
Header: 320
Code: ___
Set No: ___

Temperature: 14 °C
Lid Height: 600 meters
Rainfall: 43 cm/yr

		1	2	3	4	5	6
___	STACK Source:						
	Height (m):	46					
	Diameter (m):						
___	AREA Source Diameter (m²):						
___	BUOYANT cal/sec						
___	MOMENTUM m/s						
X	ENTERED Rise	0	0	0	0	0	0	0 meters
	Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Sacramento 5-yr met data

File Name: RANCHO

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								4			
NNW											
NW											4
WNW											10
W								5	5	30	10
WSW									80	32	10
SW										75	
SSW											
S									0		
SSE											
SE											
ESE								4			
E								4			
ENE								4			
NE								7		7	
NNE								4			

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW	8								
NW	10								
WNW	4								
W	45								
WSW	10								
SW	20								
SSW	12								
S	8								
SSE	4								
SE	8								
ESE									
E									
ENE									
NE									
NNE									

INSTALLATION: RANCHO SECO
LOCATION: 25 MI SE SACRAMENTO, CA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-312
THERMAL PWR (MWH): 9.47E+06
COMMERCIAL OPERATION: 04/17/75
COOLING WATER SOURCE: FOLSOM CANAL

LICENSEE: SACRAMENTO MUN. UTILITY
LICENSED PWR (MWT): 2.77E+03
NET ELECTRIC PWR (MWH): 2.81E+06
INITIAL CRITICALITY: 09/16/74

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	2.37E-02
MN-54	2.18E-06
CO-60	3.40E-05
KR-85	2.01E+00
KR-85M	2.95E+00
SR-85	1.58E-06
KR-87	4.84E-03
KR-88	2.38E+00
RB-88	1.88E-04
I-131	1.98E-04
XE-131M	1.53E+01
I-133	4.19E-05
XE-133	1.46E+03
XE-133M	9.66E+00
XE-135	2.53E+01
XE-135M	1.99E-04
CS-137	7.83E-06
TOTAL AIRBORNE TRITIUM RELEASE	1.75E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Salem 1 & 2
Address: Salem, NJ

____ Population Assessment JCL File Name: SALEM
____ Array attached
Latitude: 39 ° 27 ' 36 "
Longitude: 75 ° 72 ' 8 " Pop. File Name: SALEM

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: ILC1058

WBAN: 13791
Header: 1058
Code: ILG
Set No: ____

Temperature: 12 °C
Lid Height: 600 meters
Rainfall: 107 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	59	59				
Diameter (m):						

____ AREA Source
Diameter (m²):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Wilmington, DL 5-yr met data 15 miles N of pl nt

File Name: SALEM

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											10
NW											108
WNW											113
W											22
WSW											
SW											
SSW											16
S											
SSE											
SE											
ESE											
E											3
ENE										0	35
NE											9
NNE											

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW	262								
NW	104								
WNW	68								
W	54								
WSW	31								
SW	15								
SSW	11								
S	16								
SSE									
SE									
ESE									
E									
ENE	96								
NE	295								
NNE	33								

INSTALLATION: SALEM 1
LOCATION: 20 MI S WILMINGTON, DE

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-272
THERMAL PWR (MWH): 2.32E+07
COMMERCIAL OPERATION: 06/30/77
COOLING WATER SOURCE: DELAWARE RIVER

LICENSEE: PUB.SER. E&G OF NJ
LICENSED PWR (MWT): 3.34E+03
NET ELECTRIC PWR (MWH): 7.41E+06
INITIAL CRITICALITY: 12/11/76

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	7.51E-03
CO-58	3.66E-05
CO-60	1.42E-03
KR-85	1.10E+00
KR-85M	3.58E-01
I-131	6.73E-04
XE-131M	7.85E+00
XE-133	5.00E+02
XE-133M	9.90E-01
XE-135	1.90E+01
XE-135M	2.37E-04
CS-137	5.69E-06

TOTAL AIRBORNE TRITIUM RELEASE 4.00E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: SALEM 2
LOCATION: 20 MI S WILMINGTON, DE

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-311
THERMAL PWR (MWH): 1.90E+07
COMMERCIAL OPERATION: 10/13/81
COOLING WATER SOURCE: DELAWARE RIVER

LICENSEE: PUB. SER. E&G OF NJ
LICENSED PWR (MWT): 3.34E+03
NET ELECTRIC PWR (MWH): 5.97E+06
INITIAL CRITICALITY: 08/08/80

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	1.55E-02
CO-57	1.99E-07
CO-58	7.05E-05
CO-60	2.72E-05
KR-85	1.82E+00
KR-85M	3.08E+00
KR-87	5.66E-01
KR-88	4.15E+00
TE-125M	6.82E-06
I-131	8.80E-04
XE-131M	2.65E+00
XE-133	1.12E+03
XE-133M	6.08E+00
XE-135	3.43E+01
XE-135M	4.99E+00
CS-137	6.66E-06
CE-141	1.25E-07

TOTAL AIRBORNE TRITIUM RELEASE 3.70E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: ~~April 1991~~ Source Category: Reactors

Facility: S n Onofre Units 1, 2 & 3
Address: San Clemente, CA

____ Population Assessment JCL File Name: SANONOFER
____ Array attached
Latitude: 33° 23' 13"
Longitude: 117° 33' 24" Pop. File Name: SANONOFER

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: LGB1052

WBAN: 23129
Header: 1052
Code: ____
Set No: ____

Temperature: 19 °C
Lid Height: 600 meters
Rainfall: 31 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	63	63				
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0

Pasquill Category: A B C D E F G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Long Beach met data 30 miles NNW of plant

File Name: SANONOFER

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											2564
NNW									945	810	
NW									865	81	3157
WNW										3	
W											
WSW											
SW											
SSW											
S											
SSE											
SE											
ESE											
E											
ENE										3	
NE										4804	
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	730								
NNW	4612								
NW									
WNW									
W									
WSW									
SW									
SSW									
S									
SSE									
SE									
ESE									
E	2426								
ENE									
NE									
NNE									

INSTALLATION: SAN ONOFRE 1
LOCATION: 2.5 MI S SAN CLEMENTE, CA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
LICENSEE: SOUTHERN CAL EDISON & SAN DIEGO G&E
DOCKET NO.: 50-206
LICENSED PWR (MWT): 1.35E+03
THERMAL PWR (MWH): 4.52E+06
NET ELECTRIC PWR (MWH): 1.37E+06
COMMERCIAL OPERATION: 01/01/68
INITIAL CRITICALITY: 06/14/67
COOLING WATER SOURCE: PACIFIC OCEAN

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	5.79E-03
CR-51	1.05E-06
MN-54	2.21E-06
CO-58	6.46E-05
CO-60	5.48E-06
BR-82	1.01E-04
KR-85	1.15E+01
KR-85M	3.70E+00
KR-87	2.54E-01
KR-88	1.15E+00
RB-88	2.48E-03
SR-89	3.41E-07
SR-90	1.26E-08
I-131	1.03E-02
XE-131M	3.92E+00
I-132	3.88E-03
I-133	1.07E-03
XE-133	2.85E+03
XE-133M	2.67E+01
CS-134	1.91E-04
I-135	5.34E-04
XE-135	8.83E+01
XE-135M	1.12E-03
CS-137	2.41E-04
CS-138	5.87E-03
BA-140	4.52E-07

TOTAL AIRBORNE TRITIUM RELEASE 2.05E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: SAN ONOFRE 2-3
LOCATION: 2.5 MI S SAN CLEMENTE, CA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR LICENSEE: SOUTHERN CAL EDISON & SAN DIEGO G&E
DOCKET NO.: 361 LICENSED PWR (MWT): 3.41E+03
THERMAL PWR (MWH): 2.75E+07 NET ELECTRIC PWR (MWH): 9.00E+06
COMMERCIAL OPERATION: 08/08/83 INITIAL CRITICALITY: 07/26/82
COOLING WATER SOURCE: PACIFIC OCEAN

UNIT NUMBER: 3 TYPE: PWR LICENSEE: SOUTHERN CA EDISON&SAN DIEGO GAS&ELEC
DOCKET NO.: 362 LICENSED PWR (MWT): 3.39E+03
THERMAL PWR (MWH): 1.89E+07 NET ELECTRIC PWR (MWH): 6.13E+06
COMMERCIAL OPERATION: 04/01/84 INITIAL CRITICALITY: 08/29/83
COOLING WATER SOURCE: PACIFIC OCEAN

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
NA-24	4.71E-06
AR-41	1.73E+01
CR-51	1.14E-04
MN-54	1.14E-04
CO-57	8.38E-11
CO-58	1.31E-03
CO-60	6.08E-04
BR-82	1.55E-04
KR-85	1.60E+01
KR-85M	3.26E+01
KR-87	6.04E+00
KR-88	8.55E+00
RB-88	2.51E-02
SR-89	7.22E-08
SR-90	2.99E-09
SR-92	1.01E-06
Y-92	1.77E-06
NB-95	1.69E-04
NB-95M	3.16E-06
ZR-95	3.28E-05
NB-97	7.24E-04
MO-99	1.12E-05
TC-99M	1.14E-05
RU-103	1.22E-06
SN-113	3.51E-06
I-131	7.49E-02
XE-131M	1.54E+01
I-132	4.50E-04
TE-132	2.49E-07
I-133	1.62E-02
XE-133	4.69E+03
XE-133M	6.34E+00

INSTALLATION: SAN ONOFRE 2-3

CS-134	6.69E-06
I-135	1.87E-03
XE-135	3.18E+02
XE-135M	3.23E+00
CS-136	2.94E-07
CS-137	2.44E-04
CS-138	4.83E-03
XE-138	9.86E-01
BA-139	1.23E-05
TOTAL AIRBORNE TRITIUM RELEASE	1.89E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: May 1991 Source Category: Reactors

Facility: Sequoyah Units 1 and 2
Address: Daisy, TN

____ Population Assessment JCL File Name: SEQUOYAH
____ Array attached
Latitude: 35° 13' 23"
Longitude: 85° 5' 16" Pop. File Name: SEQUOYAH

____ Individual Assessment JCL File Name: ____

Distances (meters):

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10,000	15,000	20,000	30,000	40,000	50,000	60,000	80,000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.700	.300	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: CHA0711

WBAN: 13882
Header: 711
Code: ____
Set No: ____

Temperature: 15 °C
Lid Height: 1000 meters
Rainfall: 123 cm/yr

	1	2	3	4	5	6
____ STACK Source:						
Height (m):	40					
Diameter (m):						
____ AREA Source						
Diameter (m^2):						
____ BUOYANT cal/sec						
____ MOMENTUM m/s						
X ENTERED Rise	0	0	0	0	0	0	0 meters
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Chattanoogo/Lovel 5-year Met Data approximately 15 miles SSW of plant

File Name: SEQUOYAH

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N										30	20
NNW							5		210	25	40
NW								35	110	260	125
WNW									50	225	555
W							20		60	105	310
WSW							3		90	570	470
SW									1	25	265
SSW									165	155	390
S									150	15	270
SSE									125	165	570
SE								20	190	30	205
ESE								30	70	185	300
E								3	45	5	215
ENE									45	10	140
NE									3	20	30
NNE										45	150

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	20								
NNW	55								
NW	165								
WNW	440								
W	360								
WSW	1220								
SW	100								
SSW	230								
S	335								
SSE	280								
SE	180								
ESE	190								
E	150								
ENE	230								
NE	10								
NNE	90								

INSTALLATION: SEQUOYAH
LOCATION: DAISY, TN

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1983
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-327
THERMAL POWER (MWH): 5.16E+05
COMMERCIAL OPERATION: 07/01/81
COOLING WATER SOURCE: TENNESSEE RIVER

LICENSEE: TENNESSEE VALLEY AUTHORITY
LICENSED POWER (MWT): 2.82E+03
NET ELECTRIC POWER (MWH): 6.71E+04
INITIAL CRITICALITY: 07/05/80

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-328
THERMAL POWER (MWH): 1.26E+07
COMMERCIAL OPERATION: 06/01/82
COOLING WATER SOURCE: TENNESSEE RIVER

LICENSEE: TENNESSEE VALLEY AUTHORITY
LICENSED POWER (MWT): 2.82E+03
NET ELECTRIC POWER (MWH): 3.88E+06
INITIAL CRITICALITY: 11/05/81

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	3.50E+00
CR-51	4.59E-05
MN-54	9.15E-06
CO-58	3.35E-04
CO-60	4.10E-06
KR-85	8.44E+00
KR-85M	4.55E+00
KR-87	2.96E+00
KR-88	4.59E+00
SR-89	7.32E-04
SR-90	9.89E-08
Y-91	1.63E-04
NB-95	2.67E-06
RU-106	2.66E-04
I-131	6.64E-04
XE-131M	6.53E+00
I-133	2.54E-04
XE-133	3.63E+03
XE-133m	3.63E+01
I-135	2.22E-04
XE-135	2.18E+02
XE-135M	3.70E+00
CS-137	1.43E-09
XE-138	1.68E+00

TOTAL AIRBORNE TRITIUM RELEASE 8.46E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Shearon Harris Unit 1
Address: Bonsal, NC

____ Population Assessment JCL File Name: HARRIS
____ Array attached
Latitude: 35° 35' 59"
Longitude: 79° 0' 0" Pop. File Name: HARRIS

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.700	.300	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: RDU0083

WBAN: 13722
Header: 83
Code: RDU
Set No: ____

Temperature: 15 °C
Lid Height: 900 meters
Rainfall: 106 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	40					
Diameter (m):						

____ AREA Source
Diameter (m^2): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0

Pasquill Category: A B C D E F G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Raleigh 5-yr met data 20 miles E of plant

File Name: HARRIS

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N										38	47
NNW									32	114	29
NW									1047	22	29
WNW										19	29
W										17	29
WSW											29
SW										6	29
SSW											29
S											32
SSE											68
SE											71
ESE										22	89
E									3	10	80
ENE										4	92
NE										60	55
NNE									3	50	55

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	55								
NNW	38								
NW	38								
WNW	38								
W	38								
WSW	38								
SW	38								
SSW	38								
S	38								
SSE	56								
SE	115								
ESE	124								
E	126								
ENE	96								
NE	71								
NNE	71								

INSTALLATION: HARRIS
LOCATION: 20 MI SW RALEIGH, NC

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-400
THERMAL PWR (MWH): 1.71E+07
COMMERCIAL OPERATION: 05/02/87
COOLING WATER SOURCE: MAKEUP RESERVOIR

LICENSEE: CAROLINA P&L
LICENSED PWR (MWT): 2.77E+03
NET ELECTRIC PWR (MWH): 5.33E+06
INITIAL CRITICALITY: 01/03/87

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
ALPHA	1.03E-07
AR-41	3.55E-01
CR-51	6.04E-06
CO-58	3.45E-05
CO-60	3.96E-06
KR-85M	4.86E+01
KR-87	1.62E+01
KR-88	8.10E+01
NB-95	1.48E-06
I-132	3.40E-06
XE-133	1.94E+03
XE-133M	3.24E+01
XE-135	1.13E+02
XE-138	1.62E+01

TOTAL AIRBORNE TRITIUM RELEASE N/D

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: May 1991 Source Category: Reactors

Facility: South Texas Project Units 1 and 2
Address: Palacious, TX

____ Population Assessment JCL File Name: SOUTH
____ Array attached
Latitude: 28 ° 42 ' 0 "
Longitude: 96 ° 12 ' 47 " Pop. File Name: SOUTH

____ Individual Assessment JCL File Name: ____

Distances (meters):

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10,000	15,000	20,000	30,000	40,000	50,000	60,000	80,000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: CRP1459

WBAN: 12924
Header: 1459
Code: ____
Set No: ____

Temperature: 20 °C
Lid Height: 900 meters
Rainfall: 114 cm/yr

	1	2	3	4	5	6
____ STACK Source:						
Height (m):	31					
Diameter (m):						
____ AREA Source Diameter (m^2):						
____ BUOYANT cal/sec						
____ MOMENTUM m/s						
X ENTERED Rise	0	0	0	0	0	0	0 meters
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Corpus Christi 5-year Met Data approximately 90 miles SW of plant

File Name: SOUTH

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									0	46	
NNW											
NW											
WNW							0			10	
W										15	10
WSW											
SW											
SSW	0										10
S											
SSE											
SE										4	230
ESE									4		230
E											
ENE											
NE											
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW	87								
WNW	46								
W	37								
WSW	4								
SW	29								
SSW									
S									
SSE									
SE	230								
ESE	228								
E	4								
ENE									
NE									
NNE									

INSTALLATION: SOUTH TEXAS 1 & 2
LOCATION: 12 MI SSW OF BAY CITY, TX

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1990
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
LICENSEE: HOUSTON LIGHTING & POWER
DOCKET NO.: 50-498
LICENSED POWER (MWT): 3.82E+03
THERMAL POWER (MWH): 8.81E+06
NET ELECTRIC POWER (MWH): 2.79E+06
COMMERCIAL OPERATION: 08/25/88
INITIAL CRITICALITY: 03/08/88
COOLING WATER SOURCE: MAIN COOLING RESERVOIR

