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RELATED CORRESPONDENCE

PACIFIC GAS AND ELECTRIC COMPANY

PG&E

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February 13, 1981

Mr. Frank J. Miraglia, Jr., Chief
Licensing Branch No. 3
Division of Licensing
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Re: Docket No. 50-275
Docket No. 50-323
Diablo Canyon Units 1 and 2

Dear Mr. Miraglia:

The following information is submitted in response to a request by the NRC staff:

1. Shift Technical Advisor (I.A.1.1)

Currently, Diablo Canyon Power Plant (DCPP) has three personnel designated as Shift Technical Advisors (STA) and two designated backup STAs. All personnel have completed a 26-week Westinghouse STA Training Program and satisfy the qualifications and training requirements of the October 30, 1979 letter. A description of the Westinghouse program is attached. Current plans call for STAs to attend requalification programs with license personnel. However, a separate STA requalification program, including simulator training, is being investigated.

For long-term STA training, PGandE Nuclear Plant Administration Procedure, NPAP B-103, details STA selection criteria, qualifications and training requirements. Presently, proposals from three contractors are being evaluated for STA training programs to be conducted at DCPP and an appropriate simulator facility. All three proposed programs have been compared with the INPO document, "Nuclear Power Plant Shift Technical Advisor - Recommendation for Position Description, Qualification, Education and Training" and found to satisfy the recommended guidelines. Current plans are to purchase one of

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RELATED CORRESPONDENCE

these programs and begin training four or more personnel as STAs around March or April 1981.

The STA will report functionally and administratively to the Operations Engineering Senior Power Production Engineer.

2. Shift Manning (I.A.1.3)

Thirty-five cold license candidates are in training at DCPP. Ten are management and training personnel, all of whom will take the Senior Reactor Operator Examination. Six are Shift Foremen who will take the Senior Reactor Operator examination. Of the remaining 19, 12 are expected to take the Senior Reactor Operator examination and 7 are expected to take the Reactor Operator examination.

3. Corporate Organization (I.B.1)

The Supervisor of Chemistry and Radiation Protection and his backup will be ANSI 18.1 and Regulatory Guide 1.8 qualified.

4. Immediate Upgrade of RO and SRO Training and Qualifications (I.A.2.1)

The experience of each candidate for the Senior Reactor Operator and Reactor Operator examination is documented in the individual's application for examination which is dated January 23, 1981 and has been submitted to the NRC. This information shows that each individual meets or exceeds the experience requirements.

Formal training for each candidate has included classroom instruction and simulator training. Classroom subjects taught at DCPP include (1) Introduction to Nuclear Power, (2) Reactor Theory, (3) Heat Transfer, Fluid Flow and Thermodynamics, (4) Mitigation of Degraded Core Damage, (5) Plant Systems, (6) Plant Procedures, and (7) Radiation Protection. As discussed in our letter of January 26, 1981 from Philip A. Crane to Frank J. Miraglia, Item II.B.4, operator training has begun in the areas of incore instrumentation, excore instrumentation, primary chemistry, and thermocouples.

The amount of participation in these classroom subjects has been from several to several hundred hours, depending on the individual's background. All candidates have participated in simulator training at the Zion simulator. For information, summary of this training is shown in the table.

5. Dissemination of Operating Experience (I.C.5)

PGandE will either revise NPAP W-100 or write new procedures to assure that operating experience is disseminated to the entire plant staff as appropriate. In addition, PGandE will provide a positive means to assure that operating experience is incorporated into both the training and requalification programs.

6. Administration of Training Programs (I.A.2.3)

The onsite operator training instructors who teach systems, integrated responses, transient and simulator courses, will demonstrate senior reactor operator qualifications. Their SRO applications were sent to the NRC on January 23, 1981. These instructors are expected to take their license examinations in February-March 1981.

7. Final Recommendations of the B&O Task Force (II.K.3)

The following are PGandE's responses to several of the B&O Task Force's final recommendations.

