



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

July 31, 1990

Docket Nos. 50-250, 50-251
and 50-335, 50-389

LICENSEE: Florida Power & Light Company

FACILITY: Turkey Point Units 3 & 4
and St. Lucie Units 1 & 2

SUBJECT: SUMMARY OF MEETING WITH FLORIDA POWER AND LIGHT COMPANY (FPL)
ON JULY 11, 1990 REGARDING PROBABILISTIC RISK ASSESSMENT (PRA)

A meeting was held in Rockville, Maryland on July 11, 1990 to discuss FPL's plans for, and status of, their Probabilistic Risk Assessment (PRA) for Turkey Point Units 3 & 4 and St. Lucie Units 1 & 2. FPL noted they had completed the accident sequence analysis and were on schedule for submitting the results for Turkey Point by June 1991.

FPL indicated their PRA would consider external events including fire, flood and hurricanes, with most effort being given to analysis of hurricanes.

FPL further noted they were planning to limit their use of actual operational data for Turkey Point to those data collected from operation during 1985-1989. FPL stated that earlier data were either not applicable or required too many resources to collect. The staff disagreed with this approach, noting that actual operating data is most important and, in many cases, more meaningful than generic failure data. The staff feels it would be a weakness in the PRA to ignore data accumulated during operation from 1972 to 1985 and during 1990.

FPL's basis for the meeting discussions, which was handed out to participants at the meeting, is provided as Enclosure 1.

An attendance list for the meeting is provided as Enclosure 2.

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Enclosures:
As stated

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See next page

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*memo
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**NRC/FPL MEETING AGENDA
TURKEY POINT
PROBABILISTIC RISK ASSESSMENT
STATUS REPORT
JULY 11, 1990**

Objective: Inform NRC Management of the Turkey Point PRA Development Progress. Communicate Decisions made by FPL on Analysis Methods and Approach.

- GENERAL PROGRESS OF TURKEY POINT PRA TASKS
- ACCIDENT SEQUENCE ANALYSIS
 - Approach and Examples
 - Dual Unit Sequences
 - Loss of Offsite Power
- SYSTEMS ANALYSIS
 - Approach and Examples
 - Emergency Power System Enhancement
- CONTAINMENT ANALYSIS
 - Approach, Use of MAAP Code
- EXTERNAL EVENTS
 - Approach to Fire, Hurricane, Flooding

TURKEY POINT PLANT PRA - SCOPE

- LEVEL 1 PRA + LIMITED SCOPE LEVEL 2

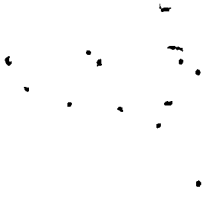
- IMPORTANT OR UNIQUE FEATURES
 - SHARED SYSTEMS: POTENTIAL FOR DUAL UNIT TRANSIENTS AND FOR CROSSTIES TO MITIGATE FAILURES - PLANT VERSUS UNIT RISK

 - IMPORTANT NON-SAFETY RELATED SYSTEMS TO BE INCLUDED (WHERE APPROPRIATE):
 - STANDBY STEAM GENERATOR FEEDWATER PUMPS (BACKUP TO AUXILIARY FEEDWATER)

 - BLACKSTART DIESEL GENERATORS - TIE TO SAFETY BUSES THROUGH C-BUS

 - TURKEY POINT DESIGN/PROCEDURES ARE A "MOVING TARGET."
(EMERGENCY POWER SYSTEM UPGRADE DISCUSSED LATER)

- EXTERNAL EVENTS INCLUDED:
 - INTERNAL FLOODING
 - FIRES
 - HURRICANES (HIGH WINDS AND EXTERNAL FLOODING)



TURKEY POINT PLANT PRA - PROGRESS TO DATE (7/90)

