



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

AUG 30 1984

MEMORANDUM FOR: [REDACTED]
Operating Reactors Branch No. 2
Division of Licensing

FROM: Voss A. Moore, Chief
Human Factors Engineering Branch
Division of Human Factors Safety

SUBJECT: RESULTS OF AUGUST 17, 1984 MEETING TO DISCUSS THE DETAILED
CONTROL ROOM DESIGN REVIEW OF NINE MILE POINT NUCLEAR
STATION, UNIT 1

The Project Manager of Nine Mile Point Nuclear Station, Unit 1 (NMP1) arranged for Niagra Mohawk Corporation (NMPC) to give a briefing on the status of the Detailed Control Room Design Review (DCRDR) for that plant. Enclosure A is a list of attendees. The briefing and related discussions centered on satisfaction of the DCRDR requirements in Supplement 1 to NUREG-0737. Vu-graph slides used during the briefing are provided as Enclosure B. Staff comments are provided as Enclosure C. Please transmit those comments to NMPC.

Based on review of the NMP1 DCRDR Program Plan and information acquired at the August 17, 1984 briefing, the staff plans an in-progress audit. We request that the NMP1 Project Manager negotiate a November 1984 date for that audit. A proposed agenda will be provided approximately two weeks prior to the audit.

Voss A. Moore, Chief
Human Factors Engineering Branch
Division of Human Factors Safety

Enclosures:
As Stated

cc: H. Thompson, Jr.
R. Hermann

Contact:
D. I. Serig
x24887

8469110439XA

Attendance List

- RAYMOND J PASTERNAK NRC- Sr Nuc ENG / LEAD LICENSING ENG
- Robert L. Kershner ARD Corp, VP- Human Factors / 41 Program Mgmt.
- Eugene B. Silverman ARD Corp, President
- Don Taylor ARD Corp, Sr. Engineer
- ~~Jack P...~~ NMPC - CIEDIR Program Mgmt
- Paul Tangaro PANGARO Incorporated, for NMPC / RTD Cognitive Process
- Mike Goldych NMPC Simulator Training Supervisor
- RAY RAMIREZ NRC / NRC / DHFS / HFEB
- Dennis I. Seriq NRC / NRR / DHFS / HFEB
- Robert A. Hernandez NRC - 41 717

NRC INTERIM REVIEW
NINE MILE POINT UNIT 1
STATUS OF DETAILED CONTROL ROOM DESIGN REVIEW (DCRDR)

- A. INTRODUCTION AND CORPORATE OVERVIEW - PASTERNAK (20 MINS.)
- B. OVERALL PROGRAM APPROACH - BENSON (30 MINS.)
- C. TASK DETAILS - KERSHNER/TAYLOR, ET. AL. (90 MINS.)
- E. SUMMARY/OPEN DISCUSSION - ALL (20 MINS.)

A. INTRODUCTION AND CORPORATE OVERVIEW

1. LONG TERM COMPANY/MANAGEMENT ACTIVITY

- ORIGINAL DESIGN BY NMPC WAS "HUMAN FACTORED"
- INITIAL BWRUG REVIEW ENCOURAGING
- CURRENT APPROACH A FRESH REVIEW AS WELL AS INTEGRATION
- CONTINUING MANAGEMENT REVIEW/SUPPORT/BUDGETING

2. BACKGROUND OF PEOPLE INVOLVED

- PROGRAM MANAGER - 28 YRS: GE, QUADREX, CYBERNETICS
- REVIEW TEAM
 - OPERATIONS
 - UNIT 1 - MANAGEMENT AND SHIFT SRO's/RO's
 - UNIT 2 - SRO w/UNIT 1 AND FITZ EXPER
 - TRAINING - 16 YRS: OPER TRAIN AND INSTRUC
 - DESIGN - 15 YRS: I&C, ORIGINAL DESIGN
 - LICENSING - 15 YRS: OPERATIONS, INT'L, CONSULTING
- CONTRACTORS
 - ADVANCED RESOURCE DEVELOPMENT - HUMAN FACTORS,
SEVERAL DCRDR'S
 - PAUL PANGARO, INC. - COGNITIVE MODELING,
DOD STUDIES

3. SYNOPSIS

- LONG TERM CONTROL ROOM EXPERIENCE GOOD
- BUT, WILL BE OPEN TO IMPROVEMENTS
- ALSO GOING BEYOND NRC GUIDELINES

B. OVERAL. PROGRAM APPROACH

1. FOUNDATION AND BASES
2. GENERAL FOCUS AREAS
3. INTERACTIONS WITH OTHER PROGRAMS
4. RELATIONSHIP BETWEEN PROGRAM TASKS (FIGURE)
5. DOCUMENTATION CONTROL

B1. FOUNDATION AND BASES FOR DCRDR FROM MANY SOURCES

- NRC GUIDELINES (NUREG'S, ETC.)
- BWROG DEVELOPMENT AND ACTIVITIES
- NUTAC'S, A/E'S, CONSULTANTS, OTHER OG'S
- KICKOFF WAS HUMAN FACTORS REVIEW BY BWROG IN JULY 81
- PROGRAM PLAN OF 30 SEPTEMBER 83 OUTLINES COMPLETION

92. CURRENT GENERAL FOCUS AREAS

- ESTABLISH INTERACTIONS WITH OTHER PROGRAMS
- ADDRESS OPERATOR OBSERVATIONS
- HIRED CONSULTANT WITH BEST BACKGROUND TO FIT NEEDS
- BALANCE AND DIVERSIFY PARTICIPATION AND APPROACH
- ESTABLISHED CYBERNETICS PRESENCE
- STARTED R&D PROGRAM ON COGNITIVE PROCESSES
(ALSO APPLICABLE TO FOSSIL FUELED PLANTS)

