ENTERGY NUCLEAR OPERATIONS, INC.
JAMES A. FITZPATRICK NUCLEAR POWER PLANT
EMERGENCY PLAN IMPLEMENTING PROCEDURE

DOSE ASSESSMENT CALCULATIONS
EAP-4
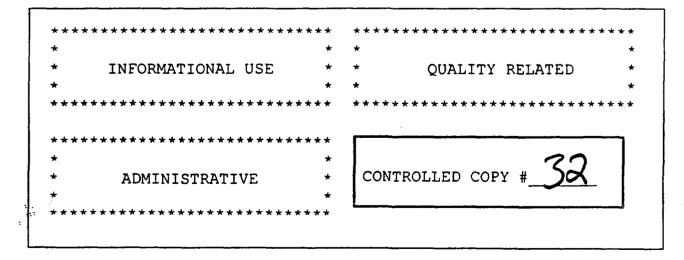**REVISION 34**

APPROVED BY: _____   DATE: _11/26/03_
RESPONSIBLE PROCEDURE OWNER

EFFECTIVE DATE: _December 3, 2003_

FIRST ISSUE ☐   FULL REVISION ☐   LIMITED REVISION ☒

```
***************************     ***************************
*                         *     *                         *
*     INFORMATIONAL USE   *     *     QUALITY RELATED     *
*                         *     *                         *
***************************     ***************************

***************************     ┌─────────────────────────┐
*                         *     │                         │
*     ADMINISTRATIVE      *     │  CONTROLLED COPY # 32    │
*                         *     │                         │
***************************     └─────────────────────────┘
```


PERIODIC REVIEW DUE DATE: _____MAY 2008_____

REVISION SUMMARY SHEET

REV. NO.

34
- Revised section 5.2.3.q to state that once PARS have been established for evacuation, they will not be downgraded until the emergency is terminated – closure of CR-JAF-2003-3166.
- Added note to 5.2.3.B.

33
- Added note in section 5.2.3.K.7 that discusses steps that need to be repeated for on going releases.
- ADDED NOTE IN SECTION 5.2.3.P.10 TO ENSURE THAT PROPER STEPS ARE TAKEN FOR FORECASTED DOSE RATES.
- Added section 5.2.3.P.11 to give instructions if the release is ongoing.

32
- Add "onsite and in-plant" to section 4.2 for clarity
- Added met data access method for simulator
- Incorporated several notes into procedure steps in section 5.2.3.Q and 5.2.3.A
- Add direction to section 5.2.3.Q regarding ERPAs for evacuation – utilizing both the model and the flowchart, and the concern for lake/land breeze considerations.
- Change the title of section 5.4 to read USING MONITOR READINGS TO ESTIMATE WHEN A PAR WILL BE REACHED BASED ON PROJECTED DOSE
- Added direction in 5.4 for use of TEDE dose.
- Added note in section 5.4 to reference attachment 7 for calculations.
- Incorporated cautions into boxes and added wording regarding notifying offsite agencies within 15 minutes of PAR changes.
- Added Section 5.5.
- Modified Attachment 1 and 2 to add a caution in the GE section for 15 minute notification requirements.
- Add caution for lake/land breeze on Attachment 2.
- Updated Attachment 4 with current 2001 population estimates ERPA'S
- Change to Attachment 5 to add lines to the 3-inch section for data recording.
- Added attachment 6.
- Add attachment 7.
- Added attachment 8.

TABLE OF CONTENTS

1.0 PURPOSE

To provide the methods for performing dose assessment and determining protective actions during accident conditions at James A. FitzPatrick Nuclear Power Plant.

2.0 REFERENCES

2.1 Performance References

2.1.1   EAP-4.1, RELEASE RATE DETERMINATION

2.1.2   EAP-5.3, ONSITE/OFFSITE DOWNWIND SURVEYS AND ENVIRONMENTAL MONITORING

2.1.3   EAP-42, OBTAINING METEOROLOGICAL DATA

2.2 Developmental References

2.2.1   EAP-4.1, RELEASE RATE DETERMINATION

2.2.2   EAP-5.3, ONSITE/OFFSITE DOWNWIND SURVEYS AND ENVIRONMENTAL MONITORING

2.2.3   EAP-42, OBTAINING METEOROLOGICAL DATA

3.0 INITIATING EVENTS

3.1   A General Emergency has been declared

OR

3.2   A vented gaseous release exceeds alarm setpoints

OR

3.3   An unmonitored gaseous release is suspected or underway.

4.0 RESPONSIBILITIES

4.1 Shift Manager/Emergency Director (SM/ED)

The SM/ED is responsible for ensuring that Protective Action Recommendations (PARs) are developed in accordance with this procedure.