A. Report on Overall Safety Effect of Power-Operated Relief Valve (II.K.3.2)

The Westinghouse Owners Group is in the process of developing a report (including historical valve failure rate data and documentation of actions taken since the TMI-2 event to decrease the probability of stuck-open PORV) to address the NRC concerns of Item II.K.3.2. This report is scheduled for submittal to the NRC on March 1, 1981, as required by the NRC. This report will be used to support a decision on the necessity of incorporating an automatic PORV isolation system as specified in Task Action Item II.K.3.1.

B. Reporting PORV and SV Failures and Challenges (II.K.3.3)

As stated in the letter of January 26, 1981, once Diablo Canyon has received its full power operating license, PGandE will promptly report to the NRC any failure of a PORV or SV to close. PGandE Procedure NPAP-C-12 provides for these reporting requirements. In addition, when Diablo Canyon has received a full power operating license, PGandE will report on an annual basis any challenges to the PORVs or the SVs.

C. Automatic Trip of Reactor Coolant Pump During LOCA (II.K.3.5)

PGandE's response to IE Bulletin 79-06C indicated that automatic reactor coolant pump trip is not necessary, as sufficient time is available for manual trip of the RCPs. This information is provided in WCAP-9584.

D. Report on Outages of Emergency Core-Cooling Systems (II.K.3.17)

Prior to ascension to full power, PGandE will provide the NRC staff a plan for data collection relating to outages of ECCS components. The plan will address details on ECCS equipment outages and will include as a minimum:

(1) outage dates and duration

(2) cause of outage (including test and maintenance)

(3) ECCS components involved in the outage

(4) corrective action taken

E. Effect of Loss of Alternating Current Power on Pump Seals (II.K.3.25)

Power to component cooling water pumps which provide cooling water to the reactor coolant pump thermal barriers is supplied from vital buses which have emergency on-site backup power. The containment isolation valves involved are water operated and also have emergency on-site backup power. We believe that this design satisfies the concern expressed in this item.

F. Revised Small-Break LOCA Methods to Show Compliance with 10CFR50, Appendix K (II.K.3.30)

WCAP 9600, the present small-break evaluation used by Westinghouse to analyze Diablo Canyon, is in conformance with 10CFR50, Appendix K. However, Westinghouse has indicated to the Westinghouse Owners Group that they will address the specific items contained in NUREG-0611 in a model change, scheduled for completion in January 1, 1982.

Further information will be provided in the attached addendum.

Very truly yours,

Philip A. Crane, Jr.

