UNION ELECTRIC COMPANY
CALLAWAY PLANT

December 30, 1981

MAILING ADDRESS:
P.O. BOX 620
FULTON, MO. 65251

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C. E. Norelius
Nuclear Regulatory Commission - Region 3
Office of Instection and Enforcement
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Mr. Norelius:

CALLAWAY SHIFT TECHNICAL ADVISOR TRAINING AND EDUCATION

Union Electric is currently using the Institute of Nuclear Power Operation (INPO) "Recommendation for Position Description, Qualifications, Education and Training" for "Nuclear Power Plant Shift Technical Advisor" document #GPG-01 as a guide in developing education and training programs for Shift Technical Advisor (STA).

Those individuals currently identified as STA have sufficient previous college education to meet or exceed the course work lested in section 6.1.1 "prerequisites Beyond High School Diploma" of the INPO document.

To meet the suggested "College Level Fundamental Education" described in section 6.1.2 we are currently contracting with the University of Missouri - Columbia (UMC), Nuclear Engineering Department to provide the following courses:

I. Nuclear Sciences	Credit Hours	Course Contents
A. Reactor Theory		
1. NE 346, Intro, to Nuclear Reactor Engineering I (Reactor Physics)	(3)	Nuclear reactions and radiations; neutron diffusion and slowing down; steady state and time dependent theory; reactor control; energy removal.
2. NE 409, Interaction of Radiation with matter (Nuclear Physics)	(3)	Theory/Applications of radiation interaction processes, reviews nuclear physics concepts; radioactive decay; sources/spectra of ionizing radiations, collision mechanisms for charged particles electromagnetic radiation, neutron for interaction with matter.

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B.	NE 341, Nuclear Chemical Engineering	(3)	Principles and processes of importance in the field of nuclear technology.
C.	NE 349, Nuclear Engineering	(3)	Properties of materials for reactor components; radiation damage and corrosion; metallurgy of reactor materials.
D.	NE 391, Nuclear Radiation Detection	(3)	Principles and application of radiation detectors and analyzers. Reactor instrumentation; reactivity control and feedback.
E.	NE 303, Radiation Safety	(3)	Types and orgins of radioactivity; radiation detection and measurements; Radiation interaction; shielding; biological effects; dose calculations; federal, state and local regulations.
F.	NE 306, Engineering Analysis	(3)	Applies ordinary and partial differntial, equations to engineering problems; fourier's series; determinants and matrices; laplace transforms; analog computer techniques.

II. Nuclear Thermosciences

A.	NE 365, Nuclear Power Generation (Thermo)	(3)	Nuclear Reactor heat generation and removal; nuclear reactor coolants; analysis of nuclear reactor power power plants; laws of thermodynamics, properties of water and steam, steam cycles and efficiency.
B.	NE 347, Introduction to Nuclear Engineering (Fluid Mechanics)	(3)	Introduction to fluid mechanics; Bernoulli's equation; fluid friction and head loss; pump and system characteristics; two phase flow; reactor fuel and other materials; safety; shielding, structural components; system design; economics.
C.	NE 357, Nuclear Heat Transport	(2)	Principals of heat transfer in nuclear reactors; brief theory of flow coast down and convective heat transfer loop experiments on flow force convection heat transfer, boiling heat transfer; heat exchangers.

III. Electrical Sciences

A. EE 301, Problems	(1)	Review of basic electric circuit analysis, circuit elements, 3 phase systems and power calculations; intorduction to control and digital systems.
B. EE 266, Power Systems	(3)	Magnetic circuitry in general and in machinery; transformer circuits; synchronous machine theory, applications; basic principles of energy conversion; power transmission and control.

After investigation of current industry, government and academia recommendation for STA training, the above courses were developed and recommended by UMC Nuclear Engineering Department, in cooperation with the Callaway Training Department. These courses supplemented with previous college education will meet or exceed the INPO guideline.

The areas of training listed in sections 6.2 "Applied Fundamentals - Plant Specific" and 6.4 "Plant Systems" will be provided by the Callaway Training Department and will be equivalent Phase I and Phase II training for Licensed Operators.

The Callaway Training Department is presently discussing possible programs, with local universities and various vendor, to provide the STA with training described in sections 6.3 "Management/ Supervisory Skills" and 6.7 "Transient/Accident Analysis and Emergency Procedures". The training provided in these areas will closely approximate INPO suggestions.

Training described in sections 6.5 "Administrative Controls" and 6.6 "General Operating Procedures" will be developed and presented by the Callaway Training Department. The appropriate sections of the INPO document will be used as guidelines in the development.

The Callaway Simulator is presently being installed and tested. It will be used to provide the type of training delineated in section 6.8 "Simulator training". Again, the INPO document will be used as a guideline in developing the training.

It is not Union Electric's intention to match hour for hour the training and education described in INPO document #GPG-01, since it is only a guideline. But, more importantly, it is our intention to provide sufficient content to meet or exceed the intent (safe and efficient operation of the Callaway Plant) of the document.

P. T. Appleby

AEW/cet

cc: Al Passwater
MAS
SEM
Jim Peschal
T56.14

UNIVERSITY OF MISSOURI-COLUMBIA

College of Engineering

Nuclear Engineering

1026 Engineering
Columbia, Missouri 65211
Telephone (314) 882-3550

October 12, 1981

Donald Schnell
Vice President for Nuclear Operations
Union Electric Company
St. Louis, MO 63103

Dear Don:

Following the completion of the proposals for the SRO-STA Education Program the University will present at the Callaway Plant, we asked for a review of the proposals by the Institute of Nuclear Power Operations. The enclosed letter has been received from E. L. Thomas indicating that the proposed courses meet the intent of the INPO guidelines for STA. This information may be of interest to you.

We are looking forward to beginning the Education Program on October 26 and will welcome your suggestions on that program as it continues through the year.

Sincerely,

Walter Meyer
Professor and Chairman
Nuclear Engineering

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Enclosures

cc: W. R. Kimel, Dean
SRO-STA Program Faculty

Institute of
Nuclear Power
Operations

1820 Water Place
Atlanta, Georgia 30339
Telephone 404 953-3600

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September 14, 1981

Mr. W. R. Kimel, Dean
University of Missouri-Columbia
Office of the Dean
1010 Engineering Building
Columbia, Missouri 65211

Dear Bill:

We have reviewed your Nuclear Engineering Department's proposal to Union Electric Company for an educational program for Senior Reactor Operators and Shift Technical Advisors. The program outlined meets the intent of the INPO guidelines for STA's. We noted your approach to developing mathematical skills of the participants and believe it will be effective.

If we may be of further assistance, please advise.

Sincerely,

E. L. Thomas
Director
Training and Education Division

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