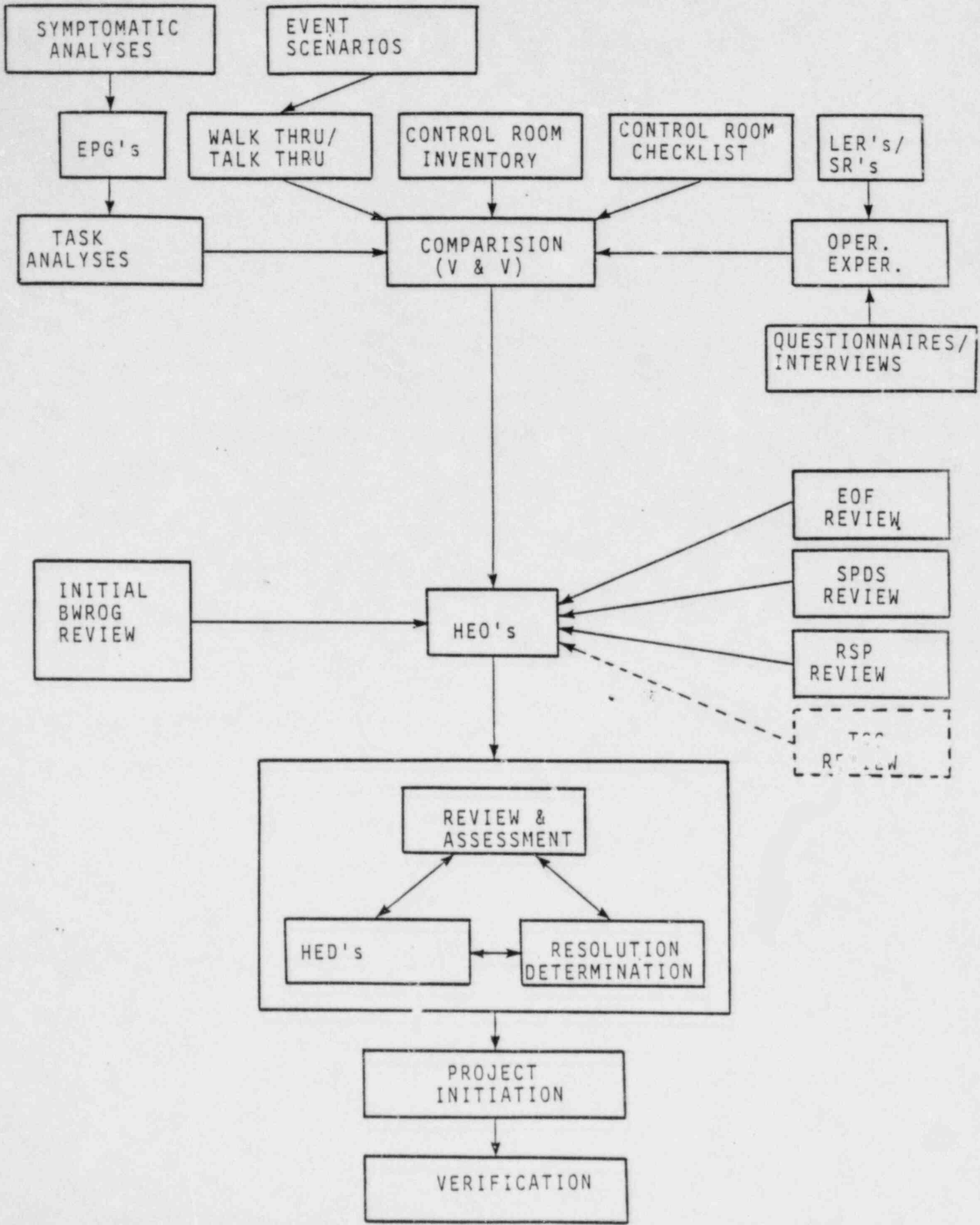
B3. INTERACTIONS WITH OTHER PROGRAMS ARE ONGOING

- PAST BWROG CRDR - INTEGRATE RESULTS
- EOP's - USING SAME EPG'S
SOME DCRDR TASKS PARTLY VALIDATE EOP'S
- OPERATOR/SIMULATOR TRAINING - ENTERTWINED TASKS
- SPDS - AUGMENT CURRENT SYSTEM
- NMP-2 DCRDR - GENERATE VARIETY AND MUTUAL BENEFITS
- TSC/EOP/RSP - EMERGENCY/HF CONCERNS
- REGULATORY GUIDE 1.97 - CONSIDER EFFECTS
- IDCOR., ICC/WL, ATWS, ETC. - INCORPORATE OTHER CONCERNS?
- R&D PROJECT - COGNITIVE PROCESSES IN ANALYSIS AND
DECISIONING
 - COGNITIVE SYSTEMS ENGINEERING
(WOODS - W R&D)
 - EXPERT SYSTEMS/ARTIFICIAL INTELLIGENCE
(CONTRACT WITH PAUL PANGARO)

B4. DOCUMENT CONTROL

- USING NMPC/ARD DOCUMENTATION PROCEDURES
- PROGRAM (PROJECT) FILE ESTABLISHED
- EACH STEP DOCUMENTED
- DATA SIGNED OFF AND STORED
- AUDITING IN PROGRESS
- MINUTES OF MEETINGS AND ACTIVITIES ALSO IN FILE

B.5 RELATIONSHIP BETWEEN PROGRAM TASKS



C. TASK DETAILS - KERSHNER/TAYLOR/BENSON

1. OPERATING EXPERIENCE
2. FUNCTION AND TASK ANALYSIS
3. CONTROL ROOM INVENTORY
4. CONTROL ROOM CHECKIST SURVEY
5. WALKTHROUGH/TALKTHROUGH
6. COMPARISONS (VERIFICATION & VALIDATION)
7. SPDS REVIEW
8. EOF REVIEW
9. RSP REVIEW
10. HEO/HED ASSESSMENT AND RESOLUTION
11. VERIFICATION OF IMPROVEMENT

NIAGARA MOHAWK POWER

OPERATOR SURVEY

PHASE I	NUMBER
BWROG INTERVIEWS	4

PHASE II	NUMBER
QUESTIONNAIRES DISTRIBUTED	32
QUESTIONNAIRES COMPLETED	19
FOLLOW-UP INTERVIEWS	8

PERSONNEL SURVEY SUMMARY FORM

Population Demographics and Statistics

MEAN STATISTICS

Group	Height	Age	Nuclear Oper Exp.	Control Board Oper Exp.	#Yrs RO	#Yrs SRO
Reactor Operator	71.45"	32.91	7.45	3.11	5.23	0
Senior Reactor Operator	68.25"	48.75	15.00	2.00	4.50	10.33
Overall	70.60"	37.13	9.47	2.88	5.03	2.21

MEDIAN STATISTICS

Group	Height	Age	Nuclear Oper Exp.	Control Board Oper Exp.	#Yrs RO	#Yrs SRO
Reactor Operator	71.00"	30.00	7.00	2.00	4.00	0
Senior Reactor Operator	68.50"	51.00	17.00	2.00	2.50	8.00
Overall	70.00"	32.00	8.00	2.00	4.00	0

HISTORICAL DOCUMENT REVIEW

	NMP-1 LERs	NMP-1 SCRAM REPORTS	SERs/SOERs
BWROG	1979-1981	1979-1981	
ARD	1981-PRESENT	1981-PRESENT	1983-PRESENT

NUCLEAR REGULATORY COMMISSION
STAFF COMMENTS
RESULTING FROM A BRIEFING
ON THE
NINE MILE POINT NUCLEAR STATION, UNIT 1
DETAILED CONTROL ROOM DESIGN REVIEW

On August 17, 1984, the staff received a briefing from Niagra Mohawk Corporation (NMPC) on the status of the Nine Mile Point Nuclear Station, Unit 1 (NMP1) Detailed Control Room Design Review (DCRDR). The briefing indicated NMPC's intent to satisfy the DCRDR requirements in Supplement 1 to NUREG-0737. The staff did, however, express several concerns. Major concerns are discussed below.