Enclosure
CC w/enc.: Service List

DCPP LICENSE CANDIDATES	HOURS OF CLASSROOM OR FORMAL INSTRUCTION RECEIVED BY DCPP LICENSE CANDIDATES										
	THEORY									WNTC	WNTC
NAME	Rx	HEAT TRANS.	PLANT SYSTEMS	PLANT PROCEDURES	INTRO. TO NUC. PWR	RAD PROTECTION	MISC.	STA TRAIN	SIMULATOR	PHASE II	PHASE III
AIKEN*	24	53	394.5	98.5	386	164	20.5		7 day (2/80)	400	(88 hrs. simulator) 360
BARTLETT*	119.5	41	601.5	196.5	85	93	37.5		14 day (74) 7 day (78) 3 day (79) 3 day 80)		
BASHAW*	135.5	41	758.5	202	93	118.5	121		14 days (74) 7 days (78) 3 days (79) 3 days (80)		
BEARDEN	22	41	649.75	106	295	66	47.5		7 days (80)	400	(88 hrs. simulator) 360
BOWLES*	24	39	518	127	247.25	67	13		7 days (80)	400	(88 hrs. simulator) 360
BRILEY	22	31	473.25	119.5	198	63	13.5		7 days (80)	400	(88 hrs. simulator) 360
COLE*	108	49	658	198	85.5	102.5	121.5		14 days (74) 7 days (78) 3 days (79) 3 days (80)		
COLLINS*	22	24	576.25	81.25	241	58	30.5		7 days (80)	400	(88 hrs. simulator) 360
CROCKETT*	47	30	206	49		15	35.5	1040 (Completed)	7 days (80)		
DAVIS*	16.5	8	152.5	13		3	4	880 (All but Pittsburgh & simulator)	14 days (80)		
DILBECK*	101.5	33	698.5	186.5	93	98.5	39		14 days (74) 7 days (78) 3 days (79) 3 days (80)		
EWING*	146.5	49	728.5	224	85.5	108.5	106		14 days (74) 7 days (78) 3 days (79) 3 days (80)		
FISHER*	27.5	32	122	13		6	5.5	880 (All but Pittsburgh & simulator)	14 days		
FRIDLEY*	49.5	38	546.5	178	188.5	13	85.5		7 days (78) 3 days (79) 3 days (80)		
GLISCON*	8.5	10.5	200.5	84		19.5	9.5		14 days (74) 7 days (78) 3 days (79) 3 days (80)		
HAUETER*	22	24	498	88	133	50	14.5		7 days (80)	400	(88 hrs. simulator) 360
KAEFER*	1		185.5	89		35	11.5		14 days (74) 7 days (78) 3 days (79) 3 days (80)		
KENSINGER*	16.5	15.5	565.5	117	251	51.5	81.5		7 days (80)	400	(88 hrs. simulator) 360
KOEHLER	32	11.5	939.25	105	335	55	18.5		7 days (80)	400	(88 hrs. simulator) 360

* = SRO candidates

DCPP LICENSE CANDIDATES

HOURS OF CLASSROOM OR FORMAL INSTRUCTION RECEIVED BY DCPP LICENSE CANDIDATES

NAME	THEORY Rx	THEORY HEAT TRANS.	PLANT SYSTEMS	PLANT PROCEDURES	INTRO TO NUC. PWR	RAD PROTECTION	MISC.	STA TRAIN	SIMULATOR	WNTC PHASE II	WNTC PHASE III
LUCO	22	42.5	370.5	79.5	122	34.5	17.5		7 days (80)	400	(88 hrs. simulator) 360
MARTIN*	48.5	24	534.5	140.5	85.5	83	85.5		14 days (74) 7 days (78) 3 days (79) 3 days (80)		
MOLDEN*	30	38	390.5	75.5	162	16	57		31 days (80)		
NAVARRO*	22	41	175	45.5	128	40	21.5		7 days (80)	400	(88 hrs. simulator) 360
NEWMAN	26	8	606	67	231.5	53.5	28.5		7 days (80)	400	(88 hrs. simulator) 360
PATTERSON*			72.5	16.5			5.5		14 days (74) 7 days (78) 3 days (79) 3 days (80)		
PAULSON	1.5	16	442	90.5	171	59.5	12.5		7 days (80)	400	(88 hrs. simulator) 360
PRICE*	22	26.5	245.5	52.5		14.5	4		21 days		
RAAB*	26	39.5	157	38.5	63.75	15	20		7 days (80)	400	(88 hrs. simulator) 360
ROOS*	26	24	344	42.5	80	18.5	5.5		21 days		
SEXTON*	44	24	288	55.5	9	23	100.5		7 days (78) 3 days (79) 3 days (80)		
SCHULZE*	115	30	661.5	153.5	62	98.5	118		14 days (74) 7 days (78) 3 days (79) 3 days (80)		
SMITH	46	49	590.5	81	173	58.5	69		21 days		
SUNDQUIST*	75	30	672	196.5	85.5	96	118		14 days (74) 7 days (78) 3 days (79) 3 days (80)		
WHITE*	71	49	695.5	174	85.5	104.5	109.5		14 days (74) 7 days (78) 3 days (79) 3 days (80)		
WILLIAMS*		24	649	119	220	47.5	14		7 days (80)	400	(88 hrs. simulator) 360

* = SRO candidates

"FOR INFORMATION ONLY"

