Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

March 17, 1981

Mr. Darrell G. Eisenhut, Director
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Dresden Station Units 1, 2, and 3
Quad Cities Station Units 1 and 2
Zion Station Units 1 and 2
LaSalle County Station Units 1 and 2
Supplemental Information Concerning
Shift Technical Advisor Long Term Program
NRC Docket Nos. 50-10/237/249,
50-254/265, 50-295/304, 50-373/374

References (1): C. Reed letter to D. G. Eisenhut dated October 18, 1979, (NUREG-0578 Item 2.2.1.b)

(2): C. Reed letter to H. R. Denton, dated November 30, 1979, (NUREG-0578 Item 2.2.1.b)

(3): J. S. Abel letter to D. G. Eisenut, dated December 15, 1980, (NUREG-0737 Item I.A.1.1)

(4): J. S. Abel letter to D. G. Eisenhut, dated February 24, 1981, (NUREG-0737 Item I.A.1.1)

(5): R. F. Janecek letter to D. G. Eisenhut, dated November 5, 1980, (NUREG-0737 Items I.A.1.1 and I.A.1.3)

(6): LaSalle County Station Final Safety Analysis Report Appendix L Sections L.1 and L.3 dated January, 1981. (NUREG-0737 Items I.A.1.1 and I.A.1.3)

(7): T. R. Tramm letter to H. R. Denton, dated February 17, 1981

(8): R. F. Janecek letter to H. R. Denton, dated September 18, 1981.

(9): W. F. Naughton to D. G. Eisenhut dated August 1, 1980 ("Requalification Program for Licensed Operators, Senior Operators, and Senior Operators (Limited)")

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Dear Mr. Eisenhut:

The purpose of this transmittal is to document the Commonwealth Edison "long-term" Shift Technical Advisor (STA) program, including candidate qualification, selection criteria training plans, and bases for the eventual phase out of the STA program currently mandated by Item I.A.1.1 of NUREG-0737. In order to facilitate your review of this long term STA program, a summary discussion of the current Commonwealth Edison STA program, previously documented in References 1 through 6, is provided.

References 1, 2, 3 and 6 describe the Commonwealth Edison STA program, whereby a technical graduate licensed at the senior reactor operator (SRO) level is intended to be provided on each shift at all times when a nuclear unit is in power operation, startup or hot shutdown. Candidates for this shift position, termed Station Control Room Engineer (SCRE), were selected and training was initiated in conformance with the guidance of NUREG-0578 and its early clarification statements. Reference 4 delineates the status of training of the SCRE candidates at each of the Commonwealth Edison licensed facilities as well as LaSalle County Station for which an operating license is expected to be issued in 1981. Reference 5 describes our program for fulfilling the NUREG-0737 Item I.A.1.3 requirement of an SRO in the control room by July 1, 1982 for all currently licensed facilities and prior to fuel loading for NTOL plants such as LaSalle County Station. As was indicated in Reference 5, Commonwealth Edison will satsify the requirement for a control room SRO through use of the SCRE, who will also be qualified as an STA. Further, it is our intent to allow the SCRE to be replaced in the control by any other SRO on shift so long as the SCRE is within 10 minutes of the control room. This will allow the SCRE the flexibility for in-plant observations from time to time although the SCRE will function, for the most part, in the control room.

Again, summarizing previous submittals, it has been the objective of Commonwealth Edison to place qualified and fully trained SCREs on shift by June 1, 1981 at each of the licensed nuclear facilities and prior to fuel loading at LaSalle County Station. This objective will be achieved provided the candidates successfully complete the NRC requirements for an SRO license. In the case of the currently licensed facilities (Dresden, Quad Cities, and Zion) failure of a SCRE candidate to fulfill the SRO license requirements by June 1, 1981 will result in substitution for the SCRE by either augmented trained SROs who are qualified by means of the training program described in Reference 2 or technical graduates qualified as STAs by means of the training program previously used for this purpose. The LaSalle County STA contingency plan has been reviewed by the NRC Staff and accepted in the NRC Safety Evaluation

Report for LaSalle County (NUREG-0519). It should be emphasized that for the operating plants, it is not expected that substitutions for the SCRE will be required for any significant length of time, if at all. However, it was judged necessary to provide for such a contingency until the results of SRO licensing exams scheduled prior to June 1, 1981 are known.