NMPC plans to consider potential corrective actions in the process for assessing human engineering discrepancies (HEDs) to determine which are significant and should be corrected. In the staff's judgment, assessment should be based on the potential for error associated with an HED and the consequences of such an error. The decision about whether or not an HED is significant should not be compromised by consideration of the means for resolving that HED.

The selection of design improvements process ("project initiation" in NMPC terms) was briefly discussed. In the staff's judgment this task should be organized to produce an integrated set of corrective actions (i.e., a set of corrective actions providing the operator with a consistent, coherent, and functionally adequate control room interface). Based on the August 17, 1984 briefing, the staff is uncertain whether plans adequate to accomplish this task have been developed.

Verification that selected design improvements will provide the necessary correction and verification that improvements will not introduce new HEDs were briefly discussed. The staff expects DCRDRs to include a formal process for accomplishing the subject verifications. Engineers, operators, and human factors specialists should be involved. Techniques might include drawing reviews, partial re-surveys, walk/talkthroughs, mock-up construction, environmental surveys, and operator interviews. The subject verifications help to assure that an integrated set of corrective actions is implemented in the control room. Thus, at least a major portion of the verifications should be accomplished prior to control room improvement. Based on the August 17, 1984 briefing, the staff is concerned that plans for the subject verifications may not satisfy the Supplement 1 to NUREG-0737 requirements.

The Summary Report for the NMP1 DCRDR is expected January 1, 1985. A rather complex process for assessment of HEDs to determine which are significant and should be corrected is scheduled for October-November 1984. The staff is concerned that the close scheduling of the assessment process and Summary Report will leave little time for adequate selection of design improvements, verification that selected design improvements will provide the necessary correction, and verification that improvement will not introduce new HEDs. As a minimum, a Summary Report shall:

1. Outline proposed control room changes
2. Outline proposed schedules for implementation
3. Provide summary justification for HEDs with safety significance to be left uncorrected or partially corrected

Those reporting requirements are heavily dependent on an adequate completion of the selection of design improvements and verification requirements in Supplement 1 to NUREG-0737.

Based on the review of the NMP1 DCRDR Program Plan and the August 17, 1984 briefing, the staff plans an in-progress audit at NMP1. The Nuclear Regulatory Commission's Project Manager has been asked to negotiate a November 1984 date for that audit. A proposed agenda will be provided approximately two weeks prior to the audit.

NIAGARA MOHAWK POWER

OPERATOR SURVEY

	NUMBER	PERCENTAGE
QUESTIONNAIRES DISTRIBUTED	32	100%
QUESTIONNAIRES COMPLETED	19	59%
FOLLOW-UP INTERVIEWS	8	25%

NIAGARA MOHAWK POWER

CONTROL ROOM DESIGN REVIEW OPERATOR SURVEY

A. WORKSPACE LAYOUT AND ENVIRONMENT

A.1 HOW WOULD YOU CHARACTERIZE THE CAPABILITY FOR DIRECT VOICE COMMUNICATION BETWEEN PERSONNEL IN THE MAIN CONTROL ROOM? CONDITIONS THAT MIGHT IMPEDE DIRECT VOICE COMMUNICATIONS COULD INCLUDE HIGH BACKGROUND NOISE, PHYSICAL BARRIERS, OR DISTANCE BETWEEN WORKSTATIONS. REMEMBER TO CONSIDER ALL MODES OF OPERATION, INCLUDING POTENTIAL ABNORMAL OR EMERGENCY CONDITIONS.

- A. EXCELLENT
- B. ADEQUATE
- C. SOME PROBLEM AREAS
- D. MANY PROBLEM AREAS

PLEASE IDENTIFY ANY PROBLEM AREAS.

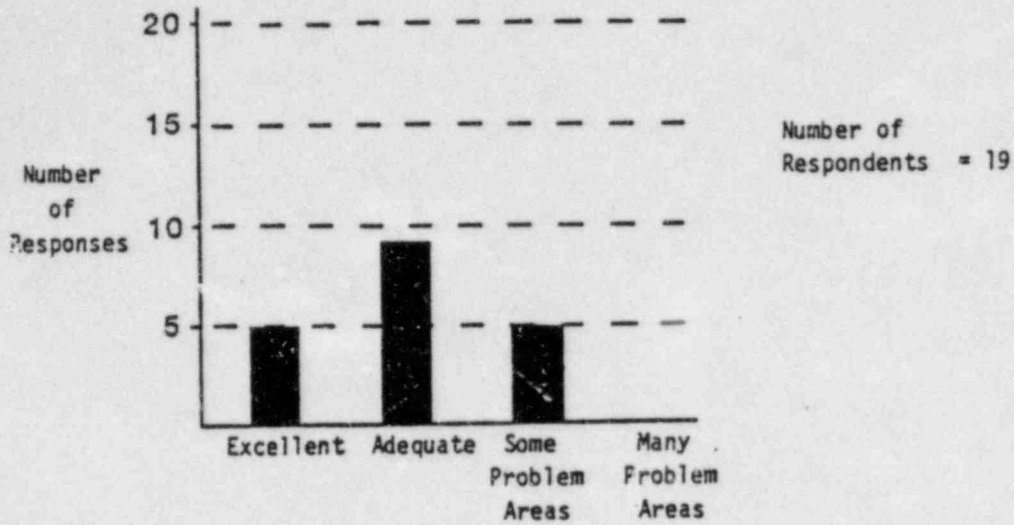
A.2 AIR QUALITY (TEMPERATURE, HUMIDITY, VENTILATION) IN THE CONTROL ROOM IS:

- A. EXCELLENT
- B. ADEQUATE
- C. SOME PROBLEM AREAS
- D. MANY PROBLEM AREAS

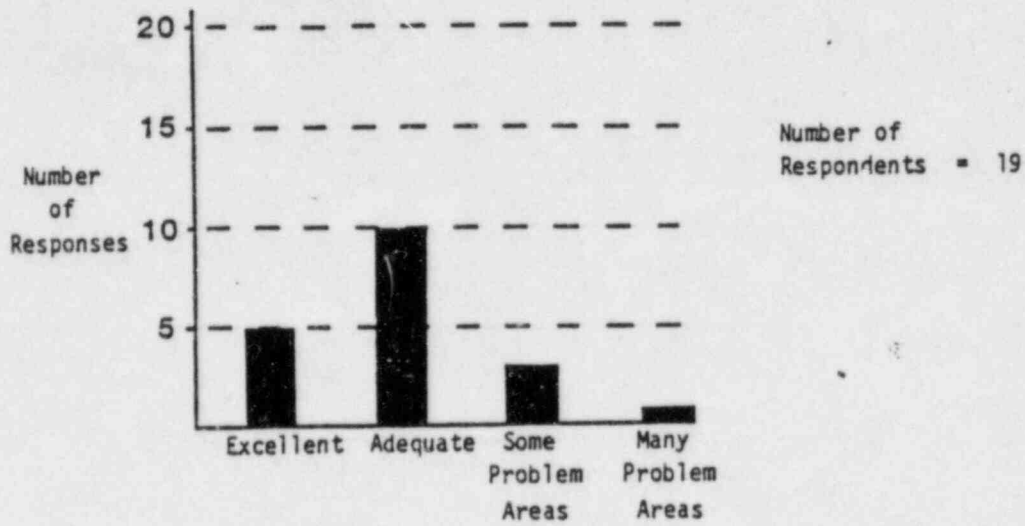
PLEASE IDENTIFY ANY PROBLEM AREAS.