Attachment: Description of STA Training

ONSITE INSTRUCTION SCHEDULE

MONDAY	8:00 - 12:00	SELF STUDY
	12:00 - 12:30	LUNCH
	12:30 - 1:00	SELF STUDY
	2:30 - 4:30	SITE INSTRUCTOR ADMINISTER W EXAMS
TUESDAY	8:00 - 9:00	EXAM REVIEW
	9:00 - 12:00	INSTRUCTION
	12:00 - 12:30	LUNCH
	12:30 - 4:30	INSTRUCTION
WEDNESDAY	8:00 - 10:00	INSTRUCTION
	10:00 - 12:00	SELF STUDY/TUTORING
	12:00 - 12:30	LUNCH
	12:30 - 4:30	INSTRUCTION
THURSDAY	8:00 - 10:00	INSTRUCTION
	10:00 - 12:00	SELF STUDY/TUTORING
	12:00 - 12:30	LUNCH
	12:30 - 4:30	INSTRUCTION
FRIDAY	8:00 - 12:00	SELF STUDY
	12:00 - 12:30	LUNCH
	12:30 - 4:30	SELF STUDY

SHIFT TECHNICAL ADVISOR TRAINING SCHEDULE

WEEKS 1-4 (March 3 - March 28)	REACTOR THEORY REACTOR KINETICS PWR CORE PHYSICS
WEEKS 5 & 6 (March 31 - April 11)	HEAT TRANSFER FLUID FLOW THERMODYNAMICS
WEEKS 7-20 (April 14 - July 18)	DETAILED PLANT LECTURE SERIES -
WEEKS 21 & 22 (July 30 - August 12)	SIMULATOR TRAINING (ZION, ILLINOIS)
WEEKS 23 & 24 (August 18 - August 29)	HEALTH PHYSICS PLANT CHEMISTRY
WEEKS 25 & 26 (September 29 - Oct. 10)	ACCIDENT ANALYSIS AND NUCLEAR DESIGNS

PG&E Diablo Canyon STA Program

INSTRUCTOR - Don Scheef

WESTINGHOUSE NUCLEAR TRAINING CENTER

WEEK 1 WEEK OF 3/3/80 FUNDAMENTAL NUCLEAR REACTOR TRAINING

	MONDAY 3	TUESDAY 4	WEDNESDAY 5	THURSDAY 6	FRIDAY 7
0800		PROGRAM INTRODUCTION	A-3 NUCLEAR PHYSICS	A-4 INTERACTION OF RADIATION WITH MATTER	
1000		BASIC PWR ORIENTATION		A-5 NEUTRON PHYSICS	
1200	L	U	N	C	H
1230		A-2 BASIC STRUCTURE & PROPERTIES OF MATTER			
1430			A-4 INTERACTION OF RADIATION WITH MATTER		
1630					

PG&E Diablo Canyon STA Program

INSTRUCTOR - Don Scheef

WESTINGHOUSE NUCLEAR TRAINING CENTER

WEEK 2 WEEK OF 3/10/80 FUNDAMENTAL NUCLEAR REACTOR TRAINING

	MONDAY 10	TUESDAY 11	WEDNESDAY 12	THURSDAY 13	FRIDAY 14
0800		A-5	A-7 NEUTRON KINETICS	A-8 SUBCRITICAL REACTOR THEORY	
1000		A-6 REACTOR PHYSICS			
1200	L	U	N	C	H
1230		A-6 REACTOR PHYSICS	A-7 NEUTRON KINETICS	B-2 PHYSICAL CORE STRUCTURE	
1630					

PG&E Diablo Canyon STA Program
INSTRUCTOR - Ron Buchholz

WESTINGHOUSE NUCLEAR
TRAINING CENTER

WEEK 3 WEEK OF 3/17/80 FUNDAMENTAL NUCLEAR REACTOR TRAINING

MONDAY 17	TUESDAY 18	WEDNESDAY 19	THURSDAY 20	FRIDAY 21
	EXAM REVIEW B-0 INTRODUCTION TO B MODULE	B-1 INTRODUCTION TO PWR CONTROL	B-3 INHERENT REACTIVITY EFFECTS	
L	U	N	C	H
A MODULE EXAM	B-1 INTRODUCTION TO PWR CONTROL	B-3 INHERENT REACTIVITY EFFECTS	B-3 INHERENT REACTIVITY EFFECTS	

