



UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
SOUTH CAROLINA ELECTRIC AND)
GAS COMPANY, ET AL)
(V. C. Summer Nuclear Station))

Docket No. 50-395

AFFIDAVIT OF PHILIP G. STODDART

State of Maryland)
County of Montgomery)

SS

I, Philip G. Stoddart, being duly sworn, depose and state:

1. I am a Nuclear Engineer, Effluent Treatment Systems Branch, Division of Site Safety and Environmental Analysis, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.
2. I have prepared the statement of Professional Qualifications attached hereto.
3. As part of my duties, I participated in the review of the application for a license to operate the V. C. Summer Nuclear Station which is the subject of the captioned proceeding.
4. I have prepared the following testimony, and I hereby certify that it is true and correct to the best of my knowledge.

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5. The testimony which follows addresses Contention A7, which states:

The Applicant's ability to anticipate, detect, or mitigate the impact of accidental releases of radioactive materials to the Broad River is inadequate to protect the potability of the water supply for the municipalities of Columbia and West Columbia.

REPORTED RELEASES FROM THE
OCONEE PLANT OF DUKE POWER COMPANY

6. During his deposition on August 2-3, 1978, Intervenor Brett Bursey stated that . . . "Duke Power Company (referring to the Oconee Plant of Duke Power Company) had . . . numerous accidental releases that were neither anticipated, detected, nor mitigated." (TR. 155:7).
7. The Technical Specifications for all licensed nuclear plants require the reporting of all releases which either exceed prescribed radioactivity limits or which are the result of accident, mishap, or operational error.
8. A review of the semi-annual effluent release reports and of Licensee Event Reports (LER's) submitted by Duke Power Company for the Oconee Plant for the period 1973 through 1978 shows only two incidents which could be interpreted as "accidental releases that were neither anticipated, detected, nor mitigated." In both of these incidents, however, the releases were in fact detected, identified, and reported by Duke Power, and were mitigated by terminating the releases.
9. In one of the two incidents, it was calculated that the maximum instantaneous concentration (concentration at the point of release) exceeded 10 CFR Part 20 limits for drinking water at a number of intervals over a three day period; however, concentration at the point of release was calculated to be a small fraction of

10 CFR Part 20 when averaged over the three day period.^{1/} In the second incident, it was discovered that an error in construction had resulted in an undetected intermittent leak which could have spanned a period of approximately two years; however, the magnitude of the radioactivity concentration of the release was a small fraction of 10 CFR Part 20 limits at the point of release.

10. Both of the incidents noted in paragraphs 8 and 9 above, are considered by the staff to fall within the category of "anticipated operational occurrences." ("Anticipated operational occurrences" are discussed in paragraphs 12 through 14 below.) In both of the cited incidents, concentrations of radioactive materials at water supply intakes downstream of the point of release were calculated to be a small fraction of 10 CFR Part 20 limits.
11. In the August 2-3, 1978, deposition of Brett Bursey, Mr. Bursey states or implies at several points that the applicant and staff either have not considered or have not satisfactorily considered such aspects of the operation of the V. C. Summer Plant as the inadvertent release of radioactive materials in liquids or the provision of systems for the mitigation of releases of radioactive materials in liquid effluents (TR 153:13; TR 155:7; TR 158:3; TR 190:16; TR 191:11, TR 193:2; TR 193:17; and TR 194:5). These matters are discussed in the following paragraphs.

^{1/}It is likely that this incident is the one referred to by Mr. Bursey in his deposition of June 13, 1978 (TR 136). The referenced incident involved a release of radioactive liquid effluent from the turbine building sump of the Oconee Nuclear Station into the Keowee River, the source of potable water for Clemson, SC.

