DMB

FEB 25 1985

Docket No. 50-454; 50-455

MEMORANDUM FOR: Thomas Essig, Section Manager, Health Physics Technology Section, Radiological Science Department, Battelle Pacific Northwest Labs

FROM: Carl J. Paperiello, Chief, Emergency Preparedness and Radiological Protection Branch, Region III

THRU: David B. Matthews, Chief, Emergency Preparedness Branch, Division of Emergency Preparedness and Engineering Response, OIE

SUBJECT: REQUEST FOR TECHNICAL ASSISTANCE - NRC EMERGENCY PREPAREDNESS PROGRAM

PLANT NAME: Byron Nuclear Generating Station, Units 1 and 2

LICENSEE/APPLICANT: Commonwealth Edison Company

EP REVIEWER: Thomas J. Ploski (FTS 388-5529)

Please take action as indicated. If you have any questions regarding the information, activity, or schedule, contact the reviewer whose name is shown above. This request has been cleared thru the NRC Headquarters program management office.

I. Area of Review:

1. ( ) Emergency Plan
2. ( ) Dose calculation methodology
3. ( ) Evacuation Time Estimates
4. (X) Emergency Action Levels
5. ( ) Other: _____

II. Information Supplied:

1. (Y) Radiological Emergency Plan Revision #1, Dated September 1984.
2. ( ) Submittal from the Licensee/Applicant dated _____.
3. ( ) Evacuation Time Estimates, Revision #_____, Dated _____.
4. ( ) Other: _____.

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III. Scope of Activities:

1. ( ) Conduct review for deficiencies and submit questions for clarification.
2. ( ) Conduct review an submit evaluation for preparation of input to SER.
3. (X) Other: Review EALS in Revision 1 versus those in Revision 0 and guidance in NUREG 0654, Revision 1. Determine whether EAL changes have decreased the effectiveness of the emergency plan and are consistent with regulatory guidance.

IV. Schedule:

1. ( ) Urgent: Contact EP Reviewer upon receipt.
2. (X) Provide requested information/response by March 29, 1985.
3. ( ) Initiate meeting to discuss findings (10 working days prior to response date).
4. ( ) Other: _____.

V. Supplemental information or instructions:

Attached are copies of Revision 0 and Revision 1 to station's EALs.

C J Paperiello

Carl J. Paperiello, Chief
Emergency Preparedness and
Radiological Protection Branch

Attachment: As stated

cc w/attachment:
S. Welch, EPB, OIE
D. Matthews, EPB, OIE
EP Reviewer

RIII
TP
Ploski/ld
02/25/85

RIII
Phillips

RIII
CJP
Paperiello
2/24/85

TABLE BYA 5-1

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
Class Description	Events in progress or have occurred which indicate a potential degradation of the level of safety of the plant.	Events in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant.	Events in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public.	Events in progress or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity.
1) Aircraft crash or missiles from whatever source.	Impacted on-site.	Impacted on-site and has degraded equipment described in the Technical Specifications such that a limiting conditon for operation requires a shutdown.	A) Impacted onsite and has degraded equipment described in the Technical Specifications beyond the limiting condition for operation that requires a shutdown; or B) has exceeded a Technical Specification safety limit.	
2) Control Room Evacuation		When 10CFR20 exposure limits are expected to be exceeded.	Due to exceeding 10CFR20 exposure limits, evacuation is required and control is not established from Local Control Stations or from Remote Shutdown Panel within 15 mins.	

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
3) Earthquake (activation of seismic monitoring alarm with level verification, not spurious or testing)	Seismic equipment is activated. (at level of 0.02g)	At a level greater than Operating Basis Earthquake (>0.095)	At a level greater than Safe Shutdown Earthquake (>0.21g)	
4) Unplanned Explosion	Onsite but not affecting plant operations.	Explosion onsite has degraded equipment described in the Technical Specifications such that a limiting condition for operation requires a shutdown.	A) Explosion has has degraded equipment described in the Technical Specifications beyond the condition for operation that requires a shutdown; or B) has exceeded a Technical Specification safety limit.	
5) Fire (ongoing as described by observation or alarm, and verified by the fire brigade)	A) Fire requires NRC notification if not identified within 10 minutes; or B) Fire requiring offsite assistance but not affecting plant operation.	Fire requires offsite assistance and has degraded equipment described in the Technical Specifications such that a limiting condition for operation requires a shutdown.	A) Fire requires offsite assistance and has degraded equipment described in the Technical Specifications beyond the limiting condition for operation that require a shutdown; or B) has exceeded a Technical Specification safety limit.	