PG&E Diablo Canyon STA Program

INSTRUCTOR - Barry Tumblin

WESTINGHOUSE NUCLEAR TRAINING CENTER

WEEK 4 WEEK OF 3/24/80 FUNDAMENTAL NUCLEAR REACTOR TRAINING

	MONDAY 24	TUESDAY 25	WEDNESDAY 26	THURSDAY 27	FRIDAY 28
0800		B-4 FISSION PRODUCT POISONING REACTIVITY EFFECTS	B-5 CHEMICAL SHIM CONTROL B-6 CONTROL ROD REACTIVITY EFFECTS	B-7 ECC & SHUTDOWN MARGIN CALCULATIONS	
1200	L	U	N	C	H
1230		B-4 FISSION PRODUCT POISONING REACTIVITY EFFECTS	B-6 CONTROL ROD REACTIVITY EFFECTS	B-7 ECC & SHUTDOWN MARGIN CALCULATIONS	
1430		B-5 CHEMICAL SHIM CONTROL		B-8 HEATUP AND STARTUP CONSIDERATIONS	
1630					

PG&E Diablo Canyon STA Program

INSTRUCTOR - Dave Ferg

WESTINGHOUSE NUCLEAR TRAINING CENTER

WEEK 5 WEEK OF 3/31/80 FUNDAMENTAL NUCLEAR REACTOR TRAINING

MONDAY 31	TUESDAY 1	WEDNESDAY 2	THURSDAY 3	FRIDAY 4
	EXAM REVIEW	D-1 THERMODYNAMICS - FUNDAMENTALS	D-2 THERMODYNAMICS - APPLIED	
	B-9 PWR CORE OPERATIONAL CONSIDERATIONS			
L	U	N	C	H
B MODULE EXAM	B-9 PWR CORE OPERATIONAL CONSIDERATIONS	D-2 THERMODYNAMICS - APPLIED	D-3 HEAT TRANSFER	
	D-1 THERMODYNAMICS - FUNDAMENTALS			

PG&E Diablo Canyon STA Program

INSTRUCTOR - Dale Van Beek

WESTINGHOUSE NUCLEAR TRAINING CENTER

WEEK 6 WEEK OF 4/7/80 FUNDAMENTAL NUCLEAR REACTOR TRAINING

	MONDAY 7	TUESDAY 8	WEDNESDAY 9	THURSDAY 10	FRIDAY 11
0800		D-3 HEAT TRANSFER	D-4 FLUID FLOW	D-6 CORE THERMAL CONSIDERATIONS	
1200	L	U	N	C	H
1230		D-4 FLUID FLOW	D-5 REACTOR VESSEL CONSIDERATIONS	D-7 INSTRUMENTATION DETECTORS	
1530			D-6 CORE THERMAL CONSIDERATIONS		
1630					

3-25-80

STA PG & E

On Site System Design Series

Week #7 (April 15-17) Instructor: Steinke
A. Reactor Coolant System
B. Reactor Vessel & Internals
C. Core Components & Rod Drive Mechanisms
D. Incore Instrumentation System

Week #8 (April 22-24) Instructor: Halverson
A. Chemical & Volume Control System
B. Reactor Makeup System
C. Boron Recycle System
D. Pressurizer Pressure & Level Control System

Week #9 (April 29-May 1) Instructor: Mowrey
A. Reactor Coolant Pumps & Steam Generators
B. Component Cooling Pumps
C. Residual Heat Removal System

Week #10 (May 6-8) Instructor: Estes
A. Emergency Core Cooling System
B. Containment Spray System
C. Containment Structure & Support Systems
D. Containment Isolation System
E. Iodine Removal System

