ENVIRONMENTAL SERVICES

RESPONSIBLE INDIVIDUAL: Environmental Services Coordinator

Conditions: Alert

Site Emergency

General Emergency

Action:

1. **NOTIFY** Radiological Assessment Director (RAD) of your presence at Alternate Emergency Control Center.

2. **REVIEW** emergency conditions and radiological release(s).

3. **ASSIST**/advise RAD.

4. **INTERFACE** with Environmental Monitoring Team Leader (EMTL).

- CAUTION -

Environmental sampling and TLD exchange during atmospheric radiological releases may result in undue exposure/contamination to personnel and equipment.

5. IF projected or measured radioactivity levels in air, water, soil or vegetation indicate significant environmental contamination may be present CONSIDER initiating environmental sample collection within 6 hours.

6. IF measured radioactivity levels indicate potential for exceeding:

Medium	Gross Activity greater than
Bay Water	10^{-5} uCi/ml
Ground	0.01 mrem/hr/m^2 or 0.14 uCi/m^3
Milk	0.007 uCi/liter
Vegetation	0.7 uCi/Kg
Airborne (offsite)	Greater than 5mrem/h("Alert" levels or higher)

CONSIDER initiating environmental sample collection immediately or within 6 hours.

7. IF initial environmental sample activities exceed:

	Radionuclides										
Medium	H3	Mn 54	Fe 59	Co 58	Co 60	Zn 65	ZrNb 95*	I 131	Cs 134	Cs 137	BaLa 140+
Water (pCi/L)	2E4*	1E3	4E2	1E3	3E2	3E2	4E2	2	30	50	2E2
Fish (pCi/kg, wet)	3E4	1E4	3E4	1E4	2E4			1E3	2E3		
Airborne particulate or gas (pCi/m^3)								0.9	10	20	
Milk (pCi/L)								3	60	70	3E2
Vegetation (pCi/kg, wet)								1E2	1E3	2E3	

* For drinking water samples (40 CFR 141 value).

+ Parent and daughter total.

CONSIDER initiating additional sampling.

CONSIDER protective actions listed on Attachments 1 through 6.

8. IF projected or measured ambient radiation dose rate(s) indicate Attachment 7, Environmental Sample Station External Background Radiation levels, will be exceeded by 25% or more for the respective location

   CONSIDER initiating collection/replacement of environmental TLDs.

9. **FORWARD** records from collection and data reports generated by this emergency response to the Supervisor-Emergency Planning Unit.

ATTACHMENT 1

PROTECTIVE ACTION GUIDELINES FOR EXPOSURES TO AIRBORNE RADIOACTIVE MATERIALS VIA DIRECT EXPOSURE OR INHALATION

Population At Risk	Projected Whole Body Exposure-Gamma(rem)	Projected Thyroid Dose-Inhalation (rem)
General Population	1 to 5 (a)	5 - 25 (a)
Emergency Workers	25	125
Lifesaving	75	(b)

A) Lowest value is used if there are no major local constraints in providing protection at that level, especially to sensitive populations. Local constraints may make lower values impractical to use, but in no case will the higher value be exceeded in determining the need for protective action.

B) No specific upper limit is given for thyroid exposure since in extreme case complete thyroid loss might be an acceptable penalty for life saved. If respirators and/or thyroid blocks (potassium iodide) are available for rescue personnel, a specific upper limit is unnecessary.

EXPOSURES TO THE PUBLIC VIA THE FOOD PATHWAY FROM DEPOSITED RADIOACTIVE MATERIALS

Protective Action Guide (PAG)	Projected Dose Commitment to Whole Body, Bone Marrow or any Other Organ (rem)	Projected Dose Commitment to the Thyroid (rem)
Preventative PAG	0.5	1.5
Emergency PAG	5.0	15.0