ANTICIPATED OPERATIONAL OCCURRENCES

12. Section 11 of the FSAR and Section 3.5 of the ER contain the applicant's analyses of the magnitude of plant liquid radioactive release from normal operations, including "expected [anticipated] operational occurrences" (see 10 CFR 50.34a and NUREG-0017^{2/}). The term "anticipated operational occurrences" is used by the staff and by the applicant to denote events, such as upsets, leaks, spills, and similar mishaps, which are anticipated to occur on the order of one event per year during the normal operating lifetime of a plant as the result of design deficiencies, construction errors, operator errors, or equipment malfunctions.
13. The applicant's evaluation assumes that an average of 0.15 Ci/yr of radioactive material will be released to the environment in liquid effluents from the V. C. Summer Nuclear Plant as the result of anticipated operational occurrences.
14. The applicant's assumption of a release of 0.15 Ci/yr is based on the PWR-GALE Code adjustment to account for anticipated operational occurrences and is in agreement with the staff's standard assumption. The staff's assumption is based on reported operating data for operational nuclear power plants. The bases for both the applicant's and staff's assumptions are given in NUREG-0017.

^{2/} NUREG-0017, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors (PWR-GALE Code). Office of Standards Development, U.S. Nuclear Regulatory Commission, Washington, DC 20555, April 1976)

ACCIDENTS

15. The term "accident" is used by the staff and by the applicant to denote types of events of a more serious nature than "anticipated operational occurrences."^{3/} Releases of radioactive materials resulting from "accidents" have the potential to result in radiation exposures to individuals in the general population in excess of 10 CFR Part 100 limits. Releases of radioactive materials resulting from anticipated operational occurrences are expected to result in a lower order of radiation exposures to individuals in the general population, e.g., a small fraction of 10 CFR Part 20 limits.
16. "Accidents" have a lower order of probability of happening than "anticipated operational occurrences." The only postulated accident which has the potential for releasing radioactive liquids to a drinking water supply is the gross failure of any tank outside the containment that contains radioactive liquids. The applicant^{4/} and the staff have performed separate independent analyses of this accident. In both of these analyses, it was calculated that the accidental release of the contents of such a tank, containing a design basis inventory of radioactive materials, would not result in radioactivity concentrations in excess of 10 CFR

^{3/} Postulated accidents and anticipated operational occurrences are classified according to a system of Class Numbers 1 through 9 (Proposed Annex to Appendix D, 10 CFR Part 50, 36 FR 22851, December 1, 1976). Anticipated operational occurrences are included in Class Numbers 1 and 2. Postulated accidents are included in Class Numbers 3 through 9. The postulated accident discussed in paragraph 16, above, is considered as a Class 3 accident.

^{4/} V. C. Summer Nuclear Plant FSAR, Section 2.4.13.3, June 2, 1977.

Part 20 at the nearest municipal water supply intake. In more than 600 reactor-years of operating experience, no such postulated accident has occurred.

ANTICIPATION OF LIQUID EFFLUENT RELEASES
RESULTING FROM NORMAL OPERATION, INCLUDING
ANTICIPATED OPERATIONAL OCCURRENCES

17. Section 11.2 of the applicant's FSAR describes design features incorporated in the plant for the control, collection, and treatment of liquid radioactive wastes in anticipation of spills, upsets, or leakage from systems or components containing radioactive liquids in the course of normal operations, including anticipated operational occurrences.
18. For liquid tanks which could potentially contain radioactive liquids, the applicant has provided instrumentation for automatic annunciation or alarm upon high liquid level or overflow conditions and has made provisions for overflows to be collected and routed to liquid radioactive waste processing systems.
19. Floors and compartments in areas where radioactive liquids may be present in equipment components, pipes, tanks, or other vessels, are provided with curbing and drain systems which will route leaked or spilled liquids to collection tanks or sumps, from which the liquids may be processed prior to discharge or reuse in the plant.

20. The liquid radioactive waste treatment system is provided to process anticipated liquid radioactive wastes prior to discharge to the environment or reuse in the plant. The systems are described in Sections 9.3, 10.4.8, and 11.2 of the FSAR.
21. The staff has evaluated the applicant's design provisions for the anticipation and control of inadvertent releases of liquid radioactive wastes from the V. C. Summer plant and finds these provisions to be adequate to minimize such releases to levels which can be considered as low as is reasonably achievable.