EXAMPLE

A.1. How would you characterize the capability for direct voice communication between personnel in the main control room?



A.2. Air quality (temperature, humidity, ventilation) in the control room is:



A.3. Lighting in the control room (illumination, glare, reflections) is:

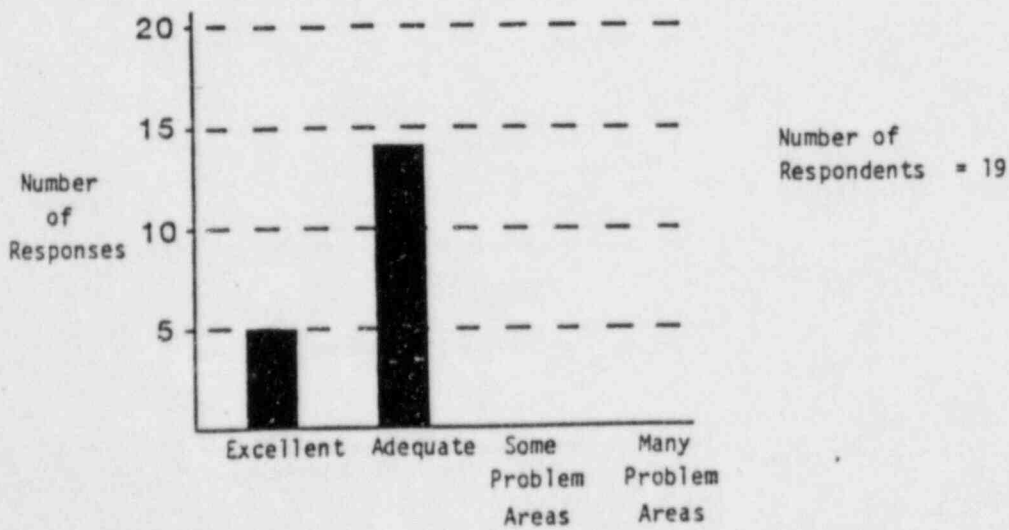


TABLE 1. CLASSIFICATION OF LERs

	INSIDE CONTROL ROOM	OUTSIDE CONTROL ROOM	
HFE-RELATED	7	19	26
NON HFE-RELATED	5	86	91
	12	105	117

TABLE 2. SCRAM REPORTS

	INSIDE CONTROL ROOM	OUTSIDE CONTROL ROOM	
HFE-RELATED	0	0	0
NON HFE-RELATED	1	4	5
	1	4	5

Nine Mile Point Unit One
Historical Document Review

PROBLEM ANALYSIS REPORT (PAR)

Name of Investigator(s): _____

Report Type and Number: _____

Station: _____ Unit: _____

Event Date: _____ Operating Status: _____

Circumstances and Events Leading to the Problem: _____

Nature of the Problem: _____

Steps Taken to Correct or Alleviate the Problem _____

Outcome: _____

Corrective Measures Undertaken: _____

Human Performance Problems Associated With Event: _____

Nine Mile Point Unit One
Historical Document Review

PROBLEM ANALYSIS REPORT (PAR) (Continued)

Applicable to Plant Under Review? Yes _____ No _____
(If no, end form here.)

In Which Areas: _____

Corrective Actions Taken: _____

Unresolved Discrepancies: _____
(If none, end form here.)

HEO Number: _____

Summary: _____

HISTORICAL DOCUMENT REVIEW

THE FOLLOWING PROBLEMS WERE RESPONSIBLE FOR MANY OF THE EVENTS FOUND IN THE REPORTS REVIEWED:

- EQUIPMENT FAILURE, WIRES CROSSED, IMPROPER CONNECTIONS
- EQUIPMENT NOT POSITIONED CORRECTLY
- ALARM MALFUNCTION
- INCORRECT BREAKER ALIGNMENT
- INACCURATE OR INCORRECT CALIBRATION
- USE OF NON-QUALIFIED EQUIPMENT
- INSTALLATION OF IMPROPER SPARE PARTS
- FAILURE TO PROPERLY FOLLOW A PROCEDURE
- INADEQUATE (DEFICIENT OR INCONSISTENCY) PROCEDURE
- MISINTERPRETATION OF PROCEDURE, INSTRUCTIONS
- INADEQUATE TRAINING (ESPECIALLY WITH NEW EMPLOYEES)
- LACK OF ADMINISTRATIVE CONTROLS
- INADEQUATE MONITORING
- FAILURE TO COMPLETE SURVEILLANCE TESTS ON TIME
- MISSED SAMPLES
- ACCEPTANCE CRITERIA OF PROCEDURE NOT MET
- CREATION OF EVENT CONTRARY TO TECHNICAL SPECIFICATIONS
- EXCEEDING TECHNICAL SPECIFICATION LIMITS
- IMPROPERLY COMPLETED RECORDS
- FIRE PROTECTION DEFICIENCIES (REMOVAL OF FIRE BARRIERS, FIRE DOOR BLOCKED OPEN, FIRE PENETRATIONS NOT SEALED, FIRE PUMPS OUT OF SERVICE)
- ACTIONS/ERRORS BY CONTRACTORS OR MAINTENANCE PERSONNEL
- INADEQUATE MAINTENANCE

FUNCTIONAL ANALYSIS
BWROG EPG GUIDELINES

REACTOR PRESSURE VESSEL CONTROL

MONITOR AND CONTROL RPV WATER LEVEL

MONITOR AND CONTROL RPV PRESSURE

MONITOR AND CONTROL REACTOR POWER

PRIMARY CONTAINMENT CONTROL

MONITOR AND CONTROL SUPPRESSION POOL TEMPERATURE

MONITOR AND CONTROL DRYWELL TEMPERATURE

MONITOR AND CONTROL PRIMARY CONTAINMENT PRESSURE

MONITOR AND CONTROL SUPPRESSION POOL WATER LEVEL

SECONDARY CONTAINMENT CONTROL

MONITOR AND CONTROL SECONDARY CONTAINMENT TEMPERATURES

MONITOR AND CONTROL SECONDARY CONTAINMENT RADIATION LEVELS

MONITOR AND CONTROL SECONDARY CONTAINMENT WATER LEVELS

RADIOACTIVITY RELEASE CONTROL

NINE MILE POINT UNIT 1

TASK ANALYSIS

OBJECTIVE

TO ESTABLISH THE CONTROL, INSTRUMENTATION AND OTHER REQUIREMENTS OF CONTROL ROOM OPERATOR TASKS

PROCESS

- BWROG PLANT-SPECIFIC EPGs AS A BASE
- IDENTIFY OPERATOR TASKS
- COLLECT TASK DATA
- ENTER TASK DATA INTO DATABASE MANAGEMENT SYSTEM