ATTACHMENT 2

RESPONSE LEVEL EQUIVALENT TO PREVENTATIVE PAG

Infant [a] as critical segment of population

	I_{131}	Cs_{134}[d]	Cs_{137_d}	Sr_{90}	Sr_{89}
Initial deposition (microcuries/meter^2)	0.13	2	3	0.5	8
Peak activity: Pasture (microcuries/kilogram)[c]	0.05	0.8	1.3	0.18	3
Milk (microcuries/liter)[b]	0.015	0.15	0.24	0.009	0.14
Total intake (microcuries)	0.09	4	7	0.2	2.6

a. Newborn infant (including fetus (Pregnant women) as critical segment of population for iodine-131. For other radionuclides "infant" refers to children under 1 year old.

b. From fallout, iodine-131 is the only significant radioiodine with respect to milk contamination beyond the first day. For reactor accident, cumulative iodine-133 intake via milk is about 2 percent of iodine-131 assuming equivalent deposition.

c. Fresh weight.

d. Cesium intake via meat/person pathway for adults may exceed milk pathway, therefore, milk levels should cause surveillance and protective actions for meat also. Reduce response levels by a factor of 2 if Cesium-134 and Cesium-137 are present equally.

ATTACHMENT 3

RESPONSE LEVEL EQUIVALENT TO EMERGENCY PAG

	I_{131}		Cs_{134}		Cs_{137}		Sr_{90}		Sr_{89}	
	Infant[a]	Adult	Infant[b]	Adult[e]	Infant[b]	Adult[e]	Infant	Adult	Infant	Adult
Initial Deposition (microcuries/meter^2)	1.3	18	20	40	30	50	5	20	80	1,600
Peak Activity[f]: Pasture (microcuries/ kilogram)[d]	0.5	17	8	17	13	19	1.8	8	30	700
Milk (microcuries/ liter)[c]	0.15	2	1.5	3	2.4	4	0.09	0.4	1.4	30
Total intake	0.9	10	40	70	70	80	2	7	26	400

a. Newborn infant (including Fetus (pregnant women,) as critical segment of population for iodine-131.

b. "Infant" refers to children 1 year old.

c. From fallout, iodine-131 is the only significant radioiodine with respect to milk contamination beyond the first day. For reactor accident, cumulative iodine-133 intake via milk is about 2 percent of iodine-131 assuming equivalent deposition.

d. Fresh weight.

e. Response levels for the adult population for cesium refer to the meat pathways. Cesium intake via meat/person pathway for adults may exceed milk pathway; therefore milk levels should cause surveillance and protective for meat also. If Cs-134 and Cs-137 are equally present, the response level should be reduced by a factor of 2.

f. Peak activity in meat, microcurie per kilogram.

NOTE: Response levels equivalent to Emergency PAG are presented in both infants and adults thus assuring a flexible approach for action in cases where exposure of the most critical population portion (infants and pregnant women) can be prevented.

ATTACHMENT 4

RECOMMENDED PROTECTIVE ACTIONS FOR POPULATION AND WORKERS

Projected Dose (rem)		Recommended Actions(s)[a]	Comments
To the Population			
Whole body Thyroid	1.0 5.0	No planned protective action[b]. State may issue advisory to seek shelter and wait further instructions. Monitor environmental radiation levels.	Previously recommended protective actions may be reconsidered or terminated.
Whole body Thyroid	1.0 to 5.0 5.0 to 25	Seek shelter Consider evacuation. Evacuate unless constraints make it impractical. Monitor environmental radiation levels. Control access.	If constraints exist, give special consideraton for children and pregnant women evacuation.
Whole body 5 and above		Conduct mandatory evacuation. Monitor environmental radiation levels and adjust for mandatory evacuation based on these levels. Control access.	Seeking shelter is an alternative if evacuation is not immediately possible.
To Emergency Team Workers			
Whole body	25	Control emergency team members exposure to these levels except for lifesaving missions. (Appropriate controls for emergency workers, include time limitations, respirators, and stable iodine).	Although respirators and stable iodine should be used where effective to control dose to emergency team workers, thyroid dose may not be a limiting factor for lifesaving missions.
Whole body Thyroid	75 (c)	Control exposure of emergency team members performing lifesaving missions to this level. (Control of exposure time is most effective).	

(a) Actions are recommended for planning purposes. Protective action decisions at time of incident must take existing conditions into consideration.