DESIGN FEATURES PROVIDED FOR
DETECTION OF RADIOACTIVE LIQUID
RELEASES

22. Section 11.4 of the FSAR contains a description of the applicant's design features incorporated in the plant for the detection of radioactive materials contained in releases to the Monticello Reservoir, to the Fairfield Pumped Storage Facility, and to the Broad River.
23. The applicant has provided continuous radioactivity monitoring instrumentation on each normally or potentially radioactive effluent stream. Each of these monitors has the capability, upon alarm, of initiating the automatic termination of the flow of the effluent stream. One of these monitors continuously measures the liquid effluent from the turbine building; this is a feature which was not included in the Oconee plant design. In addition, process monitors on principal process streams will continuously measure the radioactivity levels

in these streams to detect and annunciate leakage of radioactive materials into normally nonradioactive process streams or to detect and annunciate the buildup of above normal radioactive material concentrations in radioactive process streams.

24. In addition to continuous radioactivity monitoring instrumentation, principal process streams and all effluent streams will be sampled and analyzed for radioactivity content on a frequency which will be established in the plant Technical Specifications. Each batch of liquid waste will be sampled and analyzed prior to discharge. Discharge will take place only under administrative control, and then only through a continuously monitored discharge line with provision for the automatic termination of release in the event of a possible administrative or operational error, such as misalignment of a valve to discharge the wrong tank.
25. The staff has evaluated the applicant's design provisions for the detection of releases of radioactive liquids from normal operations, including anticipated operational occurrences, and finds these provisions to be adequate.

MITIGATION OF LIQUID EFFLUENT RELEASES
RESULTING FROM NORMAL OPERATION, INCLUDING
ANTICIPATED OPERATIONAL OCCURRENCES

26. The applicant's design features for systems relative to liquid radioactive effluents, as described in Paragraphs 17 through 25 above, serve to mitigate the effects on the inadvertent release of liquid

radioactive effluents by detecting, controlling, preventing, or otherwise minimizing such releases, thereby minimizing the potential effects of such releases.

27. The applicant's evaluation of his radioactive waste treatment systems with respect to the requirements of Appendix I to 10 CFR Part 50 shows that the anticipated releases and the corresponding doses calculated in the environment meet the "as low as is reasonably achievable" criteria and that no additional provisions are required for the further reduction of releases of radioactive materials in effluents.

CONCLUSION

28. On the basis of the above, the staff has concluded that the applicant's design provisions for the anticipation, detection, and mitigation of inadvertent releases of radioactive liquids from the V. C. Summer plant are acceptable. These features provide reasonable assurance that

radioactivity concentrations at the point of release (and at any downstream water intake) will be a small fraction of the drinking water limits of 10 CFR Part 20.

Phillip G. Stoddart

Phillip G. Stoddart
Effluent Treatment Systems Branch
Division of Site Safety and
Environmental Analysis
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

Subscribed and sworn to
before me this 27th day of
September, 1978.

Martine Jollensten
Notary Public

My Commission expires July 1, 1982.

Phillip G. Stoddart
Effluent Treatment Systems Branch
Division of Site Safety and Environmental Analysis
Office of Nuclear Reactor Regulation

My name is Phillip G. Stoddart. I am a nuclear engineer in the Effluent Treatment Systems Branch, Division of Site Safety and Environmental Analysis, in the Office of Nuclear Reactor Regulation. I attended the New Mexico School of Mines from 1947 to 1949. From 1949 to 1953 I was on active duty with the U.S. Air Force, assigned as a radiological instrumentation specialist with the Armed Forces Special Weapons Command and as a radiological safety instructor with a Strategic Air Command special weapons unit.

From 1953 to 1973 I was on the radiation safety staff of the Argonne National Laboratory, working from 1953 to 1957 at Argonne's Illinois site and from 1957 to 1973 at Argonne's test facilities at the National Reactor Testing Station, Idaho Falls, Idaho. My duties there included operation and supervision of radiation safety programs, including effluent control, environmental monitoring and waste management, for several research and test reactors and a fuel recycle facility.

In 1973 I joined the Nuclear Regulatory Commission (formerly AEC) as a nuclear engineer in the Effluent Treatment Systems Branch, Division of Site Safety and Environmental Analysis. In this position, I am responsible for the review and evaluation of radwaste systems and for the calculation of releases of radioactive materials in effluents from nuclear power reactors. I am also responsible for determining the adequacy of instrumentation provided for monitoring radioactive discharges from nuclear power plants and for providing technical bases for guides and standards. I have participated in generic studies of the relationship between reactor operation and radwaste generation and in the preparation of staff reports related to effluent control technology and effluent monitoring.