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YANKEE ATOMIC ELECTRIC COMPANY

FYR83-44
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1671 Worcester Road, Framingham, Massachusetts 01701

April 19, 1983

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Office of Nuclear Reactor Regulation
Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing

References: (a) License No. DPR-3 (Docket No. 50-29)
(b) Letter, USNRC to All Operating Licenses, Generic Letter 82-33, dated December 17, 1982

Subject: NUREG-0737, Supplement I - Proposed Integrated Plan for Emergency Response Capability

Dear Sir:

Reference (b) requested that we provide you, pursuant to 50.54(f), with an intended schedule and a description of our proposed plans with regard to the emergency response capability at our facility. The requested information is provided below. It should be noted that our response reflects an integrated approach with regard to our resolution of the concerns expressed in Reference (b), and that any change in the schedule or scope of any one item will in all likelihood impact the scope and schedule of our overall program. This interrelationship between the parts of the program is inevitable in a plan of action of this magnitude. Thus, we propose to work closely with our NRC Project Manager, both in formulating the detailed schedule, as well as determining the acceptability of our proposed resolution to each of the NUREG-0737, Supplement I items. It is our belief that this program meets the overall intent of the NRC concerns, expressed in Reference (b), in a timely and efficient manner.

A003
ADD:
W. Paulson

In Generic Letter No. 82-33, dated December 17, 1982, Supplement I to NUREG-0737, additional guidance was provided for five specific requirements as follows:

1. Upgrade Emergency Operating Procedures (EOP) I.C.1
2. Detailed Control Room Design Review (DCRDR) I.D.1
3. Safety Parameter Display System (SPDS) I.D.2
4. Regulatory Guide 1.97 "Instrumentation for Nuclear Power Plants," (1.97)
5. Emergency Response Facilities (ERF) III.A.1.2 and III.A.2.2

Our response is in the above order.

1. Upgrade Emergency Operating Procedures (EOPs)

Yankee has been an active participant in the Westinghouse Owners Group Procedure Development Program since its initial formation following the TMI-2 accident. We participated in the Initial Study (WCAP-9691) prepared in response to NUREG-0578 2.1.9.c. This report, issued March 30, 1981, was a generic study of the probabilistic risk assessment evaluation of the Westinghouse PWR designs. The study identified major design basis events that, though primarily based on large PWRs of recent vintage, can be equated with the Yankee design and characteristics. Included in the study were Optimal Recovery Guidelines (ORG) designed to provide guidance for the operator to recover the plant from a known event/condition state. Implied in the guidelines was the maintenance of Critical Safety Functions.

As the procedure review program continued to develop, it became obvious that the Westinghouse procedures were excessively complex for adaption to the Yankee Plant since it is a much smaller and older plant with a very compact control system. Yankee, therefore, formed an Emergency Operating Procedures (EOP) Committee made up of senior plant and NSD personnel. Each member of this committee holds or has held a NRC Senior Operator's license and has had experience in the nuclear power industry ranging from 5 to 20 years. One individual on the committee is a representative on the Westinghouse Owners Group Procedure Development Program.

This committee proceeded to develop EOPs that would satisfy Yankee's specific needs. They took full advantage of the following sources of information:

a) Applicable portions of the Babcock & Wilcox procedure program;
b) Applicable portions of the BWR Owners Group procedure program;
c) Applicable portions of the Combustion Engineering emergency procedure guidelines;
d) All of the Westinghouse Owners Group procedure program concepts;
e) The Yankee plant Probabilistic Safety Study program;
f) The cumulative experience of Yankee plant; and
g) NUREG-0799, Draft Criteria for Preparation of Emergency Operating Procedures, for comment.
h) NUREG-0818, Emergency Action Levels for Light Water Reactors.

As the procedure concepts evolved, the committee tested their suitability with a group of current Control Room operators to ensure their needs were incorporated. The concepts were also tested on the Combustion Engineering simulator at Windsor Locks, Connecticut.