Week #11 (May 13-15) Instructor: Betts
A. Excore Instrumentation System
B. Full Length Rod Control System
C. Rod Position Indication System

Week #12 (May 20-22) Instructor: Betts
A. Temperature Signals & Rod Insertion Limits
B. Steam Dump Control System
C. Auxiliary Feedwater System

STA DETAILED PLANT LECTURE SERIES (PG&E)
Diablo Canyon

Weeks 13 - 15
May 26 - Oct. 10, 1980

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
MAY 26	MAY 27	MAY 28	MAY 29	MAY 30
H O L I D A Y (Travel)	Steam Generator Water Level Control System	Solid State Protection Systems	Solid State Protection Systems (Cont'd.)	SELF STUDY. (Travel Home)
JUNE 2	JUNE 3	JUNE 4	JUNE 5	JUNE 6
SELF STUDY (TRAVEL)	Process Control Systems Logic Diagram	Protection and Safe-guards Logic Diagram	I&C Systems Integration	SELF STUDY (Travel Home)
JUNE 9	JUNE 10	JUNE 11	JUNE 12	JUNE 13
SELF STUDY (TRAVEL)	Main Steam Systems Auxiliary Steam Systems	Condensate System	Feed System	SELF STUDY (Travel Home)

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STA DETAILED PLANT LECTURE SERIES (PG&E). Diablo Canyon

Weeks 16 - 18
May 26 - Oct.10, 1980

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
JUNE 16	JUNE 17	JUNE 18	JUNE 19	JUNE 20
SELF STUDY (TRAVEL)	Electrical Dist. - Vital & Non-Vital Inverters - AC and DC systems	Elect. Dist. (Cont'd.) Electrical Controls	D/G and Safeguards Distribution	SELF STUDY (TRAVEL HOME)
JUNE 23	JUNE 24	JUNE 25	JUNE 26	JUNE 27
SELF STUDY (TRAVEL)	- Fuel Handling - Spent Fuel Pool - Spent Fuel Pool Cooling	- Service Water Sys. - Ventilation Sys. - Inst. & Service Air Systems	Fire Protection S/G Blowdown Systems Sampling Systems	SELF STUDY (TRAVEL HOME)
JUNE 30	JULY 1	JULY 2	JULY 3	JULY 4
SELF STUDY (TRAVEL)	Main Turbine Turbine Support Sys. DEHC System	DEHC (Cont.) Main Generator Generator Support Systems	Generator support Systems (Cont'd.) Voltage Regulator	(TRAVEL HOME) H O L I D A Y *

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STA DETAILED PLANT LECTURE SERIES (PG&E)
Diablo Canyon

Weeks 19 - 21
May 26 - Oct. 10, 1980

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
JULY 7	JULY 8	JULY 9	JULY 10	JULY 11
SELF STUDY (Travel)	- Liquid Waste Collection Disposal System	Liquid Waste (Cont'd.) Gaseous Waste System	Gaseous Waste (Cont'd.) Solid Waste Disposal System	SELF STUDY (TRAVEL HOME)
JULY 14	JULY 15	JULY 16	JULY 17	JULY 18
SELF STUDY (TRAVEL)	PLANT COMPUTER	Technical Specifications	Technical Specifications	SELF STUDY (TRAVEL HOME)
JULY 30 TO AUG. 12	SIMULATOR TRAINING			
JULY 19 - AUG. 17, 1980	BREAK			
AUG. 18	AUG. 19	AUG. 20	AUG. 21	AUG. 22
SELF STUDY (TRAVEL)	Health physics & Chemistry	Health Physics & Chemistry	Health Physics & Chemistry	SELF STUDY (TRAVEL HOME)

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Weeks 22-24
May 26 - Oct. 10, 1980

