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IP-EP-310 REV. 19

IP-EP-340 REV. 7

IP-EP-410 REV. 15

OCTOBER 8, 2019

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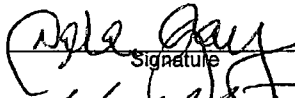
 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-410</b>	<b>Revision 15</b>
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## Protective Action Recommendations

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 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-410</b>	<b>Revision 15</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>2</u> of <u>10</u></b>

## Table of Contents

1.0	PURPOSE.....	3
2.0	REFERENCES.....	3
3.0	DEFINITIONS.....	3
4.0	RESPONSIBILITIES .....	3
5.0	DETAILS .....	3
5.1	NUE, ALERT, SITE AREA EMERGENCY.....	3
5.2	GENERAL EMERGENCY .....	3
6.0	INTERFACES.....	4
7.0	RECORDS .....	4
8.0	REQUIREMENTS AND COMMITMENT CROSS-REFERENCE .....	4
9.0	ATTACHMENTS .....	4
9.1	FLOWCHART FOR GENERAL EMERGENCY PROTECTIVE ACTION RECOMMENDATIONS .....	5
9.2	MIDAS STABILITY CATEGORY - DOWNWIND KEYHOLE SECTOR CORRELATION TABLE.....	7
9.3	EPA PROTECTIVE ACTION GUIDELINES.....	8
9.4	OVERLAY SELECTION FLOW CHART (FOR MANUAL PLUME VISUALIZATION) .....	9
9.5	WIND FIELD ORIENTATION - MIDAS vs. PLUME OVERLAYS.....	10

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-410</b>	<b>Revision 15</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>3 of 10</b>

## **PROTECTIVE ACTION RECOMMENDATIONS**

### **1.0 PURPOSE**

To prescribe the responsibilities and methods for determining recommended protective actions for New York State and County authorities.

### **2.0 REFERENCES**

EPA Protective Action Guidelines

### **3.0 DEFINITIONS**

Protective Action Recommendations (PARs) – Specific recommendations made by the Emergency Director to offsite authorities in accordance with Emergency Plan procedures based on Protection Action Guidelines.

### **4.0 RESPONSIBILITIES**

- 4.1 The Shift Manager is responsible for evaluating accident conditions, classifying the accident, and recommending protective actions to offsite authorities during the initial phases of the accident. The Emergency Director assumes these responsibilities when he takes control of the emergency response from the Shift Manager. The Radiological Assessment Coordinator will assist the Emergency Director with protective action recommendations.
- 4.2 The decision to initiate any protective actions is solely the responsibility of offsite authorities.


### **5.0 DETAILS**

#### **5.1 NUE, Alert, Site Area Emergency:**

- 5.1.1 Do not recommend protective actions be taken.

#### **5.2 General Emergency**

- 5.2.1 The initial protective action recommendation should be made within 15 minutes of the GENERAL EMERGENCY declaration.
- 5.2.2 Protective Action Recommendations (PARs) shall be made in accordance with Attachment 9.1. Downwind Sectors are identified on Attachment 9.2. The MIDAS dose assessment program uses the logic from Attachment 9.1 and 9.2 to determine PARs and affected downwind sectors. Impacted sectors include both land and water areas out to the distances included in the PAR.
- 5.2.3 The Acetate Isopleth Overlays may be used with the map table to visualize the plume. If the Isopleth Overlays are used, then use Attachment 9.4 to support isopleth selection and placement on the map table.
- 5.2.4 The initial PAR shall be made in the first GENERAL EMERGENCY notification to the State/Counties. All subsequent, Part I notifications shall include the latest PAR.

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	<b>REFERENCE USE</b>	<b>Page</b>	<b>4 of 10</b>

5.2.5 Re-evaluate the PARs based on the following:

- Changes in Wind Direction or Speed
- Dose Calculations
- Field Team Data
- EPA PAGs – Attachment 9.3
- Plant Conditions

5.2.6 **IF** conditions are present that require a revision to the current PAR, **THEN** the revised PAR must be determined within 15 minutes of those conditions being apparent.

5.2.7 **IF** a decision to revise the PAR has been made, **THEN** offsite notification shall be completed within 15 minutes of the revised PAR determination.

5.2.8 As protective action recommendations change, ensure appropriate steps are taken to protect the onsite population.

5.2.9 **IF** an EPA PAG is exceeded or expected to be exceeded beyond 10 miles **THEN** consider the need for PARs beyond 10 miles and discuss possible actions with State/Counties. Send Field Teams to confirm projections.

## 6.0 INTERFACES

- 6.1 Evacuation Time Estimates
- 6.2 IP-EP-310, Dose Assessment
- 6.3 State of New York KI Policy Paper
- 6.4 IP-EP-420, Use of Potassium Iodide by Indian Point Personnel during an Emergency

## 7.0 RECORDS


NONE

## 8.0 REQUIREMENTS AND COMMITMENT CROSS-REFERENCE

NONE

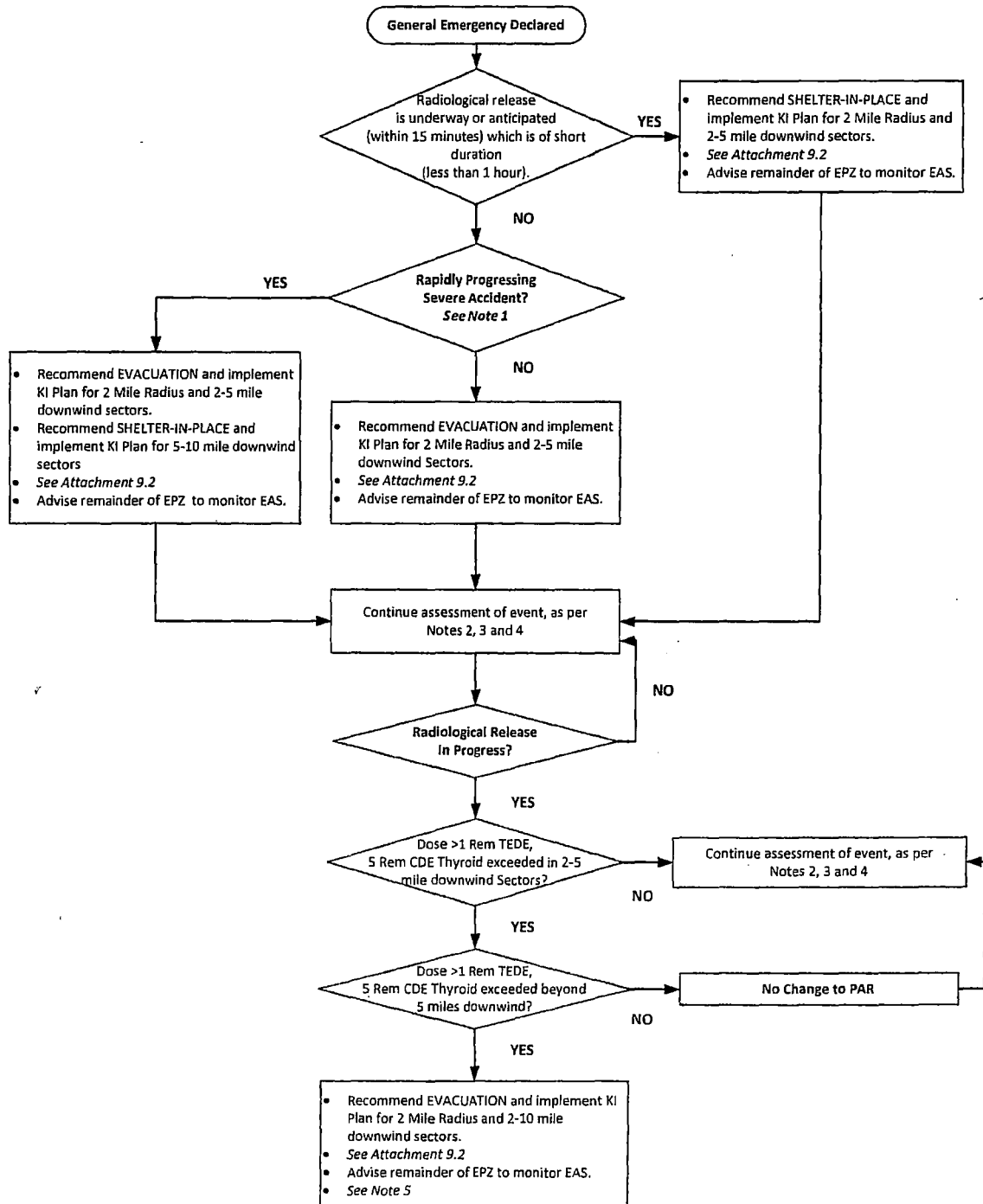
## 9.0 ATTACHMENTS


- 9.1 Flowchart for General Emergency Protective Action Recommendations
- 9.2 MIDAS Stability Category – Downwind Keyhole Sector Correlation Table
- 9.3 EPA Protective Action Guidelines
- 9.4 Overlay Selection Flow Chart (For Manual Plume Visualization)
- 9.5 Wind Field Orientation – MIDAS vs. Plume Overlays

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-410</b>	<b>Revision 15</b>
	<b>REFERENCE USE</b>	<b>Page</b> <u>5</u> <b>of</b> <u>10</u>	

### Attachment 9.1

## **FLOWCHART FOR GENERAL EMERGENCY PROTECTIVE ACTION RECOMMENDATIONS** (Sheet 1 of 2)




 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-410</b>	<b>Revision 15</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>6 of 10</b>