TASK NAME	PROGRESS (PERCENT)	ORIGINAL* SCHEDULED COMPLETION	CURRENT SCHEDULED COMPLETION
	0 20 40 60 80 100		
ACCIDENT SEQUENCE	90	7/90	7/90
SYSTEMS	80	8/90	9/90
DATA	40	7/90	9/90
HUMAN RELIABILITY	72	9/90	10/90
QUANTIFICATION/INTEGRATION	15	11/90	4/91
RECOVERY	2	10/90	12/90
CONTAINMENT PERFORMANCE	35	10/90	1/91
INTERNAL FLOODS, FIRES, HURRICANES	18	10/90	1/91
SENSITIVITY AND MODIFICATIONS EVALUATION	1	12/90	4/91
TECHNOLOGY TRANSFER AND REPORTING	35	2/91	5/91
IN - HOUSE REVIEW	10	6/91	6/91

* Revised 2/90



TURKEY POINT PLANT PRA-ACCIDENT SEQUENCE ANALYSIS

GENERAL APPROACH

- FUNCTIONAL EVENT TREE JOINED TO SYSTEMS VIA TOP LOGIC
- CRITICAL SAFETY FUNCTIONS (FROM EOP's) USED FOR EVENT TREES
- SUCCESS CRITERIA OBTAINED FROM FSAR; OTHER EXISTING ANALYSES (MAAP CODE IS EXPECTED TO BE AVAILABLE PRIOR TO PROJECT COMPLETION)

SPECIAL FEATURES

- CONTAINMENT SYSTEMS (SPRAYS & COOLERS) NOT REQUIRED FOR LEVEL 1 "FRONT-LINE" FUNCTION (MAY NEED FOR CONTAINMENT EQUIPMENT "HVAC")
- QUANTIFICATION ISSUE: SAFETY RELATED EQUIPMENT VS. OPERATOR PREFERENCE