THE INFORMATION NEEDS FOR THE OPERATOR TASK WERE DESCRIBED IN TERMS OF THE FOLLOWING CATEGORIES OF CHARACTERISTICS:

- EQUIPMENT - THE NAME OF THE PLANT EQUIPMENT INVOLVED IN THE FEEDBACK NOTING THE PARAMETER MEASURED (E.G., STATUS, FLOW, PRESSURE)
- TYPE - THE REQUIRED OR DESIRED TYPE OF DISPLAY TO SUIT THE NATURE OF THE INFORMATION NEEDED (E.G., RECORDER, ANNUNCIATOR, GRAPHIC PLOT, ETC.)
- STATE - THE STATE OF THE PARAMETER WHICH IS OF PERTINENCE TO THE TASK ACCOMPLISHMENT (E.G., L.T. 500 PSIG, AT LOW LEVEL LIMIT, LIT, ETC)
- UNITS - THE UNITS NEEDED FOR THE PARAMETER DISPLAY IN ORDER TO ACCOMPLISH THE TASK WITHOUT THE NEED FOR CONVERSION
- RANGE - THE RANGE OF PARAMETER VALUES REQUIRED FOR THE ACCOMPLISHMENT OF THE PARTICULAR TASK UNDER INVESTIGATION
- DIVISIONS - THE REQUIRED PRECISION OF THE PARAMETER VALUE DISPLAY IN TERMS OF THE SMALLEST SCALE DIVISION
- OTHER - OTHER DESCRIPTIVE FEATURES OR CHARACTERISTICS DESIRABLE OR NECESSARY FOR DISPLAY OF THE INFORMATION REQUIREMENT

THE INFORMATION COLLECTED TO DESCRIBE THE CONTROL NEEDS FOR OPERATOR TASKS INCLUDED:

- EQUIPMENT - THE NAME OF THE PLANT EQUIPMENT INVOLVED IN THE CONTROL ACTION NOTING THE REQUIRED TYPE OF CONTROL EQUIPMENT (E.G., PUMP, ISOLATION VALVE, GOVERNOR VALVE, ETC.)
- POSITION - THE CONTROL POSITION NAME WHICH CORRESPONDS TO THE ESCUTCHEON LABEL (E.G., ON, RUN, CLOSED, AUTO)
- TYPE - THE REQUIRED OR DESIRED TYPE OF CONTROL TO SUIT THE NATURE OF THE CONTROL ACTION (A KEY AT THE BOTTOM OF THE FORM PROVIDED THE MOST COMMON TYPES.)
- OTHER - OTHER DESCRIPTIVE FEATURES OR CHARACTERISTICS NECESSARY OR DESIRABLE FOR THE CONTROL ACTION
- TYPE OF FEEDBACK - THE TYPE OF FEEDBACK INDICATION NEEDED TO ASSURE THE OPERATOR THAT THE DESIRED CONTROL ACTION WAS INITIATED OR ESTABLISHED (E.G., CONTROL STATUS LIGHTS)
- FEEDBACK STATE - THE STATE OF THE INDICATION FOR DISPLAY OF CONTROL FEEDBACK (E.G., COLOR OF CONTROL STATUS LIGHTS)

TASK DESCRIPTION FORM

Page 1 of 3
 Date _____
 Analyst _____

Procedure Section: Primary Containment
Control Guideline

Task Number	Operator Task
	1. Observe suppression pool temperature greater than 80 ⁰ F
	2. Observe drywell temperature above 135 ⁰ F.
	3. Observe drywell pressure above 3.5 psig
	4. Observed suppression pool water level greater than 4'6"
	5. Observe suppression pool water level below 3'0"
SPIT-6	6. Monitor and control suppression pool temperature
SPIT-16	7. Close all SORVS
SPIT-27	8. Observe suppression pool temperature greater than 80 ⁰ F.
	9. Operate available suppression pool cooling
SPIT-39	10. Observe suppression pool temperature =110 ⁰ F.
	11. Scram the reactor
SPIT-41	12. Observe suppression pool temperature not maintained below the heat capacity temperature limit.
	13. Maintain RPV pressure below the heat capacity temperature limit.
	14. Enter RPV Control Guideline procedure at Step RC-1 and execute concurrently
DW/TM	15. Monitor and control drywell temperature
DW/T-1	16. Observe drywell temperature greater than 135 ⁰ F.
	17. Operate available drywell cooling
DW/T-2	18. Observe drywell temp. at 330ft. equals RPV saturation temp.
	19. Enter RPV control guideline procedure at step RC-1
DW/T-3	20. Observe suppression chamber temperature and drywell pressure are below the drywell spray initiation Pressure Limit
	21. Observe drywell pressure less than 301 ⁰ F and increasing
	22. Shutdown recirculation pumps
	23. Shutdown drywell cooling fans
	24. Initiate drywell sprays
	25. Observe drywell pressure greater than 301 ⁰ F go to RPV Control Guideline procedure at Step RC-1 and execute concurrently with this procedure.

TASK ANALYSIS INSTRUMENTATION REQUIREMENT FORM

Page 1 of 1
 Date 6-20-84
 Analyst DET

Same as: _____
 Task Number _____
 Alt. to: _____
 Task Number _____

2. PRIMARY CONTAINMENT CONTROL GUIDELINE
 EPC Section
2.1 OBSERVE SUPPRESSION POOL TEMPERATURE > 80 °F
 EPC Section
 Task Title

Condition

EPC Number _____
 Task Number _____

ACTION STEP	OP	VERB	CONTROL				INDICATION/FEEDBACK				OTHER PERFORMANCE REQUIREMENTS	EXIT OR COMMENTS		
			EQUIPMENT	POSITION	ID	TYPE	STATE	ID	UNITS	RANGE			DIV	OTHER
1	1	1.1	TORUS WATER TEMP			M	> 80	TS-1	°F	50-300	5			