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
CR-51	1.20E-04
MN-54	4.41E-06
CO-58	3.05E-04
FE-59	3.42E-06
CO-60	3.43E-05
KR-85M	5.53E+02
ZR-95	3.98E-06
SB-124	1.16E-07
KR-87	3.65E+02
KR-88	5.21E+02
RB-88	4.02E-03
RB-89	3.87E-04
SR-89	1.90E-03
SR-90	7.19E-06
SR-91	2.05E-03
Y-91M	1.35E-02
TC-99M	2.46E-06
I-131	6.89E-03
XE-131M	8.22E+01
I-132	3.47E-05
TE-132	2.34E-06
I-133	2.54E-02
XE-133	6.96E+03
XE-133M	7.02E+01
CS-134	1.24E-06
I-135	1.66E-02
XE-135	1.30E+03
XE-135M	4.21E+02
CS-137	4.03E-04
CS-138	9.76E-02
XE-138	5.75E+02
BA-139	1.80E-02
BA-140	2.55E-03
LA-140	1.20E-03

TOTAL AIRBORNE TRITIUM RELEASE 4.59E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: ~~April 1991~~ Source Category: Reactors

Facility: St. Lucie 1 & 2
Address: Ft. Pierce, FL

____ Population Assessment JCL File Name: SAINT
____ Array attached
Latitude: 27° 20' 54"
Longitude: 80° 14' 47" Pop. File Name: SAINT

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: PBI0054

WBAN: ____
Header: ____
Code: PBI
Set No: ____

Temperature: 24 °C
Lid Height: 1200 meters
Rainfall: 146 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	62	62				
Diameter (m):						

____ AREA Source
Diameter (m²):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: West Palm met data 1-yr 30 miles S of plant

File Name: SAINT

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											432
NW											82
WNW										100	864
W									35	13	857
WSW									111		538
SW									30	59	5175
SSW										93	343
S											156
SSE									1381	882	1321
SE									762		
ESE											
E											
ENE											
NE											
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW	109								
WNW	3029								
W	2308								
WSW	3884								
SW	4773								
SSW	2567								
S	370								
SSE	1973								
SE									
ESE									
E									
ENE									
NE									
NNE									

INSTALLATION: ST. LUCIE 1
LOCATION: 8 MI S FT. PIERCE, FL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR LICENSEE: FLORIDA P&L
DOCKET NO.: 50-335 LICENSED PWR (MWT): 2.56E+03
THERMAL PWR (MWH): 1.97E+07 NET ELECTRIC PWR (MWH): 6.25E+06
COMMERCIAL OPERATION: 12/21/76 INITIAL CRITICALITY: 04/22/76
COOLING WATER SOURCE: ATLANTIC OCEAN

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	3.04E+00
KR-85M	5.27E+00
KR-87	1.67E-01
KR-88	6.71E+00
I-131	6.40E-03
XE-131M	1.17E-02
I-132	4.28E-02
I-133	4.28E-02
XE-133	1.20E+03
XE-133M	5.47E+00
XE-135	2.03E+02

TOTAL AIRBORNE TRITIUM RELEASE 1.46E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: ST. LUCIE 2
LOCATION: 8 MI S FT. PIERCE, FL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR LICENSEE: FLORIDA P&L
DOCKET NO.: 50-389 LICENSED PWR (MWT): 2.70E+03
THERMAL PWR (MWH): 2.35E+07 NET ELECTRIC PWR (MWH): 7.41E+06
COMMERCIAL OPERATION: 08/08/83 INITIAL CRITICALITY: 06/02/83
COOLING WATER SOURCE: ATLANTIC OCEAN

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	1.88E+00
KR-85	9.60E-01
KR-85M	7.45E+01
KR-87	3.71E-01
KR-88	3.19E+01
RB-88	1.27E+00
I-131	2.85E-02
XE-131M	3.47E+00
I-133	3.89E-02
XE-133	8.01E+03
XE-133M	8.70E+01
XE-135	9.50E+02
CS-137	3.04E-05
TOTAL AIRBORNE TRITIUM RELEASE	8.55E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Surry Units 1 & 2
Address: Gravel Neck, VA

____ Population Assessment JCL File Name: SURRY
____ Array attached
Latitude: 37° 9' 56"
Longitude: 76° 41' 53" Pop. File Name: SURRY

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: GVE0824

WBAN: 13732
Header: 824
Code: EVE
Set No: ____

Temperature: 14 °C
Lid Height: 800 meters
Rainfall: 112 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	43					
Diameter (m):						

____ AREA Source
Diameter (m^2): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Goraonville 5-yr met aata

File Name: SURRY

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											28
NW											
WNW											
W											41
WSW											17
SW											
SSW										48	
S										21	48
SSE											
SE											
ESE											
E											
ENE											
NE											
NNE											

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW	21								
NW									
WNW									
W	116								
WSW	48								
SW	72								
SSW	65								
S	85								
SSE	34								
SE									
ESE									
E	14								
ENE									
NE	6								
NNE	6								

INSTALLATION: SURRY
LOCATION: 19 MI NW NEWPORT NEWS, VA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-280
THERMAL PWR (MWH): 8.45E+06
COMMERCIAL OPERATION: 12/22/72
COOLING WATER SOURCE: JAMES RIVER

LICENSEE: VIRGINIA ELECTRIC & PWR
LICENSED PWR (MWT): 2.44E+03
NET ELECTRIC PWR (MWH): 2.69E+06
INITIAL CRITICALITY: 07/01/72

UNIT NUMBER: 2 TYPE: PWR
DOCKET NO.: 50-281
THERMAL PWR (MWH): 1.16E+07
COMMERCIAL OPERATION: 05/01/73
COOLING WATER SOURCE: JAMES RIVER

LICENSEE: VIRGINIA ELECTRIC &PWR
LICENSED PWR (MWT): 2.44E+03
NET ELECTRIC PWR (MWH): 3.57E+06
INITIAL CRITICALITY: 03/07/73

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	1.22E+00
CR-51	1.45E-04
MN-54	1.11E-04
CO-57	8.60E-06
CO-58	5.22E-03
CO-60	1.90E-03
SE-75	5.65E-08
KR-85	4.13E+00
KR-85M	1.88E-01
KR-87	9.31E-03
KR-88	1.50E-02
RB-88	2.16E-03
SR-89	1.68E-06
SR-90	2.59E-07
NB-95	7.56E-06
AG-110M	2.63E-10
SB-125	2.04E-05
I-131	9.57E-03
XE-131M	1.97E+00
I-132	1.09E-03
TE-132	2.38E-06
I-133	4.70E-03
XE-133	3.53E+02
XE-133M	6.03E-01
CS-134	8.79E-04
I-134	9.19E-06
I-135	4.17E-04
XE-135	4.56E+00
XE-135M	6.41E-03
CS-137	2.33E-03
CS-138	6.24E-04

TOTAL AIRBORNE TRITIUM RELEASE 2.79E+01

INSTALLATION: SURRY

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Three Mile Island 1
Address: Middletown, PA

____ Population Assessment JCL File Name: TMI
____ Array attached
Latitude: 40° 9' 11"
Longitude: 76° 43' 29" Pop. File Name: TMI

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: HAR0214

WBAN: 14751
Header: 214
Code: ____
Set No: ____

Temperature: 12 °C
Lid Height: 900 meters
Rainfall: 105 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	55					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Harrisburg 5-yr met data 10 miles NW of plant

File Name: TMI

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								21	237	3854	3651
NNW								54	109	1204	815
NW								44	137	98	56
WNW								25	144	364	204
W								40	460	51	475
WSW								32	342	168	1143
SW								94	150	261	808
SSW								94	199	840	306
S										177	1069
SSE								96	238	130	81
SE								7	112	83	251
ESE								7	42	184	259
E								49	88	44	181
ENE								56	67	808	514
NE								47	157	302	478
NNE								61	84	189	536

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	465								
NNW	2163								
NW	1248								
WNW	359								
W	821								
WSW	340								
SW	300								
SSW	842								
S	1821								
SSE	54								
SE	489								
ESE	272								
E	649								
ENE	282								
NE	208								
NNE	416								

INSTALLATION: THREE MILE ISLAND 1
LOCATION: 10 MI SE HARRISBURG, PA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR

LICENSEE: METROPOLITAN ED & JERSEY CENTRAL P&L

DOCKET NO.: 50-289
LICENSED PWR (MWT): 2.57E+03
THERMAL PWR (MWH): 1.69E+07
NET ELECTRIC PWR (MWH): 5.47E+06
COMMERCIAL OPERATION: 09/02/74
INITIAL CRITICALITY: 06/05/74
COOLING WATER SOURCE: SUSQUEHANNA RIVER

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	3.24E+00
CR-51	2.35E-07
CO-58	9.92E-07
KR-85	8.64E+00
KR-85M	1.34E+00
KR-87	5.57E-04
KR-88	1.10E-01
NB-95	1.38E-08
AG-110M	4.34E-08
I-131	1.26E-03
XE-131M	1.18E+01
I-132	3.31E-06
I-133	7.70E-04
XE-133	1.79E+03
XE-133M	1.44E+01
I-135	1.12E-03
XE-135	3.60E+01
XE-135M	1.38E-04

TOTAL AIRBORNE TRITIUM RELEASE 6.03E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: THREE MILE ISLAND 2*
LOCATION: 10 MI SE HARRISBURG, PA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: PWR

LICENSEE: METROPOLITAN ED & JERSEY CENTRAL P&L

DOCKET NO.: 50-320
LICENSED PWR (MWT): 2.77E+03
THERMAL PWR (MWH): 0.00E+00
NET ELECTRIC PWR (MWH): 0.00E+00
COMMERCIAL OPERATION: 12/30/78
INITIAL CRITICALITY: 03/28/78
COOLING WATER SOURCE: SUSQUEHANNA RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
KR-85	4.40E-01
SR-90	6.30E-08
CS-137	9.61E-06
UNIDENTIFIED	5.81E-05

TOTAL AIRBORNE TRITIUM RELEASE 1.14E+01

*INCLUDING EPICOR II

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Trojan
Address: Prescott, OR

____ Population Assessment JCL File Name: TROJAN
____ Array attached
Latitude: 46 ° 2 ' 26 "
Longitude: 122 ° 53 ' 3 " Pop. File Name: TROJAN

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: PDX0364

WBAN: 24229
Header: 364
Code: PDX
Set No: ____

Temperature: 12 °C
Lid Height: 800 meters
Rainfall: 95 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	66					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

-x- ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Portland 5-yr met data ~40 miles S of plant

File Name: TROJAN

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N							174				
NNW							114		6	308	237
NW									6	51	166
WNW											141
W									15	128	148
WSW								6	38	30	73
SW								15	44	113	166
SSW								6	24	73	141
S								30	103	118	24
SSE							0		97		6
SE									15	1517	1162
ESE									15	177	15
E									52	111	118
ENE									27	37	68
NE									52	81	127
NNE										304	324

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW	362								
NW	2133								
WNW	216								
W	118								
WSW	79								
SW	113								
SSW	223								
S	69								
SSE	15								
SE	329								
ESE	103								
E	96								
ENE	7								
NE	297								
NNE	490								

INSTALLATION: TROJAN
LOCATION: 35 MI NW PORTLAND, OR

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-344
THERMAL PWR (MWH): 1.98E+07
COMMERCIAL OPERATION: 05/20/76
COOLING WATER SOURCE: COLUMBIA RIVER

LICENSEE: PORTLAND GEN ELEC
LICENSED PWR (MWT): 3.41E+03
NET ELECTRIC PWR (MWH): 6.34E+06
INITIAL CRITICALITY: 12/15/75

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	8.46E-01
CO-58	1.85E-04
CO-60	4.27E-06
KR-85	2.73E+00
KR-85M	3.55E-01
KR-87	9.72E-02
KR-88	1.17E-01
SR-89	1.74E-05
SR-90	7.29E-06
NB-95	3.15E-06
MO-99	1.08E-08
I-131	2.88E-03
XE-131M	2.51E+00
I-132	2.25E-07
I-133	1.02E-03
XE-133	3.84E+02
XE-133M	1.36E+00
CS-134	2.18E-08
I-135	7.01E-06
XE-135	6.45E+00
XE-135M	7.13E-01
CS-137	5.48E-08
XE-137	2.06E-01
XE-138	2.54E-01
BA-140	7.75E-09
ND-147	3.60E-05

TOTAL AIRBORNE TRITIUM RELEASE 6.44E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Turkey Point Units 3 & 4
Address: Florida City, FL

___ Population Assessment JCL File Name: TURKEY
___ Array attached
Latitude: 25° 26' 05"
Longitude: 80° 19' 53" Pop. File Name: TURKEY

___ Individual Assessment JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

___ Urban
___ Rural

WEATHER DATA:
___ Array attached STAR File Name: TOL0990

WBAN: 12839
Header: 979
Code: ___
Set No: ___

Temperature: 24 °C
Lid Height: 1400 meters
Rainfall: 146 cm/yr

	1	2	3	4	5	6
___ STACK Source:						
Height (m):	55					
Diameter (m):						
___ AREA Source Diameter (m^2):						
___ BUOYANT cal/sec						
___ MOMENTUM m/s						
X ENTERED Rise	0	0	0	0	0	0	0 meters
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Miami met data 5-yr 35 miles N of plant

File Name: TURKEY

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									3		
NNW											
NW											
WNW											24
W											
WSW											
SW											
SSW											
S											
SSE											
SE											
ESE											
E											
ENE											
NE											
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW									
WNW									
W									
WSW									
SW									
SSW									
S									
SSE									
SE									
ESE									
E									
ENE									
NE									
NNE									

INSTALLATION: TURKEY POINT 3
LOCATION: 10 MI E FLORIDA CITY, FL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 3 TYPE: PWR LICENSEE: FLORIDA P&L
DOCKET NO.: 50-250 LICENSED PWR (MWT): 2.20E+03
THERMAL PWR (MWH): 1.14E+07 NET ELECTRIC PWR (MWH): 3.45E+06
COMMERCIAL OPERATION: 12/14/72 INITIAL CRITICALITY: 10/20/72
COOLING WATER SOURCE: CLOSED CYCLE CANAL

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	8.44E-01
CR-51	1.24E-05
MN-54	2.62E-06
CO-58	1.99E-05
CO-60	1.70E-05
BR-82	6.22E-04
KR-85	1.38E+00
KR-85M	5.98E-01
KR-87	8.26E-03
KR-88	4.00E-02
SR-89	2.13E-06
I-131	3.90E-03
XE-131M	1.56E+01
I-133	4.23E-03
XE-133	1.20E+03
XE-133M	6.94E+00
CS-134	2.06E-05
I-135	1.97E-03
XE-135	1.87E+01
CS-136	6.06E-06
CS-137	6.13E-05
BA-140	2.93E-05
LA-140	1.90E-06
CE-144	1.20E-05

TOTAL AIRBORNE TRITIUM RELEASE 2.01E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: TURKEY POINT 4
LOCATION: 10 MI E FLORIDA CITY, FL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 4 TYPE: PWR
DOCKET NO.: 50-251
THERMAL PWR (MWH): 1.06E+07
COMMERCIAL OPERATION: 09/07/73
COOLING WATER SOURCE: CLOSED CYCLE CANAL

LICENSEE: FLORIDA P&L
LICENSED PWR (MWT): 2.20E+03
NET ELECTRIC PWR (MWH): 3.26E+06
INITIAL CRITICALITY: 06/11/73

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	2.91E+01
CR-51	1.24E-05
MN-54	2.62E-06
CO-58	1.99E-05
CO-60	1.68E-05
BR-82	6.22E-04
KR-85	1.51E+00
KR-85M	6.36E-01
KR-87	7.30E-03
KR-88	7.68E-02
SR-89	2.13E-06
I-131	3.85E-03
XE-131M	1.38E+01
I-133	4.22E-03
XE-133	1.23E+03
XE-133M	7.51E+00
CS-134	2.06E-05
I-135	1.97E-03
XE-135	1.94E+01
CS-136	6.06E-06
CS-137	6.11E-05
BA-140	2.93E-05
LA-140	1.90E-06
CE-144	1.20E-05

TOTAL AIRBORNE TRITIUM RELEASE 2.01E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Virgil C. Summer
Address: Jenkinsvill, SC

____ Population Assessment JCL File Name: _____
____ Array attached
Latitude: 34 ° 17 ' 44 "
Longitude: 81 ° 19 ' 13 " Pop. File Name: _____

____ Individual Assessment JCL File Name: _____

Distances (meters):

200	300	400	500	600	800	1,200	1,600	3,200	4,800
6,400	8,000	10,000	15,000	20,000	30,000	40,000	50,000	60,000	80,000

Food Fractions:

	F1	F2	F3
Meat			
Milk			
Veg			

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: _____

WBAN: 18883
Header: 1371
Code: _____
Set No: _____

Temperature: 19 °C
Lid Height: 900 meters
Rainfall: 125 cm/yr

		1	2	3	4	5	6
____	STACK Source:						
	Height (m):	27					
	Diameter (m):						
____	AREA Source						
	Diameter (m^2):						
____	BUOYANT cal/sec						
____	MOMENTUM m/s						
X	ENTERED Rise	0	0	0	0	0	0	0 meters
	Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Columbia 20 year met data, approximately 25 miles SE of plant.