**FLOWCHART FOR GENERAL EMERGENCY PROTECTIVE ACTION  
RECOMMENDATIONS**

Sheet 2 of 2

<p><b>NOTE 1: Rapidly Progressing Severe Accident <u>IF</u>:</b></p> <ul style="list-style-type: none"> <li>• First PAR after GE declared <u>AND</u>,</li> <li>• Containment Loss Conditions (Table F-1) <u>AND EITHER</u>:</li> <li>• Containment Rad Monitors R-25 or R-26 &gt; 68 R/hr <u>OR</u>,</li> <li>• Conditions for EALs AG1.1, AG1.2 or AG1.3 have been met.</li> <li>• <i>If these criteria cannot be immediately confirmed, assume a RPSA is NOT occurring.</i></li> </ul>	<p><b>NOTE 3: PAR Expansion Criteria:</b></p> <ul style="list-style-type: none"> <li>• <u>IF</u> meteorological conditions change and result in other sector(s)/area(s) being impacted after initial PAR, expand the initial PAR to include new sector(s)/area(s) <u>ONLY IF</u>:</li> <li>• Plant conditions are unknown or continue to be unstable (mitigating actions not started or not successful) or degrading <u>OR</u>,</li> <li>• EPA PAGs are projected or measured to be exceeded in the new sector(s)/area(s).</li> </ul> <p><b>For Wind Shifts:</b></p> <ul style="list-style-type: none"> <li>• Only expand the PAR to include the sector(s)/area(s) impacted by the in-transit wind shift if dose assessment projects the EPA PAGs will be exceeded in the in-transit sector(s)/area(s).</li> </ul>	<p><b>NOTE 4: IF Recommended Sectors Change, <u>THEN</u>:</b></p> <ul style="list-style-type: none"> <li>• Add new sectors to new PAR.</li> <li>• DO NOT subtract any sector in which actions have been previously recommended.</li> <li>• IF an RPSA PAR was issued, the Shelter in Place portion of the PAR is only applicable to the initial PAR and would not be applied to the sectors added in a PAR expansion.</li> </ul> <p><b>NOTE 5: IF PAGs Exceeded &gt; 10 Miles:</b></p> <ul style="list-style-type: none"> <li>• <u>IF</u> an EPA PAG is exceeded or expected to be exceeded beyond 10 miles <u>THEN</u> consider the need for PARs beyond 10 miles and discuss possible actions with State/Countries.</li> </ul>
<p><b>NOTE 2: Event Assessment Criteria:</b></p> <ul style="list-style-type: none"> <li>• Wind Direction/Speed</li> <li>• Dose Calculations</li> <li>• Field Team Data</li> <li>• EPA PAGs (Attachment 9.3)</li> <li>• Plant Conditions</li> </ul>		

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-410</b>	<b>Revision 15</b>
	<b>REFERENCE USE</b>	<b>Page</b> <u>7</u> <b>of</b> <u>10</u>	

Attachment 9.2

**MIDAS STABILITY CATEGORY**  
**DOWNWIND KEYHOLE SECTOR CORRELATION TABLE**

Sheet 1 of 1

**TABLE I – MIDAS Up-Valley Plumes**

**Up-Valley Plumes** (wind speed  $\leq 4$  m/sec and wind direction from 102°-209°)

Pasquill Stability Categories	Sectors affected
A, B	16, 1, 2, 3, 4
C, D, E, F, G	16, 1, 2, 3

**TABLE II – MIDAS Down-Valley Plumes**


**Down-Valley Plumes** (wind speed  $\leq 4$  m/sec and wind direction from 349°-101°)

Pasquill Stability Categories	Sectors affected
A, B	7, 8, 9, 10, 11
C, D, E, F, G	7, 8, 9, 10

**TABLE III – MIDAS Cross-Valley Plumes**

**Cross-Valley** (wind speed  $> 4$  m/sec OR wind direction from 210°-348°)

Wind Direction From (deg)	Center Sector No.	Pasquill Stability Categories A & B Sectors affected	Pasquill Stability Categories C-G Sectors affected
169 - 190	1 N	15, 16, 1, 2, 3	16, 1, 2
191 - 213	2 NNE	16, 1, 2, 3, 4	1, 2, 3
214 - 235	3 NE	1, 2, 3, 4, 5	2, 3, 4
236 - 258	4 ENE	2, 3, 4, 5, 6	3, 4, 5
259 - 280	5 E	3, 4, 5, 6, 7	4, 5, 6
281 - 303	6 ESE	4, 5, 6, 7, 8	5, 6, 7
304 - 325	7 SE	5, 6, 7, 8, 9	6, 7, 8
326 - 348	8 SSE	6, 7, 8, 9, 10	7, 8, 9
349 - 010	9 S	7, 8, 9, 10, 11	8, 9, 10
011 - 033	10 SSW	8, 9, 10, 11, 12	9, 10, 11
034 - 055	11 SW	9, 10, 11, 12, 13	10, 11, 12
056 - 078	12 WSW	10, 11, 12, 13, 14	11, 12, 13
079 - 100	13 W	11, 12, 13, 14, 15	12, 13, 14
101 - 123	14 WNW	12, 13, 14, 15, 16	13, 14, 15
124 - 145	15 NW	13, 14, 15, 16, 1	14, 15, 16
146 - 168	16 NNW	14, 15, 16, 1, 2	15, 16, 1

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-410</b>	<b>Revision 15</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>8 of 10</b>

Attachment 9.3  
**EPA PROTECTIVE ACTION GUIDELINES**  
Sheet 1 of 1

Recommended protective actions to reduce whole body and thyroid dose from exposure to a gaseous plume.

PROJECTED DOSE (REM) TO THE POPULATION		RECOMMENDED ACTIONS (a)	COMMENTS
Whole Body (TEDE)	< 1	No planned actions. (b) State may issue an advisory to seek shelter and await further instructions. Monitor environmental radiation levels	Previously recommended protective actions may be reconsidered or terminated.
Thyroid (CDE)	<5		
Whole Body (TEDE)	$\geq 1$	Evacuate unless constraints make it impractical; then shelter. Monitor environmental radiation levels. Control access.	If constraints exist, special consideration should be given for evacuation of children and pregnant women.
Thyroid (CDE)	$\geq 5$		

**GUIDANCE ON DOSE LIMITS FOR WORKERS PERFORMING EMERGENCY SERVICES (REM)**

Whole Body (TEDE):			
10	Protecting valuable property	Lower dose not practicable.	
25	Lifesaving or protection of large populations	Lower dose not practicable.	
> 25	Lifesaving or protection of large population	Only on a voluntary basis to persons fully aware of the risks involved.	

TEDE- Total Effective Dose Equivalent: Sum of external effective dose equivalent and committed effective dose equivalent to non-pregnant adults from exposure and intake during an emergency situation. Workers performing services during emergencies should limit dose to the lens of the eye to three times the listed value and doses to any organ (including skin and body extremities) to ten times the listed value.

CDE- Committed dose equivalent (to the Thyroid).

- (a) These actions are recommended for planning purposes. Protective action decisions at the time of the incident must take existing conditions into consideration.
- (b) At the time of the incident, officials may implement low-impact protective actions in keeping with the principle of maintaining radiation exposures as low as reasonably achievable (ALARA)



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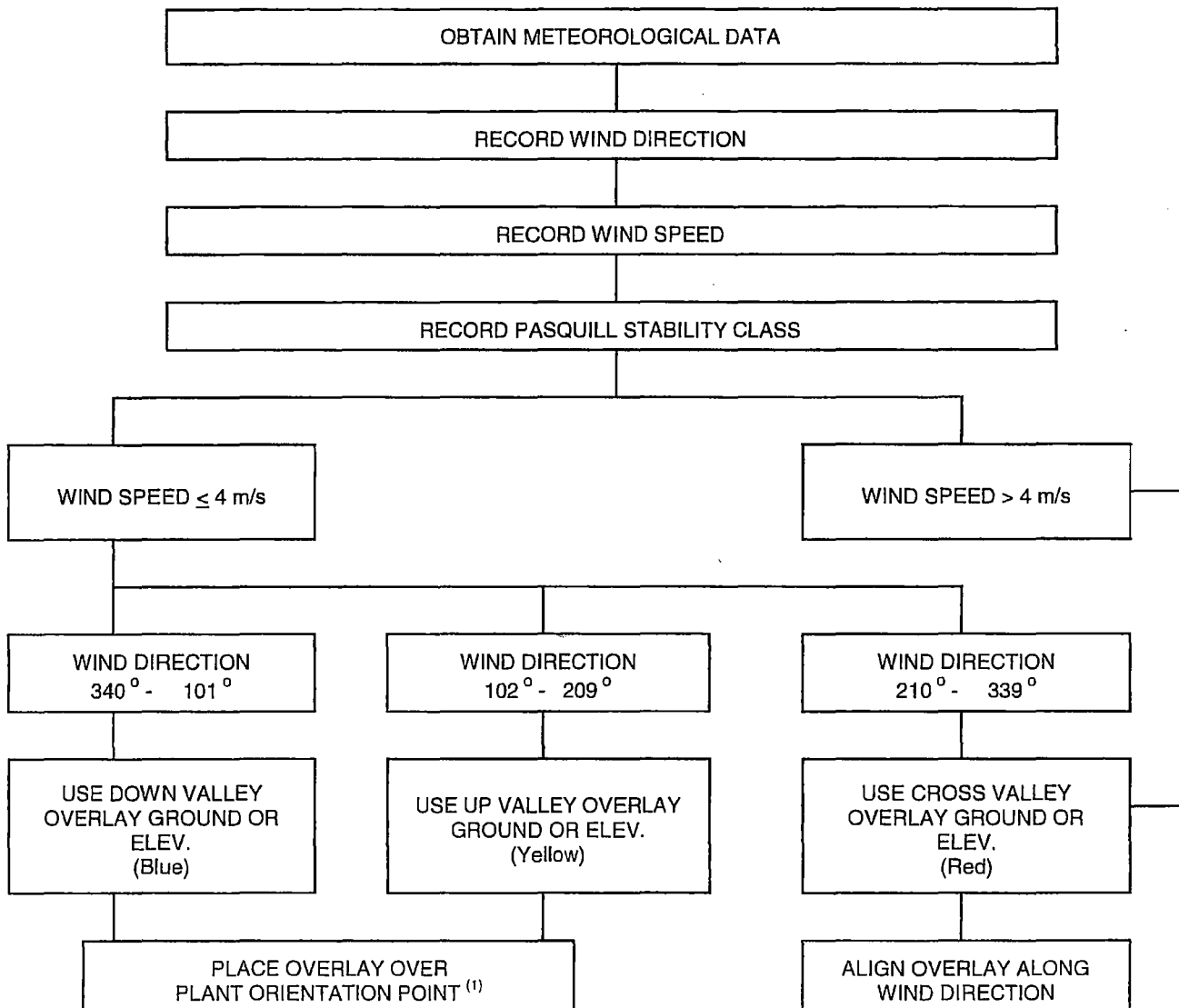
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Page 9 of 10