- VERB KEY
 1.1 OBSERVES
 2.1 COMPARES
 2.2 CALCULATES
 3.1 PUSH
 3.2 TURN
- CONTROL TYPE KEY
 J JOYSTICK
 JS JOYSTICK
 K KEY OPERATOR
 LP LEGEND PUSHBUTTON
 NP NON-LEGEND PUSHBUTTON
- 4.1 INDICATOR
 4.2 REQUESTS
 4.3 RECEIVES
- 3.3 LOCK-OUT
 3.4 TOUCH
 3.5 ADJUSTS
 3.6 TIPS
 3.7 PULL
- R ROCKER SWITCH
 RS ROTARY SWITCH
 S SLIDE SWITCH
 T HANDLE
 TG TIPS/GLE SWITCH
- TR TOUCHSCREEN
 TS TOUCHSCREEN
 KB KEYBOARD
 C CONTROLLER
- CONTROL MODE
 D "DISCRETE"
 C CONTINUOUS
- CONTROL MODE
 SF "SPRING RETURN"
 T "TWO-STEP"
 B BACKLIT
- COMPARATOR
 X ADDUCTOR
 C DOWN COUNTER
 EC ELECTRONIC COUNTER
 M METER
 R RECORDER
 GH NIMIC
- DIGITAL DISPLAY
 CSL CONTROL STATUS LIGHT
 LL LEGEND LIGHT
 HL HIGH LEGEND LIGHT
 CRT CATHODE RAY TUBE
- G GRAPHIC

TASK ANALYSIS INSTRUMENTATION REQUIREMENT FORM

Same as:

Condition

EPG Number

2. PRIMARY CONTAINMENT CONTROL GUIDELINE

EPG Section

Task Number

Alt. to:

2.20
Task Number

SHUTDOWN RECIRCULATION PUMP

Task Title

Task Number

ACTION STEP	OP	VERB	OBJECT													OTHER PERFORMANCE REQUIREMENTS	EXIT OR COMMENTS									
			CONTROL					INDICATOR/FEEDBACK																		
			EQUIPMENT	POSITION	ID	TYPE	OTHER	EQUIPMENT	TYPE	STATE	ID	UNITS	RANGE	DIV	OTHER											
1	1	3.2	REACTOR RECIRC PUMPS	OFF	2F18 2F20 2F22 2F24 2F26																					
							RECIRC FLOW	M	DECREASE	2F12 2F13-2 2F14-2 2F15-2 2F16-2	LB-MASS HR	0- 20x10 ⁶	1x10 ⁶													

VERB KEY
1.1 OBSERVES
2.1 COMPARES
2.2 CALCULATES
3.1 PUSH
3.2 TURN
3.3 LOCK-OUT
3.4 TOUCH
3.5 ADJUSTS
3.6 TYPES
3.7 PULL

4.1 INFORMS
4.2 REQUESTS
4.3 RECEIVES

CONTROL TYPE KEY
J J HANDLE
JS JOYSTICK
K KEY OPERATOR
LP LEGEND PUSHBUTTON
NP NON-LEGEND PUSHBUTTON

R ROCKER SWITCH
RS ROTARY SWITCH
S SLIDE SWITCH
T HANDLE
TW TWINWHEEL
TS TOUCHSCREEN
KB KEYBOARD
C CONTROLLER
TG TOGGLE SWITCH

CONTROL MODE
D DISCRETE
C CONTINUOUS

CONTROL OTHER KEY
SR SPRING RETURN
T THROTTLE
B BACKLIT

DISPLAY TYPE KEY
A ANNUNCIATOR
C DRUM COUNTER
EC ELECTRONIC COUNTER
M METER
R RECORDER
GM MIMIC

D DIGITAL DISPLAY
CSL CONTROL STATUS LIGHT
LL LEGEND LIGHT
NL NON LEGEND LIGHT
CRT CATHODE RAY TUBE

G GRAPHIC

NINE MILE POINT UNIT 1

CONTROL ROOM INVENTORY

OBJECTIVE

TO ESTABLISH AN INVENTORY OF ALL INSTRUMENTATION, CONTROLS AND EQUIPMENT AND THEIR PERTINENT CHARACTERISTICS FOR USE DURING THE COMPARISON WITH THE REQUIREMENTS IDENTIFIED THROUGH THE ANALYSIS OF OPERATOR TASKS

PROCESS

- ENTER CURRENT EQUIPMENT LISTS INTO DATABASE MANAGEMENT SYSTEM
- VERIFY DBMS INVENTORY OUTPUT AGAINST CONTROL ROOM PANEL INSTRUMENTS
- ENTER CORRECTIONS AND ADDITIONS TO INVENTORY DBMS

* INVENTORY FORM - INDICATORS *

RECORD NUMBER: 198

PANEL: 1H

ID 1H1-1

PN 70-01C

LOC

SYS SVC AND COOLING WTR

PARAM

LABEL RB COOLING WTR PUMP 11

TYPE M

MANUF GE

MODEL 180

UPPER RANGE 300

LOWER RANGE 0

DIV 5

UNITS AMP

MARKINGS

PENS

NO. RECORDED POINTS

OTHER LABELS

NINE MILE POINT UNIT 1

VERIFICATION

OBJECTIVE

TO ENSURE THAT THE INFORMATION AND CONTROL CAPABILITIES CALLED FOR BY THE TASK ANALYSIS IS PRESENT IN THE CONTROL ROOM AND IN A SUITABLE FORM FOR OPERATOR USE

PROCESS

- PREPARE VERIFICATION COMPUTER PROGRAM TO COMPARE DATA ENTRY FIELDS FROM TASK ANALYSIS AND INVENTORY DATA BASES AND PRINTOUT POTENTIAL MISMATCHES
- INVESTIGATE MISMATCHES FOR APPROPRIATE AVAILABILITY AND SUITABILITY CRITERIA
- PREPARE HEOs

NINE MILE POINT UNIT 1
BWROG CONTROL ROOM
CHECKLIST/SUPPLEMENT CATEGORIES

- PANEL LAYOUT AND DESIGN
- INSTRUMENTATION AND HARDWARE
- ANNUNCIATORS
- COMPUTERS
- PROCEDURES
- CONTROL ROOM ENVIRONMENT
- MAINTENANCE AND SURVEILLANCE

NINE MILE POINT UNIT 1

CONTROL ROOM CHECKLIST

REVIEW	DATE	SCOPE
BWROG SURVEY	JULY 1981	ORIGINAL CHECKLIST TO CR
ARD SURVEY	JULY 1984	SUPPLEMENT CHECKLIST TO CR ORIGINAL CHECKLIST TO CR MODs ORIGINAL AND SUPPLEMENT TO RSP

NINE MILE POINT UNIT 1
CHECKLIST PROCESS - 1984 SURVEY

- SURVEY TOPIC APPLIED TO PANEL
- DESCREPANT ITEMS RECORDED ON CHECKLIST WITH DESCRIPTION OF OBSERVATION
- PHOTOGRAPH NUMBER OF OBSERVATION RECORDED ON CHECKLIST PHOTO LOG
- HEOs PREPARED FROM CHECKLIST AND PHOTOGRAPHS ATTACHED TO APPROPRIATE HEOs - HEO NUMBER RECORDED ON CHECKLIST
- HEOs ENTERED INTO DATABASE MANAGEMENT SYSTEM
- DOCUMENTATION OF PROCESS
 - CHECKLIST FOR EACH PANEL WITH DESCRIPTION OF OBSERVATION, ITEM ID, AND HEO NUMBER
 - HANDWRITTEN HEO WITH ATTACHED PHOTOGRAPH
 - HEO DATA BASE

SB INSTRUMENTATION AND HARDWARESBI Indicators

SBI.1 Are indicator scales easily read when stationed at the panel?