(b) At time of incident, officials may implement low-impact protective actions in keeping with principle of maintaining radiation exposures as low as reasonably achievable.

(c) If one or more lives is likely to be saved, no upper limit for thyroid dose is established.

ATTACHMENT 5

RECOMMENDED PROTECTIVE ACTIONS FOR AGRICULTURAL PRODUCTS

Consider these protective actions when projected dose equals or exceeds PAG:

For Pasture
- Remove lactating dairy cows from contaminated pasturage and substitute uncontaminated stored feed.
- Substitute uncontaminated water or contaminated water.

For Milk
- Withhold contaminated milk from market to allow short-lived radionuclide radioactive decay.

- NOTE -

May be achieved by storage of frozen fresh milk, frozen concentrated milk or frozen concentrated milk products.

- If ultra high temperature pasteurization techniques were employed in processing, store for prolonged times at reduced temperatures.
- Divert fluid milk for production of dry whole milk, nonfat dry milk, butter or evaporated milk.

For Fruits and Vegetables - Wash, brush, scrub or peel to remove surface contamination, or preserve by canning, freezing and dehydrating or storing to permit radioactive decay of short-lived radionuclides radioactive decay.

For Grains - Mill or polish.

For Other Food Products - Process to remove surface contamination.

For Meat and Meat Products - Consider on a case-by-case basis.

For Animal Feeds (other than pasture) - Increase noncontaminated mineral calcium to a maximum and on a case-by-case basis.

ATTACHMENT 6

RECOMMENDED PROTECTIVE ACTIONS FOR AGRICULTURAL PRODUCTS

Isolate food containing radioactivity to prevent its introduction into commerce.

Determine if condemnation or other disposition is appropriate. Consider:

- Availability of other possible protective actions discussed for preventative PAG.
- Relative proportion of total diet by weight presented by the item in question.
- Importance of particular food in nutrition.
- Availability of uncontaminated food or substitutes having same nutritional properties.
- Relative contribution of other foods and radionuclides to total dose.
- Time and effort required to effect corrective action.

ATTACHMENT 7

ENVIRONMENTAL SAMPLING STATIONS
EXTERNAL BACKGROUND RADIATION LEVELS *

(Results in Units of mR/30 days)

Location #7	Jan.	3.17±0.14**	Jul.	2.73±0.08
	Feb.	3.21±0.16	Aug.	2.45±0.31
	Mar.	3.23±0.11	Sep.	2.95±0.27
	Apr.	3.06±0.22**	Oct.	3.65±0.15
	May	3.18±0.02	Nov.	2.91±0.26
	Jun.	3.16±0.25	Dec.	2.95±0.21
Location #17	Jan.	4.42±0.10	Jul.	4.38±0.14
	Feb.	4.85±0.29	Aug.	4.52±0.31
	Mar.	4.81±0.03	Sep.	4.37±0.03
	Apr.	4.78±0.02	Oct.	5.21±0.34
	May	4.46±0.07	Nov.	4.42±0.10
	Jun.	4.37±0.34	Dec.	4.92±0.26
Location #18	Jan.	3.91±0.27	Jul.	4.25±0.45
	Feb.	4.50±0.05	Aug.	4.08±0.16
	Mar.	4.56±0.17	Sep.	4.15±0.09
	Apr.	4.46±0.11	Oct.	5.10±0.12
	May	4.24±0.02	Nov.	4.23±0.05
	Jun.	4.06±0.07	Dec.	3.77±0.77
Location #19	Jan.	3.97±0.21	Jul.	3.87±0.13
	Feb.	4.32±0.16	Aug.	3.61±0.15
	Mar.	3.96±0.22	Sep.	3.77±0.01
	Apr.	3.88±0.11	Oct.	4.17±0.04
	May	3.73±0.17	Nov.	3.80±0.10
	Jun.	3.58±0.12	Dec.	3.83±0.09

ATTACHMENT 7

ENVIRONMENTAL SAMPLING STATIONS
EXTERNAL BACKGROUND RADIATION LEVELS*

(Results in Units of mR/30 days)