Attachment 9.4


**OVERLAY SELECTION FLOW CHART (FOR MANUAL PLUME VISUALIZATION)**

Sheet 1 of 1



1. Plant Orientation Point:

- Using down valley overlay (Blue) align horizontal axis on 90° - 270° line with plume extending south.
- Using up valley overlay (Yellow) align horizontal axis on 90° - 270° line with plume extending north.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-410</b>	<b>Revision 15</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>10</u> of <u>10</u></b>

Attachment 9.5

**WIND FIELD ORIENTATION MIDAS vs. PLUME OVERLAYS**

Sheet 1 of 1


**NOTE:**

The wind field orientation differs between MIDAS (Att. 9.2) and the Plume Overlays (Att. 9.4) at certain wind speeds.

Based on the recommendations of consulting meteorologists, the origin of the up and down valley flow for low wind speeds ( $\leq 4$  m/s) was changed to the center of the Hudson River (the plume overlays isopleth's origin was the super heater stack.) This is more representative of the true met expectations.

The origin change results in the down-valley plume range going from 340° - 101° to 349° - 101° for MIDAS.

As a result, the cross valley plume goes from 210° - 339° to 210° - 348° for MIDAS.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>	
	<b>REFERENCE USE</b>	<b>Page</b>	<b>1</b>	<b>of</b>

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## Meteorological Information and Dose Assessment System (MIDAS)

Prepared by:

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*Frank Mitchell* 10-1-19  
Signature Date

Effective Date: October 8, 2019

This procedure excluded from further LI-100 review

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>		<b>IP-EP- 340      Revision 7</b>	
	<b>REFERENCE USE</b>		<b>Page</b>	<b><u>2</u> of <u>84</u></b>

## Table of Contents

1.0	Purpose .....	3
2.0	References .....	3
3.0	Definitions.....	3
4.0	Responsibilities .....	4
5.0	Details .....	4
6.0	Interfaces .....	39
7.0	Records .....	39
8.0	Requirements & Commitment Cross-References .....	39
9.0	Attachments .....	40
9.1	Event Trees .....	41
9.2	Flow Charts .....	42
9.3	Plant & Site Specific Parameters .....	58
9.4	Quick Guide for MIDAS Operation (Plant Vent Quick Dose) .....	59
9.5	Quick Guide for MIDAS Operation (S/G Tube Rupture Quick Dose) .....	61
9.6	Quick Guide for MIDAS Operation (S/G Tube Rupture) .....	63
9.7	Quick Guide for MIDAS Operation (EOF – Auto H) .....	67
9.8	Quick Guide for MIDAS Operation (Offsite Users – Auto H) .....	70
9.9	Quick Guide for MIDAS Operation (Manual B – no automated data).....	72
9.10	Quick Guide for MIDAS Operation – Multiple Accident (EOF) .....	74
9.11	Quick Guide for MIDAS Operation – Multiple Accident (CCR).....	77
9.12	Quick Guide for MIDAS Part 1 Form Generator.....	80



## 1.0 PURPOSE


To describe the methods of estimating the whole body and thyroid doses to onsite and offsite persons in the event of potential or actual accidental release of radioactivity to the environment

## 2.0 REFERENCES

- 2.1 MIDAS user manual (ABS Consulting)
- 2.2 IP-EP-510, Meteorological, Radiological & Plant Data Acquisition System
- 2.3 IP-EP-410, Protective Action Recommendations

## 3.0 DEFINITIONS

- 3.1 MRPDAS - Meteorological, Radiological, and Plant Parameter Data Acquisition System – the system which provides meteorological, Reuter Stokes and certain plant parameter data (VC Temperature, VC Pressure, Plant Vent and VC High Radiation Monitors)
- 3.2 Total Effective Dose Equivalent (TEDE) – The sum of the Deep Dose Equivalent (DDE) and the Committed Effective Dose Equivalent (CEDE).
- 3.3 Committed Dose Equivalent Thyroid (CDE Thyroid) – The dose equivalent to the thyroid that will be received from an intake of radioiodine by an individual during the 50-year period following the intake.
- 3.4 CEDE - Committed effective dose equivalent is the sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues
- 3.5 Site Boundary - For Dose Assessment and Protective Action Recommendation purposes the Site Boundary is the closest distance at which members of the public would be exposed to a radioactive release. When the plume is traveling toward the water, the distance to the nearest point on the far shore is used.
- 3.6 MIDAS - Meteorological Information and Dose Assessment System – computer software for determining source term, atmospheric dispersion, and dose consequences
- 3.7 Source term – generic term for curies available for release or actually being released. 'Term' in mathematics is any single factor in an equation. Hence 'source term', 'dispersion term', etc are simply portions of the equation for the calculation
- 3.8 Ground level release – an effluent release point model that assumes that the release point is at ground level, with no accounting for the additional mixing from other release point factors such as height above the ground, plume temperature, and exit velocity

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>4 of 84</b>

- 3.9 Multiple Accident Run - Allows for dose calculations for accident releases occurring simultaneously from different release locations at one or both units.

#### **4.0 RESPONSIBILITIES**

Dose Assessment staff in the Control Room (CR) and in the Emergency Operations Facility (EOF) are responsible for assessing actual and potential planned and unplanned radioactive releases to the environment. Attachments at the end of the procedure may be used as a reference when stepping through a MIDAS dose assessment calculation.

##### **NOTE:**

When a dose assessment is being performed you may proceed directly to the applicable attachment in the procedure for the type of dose assessment being performed.

#### **5.0 DETAILS**

- 5.1 MIDAS is a menu driven computer system - menus are described below throughout Section 5
- 5.2 Step by step option selection for each menu are shown in the attachments
- 5.3 MIDAS uses a segmented plume model with terrain and meteorology specific wind fields. Displayed plumes are EXPECTED to have unusual shapes. (See Section 5.12)
- 5.4 MIDAS also uses an automated plant data collection system 'NDCIP' which runs in the background on the MIDAS computer
- 5.5 **MIDAS Startup**
  - 5.5.1 PC computer system should be running with the program "NDCIP" active

##### **NOTE:**

NDCIP provides the automated interface between the plant data sources (e.g. PI computer) and the MIDAS system for automated plant monitor and meteorological data collection and should not be closed by the user.

##### **NOTE:**

If NDCIP is not already active in the computer, it will start when MIDAS is started. In this case, there will not be recent history or current automated data available until a data collection cycle is completed.

- 5.5.2 Start MIDAS by 'double-clicking' on the 'MIDAS Accident Calcs' icon



5.5.3 After a few second delay with a startup screen showing a photograph of the plant, the accident dose startup menu screen will be displayed as shown in Figure 1 below.

Figure 1 Example: MIDAS Startup / Menu Screen

MIDAS - Accident Dose Calculation - Sheet #1 MIDAS-NUVersion:1.5.16.010714

**Start New Multiple Accident Run**

Site Selection: Indian Point

Unit Selection: Unit 2

☒ CCR ☐ EOF

☒ AUTOMATIC ☐ MANUAL ☐ SIMULATION

**Recap Previous Run** **Recap Multiple Accident Run**

	Date/Time	Plant	Notes(Description)
*			

Delete Selected Recap Purge Recap files

Set Map Defaults Exit OK

5.5.4 Ensure "Indian Point" is selected for the Site Selection on the upper left



5.5.5 Select 'Start New Run' for calculations involving an accident at either Unit 2 or Unit 3; or, select "Start Multiple Accident Run for accident releases occurring simultaneously from different release locations at one or both units. (See Section 5.14).

- a. 'Recap Previous Run' near the bottom left is the alternate button selection for 'Start New Run'
- b. 'Recap Previous Run' allows display of previously saved runs from the list at the bottom of the page
- c. 'Recap Previous Run' will generally not be needed in the initial phase of dose evaluation but can be used if hard copy printouts of a previous run are needed

5.5.6 Select the appropriate Unit (2 or 3) on the upper right

- a. If more than one location is experiencing a release, a calculation must be completed for each location.
  - (ex. Unit 2, Unit 3, Spent Fuel Pool)

5.5.7 Select your location CCR or EOF

5.5.8 Select Automatic, Manual, or Simulation

**NOTE:**

Automatic should be selected whenever possible unless it is KNOWN that the automated data is wrong, unavailable, or misleading.


**NOTE:**

Simulation uses automated DRILL data. Simulation should be selected whenever possible during DRILLS unless it is KNOWN that the automated drill data is wrong, unavailable, or misleading.

**NOTE:**

Choosing 'Automatic' will force MIDAS to use any of the effluent and radiation monitor data and meteorological data automatically collected from the plant computer system (PI computers). Manual will cause MIDAS to IGNORE this available data and will REQUIRE the user to obtain and enter this data by hand.