The EOPs that came out of this process made use of the Critical Safety Function (CSF) concept, referenced in WCAP-9691, and further developed in the Combustion Engineering emergency procedure guidelines. A Critical Safety Function is defined as "an activity which assures the

integrity of the physical barriers against radiation release." This is the basic objective of the Yankee Operator and this assurance is present during normal plant operation. During emergency situations where parameter(s) that validate a Critical Safety Function may be outside of normal bounds, the operator will use CSF EOPs to reestablish the CSF assurance, or as guides to the event or recovery procedure that will lead to that objective.

The Yankee CSF EOPs are relatively simple in format and content and are easy to use and follow. The operator using these CSF EOPs can optimize the assurance of the integrity of the physical barriers against radiation release for an extended period of time, establish a new condition of stability, and thoroughly diagnose the event prior to moving on to the recovery (event) procedure. In the resolution of a challenge, the operator is trained to relate the symptoms to all the CSF EOPs to alert him to multiple challenges. A hierarchy of operator action in response to challenges would be: shut down the reactor; cool the core; and preserve the containments of cladding, main coolant system, and vapor container using the primary CSF parameters on the Control Board.

The Critical Safety Functions that finally evolved from the Committee's work are:

1) Reactivity
2) Secondary Cooling/Inventory
3) Main Coolant Inventory
4) Core Heat Removal
5) Vapor Container Integrity

EOPs to maintain these Critical Safety Functions have also been developed by the committee and are in the process of nuclear engineering review.

We intend to submit the Procedures Generation package containing the EOP Technical Guidelines and the Writers Guide in October, 1983. We expect to start formal training of the operators in the CSF EOPs in October, 1983 with full implementation of the revised procedures in February, 1984.

2. Detailed Control Room Design Review (DCRDR)

Yankee has not yet formally established a DCRDR Team for the Yankee plant; however, personnel expected to be assigned to the Yankee Team are currently serving on review teams for other nuclear plants.

Yankee will submit by February, 1984 a DCRDR Program Plan for the Yankee plant. That portion of the plan that is performed at the plant will commence in April, 1984. The plan will use current operating procedures including symptom-oriented critial safety function EOPs as the basis of operator requirements. Operator aids provided by the SPDS will be included in the Program Plan. The DCRDR will be a total integration of SPDS, Control Room, Procedures and experience to improve the emergency

response to off-normal events. In what may be called a "back to basics" approach, Yankee will use a Program Plan which focuses on the objectives, the operators and their responsibilities and resources, to build a consistent response to transient management.

A DCRDR Summary Report will be submitted in November, 1984. The report will show significant changes, if any, that were made to the Program Plan, Human Engineering Discrepancies (HEDs) to be corrected, HEDs that will not be corrected and justification for that action and a proposed schedule for implementation. If the DCRDR discloses the urgent need to make changes in the plant procedures, they will be corrected and an explanation will be provided in the Summary Report.

3. Safety Parameter Display System (SPDS)

Yankee has an operational SPDS that was installed in late 1982. The development of the Yankee SPDS was a joint project with the Nuclear Safety Analysis Center (NSAC), operated by the Electric Power Research Institute (EPRI). The SPDS was designed to satisfy the intent of NUREG-0696, and took full advantage of EPRI's previous research activities in the SPDS area and Yankee's operational experience.

NSAC, in September 1980, developed guidance and general recommendations for upgrading nuclear plant process computer installations to meet NRC data system requirements. The report, (NSAC-5), was entitled "Computer Systems Interface Guidelines for Nuclear Plants". This was part of a NSAC program to develop the basic elements of a safety console to assist operators in dealing with plant upset conditions. In November 1980, NSAC reported in NSAC-10, "A Parameter Set for a Nuclear Plant Safety Console" of further work by Technology for Energy, Inc. (TEC) with an objective to develop a methodical procedure for selecting safety console parameters on the basis of their relative importance to plant safety functions. In May of 1981, NSAC issued another report NSAC-34, "Design and Hardware Alternatives for a Safety Parameter Display System". This report was prepared by two contractors, Roy and Associates, Inc. and J-E-T Consultants, Inc. with configurations using commercially available components.