File Name: SUMMER

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											57
NNW											11
NW										7	7
WNW											
W										11	14
WSW											14
SW											50
SSW											32
S										4	64
SSE										4	14
SE						0			4	28	18
ESE									36	18	14
E								4	14	14	21
ENE								4	43	43	21
NE									39	64	14
NNE										28	32

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	78								
NNW	46								
NW	28								
WNW	25								
W	36								
WSW	32								
SW	43								
SSW	28								
S	65								
SSE									
SE									
ESE	39								
E	11								
ENE	21								
NE	7								
NNE	14								

INSTALLATION: SUMMER
LOCATION: 26 MI NW OF COLUMBIA, SC

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-395
THERMAL POWER (MWH): 1.61E+07
COMMERCIAL OPERATION: 01/01/84
COOLING WATER SOURCE: MONTICELLO RESERVOIR

LICENSEE: SOUTH CAROLINA ELECTRIC & GAS
LICENSED POWER (MWT): 2.77E+03
NET ELECTRIC POWER (MWH): 5.05E+06
INITIAL CRITICALITY: 10/22/82

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	3.73E-01
CO-58	1.10E-05
KR-85	4.09E+00
KR-85M	2.03E+00
KR-87	5.25E-03
KR-88	2.91E+00
RB-88	8.44E-03
I-131	2.28E-03
XE-131M	1.52E+00
I-132	2.30E-04
I-133	1.13E-03
XE-133	2.97E+02
XE-133M	1.06E+00
CS-134	3.46E-06
I-134	2.10E-06
I-135	1.05E-04
XE-135	2.27E+01
CS-136	6.90E-06
CS-137	2.25E-05
CS-138	2.75E-04

TOTAL AIRBORNE TRITIUM RELEASE 1.51E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Waterford Unit 3
Address: Taft, LA

____ Population Assessment JCL File Name: WATERFOR
____ Array attached
Latitude: 29° 59' 43"
Longitude: 90° 28' 22" Pop. File Name: WATERFOR

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.700	.300	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: NBG1379

WBAN: 12958
Header: 1379
Code: ____
Set No: ____

Temperature: 20 °C
Lid Height: 900 meters
Rainfall: 152 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	61					
Diameter (m):						

____ AREA Source
Diameter (m²): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0

Pasquill Category: A B C D E F G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: New Orleans 5-yr 30 milesE of plant

File Name: W terfor 3

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								88	29	4	294
NNW								50	462	260	416
NW								3			216
WNW								11	472	65	
W								76	209		
WSW								18	29		
SW											
SSW											
S											
SSE											
SE											
ESE											702
E								47	76	138	2074
ENE								3		1110	4134
NE								3			195
NNE								118			8

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	269								
NNW	1693								
NW	364								
WNW	24								
W									
WSW									
SW									
SSW									
S									
SSE									
SE	3								
ESE	644								
E	1755								
ENE	39								
NE									
NNE									

INSTALLATION: WATERFORD
LOCATION: 20 MI W NEW ORLEANS, LA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 3 TYPE: PWR
DOCKET NO.: 50-382
THERMAL PWR (MWH): 1.87E+07
COMMERCIAL OPERATION: 09/24/85
COOLING WATER SOURCE: MISSISSIPPI RIVER

LICENSEE: LOUISIANA P&L
LICENSED PWR (MWT): 3.39E+03
NET ELECTRIC PWR (MWH): 6.00E+06
INITIAL CRITICALITY: 03/04/85

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
ALPHA	1.88E-04
AR-41	5.26E-01
CR-51	6.56E-05
MN-54	8.88E-06
CO-57	1.11E-07
CO-58	1.39E-04
CO-60	3.46E-05
KR-85	1.29E+01
KR-85M	3.60E-01
KR-88	1.57E-01
NB-95	5.30E-05
ZR-95	2.34E-05
RU-103	1.45E-07
RU-106	1.99E-06
I-131	8.69E-04
XE-131M	1.75E+01
I-133	5.51E-06
XE-133	5.08E+03
XE-133M	5.12E+00
CS-134	2.95E-07
XE-135	1.88E+02
CS-137	4.13E-06
HG-203	4.03E-07

TOTAL AIRBORNE TRITIUM RELEASE 2.46E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: ~~April 1991~~ Source Category: Reactors

Facility: Wolf Creek Unit 1
Address: Burlington, KS

____ Population Assessment JCL File Name: WOLF
____ Array attached
Latitude: 39° 1' 46"
Longitude: 84° 43' 23" Pop. File Name: WOLF

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.700	.300	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: TOP534

WBAN: ____
Header: ____
Code: ____
Set No: ____

Temperature: 13 °C
Lid Height: 900 meters
Rainfall: 73 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	64					
Diameter (m):						

____ AREA Source
Diameter (m²):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Verify LAT & LONG Met data Topeka 10-yr 60 miles N of plant

File Name: Wolf

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									2	2	6
NNW									1		
NW									1	593	532
WNW										2	1474
W										8	1
WSW									1	7	23
SW										3	655
SSW										1	
S											8
SSE									1		
SE									2	4	4
ESE									6	4	2
E									2.	1	1
ENE										4	2
NE									1	3	8
NNE									1	1	4

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	1								
NNW	4								
NW	6								
WNW	475								
W									
WSW	11								
SW	1456								
SSW	5								
S	5								
SSE	6								
SE	6								
ESE	11								
E	1								
ENE	2								
NE	5								
NNE	13								

INSTALLATION: WOLF CREEK
LOCATION: 3.5 MI NE BURLINGTON, KANSAS

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR LICENSEE: KANSAS G&E
DOCKET NO.: 50-482 LICENSED PWR (MWT): 3.41E+03
THERMAL PWR (MWH): 2.01E+07 NET ELECTRIC PWR (MWH): 6.66E+06
COMMERCIAL OPERATION: 09/03/85 INITIAL CRITICALITY: 05/22/85
COOLING WATER SOURCE: COOLING LAKE

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
ALPHA	8.05E-08
AR-41	9.72E-01
CO-58	1.09E-05
CO-60	1.61E-05
KR-85	1.17E+00
KR-85M	7.66E-01
KR-87	2.82E-04
KR-88	1.10E+00
I-131	5.66E-05
XE-131M	4.09E+00
XE-133	7.57E+02
XE-133M	7.66E+00
XE-135	1.88E+01
TOTAL AIRBORNE TRITIUM RELEASE	1.46E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Yankee Rowe
Address: Rowe, MA

____ Population Assessment JCL File Name: YANKEE
____ Array attached
Latitude: 42 ° 43 ' 41 "
Longitude: 72 ° 55 ' 44 " Pop. File Name: YANKEE

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: CEF0182

WBAN: 14703
Header: 182
Code: CEF
Set No: ____

Temperature: 11 °C
Lid Height: 850 meters
Rainfall: 111 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	46					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category							

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Chicopee Falls/Westover 5-yr met data ~35 miles SE of plant

File Name: YANKEE

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N										22	18
NNW								5		47	311
NW				3					5	23	23
WNW									19		10
W									19	33	9
WSW								65	28	179	
SW								28			17
SSW											6
S									19	21	13
SSE									21	77	2
SE									10	59	
ESE										13	10
E									4	13	42
ENE									6	2	8
NE										4	12
NNE										15	31

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	17								
NNW	20								
NW	17								
WNW	20								
W									
WSW	6								
SW	37								
SSW	3								
S	24								
SSE	30								
SE	10								
ESE	39								
E	21								
ENE	27								
NE	108								
NNE	169								

INSTALLATION: YANKEE ROWE
LOCATION: 20 MI NW GREENFIELD, MA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR
DOCKET NO.: 50-29
THERMAL PWR (MWH): 4.03E+06
COMMERCIAL OPERATION: 07/01/61
COOLING WATER SOURCE: DEERFIELD RIVER

LICENSEE: YANKEE ATOMIC ELECTRIC
LICENSED PWR (MWT): 6.00E+02
NET ELECTRIC PWR (MWH): 1.12E+06
INITIAL CRITICALITY: 08/19/60

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
C-14	6.41E-01
AR-37	7.11E-01
AR-41	<8.64E-01
CR-51	<1.24E-05
MN-54	<2.26E-06
CO-58	<2.18E-06
FE-59	<4.48E-06
CO-60	6.98E-06
ZN-65	<4.84E-06
KR-85	4.10E+00
KR-85M	1.94E+00
KR-87	<1.69E+00
KR-88	<3.53E+00
SR-89	<9.84E-07
SR-90	<4.32E-07
ZR-NB-95	<3.51E-06
MO-99	<1.37E-05
RU-103	<1.67E-06
AG-110M	<1.92E-06
SB-124	<1.99E-06
I-131	5.04E-05
XE-131M	1.10E+00
I-133	1.61E-05
XE-133	1.02E+02
XE-133M	2.07E+00
CS-134	<1.78E-06
I-135	<1.49E-06
XE-135	3.89E+01
XE-135M	<4.75E+01
CS-137	1.50E-06
XE-138	<8.20E-01
BA-LA-140	<6.07E-06
CE-141	<1.69E-06
CE-144	<7.33E-06

TOTAL AIRBORNE TRITIUM RELEASE 4.58E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Zion 1 & 2
Address: Waukegon, IL

____ Population Assessment JCL File Name: ZION
____ Array attached
Latitude: 42 ° 26 ' 44 "
Longitude: 87 ° 48 ' 7 " Pop. File Name: ZION

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: ORD0452

WBAN: 94846
Header: 452
Code: ____
Set No: ____

Temperature: 10 °C
Lid Height: 950 meters
Rainfall: 85 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	55					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0

Pasquill Category:

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Chicago/Ohare 5-yr 35 S of plant

File Name: ZION

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N										1408	497
NNW									1902	1408	496
NW									1902	1409	495
WNW							0	96	1902	1408	496
W								96	1902	1408	495
WSW								97	1902	1409	496
SW									1902	1408	495
SSW									1902	1408	496
S									1903	1409	495
SSE											
SE											
ESE											
E											
ENE											
NE											
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	733								
NNW	733								
NW	733								
WNW	733								
W	734								
WSW	733								
SW	733								
SSW	733								
S	734								
SSE									
SE									
ESE									
E									
ENE									
NE									
NNE									

INSTALLATION: ZION
LOCATION: 6 MI N WAUKEGAN, IL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: PWR LICENSEE: COMMONWEALTH EDISON
DOCKET NO.: 50-295 LICENSED PWR (MWT): 3.25E+03
THERMAL PWR (MWH): 1.97E+07 NET ELECTRIC PWR (MWH): 6.34E+06
COMMERCIAL OPERATION: 12/31/73 INITIAL CRITICALITY: 06/19/73
COOLING WATER SOURCE: LAKE MICHIGAN

UNIT NUMBER: 2 TYPE: PWR LICENSEE: COMMONWEALTH EDISON
DOCKET NO.: 50-304 LICENSED PWR (MWT): 3.25E+03
THERMAL PWR (MWH): 2.08E+07 NET ELECTRIC PWR (MWH): 6.65E+06
COMMERCIAL OPERATION: 09/17/74 INITIAL CRITICALITY: 12/24/73
COOLING WATER SOURCE: LAKE MICHIGAN

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
NA-24	1.03E-05
AR-41	1.04E-01
MN-54	1.90E-08
MN-56	1.30E-07
CO-58	5.77E-05
CO-60	1.51E-04
BR-82	3.01E-05
BR-84	6.20E-07
KR-85	3.40E+00
KR-85M	1.14E-02
KR-88	1.31E-02
RB-88	6.43E-03
SR-89	3.20E-07
NB-95	8.20E-09
ZR-95	2.50E-09
MO-99	4.57E-07
TC-99M	9.30E-08
AG-110M	2.10E-07
SN-113	1.30E-10
I-130	4.60E-08
I-131	1.15E-03
XE-131M	6.44E-01
I-132	1.65E-03
I-133	4.09E-04
XE-133	1.39E+03
XE-133M	3.56E-01
CS-134	1.94E-05
I-134	2.63E-04
I-135	1.82E-04
XE-135	5.53E+01
CS-136	1.09E-06
CS-137	2.26E-05
CS-138	3.94E-04
BA-139	5.90E-07

INSTALLATION: ZION

BA-140	1.64E-07
LA-140	2.02E-08
BA-142	8.10E-04
W-187	3.66E-07
TOTAL AIRBORNE TRITIUM RELEASE	3.69E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

Boiling Water Reactors (BWRs)

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Big Rock Point
Address: Charlevoix, MI

____ Population Assessment JCL File Name: BIGROCK
____ Array attached
Latitude: 45 ° 21 ' 33 "
Longitude: 85 ° 11 ' 40 " Pop. File Name: BIGROCK

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: TVC0844

WBAN: 14850
Header: 844
Code: ____
Set No: ____

Temperature: 40 °C
Lid Height: 800 meters
Rainfall: 85 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	73					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Met data Traverse City 20 miles SW of plant

File Name: BIGROCK

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											
NW											
WNW											
W											
WSW										123	279
SW									11	113	222
SSW									10	114	222
S									9	21	25
SSE									9	21	24
SE									16	34	23
ESE									16	34	23
E									4	18	17
ENE										18	18
NE											
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW									
WNW									
W									
WSW									
SW	355								
SSW	356								
S	28								
SSE	25								
SE									
ESE									
E									
ENE									
NE									
NNE									

INSTALLATION: BIG ROCK POINT
LOCATION: 4 MI NE CHARLEVOIX, MI

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-155
THERMAL PWR (MWH): 1.26E+06
COMMERCIAL OPERATION: 03/29/63
COOLING WATER SOURCE: LAKE MICHIGAN

LICENSEE: CONSUMERS PWR
LICENSED PWR (MWT): 2.40E+02
NET ELECTRIC PWR (MWH): 3.84E+05
INITIAL CRITICALITY: 09/27/62

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
N-13	1.47E+03
NA-24	1.97E-04
CR-51	5.12E-04
MN-54	1.61E-04
CO-58	1.91E-06
FE-59	7.36E-06
CO-60	2.42E-04
ZN-65	9.26E-05
BR-82	3.11E-03
KR-85M	1.13E+02
KR-87	5.62E+02
KR-88	3.54E+02
SR-89	2.03E-04
SR-90	3.37E-06
SR-91	3.72E-03
NB-95	6.22E-06
MO-99	1.04E-04
AG-110M	6.92E-04
I-131	2.15E-03
I-133	2.05E-02
XE-133	4.26E+01
CS-134	8.11E-05
I-135	2.51E-02
XE-135	5.33E+02
XE-135M	9.16E+02
CS-137	2.96E-04
XE-138	3.78E+03
BA-139	9.76E-04
BA-140	5.30E-04
LA-140	1.55E-03
HG-203	2.81E-06
NP-239	5.63E-05
UNIDENTIFIED	1.77E-04

TOTAL AIRBORNE TRITIUM RELEASE 5.30E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: May 1991 Source Category: Reactors

Facility: Browns Ferry NPS, Units 1, 2, and 3
Address: Decatur, AL

____ Population Assessment JCL File Name: BROWNS
____ Array attached
Latitude: 34° 42' 15"
Longitude: 87° 7' 6" Pop. File Name: BROWNS

____ Individual Assessment JCL File Name: ____

Distances (meters):

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10,000	15,000	20,000	30,000	40,000	50,000	60,000	80,000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: HSV0544

WBAN: 03856
Header: 544
Code: HSV
Set No: ____

Temperature: 17 °C
Lid Height: 1000 meters
Rainfall: 123 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	183					
Diameter (m):						

____ AREA Source
Diameter (m²): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0

Pasquill Category: A B C D E F G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Huntsville Met Data approximately 25 miles NE of plant (5-year)

File Name: BROWNS

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									10	45	30
NNW								5		30	20
NW											
WNW											25
W										25	5
WSW										35	15
SW										25	40
SSW										60	75
S										20	35
SSE											
SE											
ESE										10	
E										65	25
ENE									30	105	85
NE									5	35	55
NNE									5	15	55

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	70								
NNW	15								
NW	5								
WNW	55								
W	30								
WSW	140								
SW	95								
SSW	170								
S	95								
SSE	50								
SE	20								
ESE									
E	85								
ENE	150								
NE	70								
NNE	45								

INSTALLATION: BROWNS FERRY
LOCATION: 10 MI NW DECATUR, AL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1983
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-259
THERMAL POWER (MWH): 0.00E+00
COMMERCIAL OPERATION: 08/01/74
COOLING WATER SOURCE: TENNESSEE RIVER

LICENSEE: TENNESSEE VALLEY AUTHORITY
LICENSED POWER (MWT): 3.29E+03
NET ELECTRIC POWER (MWH): 0.00E+00
INITIAL CRITICALITY: 08/17/73

UNIT NUMBER: 2 TYPE: BWR
DOCKET NO.: 50-260
THERMAL POWER (MWH): 0.00E+00
COMMERCIAL OPERATION: 03/01/75
COOLING WATER SOURCE: TENNESSEE RIVER

LICENSEE: TENNESSEE VALLEY AUTHORITY
LICENSED POWER (MWT): 3.29E+03
NET ELECTRIC POWER (MWH): 0.00E+00
INITIAL CRITICALITY: 07/20/74

UNIT NUMBER: 3 TYPE: BWR
DOCKET NO.: 50-296
THERMAL POWER (MWH): 0.00E+00
COMMERCIAL OPERATION: 03/01/77
COOLING WATER SOURCE: TENNESSEE RIVER