5.5.9 Based on the choices of CCR/EOF and Automatic (Simulator) / Manual the list of available choices in the 'Accident Run Menu Selection' will change.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>7</u> of <u>84</u></b>

**NOTE:**

To the user, Automatic and Simulator processes are the same, only changing the data source for automatic data collection. Automatic and Simulator processes are generally referred to throughout this procedure as 'Automatic'.

- 5.5.10 The Automatic and Manual lists represent the same processes but using or not using the automatically collected data
- 5.5.11 With 'CCR' selected, only the automatic (Menu G & Menu J) or manual (Menu A & Menu D) quick dose projection is available as described in Section 5.5.12.
- 5.5.12 With 'EOF' selected the following menus are available: **Automatic**
- a. Menu G – *Auto Quick dose projection Plant Vent* – this menu uses automatically loaded data to project doses with minimal user intervention or input required.
  - b. Menu H – *Auto Enhanced dose projection* – this menu uses automatically loaded data but allows the user to select relevant release points and other parameters
  - c. Menu I – *Auto Met Event Tree* - uses automatically loaded meteorological data but uses a pull down event tree selection process to determine source term and release rates instead of using plant monitor data
  - d. Menu J – *Auto Quick dose projection Steam Generator Tube Rupture* – this menu uses automatically loaded data to project doses with minimal user intervention or input required.
  - e. Menu K-W – *Auto Met Back Calculation* – uses manually entered offsite monitoring centerline plume dose rate readings to estimate the release source term based on automatically collected meteorological data. This menu option should generally not be used if plant monitors are available.
  - f. Menu L – *Auto Accum. Dose Last 24 Hr* – uses the automated data collected for the last 24 hours to summarize the total dose committed for that period. This menu option would not generally be used during the initial protective action phase of an event
  - g. Menu N – *Auto Met Isotopic Entry* – uses automatically collected meteorological data and manually entered isotopic release data to project dose – requires knowledge of release by isotope, e.g. from an isotopic analysis of effluent stack samples.
  - h. Menu Y – *Auto All Screens* – is for re-creation of past events and program testing and should not be used for emergency response

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>8 of 84</b>

- i. Multiple Accident Run - Allows for dose calculations for accidents occurring simultaneously at both units. (See Section 5.14).

**NOTE:**

If the automatic process identifies missing or bad data MIDAS will prompt the user for manual inputs, even in automatic menu modes.

5.5.13 With 'EOF' selected the following menus are available: **Manual**

- a. Menu A – *Quick dose projection* – this menu assumes the release is monitored and prompts the user for input of meteorological and radiological data.
- b. Menu B – *Enhanced dose projection* – this menu prompts the user for manual input of release point, meteorological data, isotopic mix, and effluent monitor readings.
- c. Menu C – *Event Tree* - this menu prompts the user for manual input of meteorological data but uses a pull down event tree selection process to determine source term and release rates instead of using plant monitor data.
- d. Menu D – *Quick dose projection Steam Generator Tube Rupture* – this menu assumes the release is monitored and prompts the user for input of meteorological and radiological data.
- e. Menu E-W – *Back Dose Calculation* – uses manually entered offsite monitoring centerline plume dose rate readings and a pull down event tree selection process to determine the isotopic mix to estimate the release source term using manually entered meteorological data. This menu option should generally not be used if plant monitors are available.
- f. Menu F – *Auto Accum Dose Last 24 Hr* – uses the data entered for the last 24 hours to summarize the total dose committed for that period. This menu option would not generally be used during the initial protective action phase of an event
- g. Menu M – *Isotopic Entry* – uses manually entered meteorological data and manually entered isotopic release data to project dose – requires knowledge of release by isotope, e.g. from an isotopic analysis of effluent stack samples.
- h. Menu X – *Advanced Calcs All Screens* – is for re-creation of past events and program testing and should not be used for emergency response
- i. Multiple Accident Run - Allows for dose calculations for accidents occurring simultaneously at both units. (See Section 5.14).

Meteorological Edit

Sheet #/4

Date:

10/28/09

Meteorological Spreadsheet

Site ID: IP

Unit ID: U2

Menu: B

Timing	Hr	Mn	SPD10 (m/s)	DIR10M (deg)	DT60-10 (deg c) or PG A-G	RAIN1 L, M, H (in/15min)
	14	: 15				
	14	: 30				
	14	: 45				
	15	: 00				
	15	: 15				
	15	: 30				
	15	: 45				
	16	: 00				
Exposure Start/Rel Start/Current	16	: 15	2	123	d	0
	16	: 30				
	16	: 45				
	17	: 00				
	17	: 15				
	17	: 30				
	17	: 45				
	18	: 00				
	18	: 15				
	18	: 30				
	18	: 45				
	19	: 00				
	19	: 15				
	19	: 30				
	19	: 45				
	20	: 00				
	20	: 15				
	20	: 30				

Copy Cell Down

Copy Data Collection

Save to Excel

Restore From Excel

Cancel

Previous Screen

Copy

Paste

Clear

OK



IPEC  
EMERGENCY  
PLAN  
IMPLEMENTING  
PROCEDURES

NON-QUALITY RELATED  
PROCEDURE

IP-EP- 340

Revision 7

REFERENCE USE

Page 10 of 84

5.6.3 Radiation Monitor & Flow spreadsheet - includes date and time, and input fields for the plant effluent monitors, flow rates of release points, and the containment dome monitors as shown in Figure 3. The sheet may contain additional input columns to the right not shown in this screen view dependent on the release points selected as active.

- The content and columns displayed on this sheet are modified based on the selection of the four release points
- Columns for effluent monitors, dome monitors, flow instruments are selected based on the applicability of each sensor to the selected release points

Figure 3 Example: MIDAS Radiation, Effluent Monitor and Flow Data Input Sheet

Rad Monitor & Flow Data Edit Sheet #5

Date: 10/28/09

Site ID: IP  
Unit ID: U2  
Menu: B

Timing	Hr	Mn	R-44B Release ( $\mu\text{Ci/cc}$ )	VCONTACT Release (mem/hr)	PLNTVENT Flow (cfm)	R-27 Release ( $\mu\text{Ci/sec}$ )	R-45 Release ( $\mu\text{Ci/cc}$ )	CAEJ Flow (cfm)	R-28 Release (cpm)	R-28 Flow (lbs/hr)	R-29 Release (cpm)	R-29 Flow (lbs/hr)	R-30 Release (cpm)	R-30 Flow (lbs/hr)	R-31 Release (cpm)	R-31 Flow (lbs/hr)
	14	15														
	14	30														
	14	45														
	15	00														
	15	15														
	15	30														
	15	45														
	16	00														
Exposure Start/Rel Start/Current	16	15	1.00E-06		6.20E+04	1.10E+01	1.00E-06	0.00E+00	1.70E+01	0.00E+00						
	16	30														
	16	45														
	17	00														
	17	15														
	17	30														
	17	45														
	18	00														
	18	15														
	18	30														
	18	45														
	19	00														
	19	15														
	19	30														
	19	45														
	20	00														
	20	15														

Copy Cell Down Copy Data Collection Copy Selected Row Data Collection

Save to Excel Restore From Excel Cancel Previous Screen Copy Paste Clear OK

5.6.4 Mix spreadsheet - includes date and time, and input fields for the ratios of isotopes in a known mix in percent as shown below in Figure 4. The sheet contains additional input columns to the right not shown in this screen view. The sheet will adjust the input percentages to total 100, so mixes do not need to be in percent to be input.



IPEC  
EMERGENCY  
PLAN  
IMPLEMENTING  
PROCEDURES

NON-QUALITY RELATED  
PROCEDURE

IP-EP- 340

Revision 7

REFERENCE USE

Page 11 of 84

Figure 4 Example: MIDAS Effluent Isotopic Mix Data Input Sheet

Mix Edit

Mix Spread Sheet  
Percent at each Isotope

Date: 07/06/16

Timing	Hr	Min	Already Decayed (Y/N)	Total Percent	H-3	C-14	AR-41	KR-83M	KR-85M	KR-85	KR-87	KR-88	KR-89	KR-90	XE-131M	XE-133M	XE-133	XE-135M	XE-135
	12	15																	
	12	30																	
	12	45																	
	13	00																	
	13	15																	
	13	30																	
	13	45																	
	14	00																	
Release Start/Current Time	14	30																	
Expense Start	14	45																	
	15	00																	
	15	15																	
	15	30																	
	15	45																	
	16	00																	
	16	15																	
	16	30																	
	16	45																	
	17	00																	
	17	15																	
	17	30																	
	17	45																	
	18	00																	
	18	15																	

Copy Cell Down Copy Row Down Use Last Mix Copy Paste Clear

Save to CSV Restore From CSV Previous Screen Event Tree OK

Release to Isotope  
ID  
Nucleon to Isotope  
ID

5.6.5 Isotopic Data spreadsheet - includes date and time, and input fields for the concentrations or release rates and flow rates in a known mix. The sheet contains additional input columns to the right not shown in this screen view.

5.6.5.1 Before entering data, select if data is available in rate or concentration in the selection menu as shown in Figure 5.


 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>12</u></b>
			<b><u>84</u></b>

Figure 5 Example: MIDAS Effluent Isotopic Sample Data Type Selection Menu

**Type of Isotopic Values**

Select Method for Entering the Isotopic Values.