4 3 2 1 0 x 3 =

SBI.2 Is the use of multiscale and logarithmic scale indicators minimized?

4 3 2 1 0 x 2 =

SBI.3 Are displays which reflect only a demand signal labeled accordingly?

4 3 2 1 0 x 3 =

SBI.4 Are process units and multipliers specified?

4 3 2 1 0 x 3 =

SBI.5 Are drum-type counters readable from the normal viewing position?

4 3 2 1 0 x 3 =

SUMMARY OUTPUT

NO.: CS-04

GUIDELINE REF.: SB1.1

PE: 0 CF: 0 EP: 0

DESCRIPTION OF OBSERVATION

RECORDERS CONTAIN TEMPORARY SCALES WHICH ARE DIFFICULT TO READ. THESE APPEAR TO BE ON PANEL L BUT HAVE "K" INST NUMBERS

PANEL ID#	EQUIPMENT ID#	EQUIPMENT NAME
4K25-1		TORUS H2O LVL CHNL 11
4K25-2		TORUS H2O LVL CHNL 12

NINE MILE POINT UNIT 1

VALIDATION

OBJECTIVE

TO DETERMINE IF THE FUNCTION ALLOCATED TO THE CONTROL ROOM OPERATING CREW CAN BE ACCOMPLISHED EFFECTIVELY WITHIN BOTH THE STRUCTURE OF THE ESTABLISHED EMERGENCY PROCEDURES AND THE DESIGN OF THE CONTROL ROOM.

NINE MILE POINT UNIT 1

VALIDATION

PROCESS

- SIMULATOR APPROACH
- WALK-THROUGH/TALK-THROUGH SLOW TIME RUN
- RUN-THROUGH IN REAL-TIME RUN
- VALIDATION WORKSHEET CHECKLIST - DYNAMIC VALIDATION OF:
 - CONTROL/DISPLAY INTEGRATION
 - CONTROL AND DISPLAY DESIGN CHARACTERISTICS
 - TASK ALLOCATION
 - PROCEDURE SEQUENCE AND CONTENT FOR TASK ACCOMPLISHMENT
 - CONTROL AND DISPLAY SEQUENCE GROUPING
 - ANTROPOMETRIC CONSIDERATIONS FOR COMPONENT LOCATION
- VIDEOTAPE OF RUN-THROUGH FOR POST ANALYSIS
 - WORK FLOW ANALYSIS
 - LINK ANALYSIS
 - VALIDATION WORKSHEET CHECKLIST

VALIDATION CRITERIA

- THE INDICATIONS AND ANNUNCIATORS REFERENCED IN THE PROCEDURE(S)
- THE UNITS OF MEASUREMENT DISPLAYED SHOULD BE APPROPRIATE AND CONSISTENT WITH THE PROCEDURE(S)
- THE LABELS ASSOCIATED WITH THE VARIOUS CONTROLS, DISPLAYS AND ANNUNCIATORS REFERENCED/USED SHOULD BE IDENTIFIABLE.
- THE CONTROLS AND DISPLAYS NECESSARY SHOULD BE AVAILABLE
- THE OPERATORS ACTIONS EXPRESSED OR IMPLIED BY THE PROCEDURE(S) SHOULD BE WITHIN THE CAPABILITY OF THE OPERATOR(S)
- ANY SPECIAL JOB PERFORMANCE AIDS USED BY AND DESCRIBED BY THE OPERATOR(S) SHOULD BE SPECIFIED IN THE PROCEDURE(S).
- ALL CONTROLS, DISPLAYS, ANNUNCIATORS AND/OR JOB PERFORMANCE AIDS USED BUT NOT REFERENCED IN THE PROCEDURE(S) WILL BE IDENTIFIED AND RECORDED.

VALIDATION
INFORMATION RECORDED

- DIRECTION OF MOVEMENT
- SEQUENCE OF MOVEMENT
- FREQUENCY OF MOVEMENT
- ESTIMATED TIME CRITICALITY OF THE MOVEMENT
- REAL-TIME ESTIMATE OF THE TIME THAT THE OPERATOR(S) SPENDS AT EACH WORK STATION.

NINE MILE POINT UNIT 1

SPDS/EOF REVIEW

OBJECTIVE

TO ENSURE DESIGNS ARE EFFECTIVE IN ENHANCING EMERGENCY RESPONSE CAPABILITY

PROCESS

- ASSEMBLE DESIGN SOURCE DOCUMENTATION
 - IN-HOUSE SPECIFICATION MANUALS
 - VENDOR DOCUMENTS
 - HARDWARE AND SOFTWARE MANUALS
 - DETAILED DRAWINGS
 - EMERGENCY RESPONSE PLAN
 - IMPLEMENTATION DOCUMENTS

- ESTABLISH REVIEW CRITERIA
 - DESIGN SOURCE DOCUMENTATION
 - NUREGS-0696, 0814, 0835, 0700, 737 SUPPLEMENT NO.1

- CONDUCT REVIEWS
 - CHECKLISTS
 - INTERVIEWS
 - DEMONSTRATIONS

- IDENTIFY HEOs

C.10 ASSESSMENT AND RESOLUTION PROGRAM

- A. SPECIFIC FOCUS AREAS
- B. TEAM WEIGHTING
- C. JUDGEMENT TECHNIQUES
- D. FUNCTIONAL HED RESOLUTION MECHANISMS
- E. CONSENSUS METHODOLOGIES (DELPHI TECHNIQUES)
- F. FLOW OF ASSESSMENTS/RESOLUTIONS (FIGURE)

C.10.A. SPECIFIC FOCUS AREAS

- BALANCE AND EXPERIENCE OF ASSESSMENT TEAM IMPORTANT (ALSO USE REVIEW TEAM)
- CONSIDER ALL HEO'S, BUT SPEND TIME ON MAJOR CONCERNS
- DIFFERENTIATE JUDGMENT TECHNIQUES
GENERAL → SPECIFIC
QUALITATIVE → QUANTITATIVE
- SEVERAL SCREENINGS TO ACCUMULATE IMPACTS, WHERE NEEDED
- ITERATE TO ENSURE APPROPRIATE CONSIDERATION
- CONSIDER HEO → HED → FIX IN SAME CONTEXT

C.10.B. ASSESSMENT TEAM MAKEUP AND BALANCE

- NMP-1 OPERATIONS (INCL. SHIFTS): 2-3
- NMP-2 OPERATIONS : 1
- TRAINING : 1
- DESIGN : 1
- LICENSING/SYSTEMS : 1
- HUMAN FACTORS : 1
- COGNITIVE MODELER : 1 (PART TIME)