LICENSEE: TENNESSEE VALLEY AUTHORITY
LICENSED POWER (MWT): 3.29E+03
NET ELECTRIC POWER (MWH): 0.00E+00
INITIAL CRITICALITY: 08/08/76

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	1.68E+03
MN-54	2.99E-03
CO-58	2.52E-03
FE-59	6.43E-03
CO-60	1.15E-02
ZN-65	1.53E-02
KR-85	5.04E+03
KR-85M	5.56E+04
KR-87	2.85E+04
KR-88	6.07E+04
SR-89	3.72E-03
SR-90	3.68E-04
NB-95	2.00E-02
ZR-95	1.25E-02
I-131	1.96E-01
I-133	7.08E-02
XE-133	2.66E+05
CS-134	4.33E-03
I-135	3.99E-02
XE-135	6.73E+03
XE-135M	3.17E+04
CS-137	4.80E-03
XE-138	2.41E+04
BA-140	7.39E-03
LA-140	2.29E-02
TOTAL AIRBORNE TRITIUM RELEASE	4.09E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Brunswick Steam Electric Plant, 1 & 2
Address: Southport, NC

____ Population Assessment JCL File Name: BRUNSWIC
____ Array attached
Latitude: 33 ° 57 ' 29 "
Longitude: 78 ° 0 ' 38 " Pop. File Name: BRUNSWIC

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: ILMO104

WBAN: 13748
Header: 104
Code: 16M
Set No: ____

Temperature: 15 °C
Lid Height: 700 meters
Rainfall: 106 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	100					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:							

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: 5-yr met data from Wilmington ~40 miles N of plant

File Name: BRUNSWIC

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								11			
NNW								9		31	49
NW								11	19	31	31
WNW								9	19		
W									19	43	
WSW									28	175	181
SW								11	19	0	100
SSW					0				169	1340	496
S									292	1650	
SSE					448			9	19		
SE								11			
ESE								9	13		
E									13		
ENE											
NE											
NNE								9			

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	45								
NNW	194								
NW	30								
WNW									
W									
WSW	45								
SW	298								
SSW	185								
S	0								
SSE									
SE									
ESE									
E	267								
ENE									
NE	18								
NNE	0								

INSTALLATION: BRUNSWICK
LOCATION: 20 MI S WILMINGTON, NC

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-325
THERMAL PWR (MWH): 1.43E+07
COMMERCIAL OPERATION: 03/18/77
LICENSEE: CAROLINA PWR & LIGHT
LICENSED PWR (MWT): 2.44E+03
NET ELECTRIC PWR (MWH): 4.45E+06
INITIAL CRITICALITY: 10/08/76
COOLING WATER SOURCE: CAPE FEAR RIVER

UNIT NUMBER: 2 TYPE: BWR
DOCKET NO.: 50-324
THERMAL PWR (MWH): 1.24E+07
COMMERCIAL OPERATION: 11/03/75
LICENSEE: CAROLINA PWR & LIGHT
LICENSED PWR (MWT): 2.44E+03
NET ELECTRIC PWR (MWH): 3.92E+06
INITIAL CRITICALITY: 03/20/75
COOLING WATER SOURCE: CAPE FEAR RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	2.17E+01
CR-51	1.30E-01
MN-54	6.50E-03
CO-57	2.66E-06
CO-58	3.99E-03
FE-59	1.39E-03
CO-60	7.73E-03
ZN-65	5.73E-05
KR-85M	7.08E+01
KR-87	1.07E+01
KR-88	6.11E+01
SR-89	9.91E-04
SR-90	9.15E-06
NB-95	1.77E-05
RU-103	9.27E-06
I-131	2.27E-02
I-132	3.80E-02
I-133	4.35E-02
XE-133	4.35E+02
XE-133M	1.13E+00
CS-134	1.41E-04
I-134	2.27E-02
I-135	4.57E-02
XE-135	6.10E+02
XE-135M	8.45E+01
CS-136	3.73E-06
CS-137	4.41E-04
XE-137	2.30E+02
XE-138	5.05E+01
BA-140	6.14E-04
BA-LA-140	1.91E-03
LA-140	4.20E-04
CE-141	4.25E-08
CE-144	2.06E-05

INSTALLATION: BRUNSWICK

TOTAL AIRBORNE TRITIUM RELEASE 5.55E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Clinton Power Station
Address: Clinton, IL

___ Population Assessment JCL File Name: CLINTON
___ Array attached
Latitude: 40 ° 9 ' 6 "
Longitude: 88 ° 57 ' 11 " Pop. File Name: CLINTON

___ Individual Assessment JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

___ Urban
___ Rural

WEATHER DATA:
___ Array attached STAR File Name: RAN0234

WBAN: 14806
Header: 234
Code: ___
Set No: ___

Temperature: 10 °C
Lid Height: 850 meters
Rainfall: 89 cm/yr

___ STACK Source:

	1	2	3	4	5	6
Height (m):	61					
Diameter (m):						

___ AREA Source
Diameter (m²):

___ BUOYANT cal/sec
___ MOMENTUM m/s

x ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:							

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Rantoul/Chanute AFB met data 5-yr 40 miles ENE of plant

File Name: CLINTON

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N						0		6		5	20
NNW								0		8	12
NW										10	5
WNW								0	10	10	5
W						0				12	12
WSW											12
SW								6	0		14
SSW											155
S			0				0			11	8
SSE						0				8	3
SE						0				3	9
ESE											6
E								3	5	6	2
ENE					0			5		129	6
NE									5		3
NNE								3	8	5	17

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	17								
NNW	6								
NW	15								
WNW	23								
W	12								
WSW	23								
SW	28								
SSW	8								
S	19								
SSE	28								
SE	19								
ESE	6								
E	11								
ENE	9								
NE	9								
NNE	10								

INSTALLATION: CLINTON
LOCATION: 6 MI E CLINTON, IL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-461
THERMAL PWR (MWH): 1.86E+07
COMMERCIAL OPERATION: 11/24/87
COOLING WATER SOURCE: SALT CREEK

LICENSEE: ILLINOIS PWR
LICENSED PWR (MWT): 2.89E+03
NET ELECTRIC PWR (MWH): 5.86E+06
INITIAL CRITICALITY: 02/27/87

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
NA-24	2.74E-03
CR-51	5.36E-02
MN-54	2.08E-03
CO-58	1.41E-03
FE-59	2.45E-04
CO-60	1.77E-03
AS-76	3.27E-05
SR-89	5.81E-05
SR-90	8.44E-07
Y-91M	2.61E-05
TC-99M	4.65E-04
I-131	2.45E-04
I-133	4.77E-04
I-134	7.70E-05
XE-135	4.34E+00
CS-138	7.99E-04
BA-139	1.55E-04

TOTAL AIRBORNE TRITIUM RELEASE 8.82E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Cooper Nuclear Station
Address: Brownsville, NE

____ Population Assessment JCL File Name: COOPER
____ Array attached
Latitude: 40° 21' 42"
Longitude: 95° 38' 27" Pop. File Name: COOPER

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.700	.300	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: MKC1323

WBAN: 13988
Header: 1323
Code: ____
Set No: ____

Temperature: 10 °C
Lid Height: 900 meters
Rainfall: 77 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	99					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

x ENTERED Rise 0 0 0 0 0 0 0 meters
Pasquill Category: A B C D E F G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Kansas City 5-yr Distant met data

File Name: COOPER

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									8	5	9
NNW										6	8
NW								3		249	8
WNW									8	6	8
W								3	4	6	8
WSW								2	4	7	10
SW									2	123	126
SSW									3	7	10
S								2		7	10
SSE										7	10
SE										3	4
ESE									4	7	54
E									6	7	9
ENE									7	7	8
NE									1	7	9
NNE										7	9

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	10								
NNW	11								
NW	11								
WNW	11								
W	11								
WSW	13								
SW	13								
SSW	13								
S	13								
SSE	13								
SE	9								
ESE	30								
E	13								
ENE	12								
NE	10								
NNE	181								

INSTALLATION: COOPER
LOCATION: 70 MI S OMAHA, NE

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-298
THERMAL PWR (MWH): 1.31E+07
COMMERCIAL OPERATION: 07/01/74
COOLING WATER SOURCE: MISSOURI RIVER

LICENSEE: NEB PUB PWR & IOWA P&L
LICENSED PWR (MWT): 2.38E+03
NET ELECTRIC PWR (MWH): 4.20E+06
INITIAL CRITICALITY: 02/21/74

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
KR-83M	1.38E+01
KR-85	7.64E+01
KR-85M	2.70E+01
KR-87	8.56E+01
KR-88	8.83E+01
RB-88	8.00E-04
KR-89	3.82E+02
RB-89	5.38E-06
SR-89	4.23E-04
SR-91	6.62E-04
I-131	9.86E-03
I-132	9.25E-05
TE-132	4.08E-05
I-133	2.02E-03
XE-133	1.31E+02
XE-133M	1.15E+00
I-135	1.12E-03
XE-135	1.31E+02
XE-135M	4.72E+01
CS-137	3.84E-05
XE-137	4.60E+02
CS-138	7.61E-03
XE-138	3.74E+02
BA-139	2.09E-04
BA-140	4.59E-04
LA-140	3.14E-04

TOTAL AIRBORNE TRITIUM RELEASE N/D

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Dresden 2 & 3
Address: Morris, IL

____ Population Assessment JCL File Name: DRESDEN
____ Array attached
Latitude: 41 ° 23 ' 22 "
Longitude: 88 ° 16 ' 15 " Pop. File Name: DRESDEN

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: ORD0452

WBAN: 94846
Header: 452
Code: ____
Set, No: ____

Temperature: 10 °C
Lid Height: 950 meters
Rainfall: 85 cm/yr

	1	2	3	4	5	6
____ STACK Source:						
Height (m):	91					
Diameter (m):						
____ AREA Source Diameter (m^2):						
____ BUOYANT cal/sec						
____ MOMENTUM m/s						
X ENTERED Rise	0	0	0	0	0	0	0 meters
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Met data Chicago/Ohare 50 miles NE of plant 5-yr

File Name: DRESDEN

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								3			76
NNW								3			
NW								6			1264
WNW											
W							133				
WSW										3	
SW											947
SSW											
S							3				
SSE								3			
SE							3		289	1100	
ESE									3		
E								21			
ENE							3				
NE							3			1006	
NNE								3			1566

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	1427								
NNW									
NW									
WNW									
W									
WSW									
SW									
SSW									
S									
SSE									
SE									
ESE									
E									
ENE	83								
NE									
NNE									

INSTALLATION: DRESDEN
LOCATION: 14 MI SW JOLIET, IL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR LICENSEE: COMMONWEALTH EDISON
DOCKET NO.: 50-10 LICENSED PWR (MWT): 7.00E+02
THERMAL PWR (MWH): 0.00E+00 NET ELECTRIC PWR (MWH): 0.00E+00
COMMERCIAL OPERATION: 07/04/60 INITIAL CRITICALITY: 10/15/59
COOLING WATER SOURCE: KANKAKEE RIVER

UNIT NUMBER: 2 TYPE: BWR LICENSEE: COMMONWEALTH EDISON
DOCKET NO.: 50-237 LICENSED PWR (MWT): 2.53E+03
THERMAL PWR (MWH): 1.45E+07 NET ELECTRIC PWR (MWH): 4.32E+06
COMMERCIAL OPERATION: 06/09/70 INITIAL CRITICALITY: 01/07/70
COOLING WATER SOURCE: KANKAKEE RIVER

UNIT NUMBER: 3 TYPE: BWR LICENSEE: COMMONWEALTH EDISON
DOCKET NO.: 50-249 LICENSED PWR (MWT): 2.53E+03
THERMAL PWR (MWH): 1.36E+07 NET ELECTRIC PWR (MWH): 4.16E+06
COMMERCIAL OPERATION: 11/16/71 INITIAL CRITICALITY: 01/31/71
COOLING WATER SOURCE: KANKAKEE RIVER

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
MN-54	2.29E-07
CO-60	1.39E-05
SR-90	1.20E-07
CS-134	3.29E-07
CS-137	4.50E-05

TOTAL AIRBORNE TRITIUM RELEASE 2.60E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

INSTALLATION: DRESDEN 2-3
LOCATION: 14 MI SW JOLIET, IL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: BWR LICENSEE: COMMONWEALTH EDISON
DOCKET NO.: 50-237 LICENSED PWR (MWT): 2.53E+03
THERMAL PWR (MWH): 1.45E+07 NET ELECTRIC PWR (MWH): 4.32E+06
COMMERCIAL OPERATION: 06/09/70 INITIAL CRITICALITY: 01/07/70
COOLING WATER SOURCE: KANKAKEE RIVER

UNIT NUMBER: 3 TYPE: BWR LICENSEE: COMMONWEALTH EDISON
DOCKET NO.: 50-249 LICENSED PWR (MWT): 2.53E+03
THERMAL PWR (MWH): 1.36E+07 NET ELECTRIC PWR (MWH): 4.16E+06
COMMERCIAL OPERATION: 11/16/71 INITIAL CRITICALITY: 01/31/71
COOLING WATER SOURCE: KANKAKEE RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
CR-51	9.06E-04
MN-54	1.29E-03
CO-58	3.79E-04
FE-59	1.25E-04
CO-60	7.59E-03
ZN-65	1.50E-04
KR-85	1.30E-02
KR-85M	8.64E-01
KR-87	8.59E-06
KR-88	1.64E+00
SR-89	1.45E-04
SR-90	2.13E-06
ZR-95	7.80E-05
MO-99	3.66E-03
AG-110M	1.69E-05
SB-124	2.49E-06
I-131	1.09E-01
I-133	3.91E-02
XE-133	2.25E+01
I-135	6.73E-02
XE-135	1.12E+02
XE-135M	7.36E+00
CS-136	5.58E-06
CS-137	4.50E-04
XE-138	2.34E+01
BA-140	5.14E-03
CE-141	4.51E-05
CE-144	3.14E-06

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Duane Arnold
Address: Palo, Iowa

____ Population Assessment JCL File Name: DUANE
____ Array attached
Latitude: 42 ° 6 ' 2 "
Longitude: 91 ° 46 ' 37 " Pop. File Name: DUANE

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: DSM0753

WBAN: 14933
Header: 753
Code: DSM
Set No: ____

Temperature: 10 °C
Lid Height: 850 meters
Rainfall: 78 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	100					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

x ENTERED Rise	0	0	0	0	0	0	0	meters
Pasquill Category:	A	B	C	D	E	F	G	

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Des Moines ~80miles SW of plan

File Name: DUANE

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									5	35	55
NNW											20
NW								5	5	35	25
WNW									20	20	25
W									20	30	40
WSW								4	15	15	20
SW								4	10	20	25
SSW									10	240	185
S									20	20	35
SSE								3	25	85	20
SE									50	50	50
ESE									15	20	40
E									20	65	40
ENE									15	35	50
NE									15	30	40
NNE									15	30	45

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	50								
NNW	25								
NW	20								
WNW	35								
W	330								
WSW	90								
SW	25								
SSW	20								
S	15								
SSE	60								
SE	90								
ESE	65								
E	60								
ENE	50								
NE	40								
NNE	40								

INSTALLATION: DUANE ARNOLD
LOCATION: 8 MI NW CEDAR RAPIDS, IA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-331
THERMAL PWR (MWH): 9.97E+06
COMMERCIAL OPERATION: 02/01/75
COOLING WATER SOURCE: CEDAR RAPIDS RIVER

LICENSEE: IOWA ELECT LIGHT & PWR
LICENSED PWR (MWT): 1.66E+03
NET ELECTRIC PWR (MWH): 3.14E+06
INITIAL CRITICALITY: 03/23/74

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
N-13	3.15E+00
CR-51	4.73E-03
MN-54	5.18E-04
CO-58	9.52E-05
CO-60	3.29E-03
KR-85	7.45E-03
KR-85M	1.57E+01
KR-87	2.11E+01
KR-88	3.22E+01
SR-89	4.14E-05
SR-90	3.55E-07
I-131	6.65E-03
I-133	1.96E-03
XE-133	2.29E+02
XE-133M	7.30E-01
CS-134	4.00E-05
I-135	3.16E-04
XE-135	3.61E+02
XE-135M	2.29E+01
CS-137	1.41E-05
XE-138	2.06E+01
BA-LA-140	2.03E-05
CE-144	9.10E-05

TOTAL AIRBORNE TRITIUM RELEASE 2.38E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Edwin I. Hatch
Address: Baxley, GA

___ Population Assessment JCL File Name: EDWIN
___ Array attached
Latitude: 31 ° 56 ' 3 "
Longitude: 82 ° 20 ' 39 " Pop. File Name: EDWIN

___ Individual Assessment JCL File Name: ___

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

___ Urban
___ Rural

WEATHER DATA:
___ Array attached STAR File Name: AMB0771

WBAN: 13870
Header: 771
Code: ___
Set No: ___

Temperature: 19 °C
Lid Height: 1000 meters
Rainfall: 134 cm/yr

	1	2	3	4	5	6
___ STACK Source:						
Height (m):	120					
Diameter (m):						
___ AREA Source Diameter (m^2):						
___ BUOYANT cal/sec						
___ MOMENTUM m/s						
x ENTERED Rise	0	0	0	0	0	0	0 meters
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Alma met data 5-yr ~20 miles SSW of plant
NOTE DAYNITE!!!