☒ Enter Isotopic Release Rates  
☐ Enter Isotopic Concentrations and Flow Rate

- a. With release rate selected the input process requires release rate in uCi/sec for each isotope as shown in the input sheet in Figure 6

Figure 6 Example: MIDAS Effluent Isotopic Sample Data Release Rate Input Sheet

Isotopic Data Edit Sheet #6

Date: 10/28/09 Release Point: 1

Site ID: IP  
Unit ID: U2  
Menu: M

Timing	Hr	Mn	H-3 (uCi/sec)	C-14 (uCi/sec)	AR-41 (uCi/sec)	KR-83M (uCi/sec)	KR-85M (uCi/sec)	KR-85 (uCi/sec)	KR-87 (uCi/sec)	KR-88 (uCi/sec)	KR-89 (uCi/sec)	KR-90 (uCi/sec)	XE-131M (uCi/sec)	XE-133M (uCi/sec)	XE-133 (uCi/sec)	XE-135M (uCi/sec)	XE-135 (uCi/sec)
	14	: 30															
	14	: 45															
	15	: 00															
	15	: 15															
	15	: 30															
	15	: 45															
	16	: 00															
	16	: 15															
	16	: 30															
▶ Exposure Start/Current Time	16	: 45															
	17	: 00															
	17	: 15															
	17	: 30															
	17	: 45															
	18	: 00															
	18	: 15															
	18	: 30															
	18	: 45															
	19	: 00															
	19	: 15															
	19	: 30															
	19	: 45															
	20	: 00															
	20	: 15															
	20	: 30															

Copy Cell Down



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IMPLEMENTING  
PROCEDURES**

**NON-QUALITY RELATED  
PROCEDURE**

**IP-EP- 340**

**Revision 7**

**REFERENCE USE**

**Page 13 of 84**

- b. With release concentration and flow selected the input process requires release rate in uCi/sec for each isotope as shown in the input sheet in Figure 7

Figure 7 Example: MIDAS Effluent Isotopic Sample Data Concentration and Flow Rate Input Sheet

**NOTE:**

The ISOTOPIC DATA sheets are release point specific. If more than one release point is active you MUST enter data on sheets for each release point by clicking on the Release Point button to the left of the "OK" to toggle between release point sheets

- 5.6.6 Under many circumstances when release points are changed or calculation menu choices are changed MIDAS will provide a prompt to initialize ('New') or retain the old ('Edit Last') data collection spreadsheets as shown in Figure 8


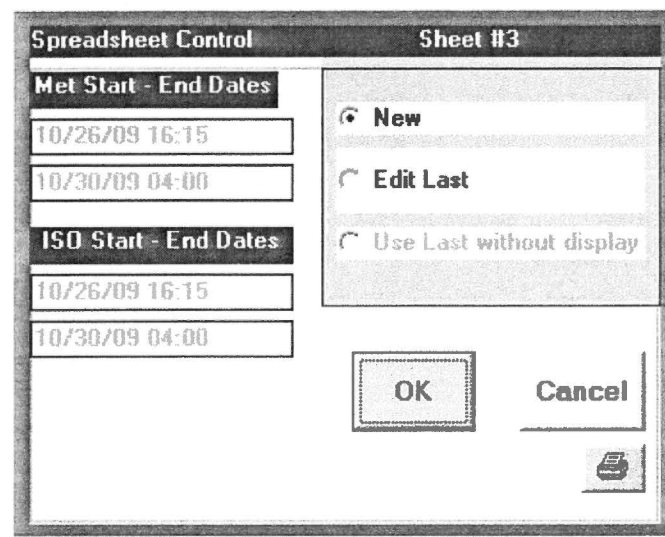
 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	NON-QUALITY RELATED PROCEDURE	IP-EP- 340	Revision 7
	REFERENCE USE	Page	<u>14</u> of <u>84</u>

Figure 8 Example: MIDAS Spreadsheet Initialization Selection Menu



- 5.6.7 The user **MUST** select 'NEW' when first starting MIDAS, otherwise the spreadsheet dates will be left over from the last time the program was used and **WILL** cause dose projection errors.
- 5.6.8 When changing menus or release points, a similar prompt may appear. If the dates of the various sheets shown are not consistent and are not appropriate for the current calculation the user **MUST** select 'NEW'.
- 5.6.9 Spreadsheet lines highlighted in the time column with **RED** are the start time of the release.
- 5.6.10 Spreadsheet lines highlighted in the time column in **LIGHT BLUE** are the start time of the dose assessment.
- 5.6.11 Because, for offsite protective action purposes, dose that has already been incurred is not used for protective action decisions, the start of release and start of dose assessment will not be the same except for initial calculations.
- 5.6.12 Make **CERTAIN** that the spreadsheets contain data in the highlighted lines. Meteorological data from previous lines is assumed to 'persist' into the current time. Release data does **NOT** 'persist' and blank lines are interpreted as **NO RELEASE**.
- 5.6.13 Buttons on the spreadsheets allow copying lines of data and pasting to new lines, clearing lines of data, and saving and retrieving sheets to / from Excel readable spreadsheet files.



**5.7 Release Points** - There are four release points available in MIDAS

**5.7.1 Release Point 1 – Plnt Vnt – (Plant Vent)**

- a. represents releases from the normal plant ventilation system
- b. R-44 and R-27 (Unit 2)
- c. R-14 and R-27 (Unit 3)
- d. stack flow rate required for R14 / R44

**5.7.2 Release point 2 – CAEJ – (Condenser Air Ejector)**

- a. represents releases from the condenser air ejectors / vacuum system
- b. R-45 (Unit-2)
- c. R-15 (Unit 3)
- d. offgas flow rate required

**5.7.3 Release Point 3 – Stm Dmp – (Steam Dump)**

- a. represents releases from atmospheric steam reliefs and dump valves
- b. R-28, R-29, R-30, and R-31 (Unit 2)
- c. R-62A, R-62B, R-62C, R-62D (Unit 3)
- d. estimates of steam flow through the open valves is required
  - 1. Flow instrumentation may not give valid values for atmospheric releases through open ADVs or Safeties
  - 2. Initial flow rates at high temperature and pressure may greatly overestimate the total release if long durations are assumed

**5.7.4 Release Point 4 – Vap Cont – (Vapor Containment)**

- a. represents releases direct from the containment including damage to containment and containment bypass releases
- b. possible unmonitored pathways
- c. Containment dome monitors R-25, R-26 (Unit 2)
- d. Containment dome monitors R-25, R-26 (Unit 3)
- e. Estimate of flow rate required



5.7.5 All four release points are treated as ground level releases

- a. application of ground level release point model to station vent will likely cause underestimate of offsite mixing and overestimate of dose consequences of release
- b. application of ground level release point model for the condenser off-gas release is probably the best reasonable model
- c. application of a ground level release to the atmospheric steam relief release may significantly underestimate the offsite mixing DURING THE FIRST SEVERAL MINUTES of a release and will overestimate offsite dose consequences. After the steam system is substantially depressurized, the ground level release model is more appropriate
- d. application of the ground level release for vapor containment building leakage is likely the most appropriate model given uncertainty in flow, height above the ground, and other relevant parameters.

5.8 Times and timing in MIDAS

5.8.1 There are several timing concepts important to successful MIDAS dose projections

5.8.2 Meteorological data

- a. Always provided in 15 minute average data
- b. Averages are CENTERED on the 15 minute clock time e.g. the 1300 average is accumulated from 12:52:30 to 13:07:30
- c. Manually entered data COULD be in instantaneous values but may not represent the long term dispersion

5.8.3 Start Date of Exposure –

- a. The date and time for the beginning of calculation of dose consequences
- b. Because dose already incurred is irrelevant to protective actions, this is typically set to the current time
- c. Defaults times will be set to Meteorological times – e.g. HH: 08, HH: 23, HH: 38, HH: 53



#### 5.8.4 Trip/Shutdown

- a. The date and time of the plant trip or shutdown
- b. Used to decay default and other isotopic information to adjust isotopic mixes and monitor response factors based on mix
- c. Should be set once at start of event
- d. MIDAS will remember this value

#### 5.8.5 Release time

- a. The date and time of the start of the release
- b. Different from start of exposure because previous releases are kept track of in MIDAS and doses for the activity already in the environment may be included in the dose assessment
- c. Should be set to the earliest time of significant releases – should NOT be the current time except for the first calculation.
- d. Should be set once at start of event
- e. MIDAS will remember this value

#### 5.8.6 Remaining duration


- a. Represents the approximate remaining duration of significant releases
- b. Used to 'persist' releases into the future
- c. Four hours is the typical default.

#### 5.8.7 Exposure time to be calculated

- a. Specific times that projections will be provided for
- b. Provides basis for plume plots, long term projections
- c. At least one value should be 4 in order to provide specific projection at the default duration

#### 5.8.8 Daylight savings time

- a. MET data is maintained in Eastern Standard Time (EST)
- b. The PI computer tags data strings with eastern daylight time (EDT) when applicable
- c. Conflicting times will cause problems with auto data collection
- d. MIDAS contains a data file (DST.txt) that tells MIDAS when to assume EDT.
- e. This file MUST be maintained annually due to possible changes in EDT/EST changeover as federally mandated
- f. MIDAS will subtract 1 hour from the PI reported met string during EDT based on the period defined in the DST.txt file.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>18 of 84</b>

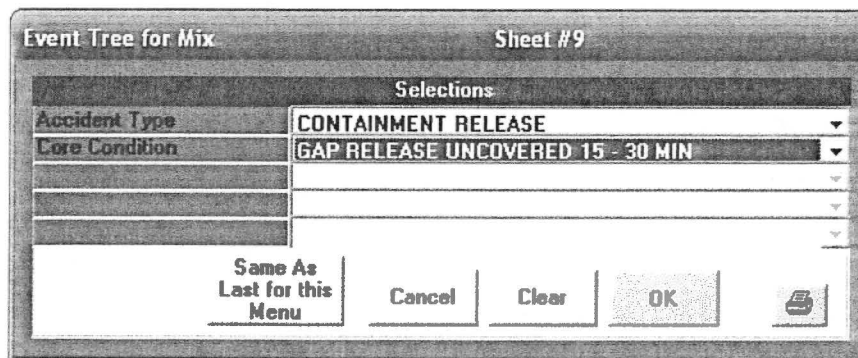
## 5.9 Automated Data collection

- 5.9.1 Automated collection of data is obtained from the EOFPI, U2PI, and U3PI servers.
- 5.9.2 Short delays are expected between data collection at the source and the availability of the data in the PI servers.
- 5.9.3 MIDAS delays acquisition of data for about 75 seconds to ensure data is updated. IF data collection is delayed longer than 75 seconds or there are errors in the time in the computers, automatic data collection will fail.
- 5.9.4 Because the data collection into the PI computers is dependent on the time and timing of multiple PI servers as well as other plant computers and data loggers (met towers) bad or old data may be collected due to delays in the data transfer path before MIDAS tries to acquire the data.