4.2 **TSC Rad Support Coordinator (TSC RSC)**

The TSC RSC is responsible to the Emergency Director for managing the radiological monitoring and assessment aspects on-site and in-plant during an emergency and of those functions specified in Step 4.3 until relieved of those functions by the EOF.

4.3 **EOF Rad Support Coordinator (EOF/RSC)**

The EOF/RSC is responsible to the Emergency Director for managing the radiological monitoring and assessment aspects offsite during an emergency.

4.4 **Dose Assessment Coordinator (DAC)**

The DAC is responsible for managing the offsite dose aspects of an emergency, in order to assess the radiological consequences to the public.

4.5 **Chemistry Technician/Rad Protection Technician**

The on-shift chemistry technician is responsible to the Emergency Director for conducting dose assessment from the control room and assisting the SM/ED with information related to offsite notification and protective action recommendations. The on-shift radiation protection technician is responsible to the SM/ED for conducting surveys as directed.

5.0 **PROCEDURE**

5.1 **Control Room Dose Assessment and Protective Action Recommendations**

Utilize Attachment 1, Initial Protective Actions, for control room dose assessment and protective action recommendations.

5.2 Augmented Dose Assessment

Dose projection shall be completed using the EDAMS computer located in the Control Room, Technical Support Center or Emergency Operations Facility as follows:

5.2.1 General Information

A. Locations

EDAMS software and hardware is located as follows:

LOCATION	HARDWARE	PRINTERS	METE DATA CONNECTION
Control Room	Personal Computer and Monitor	HP LaserJet	Direct Connect
Technical Support Center	Personal Computer and Monitor	Seiko D-Scan, HP LaserJet	Direct Connect
Emergency Operations Facility #1	Personal Computer and Monitor	Seiko D-Scan, HP LaserJet	Direct Connect OR Dial-up Modem
Emergency Operations Facility #2	Personal Computer and Monitor	HP LaserJet	Direct Connect OR Dial-up Modem

B. Computer problems

IF at any time problems are experienced with the computer, MOVE to another location that has the EDAMS software and continue.

C. The dose assessment program is called RADDOSE V and is part of the EDAMS package.

D. Meteorological data is automatically sent (via direct connect or modem) to RADDOSE V and EDAMS by the Meteorological Monitoring System (MMS). The user can use this data or manually input meteorological data.

E. Source term and release rate determination is discussed in procedure EAP-4.1.

F. Software documentation is available for the EDAMS code and is maintained by the Emergency Planning Coordinator.

5.2.2   EDAMS Dose Model Limitations

A. The EDAMS menu from the EDAMS icon only allows the operation of one DOS application at a time.

B. Dose rates and deposition rates reported by the model are the maximum for the sector; not necessarily the dose rate or deposition rate at the center of the sector. This avoids the situation of a narrow (stable) plume slipping between receptor points and being missed.

C. Deposition data reported is not intended for an environmental evaluation; its intent is to indicate areas of potentially high ground level concentrations.

D. Forecast mode results may at times exceed real-time results; this is due to the forecast mode having a greater internal time step.

E. A calculation limitation of the dose assessment model occurs when an extreme wind (direction) shift takes place. The model may not calculate doses in sectors that the plume skips over entirely within a single 15 minute interval advection step.

5.2.3   Dose Assessment Using EDAMS Computer

NOTE: The dose assessment model has many capabilities beyond those used in this procedure. Utilize the "EDAMS Operators Manual" for further reference.

```
┌──────────────────────────────────────────────────────────┐
│                        CAUTION:                          │
│                                                          │
│  Protective Action Recommendations (PARs) must be        │
│  transmitted to the State and County within 15 minutes of│
│  declaring an Emergency, changing emergency classification,│
│  or changing Protective Action Recommendations.          │
└──────────────────────────────────────────────────────────┘
```

A. IF during the course of dose assessment, the dose to the population is projected to exceed 1 Rem TEDE or 5 Rem CDE Thyroid, THEN immediately advise the ED that the General Emergency criteria have been met.