In October 1981, TEC issued a report describing the "General System Design Safety Parameter Display System at Yankee Rowe Nuclear Plant". Included in this report was an NSAC attachment, "Yankee Rowe SPDS Display Specifications", that described the details of the displays and how they were developed using information (see above) from NSAC, an evaluation of displays by EPRI using the SNUPPS simulator, follow-on work by Quadrex Corporation and TEC as well as direct input from Yankee Engineering and

Plant Operation personnel. TEC also issued the "Detail System Design Safety System Parameter Display System" in February, 1982. This report defined in detail the SPDS software modules and file structures. A follow-up report by Yankee, TEC, and NSAC was issued in August 1982, NSAC-55, "Safety Parameter Display System for the Yankee Atomic Electric Company". This report described the further development of the Yankee SPDS design.

All of the above references are cited to illustrate the depth and scope of the Yankee SPDS design. Also, Yankee personnel, including operators were heavily involved in the design, programming, installation and validation of an operational SPDS system. Of particular importance was the selection of the parameters that are displayed on the final product. These parameters were based on the symptom-based critical safety function Emergency Operating Procedures developed by a committee of senior Yankee personnel. The SPDS is fully integrated with the CSF procedures. Although the main control board remains as the primary source for operator information, the SPDS serves as an additional aid to the Shift Supervisor.

We will submit a report on September 1, 1983, describing the Yankee SPDS. Included will be hardware and software descriptions, signal specification and alarm analysis, human factors analysis and validation.

Appropriate results of the Detailed Control Room Design Review to be completed in November 1984, will be incorporated into the SPDS. Yankee will also work to improve the capabilities of the SPDS as operational experiences indicate the need.

4. Regulatory Guide 1.97 "Instrumentation of Nuclear Power Plants"

Yankee will submit a report July 1, 1983, describing how data is provided to assist the Control Room operator in preventing and mitigating the consequences of reactor accidents. This report will describe how provisions are made for measurements and indications of Type A, B, C, D, and E variables. The descriptions will incorporate conclusions reached in the preparation of our response to Equipment Qualification issues and the new capabilities provided by our recently installed Safety Parameter Display System (SPDS). The report will include a description of those variables needed at the Technical Support Center, Emergency Off-Site Facility, and the Alternate Emergency Off-Site Facility. In addition, if the Detailed Control Room Design Review indicates the need for changes to such variables, these changes will be included in the ongoing work schedule, as will changes required to meet the environmental requirements outlined in 10CFR50.49.

5. Emergency Response Facilities

Following the declaration of an emergency, the activities of the emergency organization are coordinated in a number of dedicated Emergency Response Facilities. During the initial stages of an emergency, the shift personnel, after they have classified and declared the emergency

condition, direct all initial phases of emergency response. These responses include notification of on-site and off-site emergency response personnel, corrective actions, dose assessment, and protective action recommendations. As additional support personnel arrive, certain emergency response functions are transferred to personnel located in the Technical Support Center, Operations Support Center and the Emergency Operations Facility or Alternate Emergency Operations Facility.

5.1 Technical Support Center

An on-site Technical Support Center (TSC), (see attached figure) located adjacent to the Control Room, has been established to provide plant management and technical support to plant operations personnel and relieve the reactor operators of peripheral duties and communications not directly related to reactor system manipulations. The TSC personnel can also perform Emergency Operations Facility (EOF) functions related to dose projection and protective action recommendations, if necessary, until the EOF is functional.

The location and communications equipment of the TSC facilitate voice and data interaction and coordination with the Control Room and the EOF. Voice communications are available between the TSC, Operations Support Center (OSC), EOF, NRC, and State emergency facilities. The TSC contains a Safety Parameter Display System (SPDS) CRT which monitors and displays critical plant parameters. This enables evaluation of incident sequence, appropriate mitigating actions, and damages. In addition, the TSC contains a television monitor and remote controls to a television camera in the Control Room to focus on particular instruments or panels. It can also be used to gather CSF data.