File Name: EDWIN

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											25
NNW											42
NW											8
WNW											
W								21		21	
WSW								9	26	9	17
SW								17	13	26	13
SSW									4	30	47
S								3	17	4	
SSE								4	9	43	26
SE										9	26
ESE											13
E											
ENE											
NE											17
NNE										4	8

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	53								
NNW	25								
NW	13								
WNW									
W	4								
WSW	13								
SW	13								
SSW	43								
S	43								
SSE	64								
SE	47								
ESE	13								
E	4								
ENE	13								
NE	25								
NNE	4								

INSTALLATION: EDWIN I. HATCH 1&2
LOCATION: 11 MI N BAXLEY, GA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR LICENSEE: GEORGIA PWR
DOCKET NO.: 50-321 LICENSED PWR (MWT): 2.44E+03
THERMAL PWR (MWH): 1.35E+07 NET ELECTRIC PWR (MWH): 4.11E+06
COMMERCIAL OPERATION: 12/31/75 INITIAL CRITICALITY: 09/12/74
COOLING WATER SOURCE: ALTAMAHA RIVER

UNIT NUMBER: 2 TYPE: BWR LICENSEE: GEORGIA PWR
DOCKET NO.: 50-366 LICENSED PWR (MWT): 2.44E+03
THERMAL PWR (MWH): 1.36E+07 NET ELECTRIC PWR (MWH): 4.25E+06
COMMERCIAL OPERATION: 09/05/79 INITIAL CRITICALITY: 07/04/78
COOLING WATER SOURCE: ALTAMAHA RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	1.34E+01
CR-51	6.11E-04
MN-54	3.71E-05
CO-58	2.27E-04
CO-60	3.84E-04
ZN-65	3.57E-03
KR-85	8.81E+01
KR-85M	1.83E+02
KR-87	8.36E+01
KR-88	1.80E+02
SR-89	1.58E-03
SR-90	8.25E-06
NB-95	3.65E-05
I-131	9.39E-03
XE-131M	6.80E+01
I-133	2.69E-02
XE-133	2.36E+03
XE-133M	2.50E+00
CS-134	1.05E-03
I-135	2.46E-02
XE-135	2.70E+02
XE-135M	1.20E+02
CS-137	1.29E-03
XE-137	3.27E-01
XE-138	9.11E+01
BA-140	2.73E-03
LA-140	4.22E-03

TOTAL AIRBORNE TRITIUM RELEASE 4.89E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Fermi Unit 2
Address: Newport, MI

____ Population Assessment JCL File Name: FERMI
____ Array attached
Latitude: 41 ° 58 ' 41 "
Longitude: 83 ° 15 ' 33 " Pop. File Name: FERMI

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
~~6400~~	~~8000~~	~~10000~~	~~15000~~	~~20000~~	~~30000~~	~~40000~~	~~50000~~	~~60000~~	~~80000~~

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: TOL0990

WBAN: 94830
Header: 990
Code: TOL
Set No: ____

Temperature: 9 °C
Lid Height: 900 meters
Rainfall: 79 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	51					
Diameter (m):						

____ AREA Source
Diameter (m^2): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:							

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Toledo, OH met data 15 miles SSW of plant

File Name: FERMI

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									254	133	63
NNW									215	388	138
NW								4	25	155	314
WNW							3		47	44	76
W									50	94	181
WSW									76	864	2271
SW									225		845
SSW								68	1589	25	
S								195	250		
SSE											
SE											
ESE											
E											
ENE									0		
NE									142	286	11
NNE								4	162	105	49

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	130								
NNW	54								
NW	260								
WNW	65								
W	391								
WSW	1676								
SW	0								
SSW									
S									
SSE									
SE									
ESE									
E									
ENE									
NE									
NNE	60								

INSTALLATION: FERMI
LOCATION: LAGUNA BEACH, MICHIGAN

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: BWR
DOCKET NO.: 50-341
THERMAL PWR (MWH): 1.30E+07
COMMERCIAL OPERATION: 01/23/88
COOLING WATER SOURCE: LAKE ERIE

LICENSEE: DETROIT EDISON
LICENSED PWR (MWT): 3.29E+03
NET ELECTRIC PWR (MWH): 4.06E+06
INITIAL CRITICALITY: 06/21/85

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
ALPHA	9.70E-07
NA-24	2.71E-02
CR-51	1.07E-03
MN-54	9.04E-05
CO-57	2.32E-06
CO-58	1.82E-04
CO-60	4.73E-05
ZN-65	2.72E-04
AS-76	5.07E-04
KR-85M	4.26E-01
RB-89	3.54E-04
SR-89	1.70E-04
SR-90	5.40E-05
SR-91	2.02E-04
Y-91M	1.62E-04
MO-99	1.53E-04
TC-99M	8.61E-04
RU-103	2.82E-05
BA-131	1.64E-04
I-131	4.05E-04
I-132	1.01E-05
I-133	6.39E-03
BA-135M	8.60E-04
I-135	8.44E-05
XE-135	6.84E-01
CS-138	1.78E-04
BA-139	1.51E-03
BA-140	9.54E-05
LA-140	2.69E-04
CE-144	6.74E-06

TOTAL AIRBORNE TRITIUM RELEASE N/D

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Grand Gulf
Address: Port Gibson, MS

____ Population Assessment JCL File Name: GRAND
____ Array attached
Latitude: 32° 1' 37"
Longitude: 91° 15' 10" Pop. File Name: GRAND

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: JAN1169

WBAN: 03940
Header: 1169
Code: ____
Set No: ____

Temperature: 18 °C
Lid Height: 800 meters
Rainfall: 134 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	43					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise
Pasquill Category:

	A	B	C	D	E	F	G
Rise	o	o	o	o	o	o	o

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Jackson lo-yr met data 45 miles NE of plant

File Name: GRAND GULF

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N										2	
NNW								7	19		
NW								7			
WNW											
W											
WSW											
SW								4			
SSW									4	4	
S									4		4
SSE								3	7		35
SE									4	7	42
ESE								7	7	29	
E							1	3	23	42	49
ENE										19	7
NE							1	3	4	4	12
NNE							1	10	11		1637

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW									
WNW	4								
W									
WSW									
SW									
SSW									
S									
SSE	86								
SE	1273								
ESE	199								
E	49								
ENE	30								
NE	71								
NNE									

INSTALLATION: GRAND GULF
LOCATION: 25 MI, VICKSBURG. MS

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-416
THERMAL PWR (MWH): 3.05E+07
COMMERCIAL OPERATION: 07/01/85
COOLING WATER SOURCE: MISSISSIPPI RIVER

LICENSEE: SYS ENERGY RESOURCES
LICENSED PWR (MWT): 3.83E+03
NET ELECTRIC PWR (MWH): 9.59E+06
INITIAL CRITICALITY: 08/18/82

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	2.02E+00
CR-51	3.11E-04
MN-54	2.40E-05
CO-58	2.57E-06
FE-59	5.40E-07
CO-60	4.72E-05
KR-85M	6.23E-01
KR-87	1.14E+00
KR-88	6.79E-01
KR-89	8.53E+01
SR-89	3.62E-06
RU-106	1.36E-05
I-131	6.07E-05
I-133	2.95E-04
XE-133	2.85E-02
XE-135	1.08E+00
XE-135M	9.21E-01
CS-137	1.22E-06
XE-138	2.56E+00

TOTAL AIRBORNE TRITIUM RELEASE 3.73E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Hope Creek
Address: Salem, NJ

____ Population Assessment JCL File Name: HOPE
____ Array attached
Latitude: 39 ° 74 ' 23 "
Longitude: 75 ° 28 ' 0 " Pop. File Name: HOPE

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: ILG1058

WBAN: 13791
Header: 1058
Code: ILG
Set No: ____

Temperature: 12 °C
Lid Height: 600 meters
Rainfall: 105 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	59					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Wilmington, DL 5-yr met data ~15 miles N of plant

File Name: HOPE

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											301
NNW										0	3
NW											88
WNW										0	115
W											14
WSW							0		0		
SW											
SSW											14
S										0	
SSE								0			
SE									0		
ESE											124
E										0	
ENE	0										58
NE											7
NNE											

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW	264								
NW	196								
WNW	27								
W	34								
WSW	14								
SW	27								
SSW									
S	20								
SSE	233								
SE	476								
ESE	556								
E	272								
ENE	82								
NE	329								
NNE	33								

INSTALLATION: HOPE CREEK
LOCATION: 18 MI SE WILMINGTON, DE

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR LICENSEE: PUB.SER. E&G OF NJ
DOCKET NO.: 50-354 LICENSED PWR (MWT): 3.29E+03
THERMAL PWR (MWH): 2.22E+07 NET ELECTRIC PWR (MWH): 6.99E+06
COMMERCIAL OPERATION: 12/20/86 INITIAL CRITICALITY: 06/28/86
COOLING WATER SOURCE: DELAWARE RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
KR-83M	1.76E+00
KR-85M	1.76E+00
KR-87	7.05E+00
KR-88	7.05E+00
KR-89	4.76E+01
XE-133	3.52E+00
XE-135	8.88E+00
XE-135M	1.06E+01
XE-137	5.47E+01
XE-138	3.34E+01
TOTAL AIRBORNE TRITIUM RELEASE	1.63E+02

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: James A. Fitzpatrick
Address: Scriba, NY

____ Population Assessment JCL File Name: ____
____ Array attached
Latitude: 43 ° 31 ' 26 "
Longitude: 76 ° 23 ' 57 " Pop. File Name: ____

____ Individual Assessment JCL File Name: ____

Distances (meters):

200	300	400	500	600	800	1,200	1,600	3,200	4,800
6,400	8,000	10,000	15,000	20,000	30,000	40,000	50,000	60,000	80,000

Food Fractions:

	F1	F2	F3
Meat			
Milk			
Veg			

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: ____

WBAN: 14768
Header: 598
Code: ____
Set No: ____

Temperature: 9 °C
Lid Height: 950 meters
Rainfall: 91 cm/yr

		1	2	3	4	5	6
____	STACK Source:						
	Height (m):	117					
	Diameter (m):						
____	AREA Source Diameter (m^2):						
____	BUOYANT cal/sec						
____	MOMENTUM m/s						
X	ENTERED Rise	0	0	0	0	0	0	0 meters
	Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Rochester 10 year met data approximately 65 miles SW of plant.

File Name: FITZPATR

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											
NW											
WNW											
W											
WSW									3		
SW									63	63	84
SSW									33	91	64
S									4	71	64
SSE									89	183	105
SE									41	109	89
ESE								3	60	22	68
E								3	7		
ENE											
NE											
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW									
WNW									
W									
WSW									
SW	139								
SSW	228								
S	45								
SSE	68								
SE	37								
ESE	150								
E									
ENE									
NE									
NNE									

INSTALLATION: JAMES A. FITZPATRICK
LOCATION: 36 MI N SYRACUSE, NY

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-333
THERMAL POWER (MWH): 1.34E+07
COMMERCIAL OPERATION: 07/28/75
COOLING WATER SOURCE: LAKE ONTARIO

LICENSEE: POWER AUTHORITY, STATE OF NY
LICENSED POWER (MWT): 2.44E+03
NET ELECTRIC POWER (MWH): 4.36E+06
INITIAL CRITICALITY: 11/17/74

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	1.34E+01
CR-51	2.28E-03
MN-54	2.26E-04
CO-58	2.42E-04
CO-60	8.45E-04
ZN-65	6.50E-05
KR-85M	4.16E+02
KR-87	1.66E+02
KR-88	5.59E+02
SR-89	5.60E-04
SR-90	4.12E-06
I-131	1.68E-02
XE-131M	1.26E+01
I-133	4.79E-02
XE-133	1.41E+03
XE-133M	5.92E+01
CS-134	4.03E-05
XE-135	1.05E+03
XE-135M	5.17E+01
CS-137	1.14E-04
XE-138	1.50E+02
BA-LA-140	9.44E-04
CE-141	2.21E-07

TOTAL AIRBORNE TRITIUM RELEASE 1.11E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: La Salle 1 & 2
Address: Seneca, IL

____ Population Assessment JCL File Name: LASALLE
____ Array attached
Latitude: 41° 14' 38"
Longitude: 88° 40' 14" Pop. File Name: LASALLE

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.076	.300	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: ORD0454

WBAN: 94846
Header: 452
Code: ____
Set No: ____

Temperature: 10 °C
Lid Height: 950 meters
Rainfall: 85 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	113					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:							

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Met data Chicago/Ohare 60 miles NE of plant

File Name: LASALLE

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									3		
NNW									7	3	14
NW										10	45
WNW									14	3	19
W								3	16	10	19
WSW								3	20	7	7
SW							3		3	9	12
SSW								3	10	7	13
S									3	7	20
SSE									3	9	11
SE									3	7	14
ESE								102		10	14
E								748	40	22	10
ENE									37	39	10
NE									18	10	24
NNE									3		18

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	6								
NNW	30								
NW	55								
WNW	9								
W	9								
WSW	15								
SW	4								
SSW	28								
S	12								
SSE	28								
SE	15								
ESE									
E									
ENE									
NE	284								
NNE	37								

INSTALLATION: LASALLE
LOCATION: 11 MI SE OF OTTAWA, IL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-373
THERMAL PWR (MWH): 1.69E+07
COMMERCIAL OPERATION: 01/01/84
COOLING WATER SOURCE: RESERVOIR

LICENSEE: COMMONWEALTH EDISON
LICENSED PWR (MWT): 3.32E+03
NET ELECTRIC PWR (MWH): 5.44E+06
INITIAL CRITICALITY: 06/21/82

UNIT NUMBER: 2 TYPE: BWR
DOCKET NO.: 50-374
THERMAL PWR (MWH): 1.81E+07
COMMERCIAL OPERATION: 10/19/84
COOLING WATER SOURCE: RESERVOIR

LICENSEE: COMMONWEALTH EDISON
LICENSED PWR (MWT): 3.32E+03
NET ELECTRIC PWR (MWH): 5.66E+06
INITIAL CRITICALITY: 03/10/84

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	8.30E+00
CR-51	9.58E-04
MN-54	7.72E-04
CO-58	1.55E-04
CO-60	3.56E-03
ZN-65	4.25E-05
KR-85	4.60E-02
KR-85M	5.24E+02
KR-87	2.77E-01
KR-88	6.58E+02
SR-89	5.73E-05
MO-99	7.17E-06
I-131	7.81E-03
I-132	2.40E-02
I-133	4.02E-01
XE-133	2.42E+03
I-134	3.11E-03
I-135	3.86E-02
XE-135	1.82E+02
CS-137	1.35E-05
LA-140	1.09E-05

TOTAL AIRBORNE TRITIUM RELEASE 3.15E-03

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: May 1991 Source Category: Reactors

Facility: Limmerick Unit 1
Address: Pottstown, PA

____ Population Assessment JCL File Name: LIMERICK
____ Array attached
Latitude: 40 ° 13 ' 27 "
Longitude: 75 ° 35 ' 15 " Pop. File Name: LIMERICK

____ Individual Assessment JCL File Name: _____

Distances (meters):

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10,000	15,000	20,000	30,000	40,000	50,000	60,000	80,000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.700	.300	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: RDG0184

WBAN: 14712
Header: 184
Code: RDG
Set No: _____

Temperature: 12 °C
Lid Height: 900 meters
Rainfall: 105 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	61					
Diameter (m):						

____ AREA Source
Diameter (m^2): _____

____ BUOYANT cal/sec _____
____ MOMENTUM m/s _____

x ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Readgin 1-year Met Data approximately 15 miles NW of plant

File Name: LIMERICK

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N							63		741	972	431
NNW								38	773	1876	1344
NW							22		313	2034	7244
WNW							44		347	3251	12035
W							40		136	2013	1739
WSW								53	205	612	526
SW							79		208	235	357
SSW							13		701	354	588
S							3		393	380	188
SSE								3	218	327	3058
SE								6	401	153	5263
ESE								31	194	322	291
E							22		163	294	422
ENE							13		63	216	413
NE							50		44	219	363
NNE							50		1182	265	519

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	818								
NNW	1417								
NW	1423								
WNW	3852								
W	1739								
WSW	526								
SW	357								
SSW	588								
S	390								
SSE	1822								
SE	4406								
ESE	629								
E	454								
ENE	247								
NE	300								
NNE	220								

INSTALLATION: LIMERICK
LOCATION: 21 MI NW OF PHILA., PA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR LICENSEE: PHILADELPHIA ELEC.CO
DOCKET NO.: 50-352 LICENSED PWR (MWT): 1.65E+02
THERMAL PWR (MWH): 2.19E+07 NET ELECTRIC PWR (MWH): 6.67E+06
COMMERCIAL OPERATION: 02/01/86 INITIAL CRITICALITY: 12/22/84
COOLING WATER SOURCE: SCHUYLKILL RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
KR-85	1.28E-04
SR-89	4.13E-05
I-131	5.63E-03
I-133	3.68E-03
XE-133	1.07E+02
XE-133M	9.86E-02
XE-135	4.24E+01
XE-135M	2.03E+01
UNIDENTIFIED	5.06E-06
TOTAL AIRBORNE TRITIUM RELEASE	6.40E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Monticello
Address: Monticello, MN

____ Population Assessment JCL File Name: MONTICEL
____ Array attached
Latitude: 45 • 19 ' 59 "
Longitude: 93 • 50 ' 53 " Pop. File Name: MONTICEL