5.2.3 cont'd

> **NOTE:** Attachment 1 may be used to develop protective action recommendations from the TSC/EOF prior to EDAMS becoming available.

B. Use Attachment 2 Augmented Dose Assessment Protective Actions, for guidance when performing dose assessment activities at the TSC or EOF.

C. Ensure that the black switch on the CR and TSC meteorological panels is positioned to the Niagara Mohawk (B) position.

D. Energize the EDAMS computer power strip to provide power to the computer, monitor, and printer.

E. Ensure the modem is ON (powered on).

F. Select the "Login" icon from the EDAMS icons and select "Continue" at the plant picture screen.

G. Select the appropriate menu item based on your location as follows:

Location:	Menu Choice:
CR	Direct connect to Met Data
TSC	Direct connect to Met Data
EOF	Direct connect **OR** Automatic Dial-in to Met Data
Simulator	Automatic Dial-in to Met Data

H. When the login routine finishes, close the login window screen by selecting "OK".

I. From the EDAMS icons, select JAF Raddose-V.

J. Select "Continue" at the plant picture screen.

K. From the Raddose-V start up menu, select "Begin New Incident."

5.2.3   cont'd

L. At the Raddose-V Accident Scenario Definition
screen, enter the following information:

1.   Reactor Trip Date - date the reactor was
scrammed or shutdown.

2.   Reactor Trip Time (24-hour format) - time the
reactor was scrammed or shutdown.

3.   Release Date - date the release to atmosphere
began, or is projected to begin.

4.   Release Time (24-hour format) - time the release
to atmosphere began, or is projected to begin.

5.   Lake Surface Temp (Degrees F) - Enter the known
lake surface temperature, or use the historical
default value provided.

6.   Operator Initials - Enter 2 or 3 initials, then
press ENTER.

7.   Select "Accept" to accept and continue.

NOTE: Steps M-P must be repeated for ongoing
releases to ensure that "forecasted" dose
will account for dose from both the existing
release rate, AND dose from the plume
established in the environment from previous
time steps.

M. At the Raddose-V main menu, select "Enter/Edit
Source Term Data."

N. At the Raddose-V Source Term Data Entry Screen,
proceed as follows:

1.   Utilize Attachment 6, <u>DOSE ASSESSMENT ACCIDENT
TYPE SELECTION FLOWCHART</u> as a guide to determine
the most appropriate accident type.

2.   Select "Accident Type" by pressing the "F2" key,
or by using the mouse, then choosing the
accident type which most closely matches current
conditions. Your selection determines which
default isotopic mix is used for upcoming
calculations (refer to Attachment 3, Analyzed
Accident Types).

5.2.3.N. cont'd

3. When asked, "Is this release Elevated?" select "Yes" for elevated releases or "No" for ground releases. (A stack release is elevated; all other releases are ground releases.)

NOTE: Back calculation cannot be used on first time step.

4. Select the "Method" used to determine the release rate by pressing the "F2" key, or by using the mouse, then choosing the appropriate method based on available information.

5. Select the Iodine release rate "Method" by hitting the "F2" key, or by using the mouse. Enter the "Monitor Reading" and "Release Rate" if required.

6. Up to three Accident Types (three release paths) can be entered by using the down arrow key (↓) to select type 2 and 3.

7. When the source term data entry screen has been completed, select "Accept" to accept data and return to the Raddose-V main menu.

O. At the Raddose-V main menu, the menu bar will highlight the appropriate elevated and/or ground meteorological data choices based on your input in step M.2.

1. If direct met data input is being used, the appropriate ground and/or elevated met data will automatically be displayed for the current time step.

2. Select "Accept" to accept data, OR select "Requery MMS" to update the met data.

3. IF met data is not available via the MMS, THEN enter met data obtained from alternate sources, as outlined in EAP-42, <u>OBTAINING METEOROLOGICAL DATA</u>.

5.2.3 cont'd

NOTE: To determine an estimated monitor reading to reach a PAG, refer to step 5.4

P. At the Raddose-V main menu, select "Perform Calculations."

1. The map of the 10-mile Emergency Planning Zone (EPZ) will appear with centerline dose rates after the model has calculated the actual model doses.