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
6) Flood or Low Water Level	Water at level of ESF Essential Service Water Pump (698 feet MSL) or Rock River flow ≤ 714 cubic feet per second and Rock River level ≤ 665 feet MSL	Water at level of Probable Maximum Flood (708.3 feet MSL) or Low level condition for Unusual Event plus break of the Oregon Dam.	Water above Essential Service Water Pumps and no well pumps available; or Low level condition for Alert plus no well pumps available.	
7) Security Threat Definition: Acts which threaten the safety of station personnel or the security of the nuclear units or special nuclear material. This includes crowd disturbances or acts of sabotage.	The following events as described in the Security Plan: (1) Obvious attempt to sabotage. (2) Internal disturbance (disturbance which is not short lived or is not a harmless outburst involving one or more individuals within the protected area). (3) Bomb device discovered. (4) Hostage. (5) Civil disturbance (spontaneous collective group gathering which disrupts normal operations). (6) Armed or forced protected area intrusion. (7) Armed or forced vital area intrusion.	An ongoing security threat (event) of increasing severity that persists for more than 60 min.	An ongoing security threat (event) involving an imminent loss of physical control of the facility.	An ongoing security threat (event) involving a loss of physical control of the facility.

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
8) Tornado or severe winds being experienced (Wind speed as indicated in control room is used to classify condition.)	A) Tornado near Facility (1) Control room informed by load dispatcher or (2) Station personnel have made visual sighting; or B) Sustained winds >60 mph.	A) Tornado strikes Facility or B) Sustained winds >75 mph	Sustained winds >90 mph and either unit not in cold shutdown.	
9) Toxic Gas	Uncontrolled release of toxic gas at life threatening levels near or onsite.	Entry of toxic gas into the protected area.	Entry of toxic gas into vital areas affecting the safe shutdown of the plant.	
10) Loss of AC Power	Loss of AC power has degraded equipment described in the Technical Specifications such that a limiting condition for operation requires a shutdown.	A) Loss of AC power has degraded equipment described in the Technical Specifications beyond the limiting condition for operation that requires a shutdown; or B) has exceeded a Technical Specification Safety Limit.	Engineered safety feature busses are deenergized for >15 minutes.	Ongoing loss of power and total loss of feedwater makeup capability.

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
11) Loss of DC Power	Loss of DC power sources has degraded equipment described in the Technical Specifications such that a limiting condition for operation requires a shutdown.	A) Loss of DC power sources has degraded equipment described in the Technical Specifications beyond the limiting conditions for operation that require a shutdown; or B) has exceeded a Technical Specification safety limit.	Busses 111 (211) and 112 (212) are all deenergized for > 15 minutes.	
12) Plant Shutdown Functions		A) Loss of all systems capable of maintaining cold shutdown; or B) Failure of the Reactor Protection System instrumentation to initiate and complete a reactor trip, which brings the reactor subcritical once a limiting safety system setpoint has been exceeded.	Loss of all systems capable of maintaining hot shutdown; or Transient requiring operation of shutdown systems with failure to trip. (Power Generation continues, but no core damage evident)	Transient requiring operation of shutdown systems with failure to trip and core damage is evident.