The TSC will accommodate sufficient technical staff needed to evaluate the plant condition. Communications and computer access to the Yankee Engineering Support Center in Framingham, Massachusetts will reduce the necessity for a large number of additional technical support personnel at the TSC. The Yankee Nuclear Services Division will dispatch technical support personnel as necessary to support the TSC in diagnosing accident conditions. Also, the TSC contains as-built drawings of plant systems and equipment, technical manuals, emergency plans and procedures, and current plant records which are essential for evaluation of and recommendations for the plant under accident conditions.

The TSC is habitable to the same degree as the Control Room for postulated accident conditions. Radiological protection and monitoring equipment assure that radiation exposure to any person working in the TSC would not exceed 5 rem whole body, or its equivalent to any part of the body for the duration of an accident. The TSC is designed via good human factors engineering principles and is environmentally controlled to provide room air temperature, humidity, cleanliness and lighting appropriate for personnel and

equipment. The TSC is structurally built in accordance with the Uniform Building Code.

5.2 Operations Support Center

The Operations Support Center (OSC) is located on the turbine deck adjacent to the Control Room complex. The OSC will serve as an assembly point for in-plant manpower needed to conduct support functions of plant operations during an emergency. An OSC Coordinator will be assigned and will communicate with the TSC through the in-plant page/intercom set and plant phones and will direct activities of the OSC. A secondary OSC is also available off the Main Control Room (see attached figure).

5.3 Emergency Operations Facilities

Introduction: Yankee maintains two EOFs; one near the plant site to handle emergencies up to and including DBEs, the other is located outside the ten mile radius for large and unlikely Class 9 events for which access to the Primary EOF would be difficult. The two EOF concept maximizes the effectiveness of emergency response in that the Primary EOF, since it is close, would allow for improved coordination and support for events that are more likely to occur, and secondly it provides a built-in backup should more serious and considerably less likely events occur.

The Primary Emergency Operations Facility (EOF) is located in a previously existing building on Monroe Hill Road, 2,500 feet southeast of the plant. The Alternate EOF is located in the town of Buckland at the New England Power Company Lower Deerfield Headquarters, approximately 13 miles from the plant. Under our EOF design and activation scheme proposed herein, the Primary EOF will be immediately staffed for an Alert or higher level emergency. An Alternate EOF Director is also sent to the Alternate EOF to prepare it for activation should the need arise. The responsibility of the Alternate EOF Director is to establish both data and voice communications with all operating emergency centers and track the course of events should the Primary EOF require evacuation. This concept of emergency response provides (1) an immediately functioning Primary EOF and (2) an Alternate EOF manned with sufficient personnel to assume control and coordination of emergency response activities with Federal and State agencies during the transition period in which the Primary EOF personnel may have to relocate to the Alternate EOF.

Both the EOF and Alternate EOFs have the capability to access the Plant SPDS and Meteorological data acquisition systems. The information provided by these systems together with radiological release data provided by voice communications gives the staff at the EOF or the Alternate EOF the ability to develop public protective action recommendations. Federal, State and licensees predesignated personnel who will staff the EOF will have information available

from the above mentioned systems as well as plant procedures, drawings, maps, etc. to enable them to evaluate the magnitude and effects of actual or predicted radioactive releases from the Plant and to project doses. Both Primary and Alternate EOFs are provided with reliable voice communication links to each other as well as to the TSC, Control Room, OSC, Media Center, NRC, State Emergency Facilities, and the Yankee Engineering Support Center (ESC) at corporate headquarters.

The Primary EOF contains radiation monitoring equipment and procedures which are used to assess EOF radiological habitability. This radiological surveillance plus information on plant status provided by the TSC provides early warning of any need to transfer functions to the Alternate EOF, particularly the critical functions of dose projection and protective action recommendation.

Should the extremely unlikely Class 9 type accident occur rapidly (i.e., prior to activation of the Primary EOF), personnel would be directed to the Alternate EOF instead of the Primary EOF. The Control Room instrumentation provides sufficient information for the operator to determine if this action should be taken. This determination can be made using the Critical Safety Function Concept described in 1. above. Should a lower class emergency degrade to a General Emergency there would be sufficient time and continuity based on the early manning of the Alternate EOF to transfer control without interruption of the flow of vital information and decision making. The conclusions of the Yankee Probabilistic Safety Study support the warning time necessary to effect a transfer to the Alternate EOF.