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: TOLO990

WBAN: 14922
Header: 267
Code: ____
Set No: ____

Temperature: 7 °C
Lid Height: 850 meters
Rainfall: 75 cm/yr

		1	2	3	4	5	6
____	STACK Source:						
	Height (m):	100					
	Diameter (m):						
____	AREA Source Diameter (m^2):						
____	BUOYANT cal/sec						
____	MOMENTUM m/s						
X	ENTERED Rise	0	0	0	0	0	0	0 meters
	Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Minneapolis/St. Paul 5-yr ~40 miles SE of Plant

File Name: MONTICEL

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									5		9
NNW										9	9
NW									5	5	17
WNW										13	17
W									5	17	39
WSW								9		22	92
SW										22	78
SSW									13	34	31
S									9	13	34
SSE								5	22	13	22
SE								5	138	1400	304
ESE									9	17	36
E								5	5	5	255
ENE								5	9	17	216
NE										9	13
NNE									5	22	13

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	31								
NNW	309								
NW	27								
WNW	61								
W	31								
WSW	109								
SW	87								
SSW	26								
S	34								
SSE	34								
SE	87								
ESE	31								
E	533								
ENE	312								
NE	17								
NNE	27								

INSTALLATION: MONTICELLO
LOCATION: 23 MI SE ST. CLOUD, MN

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR LICENSEE: NORTHERN STATES PWR
DOCKET NO.: 50-263 LICENSED PWR (MWT): 1.67E+03
THERMAL PWR (MWH): 1.43E+07 NET ELECTRIC PWR (MWH): 4.57E+06
COMMERCIAL OPERATION: 06/30/71 INITIAL CRITICALITY: 12/10/70
COOLING WATER SOURCE: MISSISSIPPI RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
CR-51	4.64E-05
MN-54	1.30E-05
CO-58	8.59E-07
FE-59	4.75E-06
CO-60	2.02E-04
ZN-65	7.56E-07
KR-83M	1.27E+01
KR-85	1.69E+02
KR-85M	1.27E+01
KR-87	6.40E+01
KR-88	4.15E+01
KR-89	1.11E+03
SR-89	1.03E-03
KR-90	3.75E+01
SR-90	5.10E-06
RU-103	4.26E-07
I-131	4.31E-02
XE-131M	8.21E+00
I-133	2.12E-01
XE-133	1.62E+03
XE-133M	7.96E+00
I-135	1.93E-01
XE-135	6.20E+01
XE-135M	8.62E+01
CS-137	6.47E-04
XE-137	1.45E+03
XE-138	1.08E+03
XE-139	1.11E+02
BA-140	3.51E-03
CE-141	1.65E-05

TOTAL AIRBORNE TRITIUM RELEASE 8.16E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: May 1991 Source Category: Reactors

Facility: Nine Mile Point Units 1 and 2
Address: Scriba, NY

____ Population Assessment JCL File Name: NINEMILE
____ Array attached
Latitude: 43 ° 31 ' 19 "
Longitude: 76 ° 24 ' 36 " Pop. File Name: NINEMILE

____ Individual Assessment JCL File Name: ____

Distances (meters):

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10,000	15,000	20,000	30,000	40,000	50,000	60,000	80,000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: ROC0598

WBAN: 14768
Header: 598
Code: ____
Set No: ____

Temperature: 9 °C
Lid Height: 950 meters
Rainfall: 91 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	107					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise 0 0 0 0 0 0 0 meters
Pasquill Category: A B C D E F G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Rochester 10-year Met Data approximately 65 miles SW of plant

File Name: NINEMILE

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											
NW											
WNW											
W											
WSW								3			
SW								3	61	64	129
SSW									18	86	407
S									25	75	263
SSE									25	136	107
SE									111	139	87
ESE									18	50	89
E									18	4	7
ENE											
NE											
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW									
WNW									
W									
WSW									
SW	1490								
SSW	380								
S	68								
SSE	193								
SE	54								
ESE	218								
E	57								
ENE									
NE									
NNE									

INSTALLATION: NINE MILE POINT 1 & 2
LOCATION: 8 MI NE OSWEGO, NY

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1990
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-220
THERMAL POWER (MWH): 0.00E+00
COMMERCIAL OPERATION: 12/01/69
COOLING WATER SOURCE: LAKE ONTARIO

LICENSEE: NIAGARA MOHAWK POWER
LICENSED POWER (MWT): 1.85E+03
NET ELECTRIC POWER (MWH): 0.00E+00
INITIAL CRITICALITY: 09/05/69

UNIT NUMBER: 2 TYPE: BWR
DOCKET NO.: 50-410
THERMAL POWER (MWH): 8.32E+06
COMMERCIAL OPERATION: 04/05/88
COOLING WATER SOURCE: LAKE ONTARIO

LICENSEE: NIAGARA MOHAWK POWER
LICENSED POWER (MWT): 3.32E+03
NET ELECTRIC POWER (MWH): 2.51E+06
INITIAL CRITICALITY: 05/23/87

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	1.30E+01
CR-51	2.29E-03
MN-54	1.86E-04
FE-55	5.77E-04
CO-57	3.00E-04
CO-58	4.28E-05
FE-59	5.13E-05
CO-60	1.24E-03
ZN-65	6.73E-04
SE-75	1.79E-04
KR-85	4.25E-04
KR-85M	4.78E+00
KR-87	2.08E+00
KR-88	7.24E+01
SR-89	4.80E-04
SR-90	2.17E-05
MO-99	2.72E-04
I-131	1.44E-03
I-133	2.29E-02
XE-133	1.25E-05
I-135	1.89E-02
XE-135	1.06E+00
XE-135M	4.13E+00
CS-137	1.68E-04
XE-137	4.20E+01
XE-138	2.40E+01
BA-140/LA-140	9.02E-05

TOTAL AIRBORNE TRITIUM RELEASE 6.34E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Oyster Creek
Address: Toms River, NJ

____ Population Assessment JCL File Name: OYSTER
____ Array attached
Latitude: 39 ° 48' 51"
Longitude: 74 ° 12' 23" Pop. File Name: OYSTER

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: NEL050

WBAN: 14780
Header: 505
Code: .
Set No: ____

Temperature: 12 °C
Lid Height: 600 meters
Rainfall: 107 cm/yr

	1	2	3	4	5	6
____ STACK Source:						
Height (m):	119					
Diameter (m):						
____ AREA Source Diameter (m^2):						
____ BUOYANT cal/sec						
____ MOMENTUM m/s						
x ENTERED Rise	0	0	0	0	0	0	0 meters
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Lakehurst 5-yr met data approx. 15 miles NW of plant

File Name: OYSTER

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									648	2506	710
NNW									85	777	2
NW											51
WNW											
W											
WSW											10
SW									6	1	23
SSW									4	69	426
S								1	387	686	1652
SSE								1	544	480	128
SE								94	688	13	
ESE								94	655		
E									669	71	
ENE									890	970	998
NE								198	514	629	1098
NNE								198	743	1465	995

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	100								
NNW									
NW									
WNW									
W									
WSW	22								
SW	761								
SSW	943								
S	1300								
SSE	6								
SE									
ESE									
E									
ENE									
NE	2018								
NNE	848								

INSTALLATION: OYSTER CREEK
LOCATION: 9 MI S TOMS RIVER, NJ

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-219
THERMAL PWR (MWH): 1.09E+07
COMMERCIAL OPERATION: 12/01/69
COOLING WATER SOURCE: BARNEGAT BAY

LICENSEE: JERSEY CENTRAL P&L
LICENSED PWR (MWT): 1.93E+03
NET ELECTRIC PWR (MWH): 3.54E+06
INITIAL CRITICALITY: 05/03/69

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
ALPHA	1.72E-05
MN-54	5.42E-04
CO-60	1.43E-04
KR-85M	3.40E+02
KR-87	7.72E+02
KR-88	8.86E+02
SR-89	5.40E-03
SR-90	3.13E-05
TC-99M	3.70E-03
I-131	5.28E-02
I-133	2.34E-01
XE-133	9.00E+02
I-135	2.00E-01
XE-135	1.79E+03
XE-135M	1.61E+02
XE-138	2.04E+02
BA-140	5.60E-04
LA-140	2.87E-04

TOTAL AIRBORNE TRITIUM RELEASE 1.25E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: May 1991 Source Category: Reactors

Facility: Peach Bottom Units 2 and 3
Address: Peach Bottom, PA

____ Population Assessment JCL File Name: PEACH
____ Array attached
Latitude: 39 ° 45 ' 32 "
Longitude: 76 ° 16 ' 9 " Pop. File Name: PEACH

____ Individual Assessment JCL File Name: ____

Distances (meters):

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10,000	15,000	20,000	30,000	40,000	50,000	60,000	80,000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: ILG1058

WBAN: 13791
Header: 1058
Code: ILG
Set No: ____

Temperature: 12 °C
Lid Height: 900 meters
Rainfall: 105 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	200					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Wilmington, DL 5-year Met Data approximately 35 miles E of plant

File Name: PEACH

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N										89	16
NNW								35	77	24	19
NW								29	141	176	246
WNW								32	32	13	58
W								6	26	38	80
WSW								3	22	35	138
SW									51	42	744
SSW								3	45	16	42
S								3	29	24	101
SSE								3	6		36
SE											
ESE											35
E										297	43
ENE									26	77	106
NE									6	49	111
NNE									21	24	58

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	37								
NNW	39								
NW	207								
WNW	144								
W	314								
WSW	67								
SW	857								
SSW	83								
S	115								
SSE	389								
SE	50								
ESE	49								
E	80								
ENE	280								
NE	54								
NNE	47								

INSTALLATION: PEACH BOTTOM 2 & 3
LOCATION: 17.9 MI S LANCASTER, PA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1990
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: BWR LICENSEE: PHILADELPHIA ELECTRIC
DOCKET NO.: 50-277 LICENSED POWER (MWT): 3.29E+03
THERMAL POWER (MWH): 0.00E+00 NET ELECTRIC POWER (MWH): 0.00E+00
COMMERCIAL OPERATION: 07/05/74 INITIAL CRITICALITY: 09/16/73
COOLING WATER SOURCE: CONOWINGO POND/SUSQUEHANNA RIVER

UNIT NUMBER: 3 TYPE: BWR LICENSEE: PHILADELPHIA ELECTRIC
DOCKET NO.: 50-278 LICENSED POWER (MWT): 3.29E+03
THERMAL POWER (MWH): 0.00E+00 NET ELECTRIC POWER (MWH): 0.00E+00
COMMERCIAL OPERATION: 12/23/74 INITIAL CRITICALITY: 08/07/74
COOLING WATER SOURCE: CONOWINGO POND/SUSQUEHANNA RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
NA-24	3.27E-05
KR-85M	4.50E+00
RB-88	7.41E-03
RB-89	7.85E-04
SR-89	4.43E-04
SR-90	7.55E-05
Y-91M	1.31E-03
MO-99	1.23E-04
TC-99M	1.64E-04
I-131	6.52E-03
TE-132	6.70E-06
I-133	1.42E-02
XE-133	1.57E+02
XE-135	4.54E+02
XE-135M	1.96E+01
CS-138	5.02E-02
BA-139	6.59E-03

TOTAL AIRBORNE TRITIUM RELEASE 1.94E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Perry Unit 1
Address: Perry, OH

____ Population Assessment JCL File Name: PERRY
____ Array attached
Latitude: 41° 48' 2"
Longitude: 81° 8' 35" Pop. File Name: PERRY

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.700	.300	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: IBG0745

WBAN: 14843 DAYNITE Temperature: 10 °C
Header: 745 Lid Height: 900 meters
Code: ____ Rainfall: 90 cm/yr
Set No: ____

____ STACK Source:

	1	2	3	4	5	6
Height (m):	41					
Diameter (m):						

____ AREA Source
Diameter (m²):

____ BUOYANT cal/sec
____ MOMENTUM m/s

x ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:	A	B	C	D	E	F	G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Perry 1-yr near plant
NOTE DAYNITE!!

File Name: Perry

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											
NW											
WNW											
W											
WSW								3			
SW									66	133	580
SSW								3	60	605	332
S								3	83	392	465
SSE								3	440	751	416
SE									416	489	218
ESE									230	187	199
E									121	339	221
ENE								3	302	199	404
NE								3			
NNE											

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW									
WNW									
W									
WSW	540								
SW	1033								
SSW	556								
S	489								
SSE	290								
SE	221								
ESE	501								
E	223								
ENE	1430								
NE									
NNE									

INSTALLATION: PERRY
LOCATION: 7 MI NE OF PAINESVILLE, OHIO

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
LICENSEE: CLEVELAND ELEC ILLUMINATING CO
DOCKET NO.: 50-440
LICENSED PWR (MWT): 3.58E+03
THERMAL PWR (MWH): 2.23E+07
NET ELECTRIC PWR (MWH): 7.23E+06
COMMERCIAL OPERATION: 11/18/87
INITIAL CRITICALITY: 06/06/86
COOLING WATER SOURCE: LAKE ERIE

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
AR-41	1.03E+00
KR-85M	5.26E+01
KR-87	2.84E+00
KR-88	1.77E+01
SR-89	9.03E-04
SR-90	1.35E-04
I-131	4.51E-02
XE-131M	2.66E+00
I-132	6.64E-05
I-133	3.35E-02
XE-133	7.88E+02
XE-133M	1.46E+01
I-135	4.93E-04
XE-135	2.49E+02
XE-135M	1.18E+02
XE-137	7.97E-01
XE-138	6.68E+00
TOTAL AIRBORNE TRITIUM RELEASE	4.71E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: May 1991 Source Category: Reactors

Facility: Pilgrim
Address: Plymouth

____ Population Assessment JCL File Name: PILGRIM
____ Array attached
Latitude: 41° 56' 39"
Longitude: 70° 34' 45" Pop. File Name: PILGRIM

____ Individual Assessment JCL File Name: ____

Distances (meters):

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10,000	15,000	20,000	30,000	40,000	50,000	60,000	80,000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: NZW1144

WBAN: 14790
Header: 1144
Code: NZW
Set No: ____

Temperature: 11 °C
Lid Height: 600 meters
Rainfall: 111 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	108					
Diameter (m):						

____ AREA Source
Diameter (m^2): ____

____ BUOYANT cal/sec ____
____ MOMENTUM m/s ____

X ENTERED Rise 0 0 0 0 0 0 0 meters
Pasquill Category: A B C D E F G

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: South Weymouth 5-year Met Data approximately 25 miles NNW of plant.

File Name: PILGRIM

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N											
NNW											
NW											
WNW						43					
W								163	18	64	1296
WSW								24	204	997	403
SW									50	144	50
SSW										20	
S											9
SSE									278	184	181
SE						236			534	513	902
ESE								53	564	234	
E											
ENE											
NE											
NNE											

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW									
WNW	0								
W	7040								
WSW	213								
SW	145								
SSW									
S									
SSE	41								
SE	460								
ESE									
E									
ENE									
NE									
NNE									

INSTALLATION: PILGRIM
LOCATION: 25 MI SE BOSTON, MA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1985
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
DOCKET NO.: 50-293
THERMAL POWER (MWH): 0.00E+00
COMMERCIAL OPERATION: 12/01/72
COOLING WATER SOURCE: CAPE COD BAY

LICENSEE: BOSTON EDISON
LICENSED POWER (MWT): 2.00E+03
NET ELECTRIC POWER (MWH): 0.00E+00
INITIAL CRITICALITY: 06/16/72

AIRBORNE EFFLUENTS NUCLIDES RELEASED	ACTIVITY (CI)
CR-51	1.07E-06
MN-54	5.08E-05
CO-60	1.58E-03
KR-85	2.96E-02
KR-85M	5.10E+02
KR-87	1.86E+02
KR-88	6.54E+02
SR-89	1.29E-03
SR-90	6.91E-06
I-131	4.80E-02
I-133	2.32E-01
XE-133	1.50E+03
XE-133M	9.73E+00
CS-134	6.98E-06
I-135	1.87E-01
XE-135	2.05E+02
XE-135M	5.31E+00
CS-137	6.65E-04
XE-138	2.73E+01
BA-140/LA-140	5.11E-03
CE-141	6.21E-05
TOTAL AIRBORNE TRITIUM RELEASE	6.50E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Quad Cities 1 & 2
Address: Cordova, IL

____ Population Assessment JCL File Name: QUAD
____ Array attached
Latitude: 41° 43' 33"
Longitude: 90° 18' 35" Pop. File Name: QUAD

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.442	.558	.000
Milk	.399	.601	.000
Veg	.700	.300	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: MLI0269

WBAN: 14923
Header: 269
Code: MLI
Set No: ____

Temperature: 10 °C
Lid Height: 950 meters
Rainfall: 89 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	94					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:							

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Moline/Quad City 5-yr 20 miles SSW of plant

File Name: QUAD

	Distances										
	200	300	400	500	600	800	1200	1600	3200	4800	6400
N							14		45	10	5
NNW										5	10
NW										5	10
WNW										30	35
W										10	10
WSW										10	50
SW										20	75
SSW									5	25	210
S									10	50	100
SSE								25	25	30	551
SE								10	10	5	80
ESE										3	10
E										2	10
ENE								2	5	10	5
NE								2	15	10	5
NNE								2	25	10	40