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITION	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
13) Other conditions or systems required by Technical Specifications (i.e. ECCS, fire protection, etc.)	Equipment described in the Technical Specifications is degraded such that a limiting condition for operation requires a shutdown.	A) Equipment described in the Technical Specifications is degraded beyond the limiting condition for operation that requires a shutdown; or B) has exceeded a Technical Specification safety limit.		
14) Abnormal Fuel Temperature	> 650°F in average of 10 highest incore thermocouple readings.	> 800°F in average of 10 highest incore thermocouple readings.	> 1200°F in average of 10 highest incore thermocouple readings.	
15) Abnormal Coolant Temperature	< 50°F on subcooling meter for > 15 min.	< 35°F on subcooling meter for > 15 min.		
16) Loss of Primary Coolant	A) ECCS initiation (non-spurious) or B) Failure of a primary system safety or relief valve to close; or C) Exceeding Reactor coolant system leak rate as specified in Technical Specifications.	A > 50 gpm leakage increase in a 4-hour period as indicated by either leak rate calculations, charging pump flow or VCT level changes.	Primary system leakage is beyond makeup capabilities of of charging pumps.	And Failure to activate ECCS

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
17) Main Steam Line Break	With zero or small primary to secondary leakage and/or small percentage of failed fuel.	With 1 gpm primary to secondary leakage and with 1% failed fuel.	Ten (10) gpm primary to secondary leakage And significant fuel damage.	
18) Loss of Reactor Coolant Flow FSAR 15.3.1. FSAR 15.3.2. FSAR 15.3.3. FSAR 15.3.4.	Loss of reactor coolant flow due to electrical or mechanical failure where several separate circuits will trip the reactor promptly.	Instantaneous seizure of a reactor coolant pump rotor occurs using extremely conservative assumptions where the integrity of the primary coolant system is not endangered under the worst case. The hot spot remains considerably less than 2700°F. The core will remain in place and intact with no loss of core cooling capacity.		
19) Loss of Secondary Coolant	Less than 640 psig in any operational steam generator.	Non-isolable steam release with > 1 gpm primary to secondary leakage.	Non-isolable steam release with 10 gpm primary to secondary leakage and indication of fuel damage > 1%.	Loss of Feedwater and and Aux. Feedwater for 3/4 hour plus conditions for Site Emergency.
20) Steam Generator Tube Rupture FSAR 15.6.3.		FSAR accident consisting of a double ended rupture of a single steam generator tube.		

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
21) Feedwater malfunction (excessive heat removal) FSAR 15.1.1. FSAR 15.1.2.	Transient resulting in excessive heat removal due to cold feedwater addition maintaining considerable margin above a limiting DNBR of 1.3.			
22) CVCS Malfunction Erroneous Boron Dilutions FSAR 15.4.6.	Should erroneous boron dilution occur, numerous alarms and indications are available to alert the operator to the condition to take corrective action before excessive shutdown margin is lost.			
23) Uncontrolled RCC withdrawal from subcritical FSAR 15.4.1	Should a continuous control rod assembly withdrawal occur, the transient will be terminated by the source range neutron flux level trip.			
24) Uncontrolled RCC withdrawal at power FSAR 15.4.2.	Should a continuous control rod assembly withdrawal occur, the transient will be terminated by the power range high neutron flux level trip.			

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
25) Rupture of Control Rod Drive Mechanism (rod ejection accident) FSAR 15.4.8.		The FSAR accident predicts a 2% increase in failed fuel as a result of this accident which places it in the Alert category based on NUREG 0654.		
26) Turbine-Generator accident in which missiles are generated	A turbine generator failure in which missiles are generated and no penetration of the casing occurs and normal reactor shutdown follows.	A turbine generator failure in which missiles are generated and penetration of the casing does occur; all possible impact areas containing essential equipment are protected and normal reactor shutdown follows.		