## 5.10 Event Trees

- 5.10.1 In some events source term may be developed or enhanced by selection of plant conditions from an 'event tree'
- 5.10.2 The event tree is based on the event trees in the NRC Response Technical Manual but applies only the default noble gas to iodine mixes of 10000:1 or 100:1 in use at IPEC.
- 5.10.3 As the name suggests, the event tree is a branching process that asks questions based on previous answers
- 5.10.4 The event tree may have one or two branches after the initial trunk question as shown in the example in Figure 9 below.

Figure 9 Example: MIDAS Event Tree Menu



- 5.10.5 Each line is based on a pull-down selection list with the next branch typically dependent on the answer to the previous branch.
- 5.10.6 There are four accident types, three isotopic mixes, and for steam generator releases, two possible flow rates in event tree. The tree selections are shown in detail in Attachment 9.1



5.10.7 The event tree selects the isotopic mix and / or the curies available for release by determining core condition, release conditions (flow rates etc) and adjustments for the default Noble Gas to Iodine ratios for each accident type.

5.10.8 For unmonitored releases, the event tree will derive isotopic release rates (mix and magnitude)

5.10.9 For releases with monitor data, the event tree will determine the isotopic mix which is then applied to the total activity applicable for the monitor reading to determine the magnitude of the release

5.10.10 The selection of release point does NOT limit the event tree menu choices. Therefore the user must ensure that the release point and the accident type in the event tree are consistent. E.g. do not select release point 1 and a steam generator tube failure event tree (more appropriate for release point 3).

#### 5.11 MIDAS Main input control page

**NOTE:**

Each time the NEXT arrow is selected, MIDAS will inspect the input parameters to test if there is valid complete data for a successful dose projection and will provide warnings if data is incomplete or invalid. Some of these warnings are informational and some are critical. The warnings messages must be reviewed to determine if they are critical or not.

5.11.1 MIDAS uses a main input control page to sequence the user through the input process. At each step, additional panes are shown as required as described below for individual parameter input

5.11.2 The input control page is divided into four sections horizontally

5.11.3 The first section allows selection of release points and plume plot display distance as shown in Figure 10. Default for the initial display radius is 16 miles


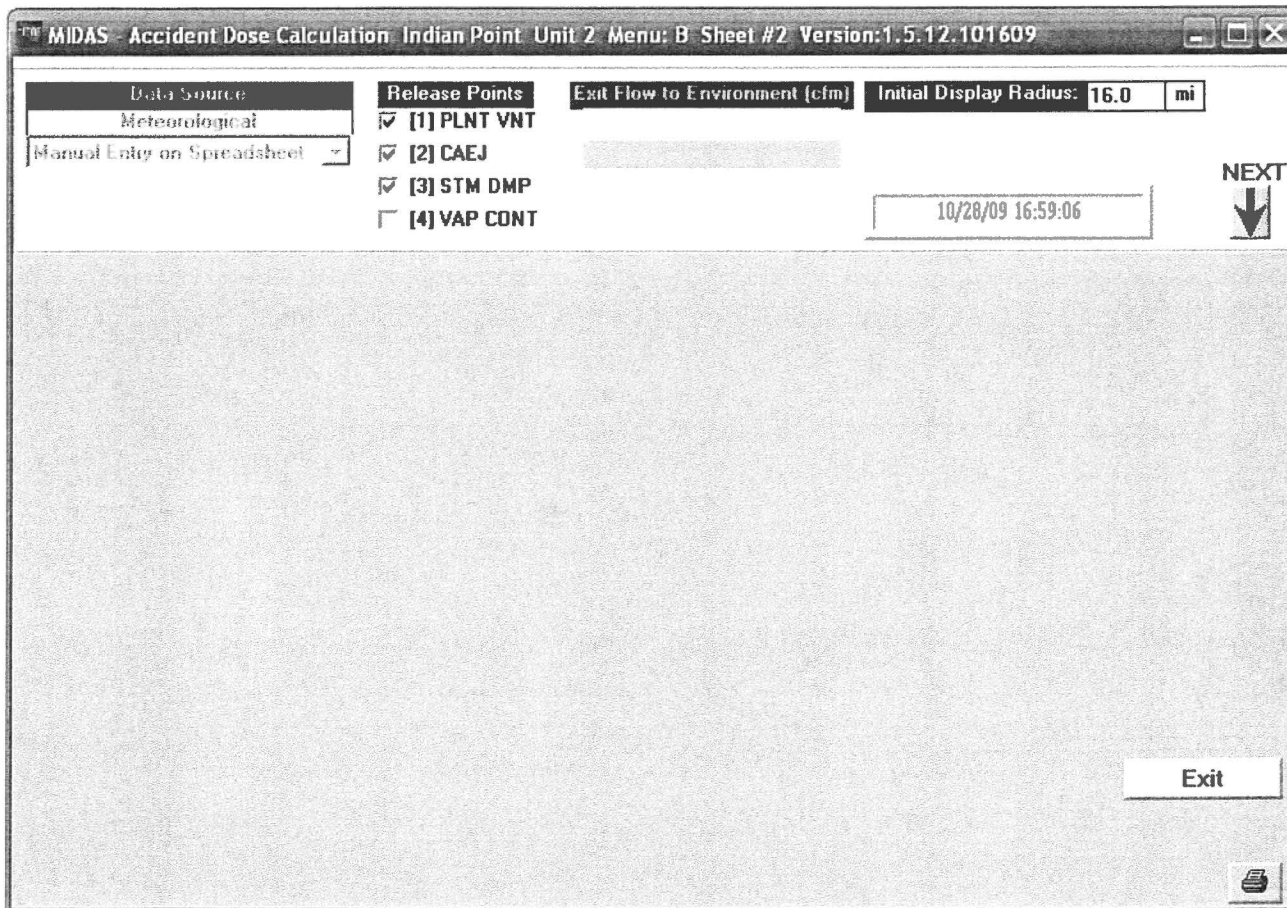
 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b> <b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page    <u>20</u>    of    <u>84</u></b>

Figure 10 Example: MIDAS Main Input Page, first quarter pane section



5.11.4 CLICK on the NEXT down arrow to continue – the arrow label will change to DONE and will turn green

5.11.5 'Exit' terminates MIDAS and must be clicked TWICE to exit

**NOTE:**

Gray items are not used in the selected menu. Most users will not need these items during emergency response activities

5.11.6 The second quarter pane of the screen inputs exposure start date/time and desired calculation times and is shown in Figure 11 below. At least one of these times should be 4 hours


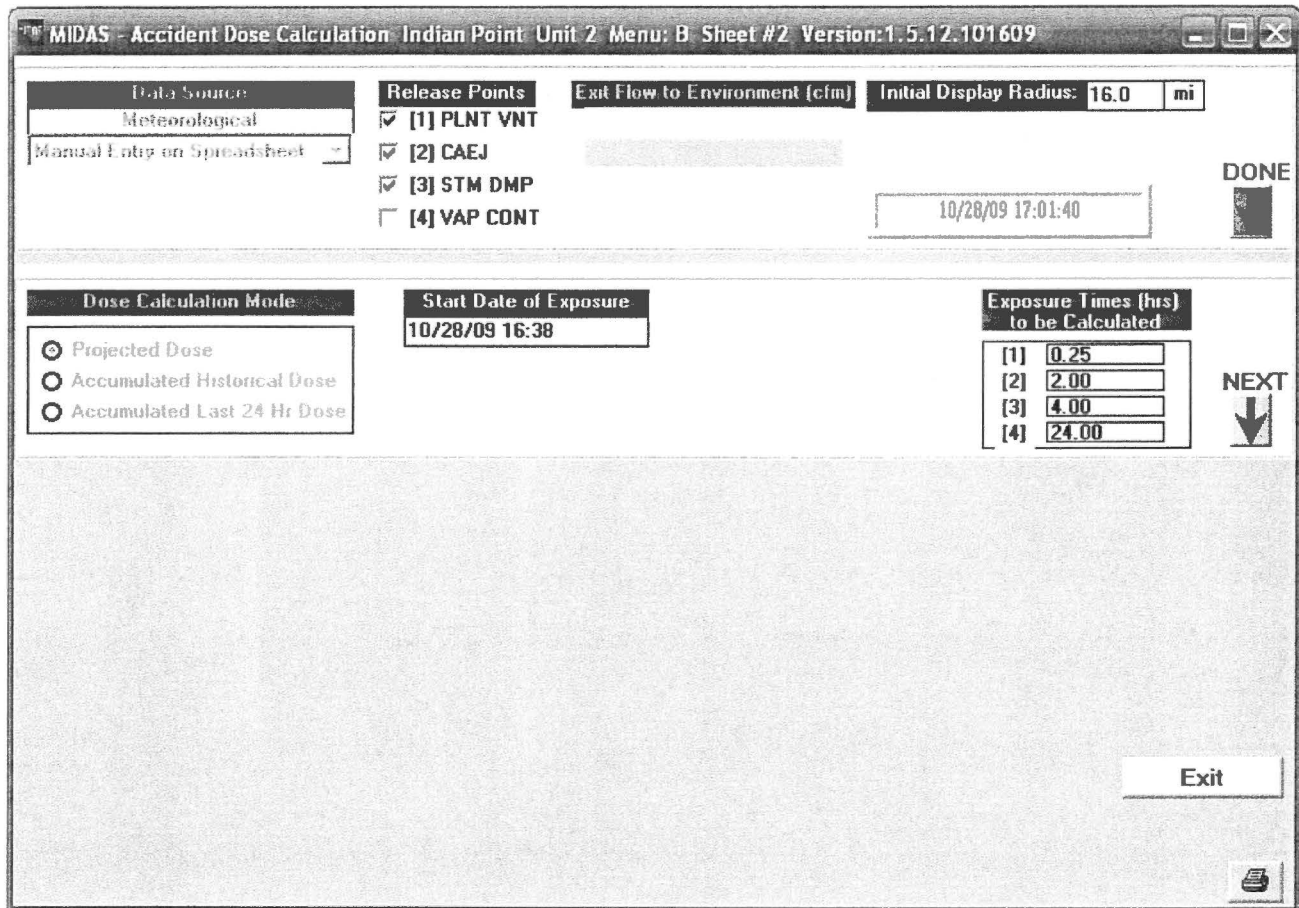
 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b> <b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page    21    of    84</b>