The posssibility of not having all SCRE candidates licensed at the SRO level by June 1, 1981 would also impact the ability to have an SRO in the control room of the currently licensed facilities. This is particularly true of Quad Cities Station, which has a limited number of licensed SROs available, compared to Dresden and Zion Stations, for which adequate backup SROs are currently available. However, as has been previously stated, this requirement need not be fulfilled until July 1, 1982.

The Commonwealth Edison SCRE Program is intended to fulfill from the outset the NUREG-0737 Long Term STA requirement. In this regard, it is the intention of Commonwealth Edison to provide two SROs on each shift in addition to the STA who is also expected to be licensed at the SRO level, and that the STA (identified previously as the SCRE) is intended to function as the SRO in the control room during normal plant operation.

The selection criteria to be used in identifying future SCRE candidates are discussed in Attachment 1 of this letter. These criteria are developed in a way that the educational and management qualifications of each prospective candidate is evaluated in light of the guidance provided by the NRC prior to acceptance in the SCRE Program. Minor deficiencies identified during this screening process will not disqualify a candidate if it is clear that training to be provided in the SCRE program will resolve those deficiencies. Other factors not specifically addressed in the NRC criteria such as naval reactors training or other nuclear industry experience, may also contribute to a prospective candidate's qualifications.

The long term training to be implemented for the SCRE Program is discussed in Attachment 2 of this letter, which includes a detailed comparison between the Commonwealth Edison SCRE Program and the program outline proposed by the Institute of Nuclear Power Operations (INPO). Also discussed in this attachment is the SCRE requalification program, which has been developed to assure the maintenance of technical proficiency of all candidates once they have demonstrated their qualification to go on shift.

Based on our experience to date with selecting and qualifying technical graduates to fill SCRE positions, and the long

term requalification training designed to maintain proficiency, it is judged that an STA contingency program must also be implemented to supplement the SCRE Program. There are now a limited number of SCREs currently in the program at our licensed facilities. Because the STA requirement will in the near future be a technical specification requirement (see References 7 and 8), the loss of a Commonwealth Edison SCRE will result in a potential replacement problem. Unless a technical graduate with acceptable STA qualifications is provided to fill in for the SRO-qualified SCRE, unit operation would be precluded. Therefore, although we do not anticipate the regular use of alternates (who would only be qualified to serve as STA and not as the SRO in the control room), their existence as a fallback measure is essential in the event of an unforseen SCRE shortfall. The training for alternate STAs is discussed in Attachment 3 of this letter. This program will be implemented for Dresden, Quad Cities, and Zion Stations, and is similar to that previously described for LaSalle County Station (Reference 6). The technical specifications previously submitted must be modified to accommodate the potential utility of the alternate STA. Absent the SCRE, another SRO on shift will assume control room command.

At this point it is worth reviewing the bases upon which Commonwealth Edison has concluded that the SCRE program not only satisfies the long term requirements for an STA defined in NUREG-0737 Item I.A.1.1 but also provides the integration of the STA and Control Room SRO functon to be required at all operating plants by July 1, 1982.

In previous discussions with the NRC Staff on the subject of the SCRE program, considerable discussion inevitably revolves around the ability of the SCRE to perform both a line supervisory function as an SRO in the control room and the accident assessment function of the STA as defined by the NRC. The concern is that the STA, in the NRC view, should be "detached" from the normal operating crew, in order to provide a better advisory role during a transient.