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
27) Loss of Fission Product Barriers		A. > 2 x 10^2 R/Hr. Primary Containment Radiation, or B. Loss of 1 of the following 3 fission product barriers: 1) Cladding: grab sample results > 300 uci/cc equivalent of I-131 2) Reactor Coolant System: a) Containment press. > 5 psig and b) Containment temp. > 150°F and c) Containment humidity > 50% 3) Primary Containment a) Containment press. > 50 psig, or b) Containment temp. > 280°F, or c) Loss of containment integrity when containment integrity is required	A. > 4 x 10^2 R/Hr Primary Containment Radiation, or B. Loss of 2 of the following 3 fission product barriers: 1) Cladding: grab sample results > 300 uci/cc equivalent of I-131 2) Reactor Coolant System: a) Containment press. > 5 psig and b) Containment temp. > 150°F and c) Containment humidity > 50% 3) Primary Containment a) Containment press. > 50 psig, or b) Containment temp. > 280°F, or c) Loss of containment integrity when containment integrity is required	A. > 2 x 10^3 R/Hr Primary Containment Radiation, and B. Loss of 2 of the following 3 fission product barriers with an imminent loss of the third barrier: 1) Cladding: grab sample results > 300 uci/cc equivalent of I-131 2) Reactor Coolant System: a) Containment press. > 5 psig and b) Containment temp. > 150°F and c) Containment himidity > 50% 3) Primary Containment a) Containment press. > 50 psig, or b) Containment temp. > 280°F, or c) Loss of containment integrity when containment integrity is required

TABLE BYA 5-1 (Continued...)
BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
28) Fuel Handling Accident (Direct information from fuel handling personnel indicating that an irradiated fuel assembly has been damaged).		Fuel Handling Building exhaust has been diverted through the charcoal filters.	A) Radiation levels in the Fuel Handling Building are >100 mR/hr, or B) Fuel Handling Building exhaust charcoal filters are depleted and and radioactivity is being released to the atmosphere.	
29) Elevated Area Rad Monitor Readings	Unplanned increase by factor of 20 in any ARM.	Unplanned increase by factor of 100 in any ARM.		
30) Gaseous Radiation Releases From the Plant.	10CFR20 instantaneous release limits (10CFR20.105) are exceeded as measured by effluent monitoring or counting instrumentation.	>10 times the 10CFR20 instantaneous release limits (10CFR20.105) as measured by the effluent monitoring or counting instrumentation.	Effluent monitors detect level corresponding to > 50mR/hr (8.9×10^{3} uCi/sec) for 1/2 hour, or >500mR/Hr (8.9×10^{6} uCi/sec) for 2 minutes at the site boundary.	Effluent monitors detect levels corresponding to > 1Rem/Hr whole body at the site boundary. This condition exists when: $Q/u > 7.1 \times 10^{6}$ where Q = release rate in uCi/sec u = mean wind speed in meters/sec.
31) Liquid Radiation Releases from the Plant as measured by effluent monitoring or counting instrumentation.	1) Gross Beta $>1 \times 10^{-7}$ uCi/ml or 2) Tritium $>3 \times 10^{-3}$ uCi/ml	1) Gross Beta $>1 \times 10^{-6}$ uCi/ml or >40 Ci total in 24 hours or 2) Tritium $>3 \times 10^{-2}$ uCi/ml or >500 Ci total in 24 hours	1) Gross Beta >2,000 Ci total in 24 hours or 2) Tritium $>2 \times 10^{4}$ Ci total in 24 hours	1) Gross Beta $>2 \times 10^{4}$ Ci total in 24 hours or 2) Tritium $>2 \times 10^{5}$ Ci total in 24 hours

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
32) Personnel Injury	Transportation of radioactivity contaminated injured person to hospital			
33) Hazardous Materials	As a direct result of hazardous materials a person is killed or hospitalized or estimated property damage exceeds $50,000.			
34) Any other conditions of equivalent magnitude to to the criteria used to define the accident category as determined by the Station Director.*	Warrants increased awareness on the part of the state and/or local off-site officials.	Warrants activation of Technical Support Center		Imminent Core Melt

* Conditions that may or may not warrant classification under GSEP include:

a. Incident reporting per 10CFR50.72
b. Incident reporting per 10CFR20.403 or Illinois Rules and Regulations, Part D.403.
c. Discharges of oil or hazardous substances into waterways per 33CFR153.
d. Security contingency events per the Station Security Plan.

The Station Director may, at his discretion, categorize the above situations as GSEP emergencies, depending upon the seriousness of the situation. (Refer to Section 9.3 of the generic plan for additional information.)