Figure 11 Example: MIDAS Main Input Page, second quarter pane section



**MIDAS - Accident Dose Calculation: Indian Point: Unit 2: Menu: B: Sheet #2: Version:1.5.12.101609**

**Data Source:**  
☐ Meteorological  
☐ Manual Entry on Spreadsheet

**Release Points:**  
☒ [1] PLNT VNT  
☒ [2] CAEJ  
☒ [3] STM DMP  
☐ [4] VAP CONT

**Exit Flow to Environment (cfm):**

**Initial Display Radius:** 16.0 mi

10/28/09 17:01:40

**Dose Calculation Mode:**  
☒ Projected Dose  
☐ Accumulated Historical Dose  
☐ Accumulated Last 24 Hr Dose

**Start Date of Exposure:** 10/28/09 16:38

**Exposure Times (hrs) to be Calculated:**  
 [1] 0.25  
 [2] 2.00  
 [3] 4.00  
 [4] 24.00

**NEXT** (down arrow)

**DONE**

**Exit**


5.11.7 CLICK on the NEXT down arrow to continue

5.11.8 DEPENDING on the initial menu selection, the manual input spreadsheets or the event tree will now be displayed

5.11.9 After completing the spreadsheets or event tree, or if automated data is available, the previous Next down arrow will turn green and be relabeled DONE.

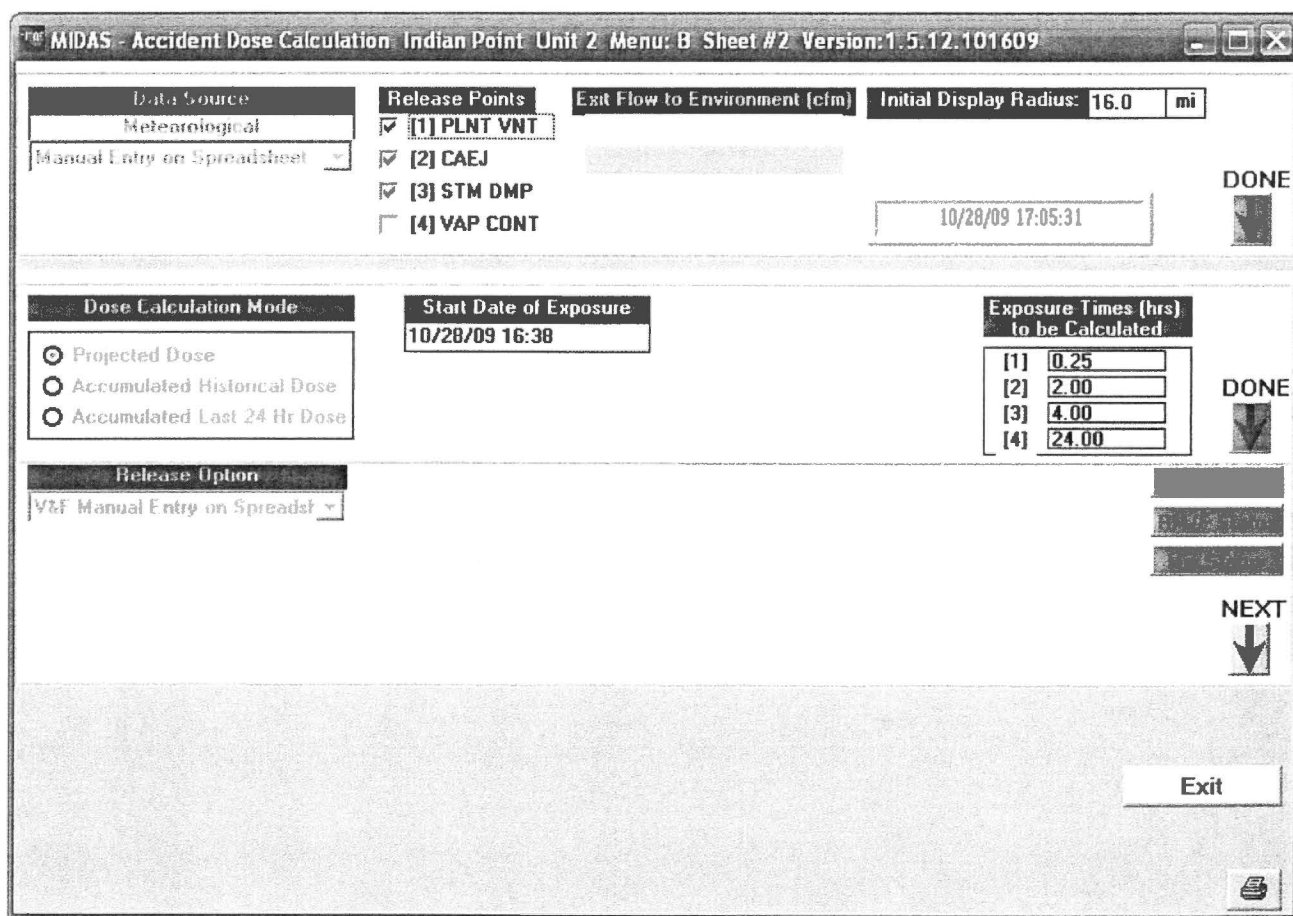
5.11.10 Click boxes are displayed on the right of the third input page section for each spreadsheet used as shown in Figure 12 below.

1. If all boxes are GREEN, MIDAS has determined that the input data is usable for calculations – i.e. there is sufficient valid data for a projection at the current projection time

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>22 of 84</b>

2. If any box is RED, MIDAS has determined that the data for that input item may not be usable.
3. If any box is RED, click on that box to repeat the input process for that item.

Figure 12 Example: MIDAS Main Input Page, third quarter pane section



**MIDAS - Accident Dose Calculation: Indian Point Unit 2 Menu: B Sheet #2 Version:1.5.12.101609**

**Data Source**  
 Meteorological  
 Manual Entry on Spreadsheet

**Release Points**  
☒ [1] PLNT VNT  
☒ [2] CAEJ  
☒ [3] STM DMP  
☐ [4] VAP CONT

**Exit Flow to Environment (cfm)**

**Initial Display Radius: 16.0 mi**

**Dose Calculation Mode**  
☒ Projected Dose  
☐ Accumulated Historical Dose  
☐ Accumulated Last 24 Hr Dose

**Start Date of Exposure**  
 10/28/09 16:38

**Exposure Times (hrs) to be Calculated**

[1]	0.25
[2]	2.00
[3]	4.00
[4]	24.00

**Release Option**  
 VNF Manual Entry on Spreadst

**NEXT** (with downward arrow)

**Exit**

- 5.11.11 CLICK on the NEXT down arrow to continue – the arrow label will change to DONE and the arrow will turn green
- 5.11.12 The final section of the input page allows changing the Trip and Release Start times, as well as the release duration as shown in Figure 13 below.


 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	NON-QUALITY RELATED PROCEDURE	IP-EP- 340	Revision 7
	REFERENCE USE	Page <u>23</u> of <u>84</u>	

Figure 13 Example: MIDAS Main Input Page, fourth quarter pane section

MIDAS - Accident Dose Calculation Indian Point Unit 2 Menu: B Sheet #2 Version:1.5.12.101609

<b>Data Source</b> Meteorological Manual Entry on Spreadsheet	<b>Release Points</b> <input checked="" type="checkbox"/> [1] PLNT VNT <input checked="" type="checkbox"/> [2] CAEJ <input checked="" type="checkbox"/> [3] STM DMP <input type="checkbox"/> [4] VAP CONT	Exit Flow to Environment (cfm) Initial Display Radius: 16.0 mi 10/28/09 17:07:10	DONE
<b>Dose Calculation Mode</b> <input checked="" type="radio"/> Projected Dose <input type="radio"/> Accumulated Historical Dose <input type="radio"/> Accumulated Last 24 Hr Dose	<b>Start Date of Exposure</b> 10/28/09 16:38	<b>Exposure Times (hrs) to be Calculated</b> [1] 0.25 [2] 2.00 [3] 4.00 [4] 24.00	DONE
<b>Release Option</b> V&F Manual Entry on Spreadst	DONE		
<b>Date, Time of Trip/Shutdown</b> 10/28/09 16:08 <input type="checkbox"/> at Current Time <input checked="" type="checkbox"/> at Start of Release	<b>Start Date of Release</b> 10/28/09 16:08 <input type="checkbox"/> Trip Date <input type="checkbox"/> Minutes Since Trip	<b>Remaining Duration (hrs)</b> 4.00 Remaining Release Duration from Current Time	Exit Start Calc

5.11.13 Click 'Start Calc' to continue and start the offsite dose calculations

5.11.14 Calculations may take several seconds and are not complete until the text displays are shown on the right side of the screen view.