As has been stated, the minimum shift manning planned for the two unit, single control room plants is three SROs (a Shift Supervisor, a SCRE (STA), and a Shift Foreman). The SCRE would report to the Shift Supervisor and directly supervise the Shift Foremen and the activities in the control room during normal operation. During an abnormal event of sufficient seriousness to require detached technical assessment, the Shift Supervisor will supervise activities in the control room, while the SCRE steps back and assumes a role of overview with the specific responsibility of monitoring the maintenance of core cooling and containment integrity. Normal SRO responsibilities that could distract the

SCRE/STA during such an event, e.g. balance of plant operation, radwaste, emergency plan implementation, etc., would be transferred at that point to the Shift Supervisor.

The approach being implemented has the potential of causing the SCRE/STA to be distracted by command functions and balance of plant concerns carried over from his role during normal operations. However, with proper discipline and appropriate procedures for turnover of the command function, the SCRE/STA will focus his attention on those items of relevance to safety. In essence, the SCRE becomes a Shift Technical Advisor with special qualifications that offset concerns regarding detachment from operations or potential distractions associated with his normal operating command function.

These special qualities that offset the NRC-expressed concerns which have in fact been endorsed by the NRC in NUREG-0519 are:

(a) By serving as the control room SRO, the STA would have an immediate and first-hand knowledge of the status of the plant and of the situation and activities that preceded an emergency. This should substantially enhance his ability to evaluate the situation and make appropriate recovery action recommendations.

(b) The additional technical qualifications required of an STA should substantially increase the control room SRO's understanding of the technical basis and limits for the design and operation of the plant systems. This should lessen the possibility that an emergency situation will arise.

(c) The additional operational training qualifications required of an SRO and the additional experience that will be gained by working as an SRO should substantially enhance the STA's ability to provide good advice in an emergency situation.

(d) By serving as the control room SRO, the STA will typically be available in the control room.

(e) An additional SRO (plant SRO) is available on shift during normal operations.

The benefits of a program like the SCRE program are recognized in the statement in NUREG-0737 that "the need for the STA

position may be eliminated when the qualifications of the shift supervisors and senior operators have been upgraded and the man-machine interface in the control room has been acceptably upgraded." The SCRE program discussed above will tend to provide long-term upgrading of the qualifications of shift management personnel.

Considerable effort has been expended within both the NRC and the nuclear industry relative to upgrading the technical competence of the shift crew. Much of this work took place after Commonwealth Edison first developed its SCRE Program in September, 1979. The essence of this effort is embodied in Regulatory Guide 1.8 (dated September, 1980) and ANS 3.1, "Standard for Selection, Qualification and Training of Personnel for Nuclear Power Plants," (dated October 23, 1980). Commonwealth Edison concurs with the position outlined in ANS 3.1 that the STA can be phased out as soon as two SROs on-shift at a two unit, single control room plant have received the upgraded training delineated in that document. It is of paramount importance that a career path "up through the ranks" to the shift supervisor position be maintained for non-degreed personnel. A requirement for a degreed shift supervisor is not necessary and is in fact excessive where adequate technical training for the shift crew can be demonstrated. The considerable discussion still in progress on this subject and the ultimate resolution of the issue must consider all views and not focus on individual utilities which could result in an unworkable resolution. Until this issue is finally resolved, Commonwealth Edison will implement the SCRE Program with the understanding that future changes may result when the industry position is finalized. This program will not be revised, however, without providing prior notice to the NRC Staff.

If there are any questions in this regard, please direct them to this office. One (1) signed original and ninety-nine (99) copies of this transmittal are provided for your use.

Very truly yours,

J. S. Abel
Director of
Nuclear Licensing

Attachments
cc: RIII Inspector - Dresden
RIII Inspector - Quad Cities
RIII Inspector - Zion
RIII Inspector - LaSalle County
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ATTACHMENT 1

SCRE SELECTION CRITERIA

Like any training program, the SCRE Program is designed around the assumption of certain trainee prerequisites. These are necessary both as job prerequisites and as background to assure success in training. The limited rate at which SCREs will be qualified makes rigid, prescribed selection criteria unnecessary and undesirable, since there is adequate opportunity for case-by-case consideration. There is still the need, however, to lay out general guidelines by which to conduct the case-by-case selection process.