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

TRANSPORTATION ACCIDENT

A. A vehicle transporting radioactive materials or non-radioactive Hazardous materials from a Commonwealth Edison generating station is involved in a situation in which:

1. Fire, breakage or suspected radioactive contamination occurs involving a shipment of radioactive material or;

2. As a direct result of Hazardous materials,

(a) A person is killed; or
(b) A person receives injuries requiring hospitalization; or
(c) Estimated carrier or other property damage exceeds $50,000.

B. Any other condition involving Hazardous material transportation and equivalent to the criteria in Item A.

TABLE BYA 5-1

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
Class Description	Events in progress or have occurred which indicate a potential degradation of the level of safety of the plant.	Events in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant.	Events in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public.	Events in progress or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity.
1) Aircraft crash or missiles from whatever source.	Impacted on-site.	Impacted on-site and has degraded equipment described in the Technical Specifications such that a limiting conditon for operation requires a shutdown.	A) Impacted onsite and has degraded equipment described in the Technical Specifications beyond the limiting condition for operation that requires a shutdown; or B) has exceeded a Technical Specification safety limit.	
2) Control Room Evacuation		When 10CFR20 exposure limits are expected to be exceeded. exceeded.	Due to exceeding 10CFR20 exposure limits, evacuation is required and control is not established from Local Control Stations or from Remote Shutdown Panel within 15 mins.	

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
3) Earthquake (activation of seismic monitoring alarm with level verification, not spurious or testing)	Seismic equipment is activated. (at level of 0.02g)	At a level greater than Operating Basis Earthquake (>0.095)	At a level greater than Safe Shutdown Earthquake (>0.21g)	
4) Unplanned Explosion	Onsite but not affecting plant operations.	Explosion onsite has degraded equipment described in the Technical Specifications such that a limiting condition for operation requires a shutdown.	A) Explosion has has degraded equipment described in the Technical Specifications beyond the condition for operation that requires a shutdown; or B) has exceeded a Technical Specification safety limit.	
5) Fire (ongoing as described by observation or alarm, and verified by the fire brigade)	A) Fire requires NRC notification if not identified within 10 minutes; or B) Fire requiring offsite assistance but not affecting plant operation.	Fire requires offsite assistance and has degraded equipment described in the Technical Specifications such that a limiting condition for operation requires a shutdown.	A) Fire requires offsite assistance and has degraded equipment described in the Technical Specifications beyond the limiting condition for operation that require a shutdown; or B) has exceeded a Technical Specification safety limit.	

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
6) Flood or Low Water Level	Water at level of ESF Essential Service Water Make-up Pump (698 feet MSL) or Rock River flow ≤714 cubic feet per second and Rock River level ≤665 feet MSL	Water at level of Probable Maximum Flood (708.3 feet MSL) or Low level condition for Unusual Event plus break of the Oregon Dam.	Water above Essential Service Water Make-up Pumps and no well pumps available; or Low level condition for Alert plus no well pumps available.	
7) Security Threat Definition: Acts which threaten the safety of station personnel or the security of the nuclear units or special nuclear material. This includes crowd disturbances or acts of sabotage.	The following events as described in the Security Plan: (1) Obvious attempt to sabotage. (2) Internal disturbance (disturbance which is not short lived or is not a harmless outburst involving one or more individuals within the protected area). (3) Bomb device discovered. (4) Hostage. (5) Civil disturbance (spontaneous collective group gathering which disrupts normal operations). (6) Armed or forced protected area intrusion. (7) Armed or forced vital area intrusion.	An ongoing security threat (event) of increasing severity that persists for more than 60 min.	An ongoing security threat (event) involving an imminent loss of physical control of the facility.	An ongoing security threat (event) involving a loss of physical control of the facility.