The transfer of emergency response functions from the Primary EOF to the Alternate EOF was tested during the April 6, 1983 emergency plan exercise (an exercise witnessed by a NRC-Region 1 observation team). In accordance with the Alert emergency procedure, personnel were dispatched to the Alternate EOF to establish communications and be available for assumption of temporary control if this later proved to be necessary. Indeed, during the drill when conditions worsened to a General Emergency and the Primary EOF had to be abandoned, the Alternate EOF was in a position to immediately assume responsibility for ongoing activities without loss of continuity or control. Emergency response activities were relocated in a timely and effective manner.

This concept of utilizing the Primary EOF for the most likely accidents, and transferring to an Alternate EOF when conditions warrant, proved to be an effective means of providing both emergency support to the plant and coordination of off-site responsibilities for dose assessment and field monitoring. Expedient transfer to the Alternate EOF was demonstrated with neither reduction in emergency response capacity nor threat to health or safety of emergency response workers.

This proposed EOF facility use plan, which does not call for using the near site EOF for Class 9 accidents, makes the issue of near site EOF protection factors and ventilation isolation with HEPA filters moot. Under Design Bases Accident Conditions, the 30-day plume exposure whole body dose at the near site EOF is 2 rems (neglecting protection factors). This is well below the EPA Protective Action Guideline of 5 rem suggested as a level for evacuation of the public and far below the 25 rem limit for emergency worker PAGs as identified in NUREG-0654 (Planning Standard K).

An additional justification for eliminating the HEPA requirement is found in an EPRI report by Levenson et al. This report concludes that, based on actual reactor accidents and controlled experiments, the predicted release of iodine and particulates are greatly reduced relative to the noble gases. This report goes on to point out that the fission product behavior models in WASH-1400 neglected significant aerosol removal mechanisms, such as particulate aglomeration and wall deposition, in predicting particulate releases. The reasoning that resulted in eliminating the requirement for a charcoal filter should likewise be applied to the HEPA filter. We do not feel that any filtration system is warranted in the near site EOF. For a vast majority of accidents therefore, the primary EOF as-built is expected to be radiologically habitable for the duration of any significant radiological release. The conclusion of our evaluation of the near site EOF against NRC's guidelines is that with our approach additional modifications such as upgrading the facility to increase protection factors and adding HEPA filtered ventilation systems are not necessary because we satisfy the functional intent of the guidelines.

Both primary and alternate EOFs satisfy good human factors engineering principles and are environmentally controlled to provide room air temperature, and cleanliness appropriate for personnel and equipment. Each EOF will be provided with industrial security, to exclude unauthorized personnel.

5.4 Additional Information

More details on the integration and layouts of these facilities can be found in the Yankee Emergency Plan. Also, as described in the Plan, an Engineering Support Center (ESC) will be established at the corporate engineering offices. The ESC will coordinate NSD emergency operations assistance with the on-site emergency operations needs, provide support for planning of re-entry and recovery operations and coordinate the identification and/or review of plant modifications needed for recovery. The Engineering Support Center also has the capability to receive and analyze SPDS and meteorological data used in accident assessment and dose projection.

We trust that the information provided above is satisfactory; however, if you have any questions or desire additional information, please contact us.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