SCRE SELECTION GUIDELINES

1. The candidate must possess a technical degree, that is, a degree in an engineering or science field. Examples of acceptable fields are: Biology, Chemistry, Computer Science, Environmental Science, Mathematics, Physics, Chemical Engineering, Civil Engineering, Electrical Engineering, Mechanical Engineering, Nuclear Engineering.

2. For candidates with degrees other than Mechanical Engineering or Nuclear Engineering, a careful study of courses taken will be made to identify demonstrated competence in college level mathematics, physics, and chemistry. To identify such competence, consideration will be given to the grade received and the reputation of the college or university for strength in the scientific or engineering field.

3. For candidates with considerable company experience, evaluation of work performed or training completed at the company may be utilized in conjunction with or in lieu of evaluation of past academic performance to identify demonstrated competence in college level mathematics, physics, or chemistry.

ATTACHMENT 2

SCRE TRAINING PROGRAM

The following outline describes the SCRE post-SRO Training Program, which is designed to complete the training of an individual who has a technical degree and has completed Senior Reactor Operator training. Depending on the type of technical degree held, some individuals may not require some of the modules in the engineering area, and the requirement for such modules will be waived.

The first modules to be developed in this program were those that enabled the trainees to satisfy the NRC STA training requirements, plus others that were deemed essential to the effectiveness of the SCRE. Developement of the remainder of the program is continuing at present, and modules will be administered as they are developed to on-shift SCREs through the requalification program. When all modules have been fully developed, and appropriate long-term scheduling arrangements can be secured with the universities involved, the "SCRE pipeline" program will be put into effect, whereby the modules of the SCRE Post-SRO Training Program will be restructured around and integrated with the SRO training. The purpose of the SCRE Pipeline will thus be to develop an individual with a technical degree into a fully-trained SCRE.

Consideration is also being given to individuals who are working toward, but have not yet obtained, a technical degree. We intend to seek accreditation for parts of the SCRE Pipeline program so that such individuals, provided they enter the program with appropriate prerequisites, will be able to complete their degree requirements while in the program. At the time that we institute such a scheme, we will revise the SCRE selection guidelines accordingly.

STATION CONTROL ROOM ENGINEER

POST-SRO TRAINING PROGRAM

I. Management
II. Engineering
III. Administration
IV. Assessment and Response

COMMONWEALTH EDISON COMPANY
PRODUCTION TRAINING DEPARTMENT

REV. 0

I. MANAGEMENT (128 hours)

I.A. Job Description
1. shift organization and responsibilities
2. SCRE
   a. responsibility
   b. authority
   c. accountability
   d. interfaces
3. expected routine

I.B. Supervision
1. basic supervisory skills
2. management by objectives
3. communication and motivation

I.C. Human Behavior Under Stress
1. the bi-modal model of the mind
2. effects of stress on behavior
3. identification of behavior problems/tracking
4. mitigating stress-induced behavior problems

I.D. Rational Situation Management
1. situation appraisal
2. problem analysis
3. decision analysis

II. ENGINEERING (216 hours, some optional)

II.A. Materials Science
1. strength of materials
2. structural materials (SS, carbon steel, Zr, concrete)
   a. properties
   b. applications
   c. typical modes of degradation and failure

II.B. Electrical Engineering
1. electronics
   a. circuit analysis
   b. frequency response
   c. transducer fundamentals
   d. transistor circuits
   e. operational amplifier characteristics
   f. operational amplifier applications
2. control systems theory
   a. basic control principles
   b. dynamic systems
   c. transfer functions for dynamic systems
   d. stability of control systems
   e. quality of control systems

II.C. Plant Instrumentation and Control Technology
1. nuclear instrumentation
   a. design, function
   b. signals, electronic calibration
   c. limitations, failure modes
2. process instrumentation
   a. design, function
   b. signals, limits, action levels
   c. limitation, failure modes
3. plant control systems