EXAMPLE

HEAT SINK CHOICES

SAFETY RELATED

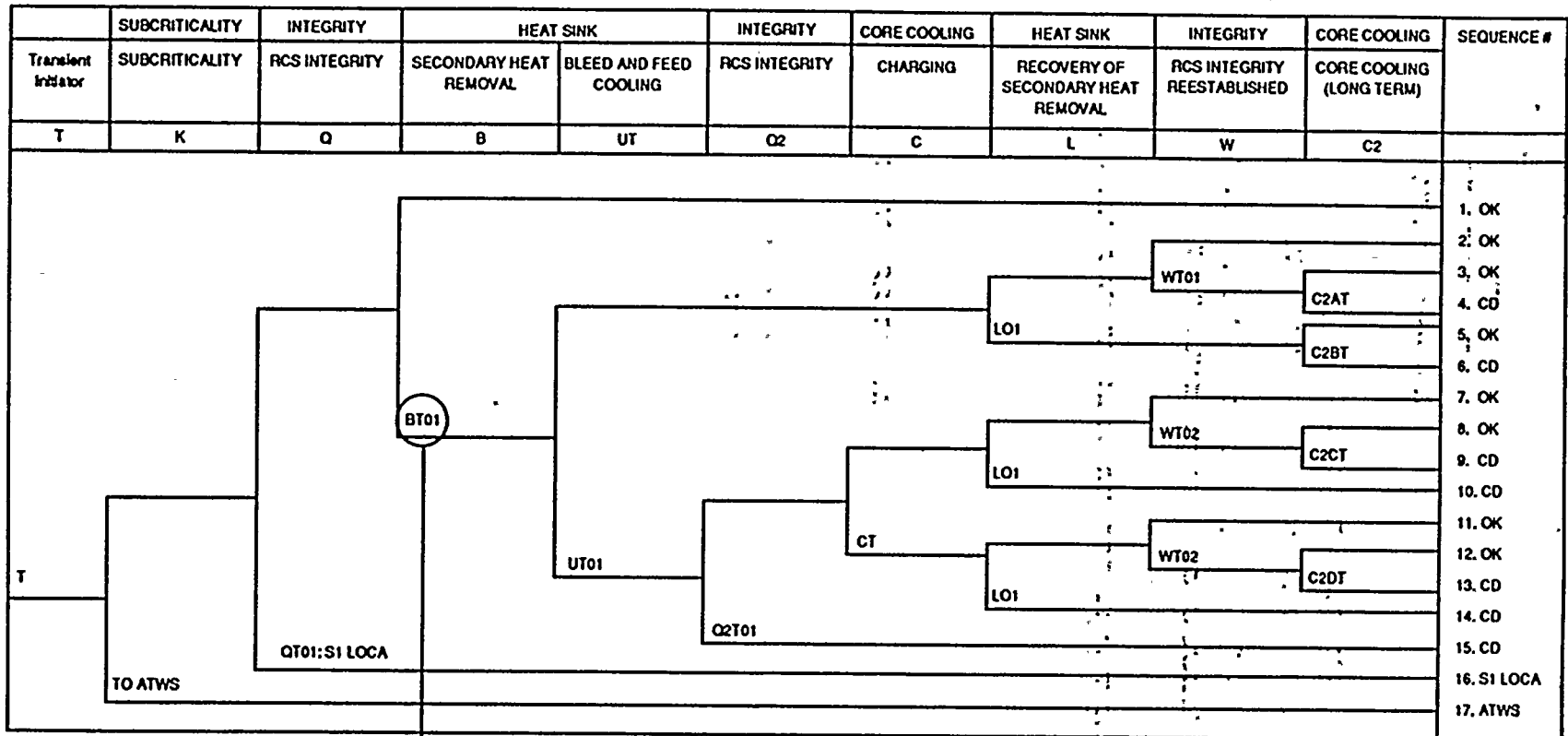
LMFW → AFW → FEED & BLEED

OPERATOR DIRECTION (DEPENDENT ON TIMING)

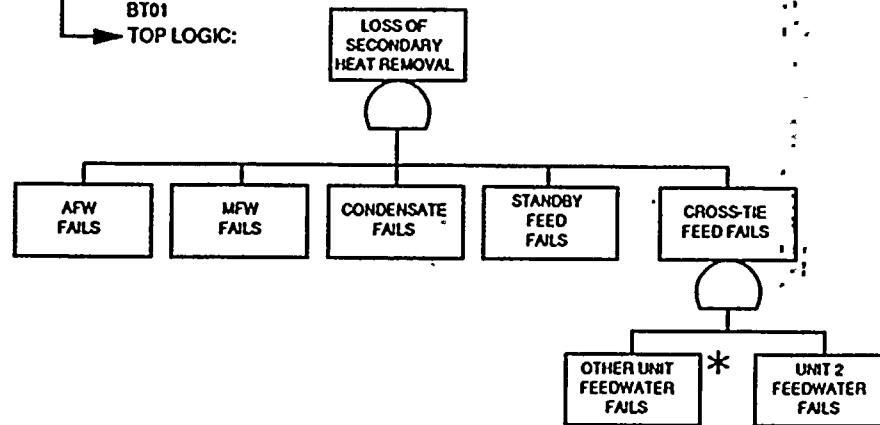
LMFW → AFW → MFW → STBY
FEED
PUMPS

MF
X-TIE'S → FEED & BLEED

TURKEY POINT PLANT PRA - TRANSIENT EVENT TREE



BT01
TOP LOGIC:



* NUCLEAR UNIT

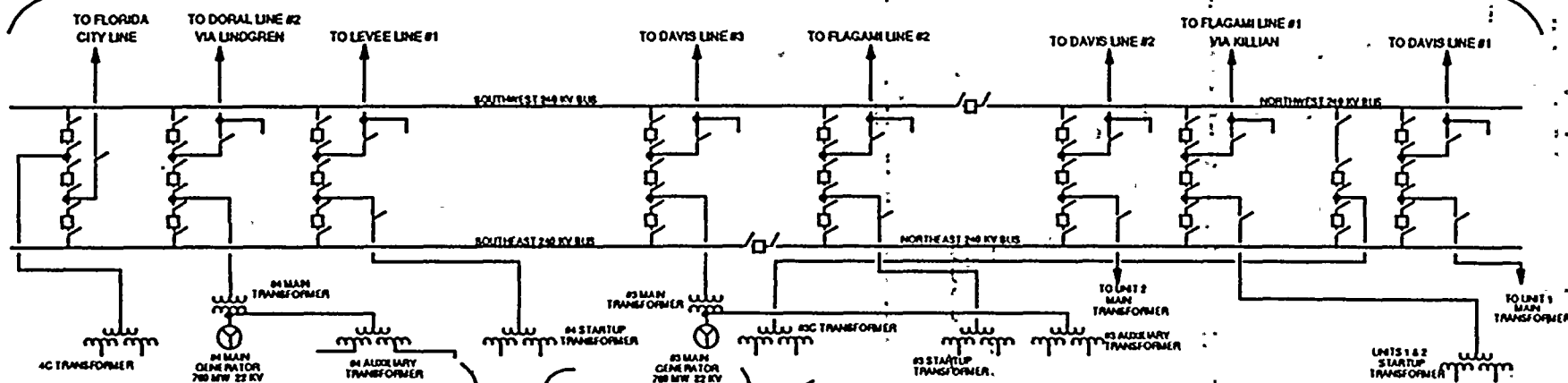
TURKEY POINT PLANT PRA-INITIATING EVENT CATEGORIES

<u>SYMBOL</u>	<u>DESCRIPTION</u>
T ₁ -	Reactor Trip
T ₂ -	Reactor Trip with PORV Challenge
T ₃ -	Loss of Power Conversion System
T _{3a} -	Loss of Main Feedwater, but recoverable
T _{3b} -	Loss of Main Feedwater, only condensate pumps recoverable
T _{3c} -	Loss of Main Feedwater, but not recoverable
T _{3d} -	Loss of MFW due to Feedline Break
T _{3e} -	Excessive Feedwater
T ₄ -	Loss of Offsite Power → See Slide 7
T ₅ -	Steamline Break Upstream of Main Steam Isolation Valves (MSIVs)
T ₆ -	Steamline Break Downstream of MSIVs
T ₇ -	Spurious SI Actuation
S ₁ -	Small-Small LOCA S1 (Breaks 3/8" <D <1")
S ₂ -	Small LOCA S2 (Breaks ~ 1"-3" in D)
M -	Medium LOCA (Breaks 3" <D <13.5")
A -	Large LOCA (Breaks D > 13.5")
R -	Steam Generator Tube Ruptures
W -	ATWS (Anticipated Transients Without Scram)
V -	Interfacing System LOCA
-	Special Initiators
-	Dual Initiators → See Slide 8

TURKEY POINT PLANT PRA - LOSS OF OFFSITE POWER CATEGORIES

LOSS OF GRID

= SEPARATION OF SWITCHYARD FROM ALL OFFSITE POWER SOURCES



LOSS OF SAFETY BUSES

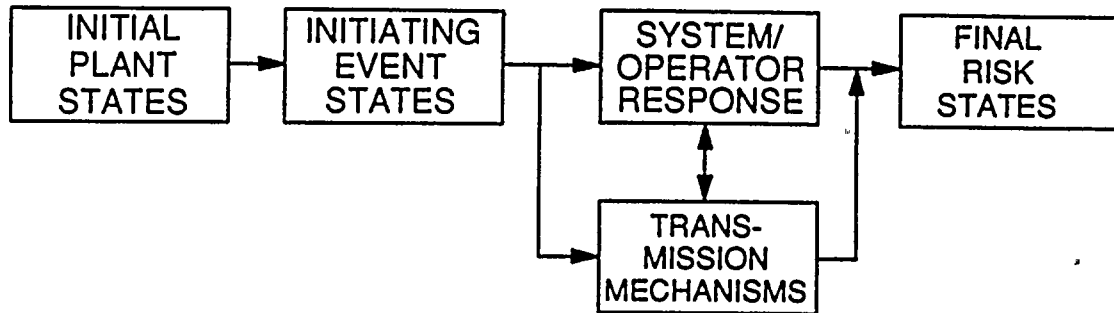
= SWITCHYARD FAULTS WHICH ISOLATE STARTUP TRANSFORMER (POST-TRIP)