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
8) Tornado or severe winds being experienced (Wind speed as indicated in control room is used to classify condition.)	A) Tornado near Facility (1) Control room informed by load dispatcher or (2) Station personnel have made visual sighting; or B) Sustained winds >60 mph.	A) Tornado strikes Facility or B) Sustained winds >75 mph	Sustained winds >90 mph and either unit not	in cold shutdown.
9) Toxic Gas	Uncontrolled release of toxic gas at life threatening levels near or onsite.	Entry of toxic gas into the protected area.	Entry of toxic gas into vital areas	affecting the safe shutdown of the plant.
10) Loss of AC Power	Loss of all offsite power or loss of all onsite AC power required per unit.	Loss of all offsite AC power and loss of all onsite AC power required per unit.	Both ESF 4KV busses per unit deenergized for >15 minutes.	Ongoing loss of power and total loss of feedwater makeup capability.

TABLE BYA 5-1 (Continued...)
BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
11) Loss of DC Power	Loss of DC power sources has degraded equipment described in the Technical Specifications such that a limiting condition for operation requires a shutdown.	A) Loss of all ESF DC power, per unit.	Busses 111 (211) and 112 (212) are all deenergized for >15 minutes.	
12) Plant Shut-down Functions		A) Complete loss of any function needed to maintain cold shutdown (Both RH trains, OR both CC trains, OR both SX trains). OR B) Failure of the Reactor Protection System instrumentation to initiate and complete a reactor trip, which brings the reactor subcritical once a limiting safety system setpoint has been exceeded.	Complete loss of any function needed to maintain hot shutdown. (If you do not have at least one operable S/G with WR level ≥ 65% AND ability to control steam release either by S/G PORV, or steam dump cpability to the condenser.) OR Transient requiring operation of shutdown systems with failure to trip. (Power generation continues, but no core damage evident)	Transient requiring operation of shutdown systems with failure to trip and core damage is evident.
13) Loss of most or all alarm capability of annunciators.		In the Main Control Room.	In the Main Control Room and a plant transient is in progress.	

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
14) Conditions or systems required by Technical Specifications (i.e. ECCS, fire protection, etc.)	Equipment described in the Technical Specifications is degraded such that a limiting condition for operation requires a shutdown.	A) Equipment described in the Technical Specifications is degraded beyond the limiting condition for operation that requires a shutdown; or B) has exceeded a Technical Specification safety limit.		
15) Inadequate Core Cooling	>650°F in average of 10 highest incore thermocouple readings. OR Subcooling <25°F for 15 minutes.	Byron Status Tree's (BST's) require entry into BFR-C.2 Response to Degraded Core Cooling, based on subcooling, number of RCP's running, vessel level, and core exit thermocouples.	Byron Status Tree's (BST's) require entry into BFR-C.1 Response to Inadequate Core Cooling, based on subcooling, number of RCP's running, vessel level, and core exit thermocouples.	
16) Loss of Primary Coolant	A) Failure of a primary system safety valve to close, OR a primary PORV failure to close, and its block valve will will not isolate. B) Exceeding Reactor coolant system leak rate as specified in Technical Specifications.	A >50 gpm leakage increase in a 4-hour period as indicated by either leak rate calculations, charging pump flow or VCT level changes.	Primary system leakage is beyond makeup capabilities of of charging pumps.	And Failure to activate ECCS

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
17) Main Steam Line Break/Feed line Break	With zero or small primary to secondary leakage and/or small percentage of failed fuel.	With 1 gpm primary to secondary leakage and with 1% failed fuel.	Ten (10) gpm primary to secondary leakage And significant fuel damage.	
18) Loss of Heat Sink		Byron Status Tree's (BST's) require entry into BFR-H.1 Response to Loss of Secondary Heat Sink, based on total feedwater flow to the stream generators.	Alert condition is on going for 15 minutes. (Loss of all feedwater and all auxiliary feed water, and the residual heat removal system is not in operation.)	Alert condition is on going for 45 minutes. (Loss of all feedwater and all auxiliary feedwater and the residual heat removal system is not in operation).
19) Steam Generator Tube Rupture	Exceeding primary to secondary leakage rates as specified in Technical Specifications.	Entry into BEP-3 Steam Generator Tube Rupture with the following: 1. Reactor Trip/ Safety Injection AND 2. High radiation in the condenser air removal system. OR 3. High radiation in steam generator blowdown. OR 4. Unexplained increase in any steam generator level.	Same conditions as alert and loss of offsite power OR Tube(s) rupture is beyond the capability of the charging pumps.	