Location #20	Jan.	3.97±0.13	Jul.	3.81±0.46
	Feb.	4.12±0.33	Aug.	3.64±0.22
	Mar.	4.13±0.11	Sep.	3.71±0.38
	Apr.	4.15±0.24	Oct.	4.31±0.27
	May	3.94±0.24	Nov.	3.92±0.28
	Jun.	3.63±0.19	Dec.	3.76±0.07
Location #21	Jan.	3.72±0.11	Jul.	3.93±0.26
	Feb.	4.69±0.62	Aug.	4.01±0.21
	Mar.	4.12±0.11	Sep.	3.88±0.17
	Apr.	4.17±0.05	Oct.	4.45±0.28
	May	3.90±0.20	Nov.	3.84±0.17
	Jun.	3.96±0.19	Dec.	4.39±0.78
Location #22	Jan.	3.81±0.23	Jul.	3.65±0.05
	Feb.	4.35±0.14	Aug.	3.83±0.06
	Mar.	4.24±0.21	Sep.	3.61±0.60
	Apr.	4.08±0.19	Oct.	4.57±0.25
	May	3.90±0.04	Nov.	3.54±0.48
	Jun.	3.71±0.16	Dec.	3.60±0.22
Location #23	Jan.	4.79±0.05	Jul.	5.25±0.10
	Feb.	5.15±0.01	Aug.	5.19±0.34
	Mar.	5.58±0.21	Sep.	5.56±0.21
	Apr.	5.21±0.07	Oct.	6.50±0.40
	May	5.27±0.34	Nov.	5.70±0.22
	Jun.	5.32±0.11	Dec.	4.81±0.16

ATTACHMENT 7

ENVIRONMENTAL SAMPLING STATIONS
EXTERNAL BACKGROUND RADIATION LEVELS*

(Results in Units of mR/30 days)

Location #24	Jan.	4.59±0.09	Jul.	4.89±0.17
	Feb.	5.24±0.08	Aug.	4.71±0.16
	Mar.	5.14±0.27	Sep.	5.14±0.24
	Apr.	5.36±0.20	Oct.	5.60±0.17
	May	4.91±0.18	Nov.	4.71±0.29
	Jun.	4.60±0.22	Dec.	5.03±0.13
Location #25	Jan.	4.36±0.01	Jul.	4.35±0.23**
	Feb.	4.84±0.28	Aug.	4.43±0.02
	Mar.	4.71±0.22	Sep.	4.77±0.15
	Apr.	4.85±0.34	Oct.	4.86±0.13
	May	4.39±0.03	Nov.	4.45±0.20
	Jun.	4.35±0.02	Dec.	4.46±0.18
Location #26	Jan.	3.84±0.02	Jul.	3.69±0.06
	Feb.	4.32±0.15	Aug.	4.02±0.06
	Mar.	4.34±0.28	Sep.	3.72±0.09
	Apr.	4.03±0.17	Oct.	4.44±0.05
	May	3.90±0.04	Nov.	3.97±0.39
	Jun.	4.11±0.33	Dec.	3.89±0.29
Location #27	Jan.	3.66±0.15	Jul.	3.44±0.17
	Feb.	4.20±0.15	Aug.	3.58±0.23
	Mar.	4.00±0.03	Sep.	3.57±0.09
	Apr.	4.01±0.15	Oct.	4.20±0.36
	May	3.75±0.12	Nov.	3.90±0.11
	Jun.	3.74±0.23	Dec.	3.59±0.12

ATTACHMENT 7

ENVIRONMENTAL SAMPLING STATIONS
EXTERNAL BACKGROUND RADIATION LEVELS*

(Results in Units of mR/30 days)

Location #28	Jan.	4.17±0.06	Jul.	4.13±0.68
	Feb.	4.56±0.34	Aug.	3.99±0.27
	Mar.	4.41±0.30	Sep.	4.39±0.02
	Apr.	4.14±0.18	Oct.	5.06±0.25
	May	4.51±0.18	Nov.	4.27±0.07
	Jun.	4.22±0.17	Dec.	4.05±0.12

* Data based on TLD measurements made during 1982 except where identified with double asterisks.