TOTAL : 9 (MAXIMUM)

C.10.C JUDGEMENT TECHNIQUES TO BE USED

- SCOPE SCREEN - FUNCTIONAL, COSMETIC OR INVALID
- HF VALUE RANKINGS - BWROG EVALUATION PRODUCT
 - NMP-2 DCRDR PROGRAM QUESTIONS
- CATEGORY SCREEN - NUTAC OPERATIONAL IMPACT
- INTERACTIONAL STUDIES - SYSTEMS/PARAM. INTERDEPENDANCY
 - SAFETY ANALYSES/BASES
 - OPERATING EXPERIENCE
 - TRAINING/PERSONNEL PRACTICES
 - COGNITIVE PROCESSES
 - OTHER PROGRAMS
- POTENTIAL CONSEQUENCES EVALUATION - GENERALIZED PSA
- COST/BENEFIT CALCULATION - SAFETY
 - AVAILABILITY
 - PROGRAMMATIC (RESOURCES, SCHEDULE, ETC.)

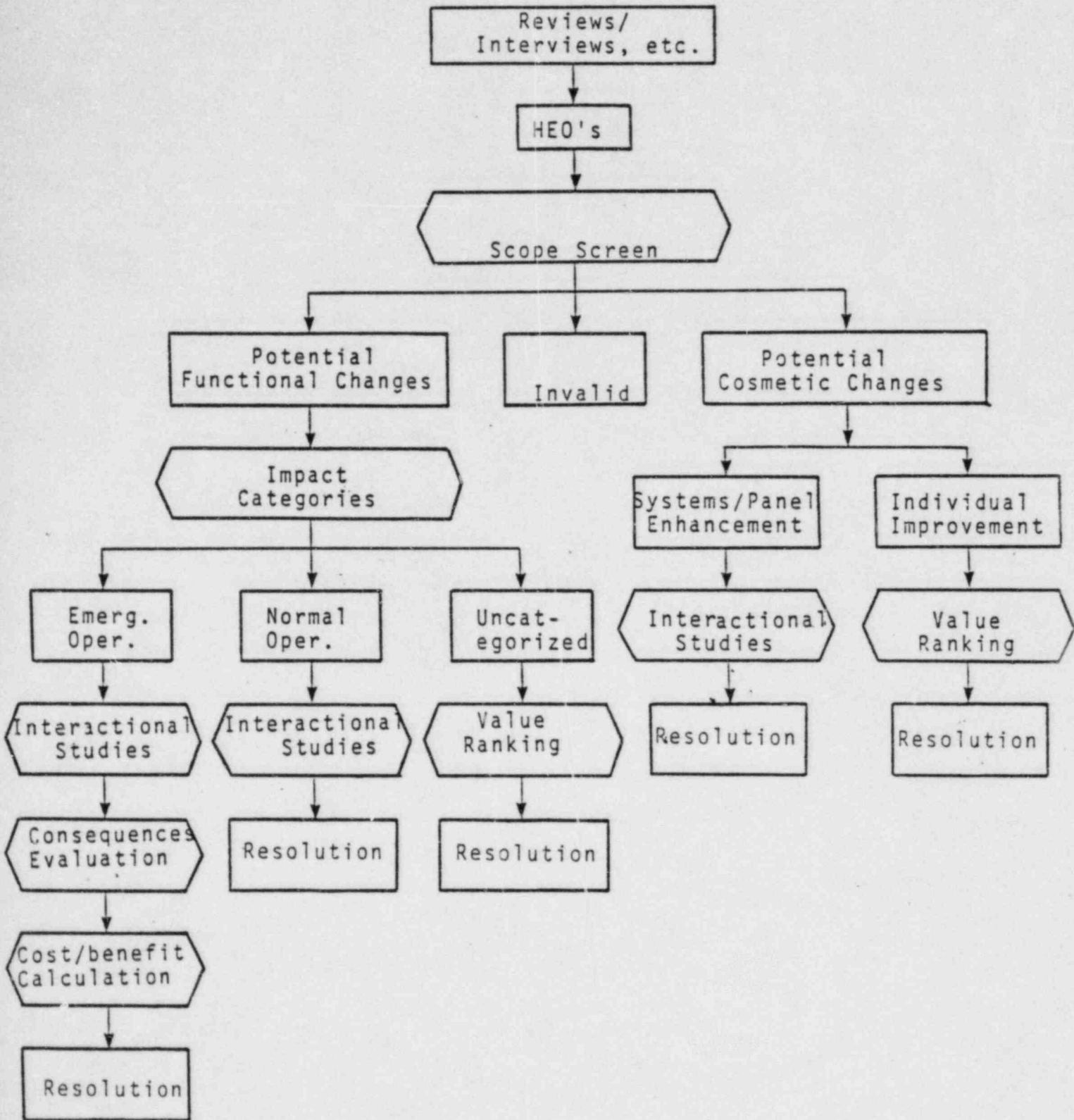
C.10.D. FUNCTIONAL HED RESOLUTION MECHANISMS TO BE CONSIDERED

- CONTROL/INSTRUMENTATION CHANGES
- EQUIPMENT CHANGES
- SYSTEM CHANGES
- PROCEDURE CHANGES
- MAINTENANCE CHANGES
- TECH SPEC CHANGES
- ADMINISTRATIVE/ORGANIZATIONAL CHANGES
- DESIGN/ANALYTICAL STUDIES - ITERATE
- INCORPORATE WITH OTHER PROGRAMS/PROJECTS
- CHANGES RELATIONSHIP OR SYNERGISMS

C.10.E. APPLY CONSENSUS METHODOLOGIES TO AGREE ON CHANGES

- GENERATE ALTERNATIVES
- DEVELOP SYNERGISTIC THINKING
- ESTABLISH RELATIONSHIPS/GROUPINGS
- RANK ALTERNATIVES
- USE WEIGHTED COMBINATORIAL VOTING
- ORDER URGENCY LEVEL

C.10.F. Flow of Assessments/Resolutions



D. SUMMARY/OPEN DISCUSSION

1. PROGRAM PROCEEDING WELL AND ABOUT ON ADJUSTED SCHEDULE.
2. THE HEAVIEST AND MOST DIFFICULT ACTIVITIES WILL OCCUR IN OCTOBER/NOVEMBER WITH THE HEO/HED ASSESSMENT/RESOLUTION ACTIVITIES.
3. NO MAJOR COMPLICATIONS OR SURPRISE RESULTS, YET.
4. INTRODUCTION OF SYMPTOMATIC THINKING IS WORTHWHILE - EXPANDS RANGE OF CONSIDERATIONS.
5. INCORPORATING TASK ANALYSIS AND WALKTHRU/TALKTHRU WITH SHIFT TRAINING AND SIMULATOR ACTIVITIES HAS SYNERGISTIC BENEFITS.