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
20) Inadvertent positive reactivity insertions due to rods or dilution.	A. Inadvertent dilution such that: (1) Technical Specification shutdown margin requirements are violated. OR (2) The control bank low low insertion limit is reached. B. Uncontrolled rod withdrawal from subcriticality or power operation.			
21) Feedwater Malfunction	Any feedwater malfunction resulting in a sustained decrease in Feedwater temperature to the steam generators by >40°F.			
22) ECCS Actuation	ECCS initiation. (Non-Spurious) with flow into reactor coolant system.			
23) Turbine-Generator accident in which missiles are generated	A turbine generator failure in which missiles are generated and no penetration of the casing occurs and normal reactor shutdown follows.	A turbine generator failure in which missiles are generated and penetration of the casing does occur; all possible impact areas containing essential equipment are protected and normal reactor shutdown follows.		

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
24) Loss of Fission Product Barriers Primary Containment Radiation is observed on the RM-11 display console for 1(2)RE-AR020 or 1(2)RE-AR021		A. >2 x 10^2 R/Hr. Primary Containment Radiation, OR B. Loss of 1 of the following 3 fission product barriers: 1) Cladding: grab sample results >300 uci/cc equivalent of I-131 2) Reactor Coolant System: a) Containment press. >5 psig and b) Containment temp. >150°F and c) Containment humidity >50% 3) Primary Containment a) Containment press. >50 psig, or b) Containment temp. >280°F, or c) Loss of containment integrity when containment integrity is required	A. >4 x 10^2 R/Hr Primary Containment Radiation, OR B. Loss of 2 of the following 3 fission product barriers: 1) Cladding: grab sample results >300 uci/cc equivalent of I-131 2) Reactor Coolant System: a) Containment press. >5 psig b) Containment temp. >150°F and c) Containment humidity >50% 3) Primary Containment a) Containment press. >50 psig, or b) Containment temp. >280°F, or c) Loss of containment integrity when containment integrity is required	A. >2 x 10^3 R/Hr Primary Containment Radiation, AND B. Loss of 2 of the following 3 fission product barriers with an imminent loss of the third barrier: 1) Cladding: grab sample results >300 uci/cc equivalent of I-131 2) Reactor Coolant System: a) Containment press. >5 psig b) Containment temp. >150°F and c) Containment himidity >50% 3) Primary Containment a) Containment press. >50 psig, or b) Containment temp. >280°F, or c) Loss of containment integrity when containment integrity is required

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
25) Fuel Handling Accident (Direct information from fuel handling personnel indicating that an irradiated fuel assembly has been damaged).		Fuel Handling Building exhaust has been diverted through the charcoal filters.	A) Radiation levels in the Fuel Handling Building are >100 mR/hr, OR as observed on the RM-11 display console for ORE-AR055 or ORE-AR056, B) Fuel Handling Building exhaust charcoal filters are depleted OR inoperable and radioactivity is being released to the atmosphere.	
26) Elevated Area Rad Monitor Readings	Unplanned increase by factor of 20 in any ARM.	Unplanned increase by factor of 100 in any ARM.		