II.D. Light Water Reactor Engineering
1. atomic and nuclear physics review
   a. fission and other nuclear reactions
   b. neutron cross sections
2. neutron moderation and diffusion
   a. neutron spectra in inside media
   b. introduction to neutron streaming and diffusion
   c. neutron diffusion in one energy group
   d. neutron diffusion in two energy groups
3. reactor statics
   a. multipliction and criticality
   b. analysis of bare reactors
   c. control rods and reflectors
   d. temperature and power coefficients

4. core heat transport
   a. LWR design features and constraints
   b. fission energy
   c. heat generation and removal
   d. heat conduction equation and solutions
      1) steady state
      2) transient
   e. fuel element heat transport
      1) steady-state
      2) thermal, material, and mechanical considerations
   f. convective heat transport
      1) single phase coolant
      2) boiling and two-phase coolant
5. steady state thermal design considerations
6. transient analysis
7. design basis vs. accident events
8. reactor dynamics
   a. delayed neutrons and reactor kinetics equations
   b. kinetics with feedback
   c. reactivity feedback and control
   d. fuel depletion
   e. power transients

II.E. Station Nuclear Engineering (BWR only)

1. station nuclear engineer responsibilities
2. reactor power measurement; energy accounting
3. core power distribution measurement; instrument calibration data
4. criticality predicton and verification
5. startup and power testing
6. control rod withdrawal sequence fundamentals, admin controls
7. general and localized reactor power response
8. startup concerns: rod drop, short period
9. operational concerns: PCI
10. thermal limits calculation, evaluation: LHGR, MAPLHGR, MCPR, LTPF
11. cycle management and fuel warranty
12. nuclear materials accountability

III. ADMINISTRATION (44 hours)

III.A. Federal Regulations and Regulatory Guides

III.B. Industrial Codes and Standards
1. ANSI
2. ASME

III.C. Facility FSAR

III.D. Facility License
1. format
2. technical specifications
3. reload license submittals

III.E. Policies, Procedures, Orders, Instructions
1. Company operating policy
2. Company procedures, orders, and instructions
   a. authority
   b. mechanisms for issuance, revision, cancellation
3. station procedures, orders, and instructions
   a. authority
   b. mechanisms for issuance, revision, cancellation
4. examples

III.F. CECo Radiation Control Standards

III.G. CECo Security Plan

III.H. CECo Nuclear Fire Protection Program

III.I. CECo Quality Assurance Program

IV. ASSESSMENT AND REPONSE (56 hours)

IV.A. Communications Equipment and Methods
- 1. equipment
- 2. protocol

IV.B. Generating Stations Emergency Plan
- 1. generic program
- 2. site-specific program

IV.C. Abnormal Operating Events
- 1. classroom session
  - a. situation appraisal review
  - b. problem analysis/decision analysis review
  - c. adverse consequence consideration/prioritization
- 2. simulator exercises
  - a. multiple failures
  - b. operator errors
  - c. different roles for trainees
    - 1) SCRE
    - 2) NSO
    - 3) extra NSO
  - d. realtime practice and critique of assessment and response

IV.D. Radiation Occurrences

IV.E. Security Incidents

IV.F. Fires

REQUALIFICATION PROGRAM

The SCRE Requalification Program content will consist of topics drawn from the SCRE Training Program by the application of two critieria:

1) Topics in which skills and knowledge are expected to diminish due to infrequent or incomplete application on the job;

2) Topics which have changed in content due to changes in plant configuration, company policy, regulations, or technological advance.

The time frame for requalification in topics identified by the application of the first criterion will be based on the rate at which skills and knowledge are expected to diminish, and the expected impact such diminishment would have an safe and efficient plant operation.

For topics identified by application of the second criterion, the time frame will be based on the time of occurrence of the change, with an allowance for lag based on the impact expected on safe and efficient plant operation.

The time frame specified in the current License Requalification Program, if it is more restrictive than that derived from the above, will apply for topics covered by that Program.

Administration of the SCRE Requalification Program, including evaluation criteria and provision for accelerated requalification, will parallel that of the current License Requalificaion Program.

INTERIM REQUALIFICATION PROGRAM

The SCRE Requalification Program will be fully implemented following implementation of the SCRE Pipeline program. Until then, SCRE's will be requalified via the current License Requalification Program, with modifications to specific sections as shown below.