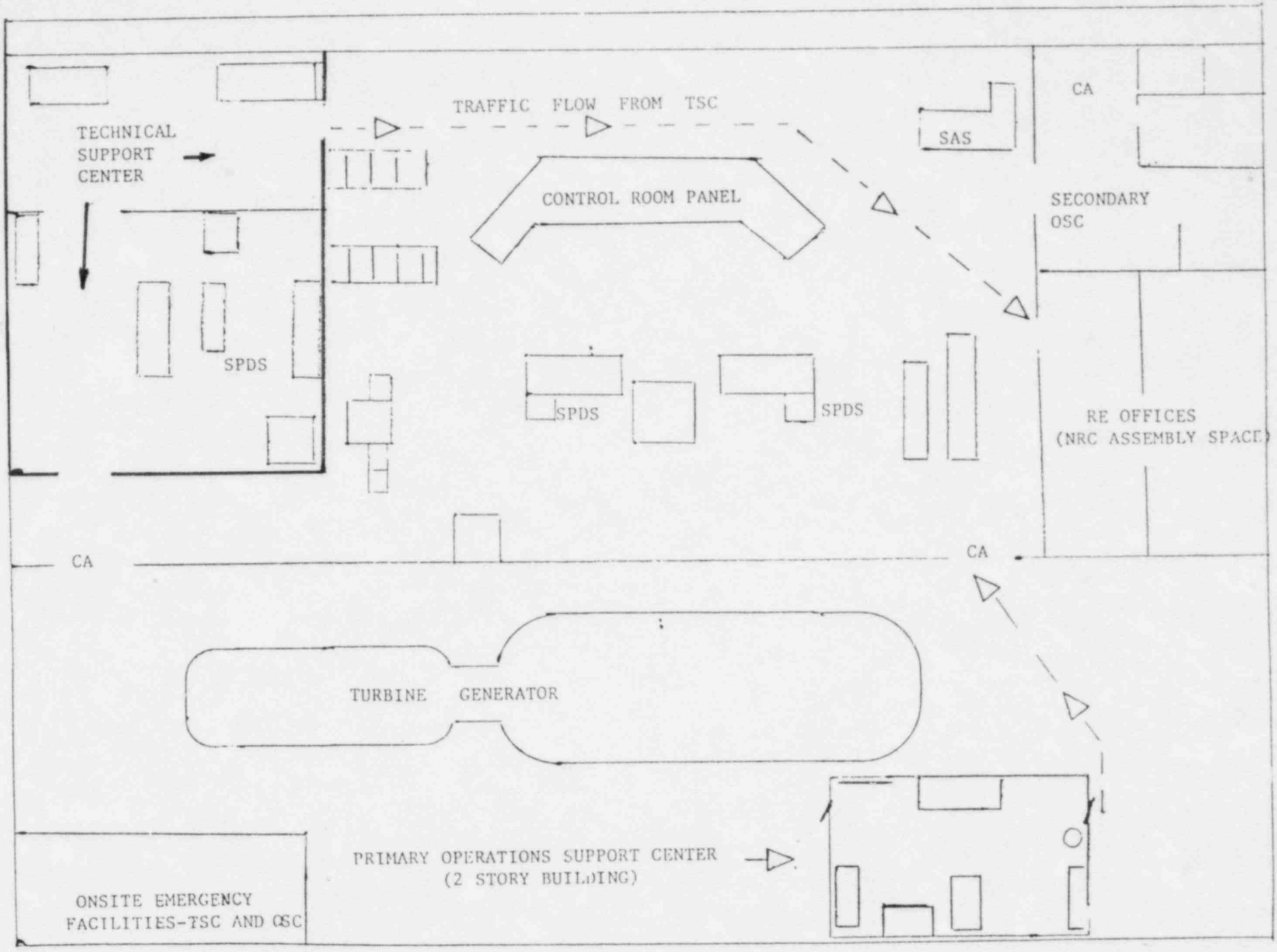
L. H. Heider
Vice President/Manager of Operations

LHH/ba

COMMONWEALTH OF MASSACHUSETTS)
)ss
MIDDLESEX COUNTY)

Then personally appeared before me, L. H. Heider, who, being duly sworn, did state that he is a Vice President of Yankee Atomic Electric Company, that he is duly authorized to execute and file the foregoing request in the name and on the behalf of Yankee Atomic Electric Company and that the statements therein are true to the best of his knowledge and belief.

Robert H. Groce Notary Public
My Commission Expires September 14, 1984


TECHNICAL
SUPPORT
CENTER
TRAFFIC FLOW FROM TSC
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CONTROL ROOM PANEL
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RE OFFICES
(NRC ASSEMBLY SPACE)
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TURBINE GENERATOR
PRIMARY OPERATIONS SUPPORT CENTER
(2 STORY BUILDING)
ONSITE EMERGENCY
FACILITIES-TSC AND OSC