TABLE BYA 5-1 (Continued...)
BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
27) Gaseous Radiation Releases**				
A. Core Damage Suspected	No core damage event is postulated at the Unusual Event level.	Instantaneous release rate exceeds 1.8×10^6 µCi/sec	Release rate averaged for 2 minutes exceeds >500 mR/hr whole body at the site boundary (8.9×10^6 µCi/sec) OR Release rate averaged for 30 min. exceeds >50 mR/hr whole body at the site boundary (8.9×10^5 µCi/sec)	Instantaneous release rate exceeds level corresponding to >1 rem/hr whole body at the site boundary under actual meteorology. This condition exists when $Q > 7.1 \times 10^6 \times U$ where Q = release rate in µCi/sec U = mean wind speed in meters/sec
B. NO Core Damage Suspected	Instantaneous release rate exceeds 4×10^6 µCi/Sec Noble gas OR 90 µCi/Sec Iodine OR 10 CFR 20.105 instantaneous release limits are exceeded.	Instantaneous release rate exceeds 4×10^7 µCi/Sec Noble gas OR 900 µCi/Sec Iodine OR 10x10 CFR 20.105 instantaneous release limits are exceeded.	Release rate averaged for 2 minutes exceeds >500 mR/hr whole body at the site boundary (1.6×10^8 µCi/sec) OR Release rate averaged for 30 min. exceeds >50 mR/hr whole body at the site boundary (1.6×10^7 µCi/sec)	Instantaneous release rate exceeds level corresponding to >1 rem/hr whole body at the site boundary under actual meteorology. This condition exists when: $Q > 1.3 \times 10^{8 \times U}$ where Q = release rate in µCi/sec U = mean wind speed in meters/sec

**Monitored releases can be measured by effluent monitoring or counting instrumentation. For noble gases, effluent monitor 1(2)RE-PR030, channel 4, ldisplays the release rate in µCi/sec on the RM-11 display console. For iodines, effluent monitor 1(2)RE-PR028 displays a concentration in µCi/cc that must be corrected for stack flow rate to obtain a release rate in µCi/sec.

Unmonitored releases can be estaimated by field mesurements taken by environmental survey teams.

All release rates in EAL #27 are for noble gases, unless otherwise specified.

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
28) Liquid Radiation Releases from the Plant as measured by effluent monitoring or counting instrumentation. (Radiation releases are observed on the RM-11 display console for ORE-PR010.)	1) Gross Beta >1 x 10^{-7} µCi/ml or 2) Tritium >3 x 10^{-} µCi/ml	1) Gross Beta >1 x 10^{-6} µCi/ml or >40 Ci total in 24 hours or 2) Tritium >3 x 10^{-2} µCi/ml or >500 Ci total in 24 hours	1) Gross Beta >2,000 Ci total in 24 hours or 2) Tritium >2 x 10^{4} Ci total in 24 hours	1) Gross Beta >2 x 10^{4} Ci total in 24 hours or 2) Tritium >2 x 10^{5} Ci total in 24 hours
29) Personnel Injury	Transportation of radioactivity contaminated injured person to hospital			
30) Hazardous Materials	As a direct result of hazardous materials a person is killed or hospitalized or estimated property damage exceeds $50,000.			

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

CONDITIONS	UNUSUAL EVENT	ALERT	SITE EMERGENCY	GENERAL EMERGENCY
31) Any other conditions of equivalent magnitude to to the criteria used to define the accident category as determined by the Station Director.*	Warrants increased awareness on the part of the state and/or local off-site officials.	Warrants activation of Technical Support Center	Warrants activation of the Emergency Operations Facility and lmonitoring teams; warrants notification of the public by State and local agencies.	Imminent Core Melt

* Conditions that may or may not warrant classification under GSEP include:

a. Incident reporting per 10CFR50.72
b. Incident reporting per 10CFR20.403 or Illinois Rules and Regulations, Part D.403.
c. Discharges of oil or hazardous substances into waterways per 33CFR153.
d. Security contingency events per the Station Security Plan.

The Station Director may, at his discretion, categorize the above situations as GSEP emergencies, depending upon the seriousness of the situation. (Refer to Section 9.3 of the generic plan for additional information.)

TABLE BYA 5-1 (Continued...)

BYRON EMERGENCY ACTION LEVELS

TRANSPORTATION ACCIDENT

A. A vehicle transporting radioactive materials or non-radioactive Hazardous materials from a Commonwealth Edison generating station is involved in a situation in which:

1. Fire, breakage or suspected radioactive contamination occurs involving a shipment of radioactive material or;

2. As a direct result of Hazardous materials,

(a) A person is killed; or
(b) A person receives injuries requiring hospitalization; or
(c) Estimated carrier or other property damage exceeds $50,000.

B. Any other condition involving Hazardous material transportation and equivalent to the criteria in Item A.