** Data based on TLD measurements made during 1981. The 1982 data not available either because the TLDs were stolen or were unable to collect the TLD due to adverse weather conditions.

ATTACHMENT 7

ENVIRONMENTAL RADIATION MONITORING

SAMPLE POINT DESCRIPTIONS

Sector from CCNPP	Sample No.	Description	Distance from CCNPP (ft.)	Type of Sample
N (on water)				
NNW	3	Kenwood Beach	35,000	oysters
	4	Rocky Point	10,000	oysters
	6	Long Beach	15,000	sediment
	PS	Plant Site	4,600	crabs
NW	17	Plant Site	1,200	TLD, air sampler
	21	Long Beach	14,000	TLD, air sampler
	24	Plant Site	1,800	TLD, air sampler
	26	St. Leonard	27,000	TLD
	29	Flag Pond	7,500	Rooted Aquatics
WNW	11	Plant Site	1,300	soil
W	14	Plant Site	1,200	soil, vegetation
WSW	12	Plant Site	1,600	soil
	15	Farm	24,000	vegetation
	19	Giovanni's Lobster Pot	8,900	TLD, air sampler
	25	White Sands Club Sign	7,300	TLD
SW	16	Farm	22,000	vegetation
SSW	20	Lusby	9,900	TLD, air sampler
	PS	Plant Site	1,400	Precipitation
S	27	Solomons	42,000	TLD
	28	Bertha	17,000	TLD
SSE	2	Country Club	20,000	Ground Water
	13	Plant Site	2,400	Soil