	Distances								
	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	320								
NNW	50								
NW	50								
WNW	100								
W	230								
WSW	60								
SW	90								
SSW	681								
S	210								
SSE	40								
SE	10								
ESE	5								
E	10								
ENE	210								
NE	320								
NNE	2205								

INSTALLATION: QUAD-CITIES
LOCATION: 20 MI NE MOLINE, IL

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR LICENSEE: COMMONWEALTH ED & IOWA-ILLINOIS G&E
DOCKET NO.: 50-265 LICENSED PWR (MWT): 2.51E+03
THERMAL PWR (MWH): 1.83E+07 NET ELECTRIC PWR (MWH): 5.66E+06
COMMERCIAL OPERATION: 02/18/73 INITIAL CRITICALITY: 10/18/71
COOLING WATER SOURCE: MISSISSIPPI RIVER

UNIT NUMBER: 2 TYPE: BWR LICENSEE: COMMONWEALTH ED&IOWA-ILLINOIS GAS&ELEC
DOCKET NO.: 50-265 LICENSED PWR (MWT): 2.51E+03
THERMAL PWR (MWH): 1.36E+07 NET ELECTRIC PWR (MWH): 4.18E+06
COMMERCIAL OPERATION: 03/10/73 INITIAL CRITICALITY: 04/26/72
COOLING WATER SOURCE: MISSISSIPPI RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
CR-51	2.53E-03
MN-54	4.18E-04
CO-58	1.51E-04
CO-60	6.78E-03
ZN-65	3.06E-05
KR-88	1.69E+00
SR-89	3.85E-04
SR-90	3.70E-06
MO-99	1.82E-03
AG-110M	9.59E-06
I-131	6.07E-03
I-133	3.56E-02
XE-133	1.72E+00
I-135	9.14E-02
XE-135	3.56E-01
CS-137	7.75E-04
BA-140	2.91E-04
LA-140	9.70E-04
HF-181	8.76E-06

TOTAL AIRBORNE TRITIUM RELEASE 4.50E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: River Bend
Address: St, Francisvile, LA

____ Population Assessment JCL File Name: RIVER
____ Array attached
Latitude: 30 ° 45 ' 25 "
Longitude: 91 ° 19 ' 54 " Pop. File Name: RIVER

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.000	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: BTRO166

WBAN: 13970
Header: 166
Code: ____
Set No: ____

Temperature: 20 °C
Lid Height: 900 meters
Rainfall: 152 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	59					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	0	0	0	0	0	0	0	meters
Pasquill Category:	A	B	C	D	E	F	G	

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Baton Rouge 10-yr met data ~25 miles SSE of plant

File Name: RIVER

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									91	11	28
NNW									40	170	9
NW								4	21	150	45
WNW								16	68	33	735
W								12	6	51	588
WSW											
SW										13	
SSW											
S											
SSE								4	3		
SE										25	
ESE										16	15
E									3	11	21
ENE									11	6	40
NE									42	12	12
NNE								9	37	16	

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	16								
NNW	163								
NW	16								
WNW	104								
W	231								
WSW	14								
SW									
SSW									
S	26								
SSE									
SE									
ESE	10								
E	61								
ENE	10								
NE	49								
NNE	28								

INSTALLATION: RIVER BEND
LOCATION: 24 MI NNW OF BATON ROUGE, LA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR LICENSEE: GULF STATES UTILITIES
DOCKET NO.: 50-458 LICENSED PWR (MWT): 2.89E+03
THERMAL PWR (MWH): 2.25E+07 NET ELECTRIC PWR (MWH): 7.25E+06
COMMERCIAL OPERATION: 06/16/86 INITIAL CRITICALITY: 10/31/85
COOLING WATER SOURCE: MISSISSIPPI RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
MN-54	3.09E-04
CO-58	6.72E-06
CO-60	3.89E-05
SR-89	1.47E-05
I-131	4.78E-04
I-133	4.76E-03
XE-135	2.05E+00
TOTAL AIRBORNE TRITIUM RELEASE	2.88E+00

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Susquehanna 1 & 2
Address: Berwick, PA

____ Population Assessment JCL File Name: SUSQUEHA
____ Array attached
Latitude: 41° 5' 59"
Longitude: 76° 9' 0" Pop. File Name: SUSQUEHA

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
~~6400~~	~~8000~~	~~10000~~	~~15000~~	~~20000~~	~~30000~~	~~40000~~	~~50000~~	~~60000~~	~~80000~~

Food Fractions:

	F1	F2	F3
Meat	.008	.922	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: AVP0499

WBAN: 14777
Header: 499
Code: AVP
Set No: ____

Temperature: 12 °C
Lid Height: 900 meters
Rainfall: 105 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	60					
Diameter (m):						

____ AREA Source
Diameter (m^2):

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	A	B	C	D	E	F	G
Pasquill Category:	0	0	0	0	0	0	0

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Wilkes-Barre 5-yr met data 20 miles NE of plant

File Name: SUSQUENA

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								40	15	49	1159
NNW							20		19	15	
NW								16	73	94	
WNW							12		42	45	103
W								4	31	60	96
WSW								4	61	340	116
SW								4	15	344	93
SSW								4	249	45	86
S								36	150	30	142
SSE							40		157	38	93
SE						44			249	151	149
ESE							24		27	64	182
E									57	23	43
ENE									15	38	70
NE										166	199
NNE									17	30	

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	2215								
NNW	23								
NW	97								
WNW	267								
W	187								
WSW	4181								
SW	1560								
SSW	123								
S	10								
SSE	47								
SE	13								
ESE	177								
E	79								
ENE	97								
NE	379								
NNE									

INSTALLATION: SUSQUEHANNA
LOCATION: 7 MI NE OF BERWICK, PA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR LICENSEE: PENNSYLVANIA P&L
DOCKET NO.: 50-387 LICENSED PWR (MWT): 3.29E+03
THERMAL PWR (MWH): 2.65E+07 NET ELECTRIC PWR (MWH): 8.41E+06
COMMERCIAL OPERATION: 06/08/83 INITIAL CRITICALITY: 09/10/82
COOLING WATER SOURCE: SUSQUEHANNNA RIVER

UNIT NUMBER: 2 TYPE: BWR LICENSEE: PENNSYLVANIA P&L
DOCKET NO.: 50-388 LICENSED PWR (MWT): 3.29E+03
THERMAL PWR (MWH): 1.87E+07 NET ELECTRIC PWR (MWH): 5.90E+06
COMMERCIAL OPERATION: 02/12/85 INITIAL CRITICALITY: 05/08/84
COOLING WATER SOURCE: SUSQUEHANNNA RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
CR-51	7.37E-04
MN-54	2.74E-04
CO-58	3.95E-05
CO-60	5.50E-05
SR-89	7.81E-07
I-131	7.07E-04
XE-133	7.25E+01

TOTAL AIRBORNE TRITIUM RELEASE 2.05E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Vermont Yankee
Address: Vernon, VT

____ Population Assessment JCL File Name: VERMONT
____ Array attached
Latitude: 42° 46 49"
Longitude: 72° 30 56" Pop. File Name: VERMONT

____ Individual Assessment JCL File Name: _____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: CEF0182

WBAN: 14703
Header: 182
Code: CEF
Set No: _____

Temperature: 20 °C
Lid Height: 1000 meters
Rainfall: 100 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	94					
Diameter (m):						

____ AREA Source
Diameter (m^2): _____

____ BUOYANT cal/sec
____ MOMENTUM m/s

X ENTERED Rise

	1	2	3	4	5	6	7
	0	0	0	0	0	0	0
Pasquill Category:	A	B	C	D	E	F	G

meters

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Chicopee Falls/Westover 5-yr met data 45 miles off plant

File Name: VERMONT

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N									31	104	224
NNW									31	212	104
NW								11	31	15	175
WNW								59	31	31	31
W							3			108	6
WSW							6		6	21	46
SW							42		31	6	46
SSW							7		36	6	21
S							3		92	139	21
SSE									73	21	71
SE									73	62	130
ESE									15	10	31
E								165	335	211	139
ENE								236	731	288	10
NE								11	36	98	6
NNE									15	36	52

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N	42								
NNW	2600								
NW	324								
WNW	139								
W	114								
WSW	36								
SW	91								
SSW	6								
S	21								
SSE	87								
SE	242								
ESE	15								
E	472								
ENE	25								
NE	21								
NNE									

INSTALLATION: VERMONT YANKEE
LOCATION: 5 MI S BRATTLEBORO, VT

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 1 TYPE: BWR
LICENSEE: VERMONT YANKEE NUC. PWR
DOCKET NO.: 50-271
LICENSED PWR (MWT): 1.59E+03
THERMAL PWR (MWH): 1.30E+07
NET ELECTRIC PWR (MWH): 4.11E+06
COMMERCIAL OPERATION: 11/30/72
INITIAL CRITICALITY: 03/24/72
COOLING WATER SOURCE: CONNECTICUT RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
MN-54	9.82E-05
CO-58	9.78E-07
CO-60	2.54E-03
ZN-65	7.99E-05
SR-89	1.12E-04
SR-90	4.61E-06
I-131	3.47E-03
I-133	4.97E-03
CS-134	2.78E-05
CS-137	2.21E-04

TOTAL AIRBORNE TRITIUM RELEASE 4.39E+01

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

CAP-88 INFORMATION SHEET

Date: April 1991 Source Category: Reactors

Facility: Washington Nuclear Project #2
Address: Richland, WA

____ Population Assessment JCL File Name: WPN2
____ Array attached
Latitude: 46° 16' 59"
Longitude: 119° 17' 29" Pop. File Name: WPN2

____ Individual Assessment JCL File Name: ____

Distances (meters)

200	300	400	500	600	800	1200	1600	3200	4800
6400	8000	10000	15000	20000	30000	40000	50000	60000	80000

Food Fractions:

	F1	F2	F3
Meat	.008	.992	.000
Milk	.000	1.00	.000
Veg	.076	.924	.000

____ Urban
____ Rural

WEATHER DATA:
____ Array attached STAR File Name: YKM0484

WBAN: 24243
Header: 484
Code: YKM
Set No: ____

Temperature: 9 °C
Lid Height: 1100 meters
Rainfall: 42 cm/yr

____ STACK Source:

	1	2	3	4	5	6
Height (m):	70					
Diameter (m):						

____ AREA Source
Diameter (m²):

____ BUOYANT cal/sec
____ MOMENTUM m/s

x ENTERED Rise

	A	B	C	D	E	F	G
Rise (meters)	0	0	0	0	0	0	0
Pasquill Category:							

Nuclide	Class	Diam	Ci/yr:					

COMMENTS: Yakima 5-yr met data 25 miles E of plant

File Name: WNP2

Distances

	200	300	400	500	600	800	1200	1600	3200	4800	6400
N								0	0		
NNW							0				
NW			0				0				
WNW										0	0
W							0				0
WSW									0		
SW											
SSW						0		0			
S								0		0	0
SSE									0	0	0
SE							0		0	0	
ESE								0	0		
E											0
ENE							0				20
NE				0				0	0		
NNE									0	0	

Distances

	8000	10000	15000	20000	30000	40000	50000	60000	80000
N									
NNW									
NW	0								
WNW									
W									
WSW									
SW	4								
SSW	140								
S	12								
SSE	36								
SE	24								
ESE	52								
E	96								
ENE	96								
NE	4								
NNE									

INSTALLATION: WNP-2
LOCATION: 12 MI NW OF RICHLAND, WA

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT FOR YEAR 1988
AIRBORNE EFFLUENTS

UNIT NUMBER: 2 TYPE: BWR LICENSEE: WASHINGTON PUBLIC PWR SUPPLY SYSTEM
DOCKET NO.: 50-397 LICENSED PWR (MWT): 3.32E+03
THERMAL PWR (MWH): 2.06E+07 NET ELECTRIC PWR (MWH): 6.54E+06
COMMERCIAL OPERATION: 12/13/84 INITIAL CRITICALITY: 01/19/84
COOLING WATER SOURCE: COLUMBIA RIVER

AIRBORNE EFFLUENTS

NUCLIDES RELEASED	ACTIVITY (CI)
NA-24	2.87E-03
AR-41	6.18E-01
CR-51	1.54E-02
MN-54	7.00E-04
MN-56	9.30E-04
CO-58	2.73E-03
CO-60	6.81E-03
CU-64	1.44E-02
ZN-65	4.27E-02
ZN-69M	7.06E-04
AS-76	4.80E-05
BR-82	1.99E-05
KR-85	3.40E-02
KR-85M	4.39E+01
KR-87	1.66E+01
KR-88	5.20E+01
SR-89	8.81E-05
SR-90	1.88E-06
ZR-NB-95	1.31E-04
MO-99	1.20E-03
TC-99M	8.87E-03
AG-110M	4.20E-06
I-131	9.00E-02
XE-131M	6.23E+00
I-132	6.74E-03
I-133	4.02E-02
XE-133	5.64E+02
XE-133M	4.00E+01
CS-134	4.50E-04
I-135	1.36E-03
XE-135	1.15E+02
XE-135M	4.51E+01
CS-137	2.80E-04
CS-138	2.49E-01
XE-138	1.65E+01
BA-139	1.00E-02

TOTAL AIRBORNE TRITIUM RELEASE 8.59E+00

INSTALLATION: WNP-2

N/A=NOT APPLICABLE
N/D=NOT DETECTED
N/R=NOT REPORTED

APPENDIX D

LISTS OF NUCLEAR POWER PLANTS

TABLE D-1: NUCLEAR POWER PLANTS IN THE UNITED STATES

No.	UTILITY/UNIT	CITY	STATE	NET MWe	TYPE	% COMPL (1)	INIT CRIT DATE	COMM START DATE
	ALABAMA POWER CO.							
1	* Farley 1, Joseph M.	Dothan	Ala.	824	PWR	100	08/1977	12/1977
2	* Farley 2, Joseph M.	Dothan	Ala.	828	PWR	100	05/1981	07/1981
	ARIZONA PUBLIC SERVICE CO.							
3	* Palo Verde 1	Wintersburg	Ariz.	1221	PWR	100	05/1985	01/1986
4	* Palo Verde 2	Wintersburg	Ariz.	1221	PWR	100	04/1986	09/1986
5	* Palo Verde 3	Wintersburg	Ariz.	1221	PWR	100	10/1987	01/1988
	BALTIMORE GAS & ELECTRIC CO.							
6	* Calvert Cliffs 1	Lusby	Md.	825	PWR	100	10/1974	05/1975
7	* Calvert Cliffs 2	Lusby	Md.	825	PWR	100	11/1976	04/1977
	BOSTON EDISON CO.							
8	* Pilgrim	Plymouth	Mass.	670	BWR	100	06/1972	12/1972
	CAROLINA POWER & LIGHT CO.							
9	* Brunswick 1	Southport	N.C.	790	BWR	100	10/1976	03/1977
10	* Brunswick 2	Southport	N.C.	790	BWR	100	03/1975	11/1975
11	* Robinson 2	Hartsville	N.C.	665	PWR	100	09/1970	03/1971
12	* Shearon Harris	New Hill	N.C.	860	PWR	100	01/1987	05/1987
	THE CLEVELAND ELECTRIC ILLUMINATING CO.							
13	* Perry 1	North Perry	Ohio	1141	BWR	100	06/1986	11/1987
14	Perry 2	North Perry	Ohio	1205	BWR	57	Indefinite	
	COMMONWEALTH EDISON CO.							
15	* Braidwood 1	Braidwood	Ill.	1120	PWR	100	05/1987	07/1988
16	* Braidwood 2	Braidwood	Ill.	1120	PWR	100	03/1988	10/1988
17	* Byron 1	Byron	Ill.	1105	PWR	100	02/1985	09/1985
18	* Byron 2	Byron	Ill.	1105	PWR	100	01/1987	08/1987
19	* Dresden 2	Morris	Ill.	772	BWR	100	01/1970	06/1970
20	* Dresden 3	Morris	Ill.	772	BWR	100	01/1971	11/1971
21	* LaSalle County 1	Seneca	Ill.	1036	BWR	100	06/1982	01/1984
22	* LaSalle County 2	Seneca	Ill.	1036	BWR	100	03/1984	10/1984
23	* Quad Cities 1	Cordova	Ill.	769	BWR	100	10/1971	03/1973
24	* Quad Cities 2	Cordova	Ill.	769	BWR	100	04/1972	03/1973
25	* Zion 1	Zion	Ill.	1040	PWR	100	06/1973	12/1973
26	* Zion 2	Zion	Ill.	1040	PWR	100	12/1973	09/1974
	CONNECTICUT YANKEE ATOMIC POWER CO.							
27	* Haddam Neck	Haddam Neck	Conn.	565	PWR	100	07/1967	01/1968
	CONSOLIDATED EDISON CO.							
28	* Indian Point 2	Indian Point	N.Y.	970	PWR	100	05/1973	08/1974

TABLE D-1: NUCLEAR POWER PLANTS IN THE UNITED STATES (Continued)