NOTE: This data SHOULD NOT be used for PARs. PARs should be based on <u>forecast</u> data, which will be the dose to be avoided by the protective action.

2. Select "Continue" to continue.

3. At the Raddose-V output menu, select "Continue Calculations".

4. At the Raddose-V main menu, select "Perform a Forecast".

NOTE: A new time step must be added to perform a forecast.

5. Verify meteorology and source term data as required. Select "Accept" to accept.

6. Enter "Forecast Period" (i.e. release duration). Use 4 hours as a default value. Select "OK".

7. When asked, "Has a General Emergency been declared?" enter "Yes" or "No".

8. The forecast mode map will be displayed, including TEDE and CDE thyroid doses, and PARs. Select "Continue" to continue.

9. Select "Go to Report Menu".

10. Select "Print Complete Dose/Dose Rate Report".

5.2.3   cont'd

NOTE: Performance of the following step is necessary to ensure that "forecasted" dose will account for dose from both the current release rate, AND dose from the plume established in the environment from previous time steps.

11. **IF** the release is ongoing, **THEN** add a new time step, AND repeat the "Calculation" and "Forecast" actions described in steps M-P.

NOTE: County and State Protective Action Recommendations (PARs) take many factors into account that NMP/JAF procedures do not (i.e., road conditions, special population needs, Evacuation Travel Time Estimates, evacuation scenarios, and shelter vs. evacuation doses). Therefore, differences in PARs may occur. The Rad Support Coordinator must account for differences in Protective Action Recommendations when those exist. PARs should not be modified to match County or State PARs without justification.

CAUTION:
Protective Action Recommendations (PARs) must be transmitted to the State and County within 15 minutes of declaring an Emergency, changing emergency classification, or changing Protective Action Recommendations.

Q.   Protective Action Recommendations (PARs)

1.   Since the Nine Mile Point/J.A. FitzPatrick (NMP/JAF) Site is contained in ERPA 1, any recommendation made for ERPA 1 must also apply to all NMP/JAF personnel not required to be onsite for the emergency.

2.   The RADDOSE model factors in meteorological conditions such as lake/land breeze that the Attachment 2 flowchart does not. Therefore, the model needs to be considered even during situations where no release is occurring.

5.2.3.Q.   cont'd

   3.   The EDAMS RADDOSE V program will recommend PARs for each ERPA, based upon the dose assessment (in forecast mode).

     a.   Ensure that both the RADDOSE ERPAs recommended for Evacuation, and the Attachment 2 ERPAs recommended for evacuation are considered when developing PARs.

     b.   For ERPAs recommended by RADDOSE for evacuation, ensure that both Dose PARs and Plant PARs are included.

   4.   Initiate or revise PARs based upon this recommendation (and previous recommendations, if made).

   5.   Wind shifts and/or decreases in release rate could result in revised PARs being developed that "drop" one or more ERPAs from evacuation recommendations. HOWEVER, revised PARs must contain all previously identified ERPAs recommended for evacuation, as well as any newly identified ERPAs for evacuation, i.e.:

     a.   Do NOT delete ERPAs from a PAR that previously recommended the ERPA for evacuation.

     b.   There is no practical method to recall an evacuation recommendation and attempting this could cause undue confusion on the part of the public.

   6.   The only time it would be appropriate to attempt to recall a PAR for evacuation of an ERPA, would be if an error was made and recognized prior to the County taking action to implement the PAR.

     a.   In this case it would be appropriate for the Emergency Director to immediately contact the County and discuss the issue.

5.2.3   cont'd

R. Notification

1. Record the revised PAR for each ERPA on the Part
    1 Notification Form (EAP-1.1, Attachment 1) and
    give to the ED for approval.

2. Record PARs on Attachment 4 map or wall displays
    in the TSC or EOF, if appropriate.

S. Update the RADDOSE-V Model at 15-minute intervals or
    as directed by the Dose Assessment Coordinator.

5.3 Downwind Survey Dose Estimates

5.3.1   Use Attachment 5, Downwind Survey Worksheet, to record
        field data transmitted to the dispatch center.

5.3.2   Projected Deep Dose Equivalent (DDE) is approximately
        equal to TEDE Projected Dose

A. Use field information recorded on the Downwind
    Survey Worksheet, Attachment 5, to perform projected
    dose calculations.