ATTACHMENT 7

ENVIRONMENTAL RADIATION MONITORING

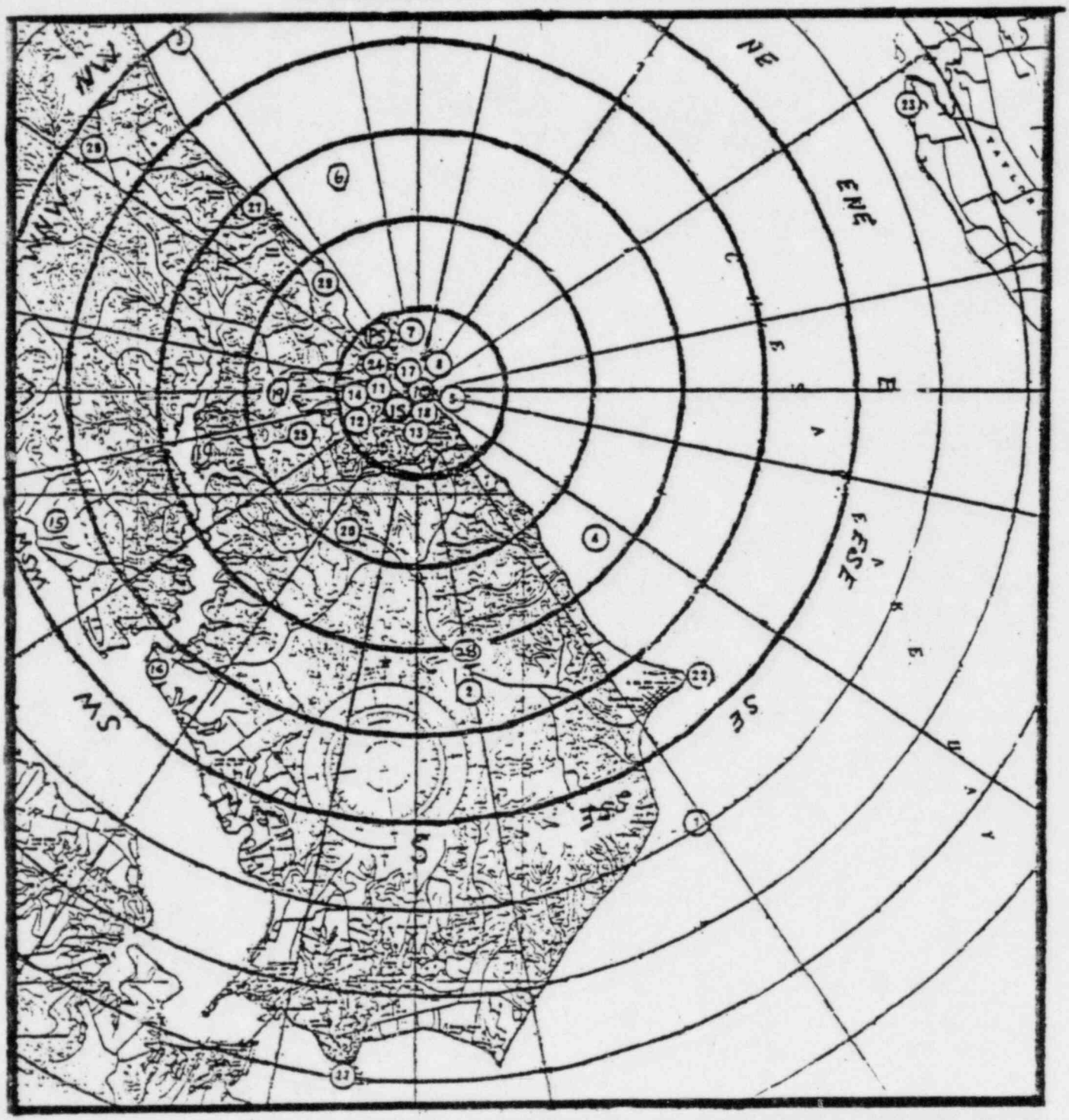
SAMPLE POINT DESCRIPTIONS

Sector from CCNPP	Sample No.	Description	Distance from CCNPP (ft.)	Type of Sample
SE	1	Cove Point	38,000	Fish
	5	Camp Canoy	3,000	Oysters, Sediment
	10	Plant Site Well	600	Ground Water
	18	Plant Site	2,000	TLD, air sampler
	22	Cove Point	24,000	TLD, air sampler
ESE (on water)				
E	8	Plant Intake	5,000	Crabs, bay water sediment
ENE	22	Taylors Island	40,000	TLD, air sampler
NE	7	Plant Discharge Area	2,500	TLD, bay water sediment
NNE (on water)				

ATTACHMENT 7

ENVIRONMENTAL RADIATION MONITORING

SAMPLE POINTS IN THE VICINITY OF CCNPP



ERPIP 4.1.25 REVIEW/APPROVAL

REVISION	CHANGE	REVIEWER SIG/ DATE	SUPERVISOR EPU SIG/DATE	POSRC MTG	PLANT SUPERINTENDENT /DATE
4	–	[signature] 2-3-83	[signature] 2/8/83	83-25	[signature] 2/9/83

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ENVIRONMENTAL MONITORING TEAM

RESPONSIBLE INDIVIDUAL: Environmental Monitoring Team Leader

CONDITIONS:

Alert
Site Emergency
General Emergency

ACTIONS:

_____ / _____
Signature Date

- CAUTION -

Failure to consult Radiological Assessment Director (RAD)/Environmental Services Coordinator (ESC) may result in undue personnel radiation exposure(s) to personnel and equipment.

1. **DISPATCH** mobile van to 10 mile EPZ, Calvert County.

2. **CONTACT** Radiological Assessment Director (RAD)/Environmental Services Coordinator (ESC) at Alternate Emergency Control Center. **REPORT** van availability.

3. **RECORD** assistance requested/initial instructions:

   ☐ Standby

   ☐ Other: _____

_____

_____

_____

_____

_____

_____

4. **PROVIDE** assistance/execute instructions.

5. **REPORT** monitoring results to RAD/ESC.

6. **FORWARD** this procedure and all records generated by this emergency response to Supervisor-Emergency Planning Unit.