No.	UTILITY/UNIT	CITY	STATE	NET MWe	TYPE	% COMPL (1)	INIT CRIT DATE	COMM START DATE
	CONSUMERS POWER CO.							
29	* Big Rock Point	Charlevoix	Mich.	67	BWR	100	09/1962	03/1963
30	* Palisades	South Haven	Mich.	768	PWR	100	05/1971	12/1971
	DETROIT EDISON CO.							
31	* Fermi 2	Newport	Mich.	1075	BWR	100	06/1985	01/1988
	DUKE POWER CO.							
32	* Catawba 1	Clover	S.C.	1129	PWR	100	01/1985	06/1985
33	* Catawba 2	Clover	S.C.	1129	PWR	100	05/1986	08/1986
34	* McQuire 1	Cornelius	N.C.	1129	PWR	100	08/1981	12/1981
35	* McQuire 2	Cornelius	N.C.	1129	PWR	100	05/1983	03/1984
36	* Oconee 1	Seneca	S.C.	846	PWR	100	04/1973	07/1973
37	* Oconee 2	Seneca	S.C.	846	PWR	100	11/1973	09/1974
38	* Oconee 3	Seneca	S.C.	846	PWR	100	09/1974	12/1974
	DUQUESNE LIGHT CO.							
39	* Beaver Valley 1	Shippingport	Pa.	810	PWR	100	05/1976	10/1976
40	* Beaver Valley 2	Shippingport	Pa.	830	PWR	100	08/1987	
	ENTERGY OPERATIONS, INC.							
41	* Arkansas Nuclear One 1	Russellville	Ark.	836	PWR	100	08/1974	12/1974
42	* Arkansas Nuclear One 2	Russellville	Ark.	858	PWR	100	12/1978	03/1980
43	* Grand Gulf	Port Gibson	Miss.	1142	BWR	100	08/1982	07/1985
44	* Waterford 3	Taft	La.	1075	PWR	100	03/1985	09/1985
	FLORIDA POWER & LIGHT CO.							
45	* St. Lucie 1	Hutchinson Island	Fla.	839	PWR	100	04/1976	12/1976
46	* St. Lucie 2	Hutchinson Island	Fla.	839	PWR	100	06/1983	08/1983
47	* Turkey Point 3	Florida City	Fla.	666	PWR	100	10/1972	12/1972
48	* Turkey Point 4	Florida City	Fla.	666	PWR	100	06/1973	09/1973
	FLORIDA POWER CORP.							
49	* Crystal River 3	Red Level	Fla.	821	PWR	100	01/1977	03/1977
	GEORGIA POWER CO.							
50	* Hatch 1, Edwin I.	Baxley	Ga.	753	BWR	100	09/1975	12/1975
51	* Hatch 2, Edwin I.	Baxley	Ga.	766	BWR	100	07/1978	09/1979
52	* Vogtle 1, Alvin W.	Waynesboro	Ga.	1079	PWR	100	03/1987	06/1987
53	* Vogtle 2, Alvin W.	Waynesboro	Ga.	1100	PWR	100	03/1989	05/1989
	GPU NUCLEAR CORP.							
54	* Oyster Creek	Forked River	N.J.	620	BWR	100	05/1969	12/1969
55	* Three Mile Island 1	Londonderry Twp.	Pa.	808	PWR	100	06/1974	09/1974
	GULF STATES UTILITIES CO.							
56	* River Bend	St. Francesville	La.	936	BWR	100	10/1985	06/1986

TABLE D-1: NUCLEAR POWER PLANTS IN THE UNITED STATES (Continued)

No.	UTILITY/UNIT	CITY	STATE	NET MWe	TYPE	% COMPL (1)	INIT CRIT DATE	COMM START DATE
	HOUSTON LIGHTING & POWER CO.							
57	* South Texas Project 1	Palacios	Tex.	1250	PWR	100	03/1988	08/1988
58	* South Texas Project 2	Palacios	Tex.	1250	PWR	100	03/1989	06/1989
	ILLINOIS POWER CO.							
59	* Clinton	Clinton	Ill.	930	BWR	100	02/1987	04/1987
	INDIANA/MICHIGAN POWER CO.							
60	* Cook 1, Donald C.	Bridgman	Mich.	1020	PWR	100	01/1975	08/1975
61	* Cook 2, Donald C.	Bridgman	Mich.	1060	PWR	100	03/1978	07/1978
	IOWA ELECTRIC LIGHT & POWER CO.							
62	* Duane Arnold	Palo	Iowa	538	BWR	100	03/1974	02/1975
	MAINE YANKEE ATOMIC POWER CO.							
63	* Maine Yankee	Wiscasset	Me.	830	PWR	100	10/1972	12/1972
	NEBRASKA PUBLIC POWER DISTRICT							
64	* Cooper	Brownville	Neb.	764	BWR	100	02/1974	07/1974
	NEW HAMPSHIRE YANKEE							
65	Seabrook	Seabrook	N.H.	1150	PWR	100	06/1989	1990
	NEW YORK POWER AUTHORITY							
66	* Fitzpatrick, James A.	Scriba	N.Y.	757	BWR	100	11/1974	07/1975
67	* Indian Point 3	Indian Point	N.Y.	965	PWR	100	04/1976	08/1976
	NIAGARA MOHAWK POWER CO.							
68	* Nine Mile Point 1	Scriba	N.Y.	610	BWR	100	09/1969	12/1969
69	* Nine Mile Point 2	Scriba	N.Y.	1072	BWR	100	05/1987	04/1988
	NORTHEAST UTILITIES							
70	* Millstone 1	Waterford	Conn.	654	BWR	100	10/1970	06/1971
71	* Millstone 2	Waterford	Conn.	863	PWR	100	10/1975	12/1975
72	* Millstone 3	Waterford	Conn.	1142	PWR	100	01/1986	04/1986
	NORTHERN STATES POWER CO.							
73	* Monticello	Monticello	Minn.	536	BWR	100	12/1970	06/1971
74	* Prairie Island 1	Red Wing	Minn.	503	PWR	100	12/1973	12/1973
75	* Prairie Island 2	Red Wing	Minn.	500	PWR	100	12/1974	12/1974
	OMAHA PUBLIC POWER DISTRICT							
76	* Fort Calhoun	Fort Calhoun	Neb.	478	PWR	100	08/1973	06/1974
	PACIFIC GAS & ELECTRIC CO.							
77	* Diablo Canyon 1	Avila Beach	Cal.	1073	PWR	100	04/1984	05/1985

TABLE D-1: NUCLEAR POWER PLANTS IN THE UNITED STATES (Continued)

No.	UTILITY/UNIT	CITY	STATE	NET MWe	TYPE	% COMPL (1)	INIT CRIT DATE	COMM START DATE
78	* Diablo Canyon 2	Avila Beach	Cal.	1087	PWR	100	08/1985	03/1986
	PENNSYLVANNIA POWER & LIGHT CO.							
79	* Susquehanna 1	Berwick	Pa.	1032	BWR	100	09/1983	06/1983
80	* Susquehanna 2	Berwick	Pa.	1038	BWR	100	05/1984	02/1985
	PHILADELPHIA ELECTRIC CO.							
81	* Limerick 1	Pottstown	Pa.	1055	BWR	100	12/1984	02/1986
82	* Limerick 2	Pottstown	Pa.	1055	BWR	100	08/1989	02/1990
83	* Peach Bottom 2	Peach Bottom	Pa.	1051	BWR	100	09/1973	07/1974
84	* Peach Bottom 3	Peach Bottom	Pa.	1035	BWR	100	08/1974	12/1974
	PORTLAND GENERAL ELECTRIC CO.							
85	* Trojan	Prescott	Ore.	1095	PWR	100	12/1975	05/1976
	PUBLIC SERVICE ELECTRIC & GAS CO.							
86	* Hope Creek	Salem	N.J.	1031	BWR	100	06/1986	12/1986
87	* Salem 1	Salem	N.J.	1106	PWR	100	12/1976	06/1977
88	* Salem 2	Salem	N.J.	1106	PWR	100	08/1980	10/1981
	ROCHESTER GAS & ELECTRIC CORP.							
89	* Ginna, R. E.	Ontario	N.Y.	470	PWR	100	11/1969	07/1970
	SOUTH CAROLINA ELECTRIC & GAS CO.							
90	* Summer, Virgil C.	Parr	S.C.	885	PWR	100	10/1982	01/1984
	SOUTHERN CALIFIRNIA EDISON & SAN DIEGO GAS & ELECTRIC CO.							
91	* San Onofre 1	San Clemente	Cal.	436	PWR	100	06/1967	01/1968
92	* San Onofre 2	San Clemente	Cal.	1070	PWR	100	07/1982	08/1983
93	* San Onofre 3	San Clemente	Cal.	1080	PWR	100	08/1983	04/1984
	TENNESSEE VALLEY AUTHORITY							
94	Bellefonte 1	Scottsboro	Ala.	1213	PWR	89	Indefinite	
95	Bellefonte 2	Scottsboro	Ala.	1213	PWR	58	Indefinite	
96	* Browns Ferry 1	Decatur	Ala.	1065	BWR	100	08/1973	08/1974
97	* Browns Ferry 2	Decatur	Ala.	1065	BWR	100	07/1974	03/1975
98	* Browns Ferry 3	Decatur	Ala.	1065	BWR	100	08/1976	03/1977
99	* Sequoyah 1	Soddy-Daisy	Tenn.	1148	PWR	100	07/1980	07/1981
100	* Sequoyah 2	Soddy-Daisy	Tenn.	1148	PWR	100	11/1981	06/1982
101	Watts Bar 1	Spring City	Tenn.	1177	PWR	100		06/1992
102	Watts Bar 2	Spring City	Tenn.	1177	PWR	85	Indefinite	
	TEXAS UTILITIES ELECTRIC CO.							
103	Comanche Peak 1	Glen Rose	Tx.	1150	PWR	100	04/1990	1990
104	Comanche Peak 2	Glen Rose	Tx.	1150	PWR	86		1992

TABLE D-1: NUCLEAR POWER PLANTS IN THE UNITED STATES (Continued)

No.	UTILITY/UNIT	CITY	STATE	NET MWe	TYPE	% COMPL (1)	INIT CRIT DATE	COMM START DATE
	TOLEDO EDISON CO.							
105	* Davis-Besse	Oak Harbor	Ohio	874	PWR	100	08/1977	07/1978
	UNION ELECTRIC CO.							
106	* Calloway	Fulton	Mo.	1125	PWR	100	10/1984	12/1984
	VERMONT YANKEE NUCLEAR POWER CO.							
107	Vermont Yankee	Vernon	Vt.	504	BWR	100	03/1972	11/1972
	VIRGINIA POWER CO.							
108	* North Anna 1	Mineral	Va.	915	PWR	100	04/1978	06/1978
109	* North Anna 2	Mineral	Va.	915	PWR	100	06/1980	12/1980
110	* Surry 1	Gravel Neck	Va.	781	PWR	100	07/1972	12/1972
111	* Surry 2	Gravel Neck	Va.	781	PWR	100	03/1973	05/1973
	WASHINGTON PUBLIC POWER SUPPLY SYSTEM							
112	WNP-1	Richland	Wash.	1250	PWR	65	Indefinite	
113	* WNP-2	Richland	Wash.	1095	BWR	100	01/1984	12/1984
114	WNP-3	Richland	Wash.	1240	PWR	75	Indefinite	
	WISCONSIN ELECTRIC POWER CO.							
115	* Point Beach 1	Two Rivers	Wis.	485	PWR	100	11/1970	12/1970
116	* Point Beach 2	Two Rivers	Wis.	485	PWR	100	05/1972	10/1972
	WISCONSIN PUBLIC SERVICE CORP.							
117	* Kewaunee	Carlton	Wis.	503	PWR	100	03/1974	06/1974
	WOLF CREEK NUCLEAR OPERATING CORP.							
118	* Wolf Creek	Burlington	Kans.	1135	PWR	100	05/1985	09/1985
	YANKEE ATOMIC ELECTRIC CO.							
119	* Yankee	Rowe	Mass.	167	PWR	100	08/1960	07/1961

* Units in Commercial Operation

(1) As of August 1990

TABLE D-2: NUCLEAR POWER PLANTS NO LONGER IN SERVICE

NAME	LOCATION	NET MWt	TYPE	LICENSE ISSUED	SHUTDOWN
BONUS	Rincon, PR	50	BWR	4/64	6/68
CVTR	Parr, SC	65	PTHW	11/62	1/67
Dresden 1	Morris, Ill	700	BWR	9/59	10/78
Elk River	Elk River, Mn	58	BWR	11/62	2/68
Fermi 1	Monroe, Mi	200	SCF	5/63	11/72
Fort St. Vrain	Platteville, Co	842	HTGR	12/73	8/89
Hallam	Hallem, Ne	256	SCGM	1/62	9/64
Humboldt Bay 3	Eureka, Ca	200	BWR	8/62	7/76
Indian Point 1	Buchanan, NY	615	PWR	3/62	10/74
LaCrosse	Genoa, Wi	165	BWR	7/67	4/87
Pathfinder	Sioux Falls, SD	190	BWR	3/64	10/67
Peach Bottom 1	Peach Bottom, PA	115	HTGR	1/66	11/74
Piqua	Piqua, Oh	46	OCM	8/62	1/66
Rancho Seco	Clay Station, Ca	913	PWR	4/75	6/89
Shippingport	Shippingport, Pa	60	PWR/ LWBR	12/57	10/82
Shoreham	Brookhaven, NY	809	BWR	----*	5/89
Three Mile Island 2	Londonderry Twp, Pa	792	PWR	12/78	3/79
VBWR	Pleasanton, Ca	50	BWR	8/57	12/63

* The Shoreham unit achieved criticality and produced power, but closed before it could begin commercial operation.

APPENDIX E

QUALITY ASSURANCE CRITERIA FOR NUCLEAR POWER PLANTS AND FUEL REPROCESSING PLANTS

Quality assurance (QA) comprises all those planned and systematic actions necessary to provide confidence that a component will perform satisfactorily in service. This program must be documented by written policies, procedures, or instructions and must be carried out throughout the plant life. The QA program provides control over activities affecting the quality of components to an extent consistent with their importance to safety. The program must provide for the indoctrination and training of personnel performing activities affecting quality.

The purpose of each of the 18 QA criteria is briefly explained in the following pages.

Criterion 1 - Organization - To identify all activities affecting quality and to assure that the responsibilities and authorities of key personnel are clear.

Criterion 2 - Quality Assurance Program - To cause the project manager to articulate the actions necessary to plan and implement an effective quality assurance program.

Criterion 3 - Design Control - To control the following processes in accordance with the requirements of Applicable and Relevant or Appropriate Requirements: (1) designing tests and sampling patterns to characterize the geologic setting, to develop models to predict the performance and long-term stability of the site, and to predict the environmental interaction between the site and its surroundings; (2) specifying requirements for design and construction; and (3) designing computer codes.

Criterion 4 - Procurement Document Control - To provide the management controls to manage the work activities of contractors and subcontractors and ensure acceptable quality of the results.

Criterion 5 - Instructions, Procedures, and Drawings - To ensure the use of formal instructions for work activities related to the accomplishment of performance objectives and the design bases.

Criterion 6 - Document Control - To ensure that documents prescribing activities related to the accomplishment of the performance objectives and the design bases are controlled during review, approval, and distribution to ensure that those performing activities use approved and up-to-date instructions.

Criterion 7 - Control of Purchased Material, Equipment, and Services - To oversee and control the work of contractors and suppliers and to ensure that the results are consistent with performance objectives and design bases.

Criterion 8 - Identification and Control of Materials, Parts, and Components - To ensure that all materials, parts, samples, and components important to the accomplishment of performance objectives and the design bases are identified and controlled.

Criterion 9 - Control of Special Processes - To ensure that all work activities important to the accomplishment of performance objectives and the design bases are controlled, including the identification of activities that require specially trained personnel, or specialized equipment or procedures.

Criterion 10 - Inspection - To ensure that independent, pre-planned inspections are performed where it is deemed necessary to establish the acceptability of a product, process, or service, either in progress or upon completion.

Criterion 11 - Test Control - To ensure that test are conducted to determine if an item or service is acceptable or to satisfy a need for more information.

Criterion 12 - Control of Measuring and Test Equipment - To ensure that measurements that affect quality of work are taken only with instruments, tools, gauges, or other measuring devices that are accurate, controlled, calibrated, and adjusted at predetermined intervals to maintain accuracy within necessary limits.

Criterion 13 - Handling, Storage, and Shipping - To ensure control over handling, storage, cleaning, packaging, preservation, and shipping of items affecting quality of work.

Criterion 14 - Inspection, Test, and Operating Status - To ensure the identification of the inspection and/or test status of samples, structures, systems, and components to prevent inadvertent use of items found to be unacceptable for use.

Criterion 15 - Nonconforming Materials, Parts, or Components - To ensure that items not conforming to specified requirements are identified and controlled to prevent inadvertent use.

Criterion 16 - Corrective Action - To ensure that management systems comprised by the QA program are constantly monitored and that timely measures are taken to correct conditions adverse to quality.

Criterion 17 - Quality Assurance Records - To ensure that records important to the accomplishment of performance objectives and the design bases (including the data analysis phase, hearings, permitting and licensing processes) are sufficient to demonstrate the quality of work performed. Records will also be needed should problems related to the performance of the facility occur at a later date.

Criterion 18 - Audits - To ensure that audits, which are part of the management system's sensors, are effective by being well planned, conducted by trained personnel familiar with the work being audited, and designed to measure the potential of the activity or process being audited to produce an acceptable product.

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