B. Obtain the estimated duration of release from the
    Emergency Director and record it on Attachment 5.
    If it is unknown, use 4 hours as a first estimate.

C. Complete the calculations, as shown, on Attachment 5
    to determine DDE projected doses for each sampling
    location.

5.3.3   CDE Thyroid Projected Dose

A. Use field information recorded on the Downwind
    Survey Worksheet, Attachment 5, to perform CDE
    Thyroid Projected Dose.

B. Obtain the estimated duration of release from the
    Emergency Director and record it on Attachment 5.

5.3.3   cont'd

C. Calculate the I-131 concentration in accordance with Attachment 5.

D. Complete the calculations, as shown, on Attachment 5 to determine thyroid rate and CDE thyroid projected doses for each location for which data has been recorded.

5.3.4   Results

A. Provide the results of the DDE and CDE thyroid projected dose calculations from steps 5.3.2 and 5.3.3 to the individual tasked with calculating protective action recommendations.

5.4 **Using monitor readings to estimate when a PAR will be reached based on projected dose**

NOTE: Attachment 7 may be utilized to perform the following calculations:

5.4.1   To determine the estimated monitor reading needed to reach a **Child Thyroid dose** of 5rem CDE, perform the following:

A. Perform a forecast using EDAMS;

B. Divide the Child Thyroid CDE dose (forecasted), by the release point monitor reading (mr/hr, cpm, cps);

C. Divide the result from 5.4.1.B into 5 rem. This result becomes the estimated monitor reading corresponding to 5rem CDE for the forecast duration, based on the inputted flow rate, monitor reading and meteorology at the time the data was taken.

D. To determine the estimated monitor reading needed to reach a **TEDE dose** of 1 rem, perform the following:

1. Perform a forecast using EDAMS;

2. Divide the TEDE dose (forecasted), by the release point monitor reading (mr/hr, cpm, cps);

3. Divide the result from 5.4.2.B into 1 rem. This result becomes the estimated monitor reading corresponding to 1rem CDE for the forecast duration, based on the inputted flow rate, monitor reading and meteorology at the time the data was taken.

5.5 **Proactive Action Recommendations (PARs) beyond 10 miles**

    5.5.1   If projected doses exceed the following values at 10 miles;

EPA Protective Action Guidelines	
TEDE (Rem)	CDEt (Rem)
>1	>5

            Then PARs need to be developed beyond the 10 mile EPZ. PARs can be developed using the EDAMs routine that calculates <u>Dose Rates</u> at a point of interest.

    5.5.2   Chose several points of interest that will encompass the postulated plume beyond the 10 miles (bound the plume). Determine the dose rate. Multiply the dose rate by the expected duration of the release to determine the TEDE or CDEt. Make additional PARs based on this data and by using existing geo-political boundaries (i.e. towns, cities, etc.). List those recommendations on the Part 1 form or provide additional detail on supplemental forms. If PARs extend beyond the border of Oswego County request assistance from NY State staff to make proper notifications.

6.0 **ATTACHMENTS**

    1.   <u>INITIAL PROTECTIVE ACTIONS - Pull out color flowchart</u>

    2.   <u>AUGMENTED DOSE ASSESSMENT AND PROTECTIVE ACTIONS - Pull out color flowchart</u>

    3.   <u>ANALYZED ACCIDENT TYPES</u>

    4.   <u>2001 POPULATION ESTIMATES EMERGENCY RESPONSE PLANNING AREAS</u>

    5.   <u>DOWNWIND SURVEY WORKSHEET</u>

    6.   <u>DOSE ASSESSMENT ACCIDENT TYPE SELECTION FLOWCHART</u>

    7.   <u>CALCULATION FORM WHEN USING MONITOR READINGS TO ESTIMATE WHEN A PAR WILL BE REACHED BASED ON PROJECTED DOSE</u>

    8.   <u>SOURCE TERM ENTRY FOR FIRST 15 MINUTE TIME STEP OF A REFUEL ACCIDENT WHEN BUILDING ISOLATON HAS OCCURRED AND THE RELEASE IS THROUGH THE STACK</u>

    9.   <u>SOURCE TERM FOR A REFUEL ACCIDENT THAT RESULTS IN AN UNFILTERED RELEASE PATHWAY</u>