I.A. Reactor Thermal Hydraulics

Lectures for SCREs shall include review of fluid statics, core heat transport, and steady state thermal design considerations.

I.B. Theory of Reactor Design and Operation

Lectures of SCREs shall include review of atomic and nuclear physics, neutron moderation and diffusion, reactor statics (including control rod worths and reactivity coefficients), transient analysis, reactor dynamics, design basis and accident events (including core damage mitigation concepts), reactor dynamics, electronic, and control systems.

I.H. Plant Systems Operation and Control

Lectures for SCREs shall include review of the operation and control of reactor protection systems, plant instrumentation (under both normal and accident conditions), emergency core and containment cooling systems, engineered safeguards, and other related plant systems.

COMPARISON TO INPO GUIDELINES

The following table compares the qualifications, education, and training of Commonwealth Edison SCREs under the previously described program to the recommendations of (INPO GPG-01, Rev. 1).

INPO Recommendation	How Addressed by CECo. SCREs
(6.1.1) Prerequisites Beyond H.S. Diploma	SG
(6.1.2) College Level Fundamental Education	SG
mathematics thru O.D.E.	SG
reactor theory thru 2-grp diff	Post SRO: II.D
reactor chemistry	Post SRO: II.G
nuclear materials	Post SRO: II.A
thermal sciences	SG & Post SRO: II.D
electrical sciences	Post SRO: II.B
nuc. inst. & control	Post SRO: II.C
nuc. RP & HP	SRO & Post SRO: II.F
(6.2) Applied Fund - Plant Specific reactor technology	SRO & Post SRO: II.E
chem. & corrosion control	SRO
rx instr. & control	SRO
rx plant mat'ls.	SRO
rx plant thermal cycle	SRO
(6.3) Management/Supervisory Skills leadership	Post SRO: I.B
interpers. communication	Post SRO: I.B, IV.A
motivation	Post SRO: I.B
problem & decis. analysis	Post SRO: I.D
command respons. & limits	Post SRO: I.A.
stress	Post SRO: I.C
human behavior	Post SRO: I.C
(6.4) Plant Systems	SRO
(6.5) Administrative Controls resp. for safe op. & shutdown	SRO & Post SRO: III.E
equip. outage & clearance proc.	SRO
use of proc.	SRO & Post SRO: III.E
plant mods.	SRO
shift relief/turnover	SRO
containment access	SRO

maintaining cognizance	SRO & Post SRO:	IV.C
unit interface controls	SRO	
physical security	SRO & Post SRO:	III.G, IV.E
control room access	SRO	
duties/resp. of STA	Post SRO:	I.A
radiological emerg. plan	SRO & Post SRO:	IV.B
CFR	SRO & Post SRO:	III.A
plant tech specs	SRO & Post SRO:	III.D
rad. control instructions	SRO & Post SRO:	II.F, IV.D
(6.6) General Operating Procedures	SRO	
(6.7) Trans/Accident Anal & Emerg. Response		
trans/accident anal	SRO & Post SRO:	II.D
abnormal & emerg. procedures	SRO & Post SRO:	IV.C
(6.8) Simulator Training	SRO & Post SRO:	IV.C

ATTACHMENT 3

PROGRAM FOR ALTERNATE STA

The following critieria shall apply to personnel utilized as contingency substitutes for SCREs (in the event of incidents of SCRE unavailability that cannot prudently be handled with schedule modifications).

1. General Technical Education

Contingency substitutes will possess engineering degrees.

2. Reactor Operations Training

Contingency substitutes will have had a minimum of two weeks training in plant systems design and operation, including training on:

- core instrumentation and thermal limits
- reactor vessel and internals
- process instrumentation and control
- ECCS systems
- electrical distribution

3. Transient and Accident Response Training

Contingency substitutes will have spent a minimum of three days at a training simulator where they will have observed the symptoms of, assessment of, and response to various operational casualties, as well as normal plant startup and shutdown.

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