LOSS OF C - BUS

= LOSS OF SUPPLY TO 'C' BUS → TRIPS UNIT, LOSS OF ONE MFW TRAIN, ONE STBY FD PUMP TRAIN

TURKEY POINT PRA - DUAL UNIT ACCIDENT SEQUENCES

GENERAL APPROACH



- INITIAL PLANT STATES "ALLOWABLE" UNIT STATES, AT LEAST ONE UNIT AT POWER
- INITIATING EVENT STATES SINGLE OR DUAL UNIT TRIPS
 - CONSIDER SYSTEM ALIGNMENT IF ONE UNIT NOT AT POWER
 - FMEA OF SYSTEMS TO SCREEN FOR POTENTIAL DUAL UNIT INITIATORS
- SYSTEM/OPERATOR RESPONSE DUAL UNIT EVENT TREE/FAULT TREES
 - AFW, HHSI, EPS, IA, HVAC, CCW
- TRANSMISSION MECHANISMS PHYSICAL (T/H OR FAILURE MECHANISMS), ENVIRONMENTAL, SIGNAL AND CONTROL UNIT DAMAGE (e.g. EVENT V IN AUX BUILDING)
- FINAL RISK STATES COMBINATIONS OF UNIT OK, UNIT CORE DAMAGE (CONTAINMENT PERFORMANCE IF IMPORTANT)

PLAN

TEST DUAL UNIT FRAMEWORK BY ANALYSIS OF LOSS OF GRID, EXPAND AS NECESSARY

- TURKEY POINT PLANT PRA - SYSTEMS ANALYSIS

GENERAL APPROACH

- DETAILED SYSTEM DESCRIPTION DEVELOPMENT PRECEDES FAULT TREE CONSTRUCTION
 - REVIEW BY SYSTEMS ENGINEERS (SITE), DESIGN (JUNO)
- CAFTA/MODULAR FAULT TREE METHOD
 - ONE TREE FOR "ALL" MISSIONS, FLAGS TO DEFINE WHICH MISSION
- QUANTIFY INITIALLY WITH GENERIC DATA, HUMAN RELIABILITY SCREENING VALUES
 - PLANT SPECIFIC DATA COLLECTION/REDUCTION UNDERWAY (5 YEARS, 1984 - 1989)

OBSERVATIONS

- "HERCULEAN" EFFORT REQUIRED TO MODEL NEW (4 DIESEL) ELECTRIC POWER SYSTEM
- "PERCEIVED" RELIABILITY OF SAFETY VS. NON-SAFETY SYSTEMS (e.g. STANDBY FEEDWATER, BLACK-START DIESELS)
- "HVAC" SUPPORT (SPRAYS AND COOLERS) NEEDED FOR IN-CONTAINMENT ECCS EQUIPMENT (DESIGN VS LOCA PRESSURE)
- PRA FINDINGS - DRAWING, PROCEDURE CHANGES

TURKEY POINT PRA - CONTAINMENT ANALYSIS

GENERAL APPROACH

- BINNING, CONTAINMENT EVENT TREE, FAULT TREES FOR CONTAINMENT SYSTEMS, PHENOMENA
 - WILL NEED "BRIDGE" TREE - SHOWS IMPACT OF EARLY FAILURE OF SPRAYS, COOLERS
 - MAAP 3.0B TO BE USED FOR PLANT SPECIFIC UNDERSTANDING

PROGRESS TO-DATE

- CONTAINMENT CHARACTERISTICS IDENTIFIED (MAAP INPUT PARAMETERS)
- WALKDOWNS PERFORMED DURING UNIT 3 REFUELING OUTAGE (MARCH, '90)
- CONTAINMENT ULTIMATE PRESSURE CALCULATED
 - FAILURE CRITERIA
 1. ULTIMATE STRUCTURAL FAILURE (1% STRAIN IN POST-TENSIONED TENDONS) = 153 PSIG
 2. CONTAINMENT LEAKAGE (INITIATION OF LOCAL LINER DUCTILE FAILURE) = 145 PSIG