ERPIP 4.1.26 REVIEW/APPROVAL

REVISION	CHANGE	REVIEWER SIG/ DATE	SUPERVISOR EPU SIG/DATE	POSRC MTG	PLANT SUPERINTENDENT /DATE
0	—	[signature] 2.8.83	[signature] 2/8/83	83-25	[signature] 2/9/83

CALVERT CLIFFS NUCLEAR POWER PLANT
EMERGENCY RESPONSE PLAN
IMPLEMENTATION PROCEDURES

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METEOROLOGIST

RESPONSIBLE INDIVIDUAL: Meteorologist

CONDITIONS:

- Alert
- Site Emergency
- General Emergency

ACTIONS:

1. **REPORT** to Electric System Operations Building, Rutherford Business Center.

2. **ESTABLISH** communications with Radiological Assessment Director (RAD)/ Environmental Services Coordinator (ESC) at Alternate Emergency Control Center.

3. **ADVISE** RAD/ESC on meteorological conditions as they affect the emergency.

ERPIP 4.1.27 REVIEW/APPROVAL

REVISION	CHANGE	REVIEWER SIG/ DATE	SUPERVISOR EPU SIG/DATE	POSRC MTG	PLANT SUPERINTENDENT /DATE
0	—	2.8.83	2/8/83	83-25	2/9/83

LIST OF EFFECTIVE PAGES

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TITLE: OFFSITE PROTECTIVE ACTIONS

1.0 RESPONSIBLE INDIVIDUAL

The Radiological Assessment Director is responsible to promptly determine projected and actual doses to the population-at-risk, and to advise the SEC on protective actions when these doses meet Preventative Protective Action Guidelines or Emergency Protective Action Guidelines. The Site Emergency Coordinator is additionally responsible to assure recommended protective actions are properly communicated.

2.0 CONDITIONS AND PREREQUISITES

Actual or projected doses to the population-at-risk meet or exceed Preventative PAGs or Emergency PAGs.

3.0 ACTIONS AND LIMITATIONS

3.1 Radiological Assessment Director:

3.1.1 Assess actual effects of offsite releases per ERPIP 4.3.1, 4.3.2 and 4.3.3 surveys and resultant data.

3.1.2 Assess projected effects of offsite releases per ERPIP 4.4 procedures.

3.1.3 Review EXHIBITS 4.5.6-A through 4.5.6-C, to determine if PAGs have been met or exceeded in the Plume exposure pathway and to determine appropriate protective actions as indicated on EXHIBITS 4.5.6-A and 4.5.6-E.

-CAUTION-

EVEN IF THE LOWER PROJECTED OR ACTUAL DOSES IN AREAS ADJACENT TO THE PLUME DO NOT REQUIRE PROTECTIVE ACTIONS PER PROCEDURES, CONSIDER INFORMING THE MEDIA TO RECOMMEND SHELTER OR EVACUATION IF UNCERTANTITIES IN WIND DIRECTION, TOPOGRAPHY, ETC., INDICATE POTENTIAL DANGER TO THE PUBLIC.

3.1.4 Direct monitoring teams as required or requested by the SEC.

3.1.5 Record and communicate survey data.

3.1.6 Assist the SEC in determining protective actions to be recommended for the Population at Risk in EPZ sectors.

3.2 Site Emergency Coordinator

3.2.1 Determine recommended offsite protective actions, and assure they are recorded on notification lists and communicated to appropriate offsite agencies and emergency operations centers. CH 1

-NOTE-

EXHIBITS 4.5.6-B and 4.5.6-C are to be recommended only upon request from the Accident Assessment Command Center of the Division of Radiation Control (Md. Department of Health and Mental Hygiene).

3.2.2 Review Exhibit 4.5.6-F for General Emergency class evacuation recommendations relative to PAGs and PWR accident sequences.

ERPIP 4.5.6 REVIEW/APPROVAL

REVISION	CHANGE	REVIEWER SIG/ DATE	SUPERVISOR EPU SIG/DATE	POSRC MTG	PLANT SUPERINTENDENT /DATE
8	1	[signature] 2.8.83	[signature] 2/8/83	83-25	J R Dunn 2/9/83

CALVERT CLIFFS NUCLEAR POWER PLANT
EMERGENCY RESPONSE PLAN
IMPLEMENTATION PROCEDURES

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