STA DETAILED PLANT LECTURE SERIES (PG&E)
Diablo Canyon

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
AUG. 25	AUG. 26	AUG. 27	AUG. 28	AUG 29
SELF STUDY (TRAVEL)	Health Physics & Chemistry	Health Physics & Chemistry	Health Physics & Chemistry	SELF STUDY (TRAVEL HOME)
SEPT. 29	SEPT. 30	OCT. 1	OCT. 2	OCT. 3
Plant Systems Summary & Integration Systems Review and Interface Control and Protection System Review	Transient Analysis Reactor S/U Comp to 100% power 5%/min up power 5%/min down power 10% step load changes 20,50,100% load rejection Reactor Shutdown	- Transient Analysis (cont'd.) - Abnormal Transients - Instrument Failure - Transient Analysis	Instrument Failure Transient Analysis (Cont'd.) Tech. Specifications Review	Introduction to Accident Analysis - Classes - Design Accident Study Assumptions Accident Analysis - Reactivity Excursion Accidents
Oct. 6	OCT. 7	OCT. 8	OCT. 9	OCT. 10
- Accident Analysis (Cont'd.) - Increase in Secondary Heat Removal - Decrease in Secondary Heat Removal	- Accident Analysis (cont'd.) - Mass/Energy Release from Secondary Break - Loss of flow - Locked Rotor	- Accident Analysis (Cont'd.) - Over Pressure Protect. - ATWT's - LOCA	- Accident Analysis (Cont'd.) - Small LOCA (H CAP-9600) - S/G Tube Rupture	- Accident Analysis (Cont'd.) Radiological Assessments Course Summary

ADDENDUM

Immediate Upgrade of RO and SRO Training and Qualifications (I.A.2.1)

Training programs have been modified in accordance with the letter from H. R. Denton, NRC, to all Power Reactor Applicants and licensees, dated March 28, 1980. License candidates have received training as discussed below.

1. Heat Transfer, Fluid Flow and Thermodynamics

This was a five-day course taught by a consultant (ECI) in December 1980. An examination was given at the end of the course. The course included the following subjects:

A. Basic Properties of Fluids and Matter

Concepts such as temperature, density, viscosity, specific heat and latent heat of vaporization were presented.

B. Fluid Statics

Subject matter included topics which addressed pressure, temperature and volume effects on fluids in systems. Principles of hydraulics, saturation temperature and pressure, and the concept of subcooling, were covered.

C. Fluid Dynamics

Fluid flow in systems with resultant head loss was covered. Also, concepts such as NPSH, carry-over and two phase flow were included.

D. Heat Transfer by Conduction, Convection and Radiation

The fundamentals of heat transfer by the three different processes were covered. Heat transfer characteristics under different operating conditions were included.

E. Change of Phase - Boiling

Different types of boiling were discussed. Basic thermodynamic properties such as enthalpy and entropy were covered and sample calculations involving these quantities were performed for two-phase conditions.

F. Burnout and Flow Instability

Description of critical heat flux, DNP ratio and hot channel factors was covered and techniques for calculating these quantities were demonstrated.

G. Reactor Heat Transfer Limits

Heat transfer limits were related to core design. The basis of various limits such as axial power distribution and the effect on these limits by variables such as xenon and rod position were covered.

2. Use of Installed Plant Systems to Control or Mitigate an Accident in Which the Core is Severely Damaged

   A three-hour course was prepared and presented by plant engineering personnel. This course covered the following subjects:

   a. Incore instrumentation operation and use

   b. Excore nuclear instrumentation response during an accident

   c. Primary chemistry expected results during accident conditions

   d. Gas generation during an accident

   The use of vital instrumentation, failure modes and alternatives was covered separately. This material was included in several different lectures on instrumentation.

   It is planned that a contractor will conduct an expanded course on this subject matter in April 1981.

3. Increased Emphasis on Reactor and Plant Transients

   Since the TMI accident, all license candidates have received training on the Zion simulator. This training has emphasized reactor and plant transients and accidents.

Administration of Training Program (I.A.2.3)

All instructors will participate in an ongoing retraining program to ensure that they are cognizant of current operating problems, procedural changes and changes to administrative documents.