NOTE: TURKEY POINT DESIGN = 59 PSIG



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- TURKEY POINT PLANT PRA - EXTERNAL EVENTS

PRIORITIZATION - RESOURCES APPLIED

1. HURRICANE - DESIGN BASIS, APPLICATION, "HUGO,"
NEW PMP CRITERIA
2. INTERNAL FLOODING - DESIGN BASIS, APPLICATION
CURRENT OPERATIONS
3. FIRE - WELL UNDERSTOOD, APPENDIX R MODIFICATIONS,
CURRENT CONTROLS

GENERAL APPROACH:

- HURRICANE - SPECIFIC PROCEDURE, HAZARDS IDENTIFICATION
STRUCTURE, COMPONENT VULNERABILITIES, SCREENING,
CORE DAMAGE SEQUENCES
 - "START" HURRICANE SEQUENCE WITH UNITS SHUTDOWN
 - DUAL UNIT RISK IMPLICATIONS
- FLOODING - SIMILAR TO HURRICANE, SCREENING EXPECTED TO
QUICKLY FOCUS ANALYSIS
- FIRE - EPRI/NUMARC "FIVE" METHOD TO BE USED, QUALITATIVE/
QUANTITATIVE SCREENING, WALKDOWNS TO VERIFY DATA

NOTE: FPL INTENT IS TO SATISFY EXPECTED IPEEE GENERIC
LETTER FOR THESE THREE EXTERNAL EVENTS

MISCELLANEOUS/CONCLUSION

SCHEDULE

- TIGHT, BUT DO-ABLE (52 WEEK COUNTDOWN)
- COUNTERMEASURES AND THE DUAL UNIT OUTAGE

FUTURE MEETINGS

- JANUARY, 1991 - PRELIMINARY RESULTS AND CERTIFICATION ISSUE RESOLUTION
- JUNE, 1991 - FINAL RESULTS AND REPORT

NRC REVIEW PLAN

- DUQUESNE LIGHT MEETING - CLARIFICATION OF DR. BECKNER COMMENT - "STAFF . . . DOCUMENT NOT ADEQUATE FOR LICENSING DECISIONS."
- FPL COMMITMENT TO TURKEY POINT PRA:
 - PERMANENT TEAM
 - GREATER THAN 15 MAN-YEAR EFFORT (FPL)
 - GREATER THAN \$1 MILLION DOLLAR EXPENDITURE
 - S. VARGAS LETTER VS. IPE GENERIC LETTER 88-20

QUESTION AND ANSWER

MEETING ATTENDANCE
ON 07/11/90 FOR
TURKEY POINT/ST. LUCIE
PRA PRESENTATION

<u>NAME</u>	<u>ORGANIZATION</u>
G. E. EDISON	NRC
M. V. SINKULE	NRC - RII
D. J. MODEEN	NUMARC
D. C. BAKER	FPL - NUCLEAR ENGINEERING
D. D. GRANDAGE	FPL - TURKEY POINT
L. E. PHILPOT	CE
A. ORTIOJA	FPL - MECHANICAL SECTION OF ENGINEERING
R. L. TEUTEBERG	FPL - NUCLEAR ENGINEERING
J. J. O'NEILL	FPL - RELIABILITY & RISK ASSESSMENT
GLENN KELLY	NRC RISK APPLICATIONS BRANCH
G. SALAMON	FPL - PTN LICENSING
M. POHIDA	NRC - RISK APPLICATIONS BRANCH
ADEL EL-BASSIONI	NRC / NRR / RISK APPLICATIONS

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AEIBassioni 10/A/2

GKelly 10/E/4

GLainas 14/H/4

RCrlenjak, RII

RBorchardt 17/G/21

SVarga

SHoffman

ACRS (10)

GEdison

DMiller

JNorris

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EJordan MNBB-3302

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July 31, 1990

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Project Directorate II-2
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Enclosures:
As stated

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See next page

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07/31/90

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07/31/90

PM:PDII-2
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BC:PRAB
A.EI Bassioni(A)
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D:PDII-2
HBerkow
08/1/90

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