5.11.15 MIDAS will complete calculations and show the default results page, a plume plot of the integrated TEDE dose at 4 hours.



**IPEC  
EMERGENCY  
PLAN  
IMPLEMENTING  
PROCEDURES**

**NON-QUALITY RELATED  
PROCEDURE**

**IP-EP- 340**

**Revision 7**

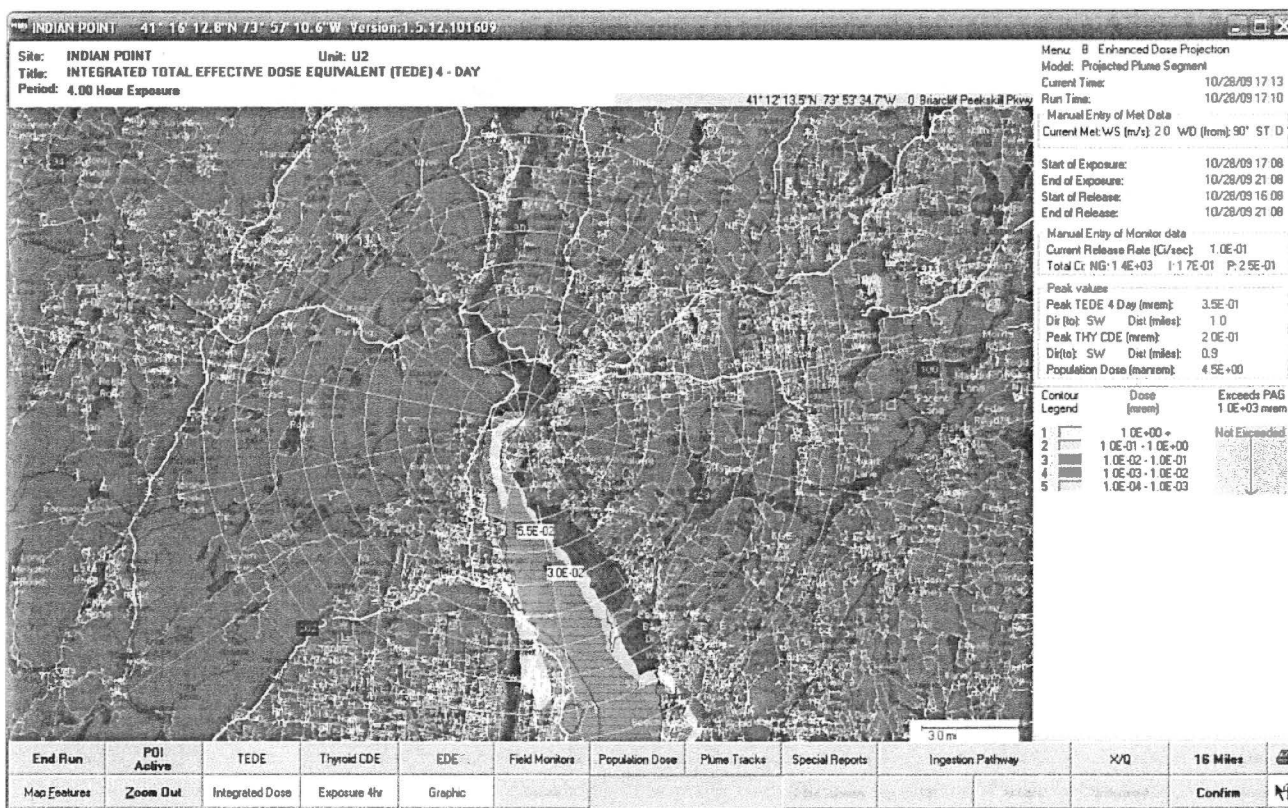
**REFERENCE USE**

**Page 24 of 84**

## 5.12 MIDAS Output

5.12.1 MIDAS will display various plume plots depending on user selected options as shown in Figure 14 below.

Figure 14 Example: MIDAS Plume Plot Output Display Page



**NOTE:**


MIDAS uses site-specific variable wind fields so the plume may not be linear.

**NOTE:**

MIDAS plot screen can be printed by clicking on the printer icon on the lower right

5.12.2 In addition to the plume plot, various input and calculated parameters are displayed on the right side of the output page.

5.12.3 Numerous plume display options are available by selecting the buttons at the bottom of the frame. Clicking on these buttons activates additional features or toggles display options

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>25</u> of <u>84</u></b>

**NOTE:**

Most of the plume display option buttons require clicking on the CONFIRM button on the lower right to redraw the display. The CONFIRM button will blink when required.

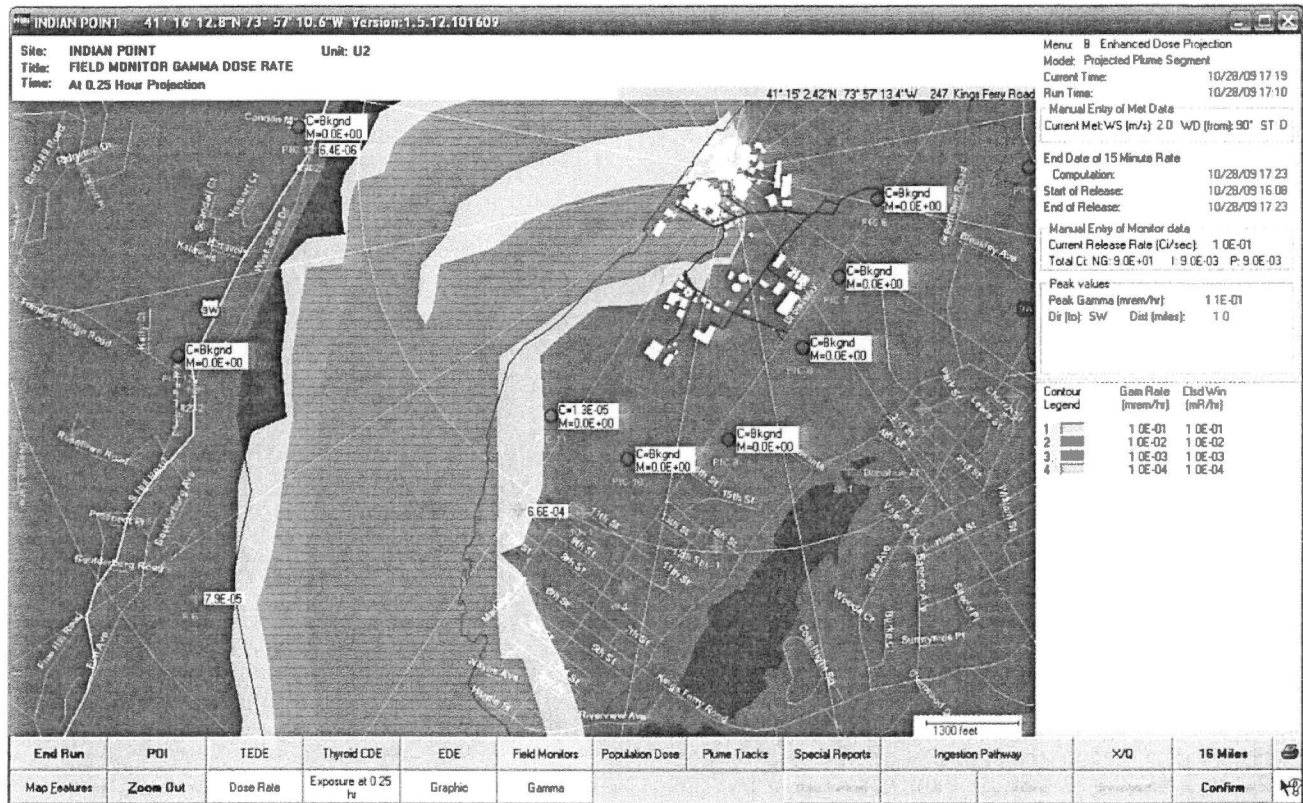
- 5.12.4 POI activates a Point of Interest pointer. Selecting POI and clicking on any point on the active plot will cause a point specific value to be shown on the plume plot.

**NOTE:**

Changing the plume display by selecting a different plume or zooming the display will clear the points of interest. Two points of interest are shown in the plume plot in Figure 14 above

- 5.12.5 TEDE will display various options for the Total Effective Dose Equivalent calculation based on the yellow buttons below (see Sections 5.12.6 through 5.12.8)
- 5.12.6 Integrated dose button toggles between integrated dose and dose rate display
- 5.12.7 Exposure 4 hr toggles between the four calculation display times previously input in the second section of the input page
- 5.12.8 Graphic toggles between graphic on tabular display. Generally the graphic display is more useful for emergency response; tabular reports are available elsewhere (see below)
- 5.12.9 Child Thyroid CDE (previously referred to as TODE) will display various options for the thyroid specific organ dose calculation based on the yellow buttons above (see Sections 5.12.6 through 5.12.8)
- 5.12.10 EDE will display various options for the external photon dose based on the yellow buttons above (see Sections 5.12.6 through 5.12.8)
- 5.12.11 Field Monitors will display various options for external photon dose rates with overlay projected photon dose and measured dose (or dose rate) at the Reuter Stokes monitors and field monitoring points as shown in Figure 15 below (view zoomed in compared to the view above)
- 5.12.12 Points with two values are Reuter Stokes locations
- C – MIDAS calculated value
  - M – Reuter Stokes monitor reported value (in this case M values are zero because the data was not being collected)
  - Calculated values (dose or dose rate) for predefined field monitoring points are shown at the 'circle and plus' crosshairs

Figure 15 Example: MIDAS Plume Display with Reuter Stokes and Monitoring Location Data



- 5.12.13 Population Dose will display a plot of integrated population dose
- 5.12.14 Plume Tracks is a simplified display of the plume. This is useful to highlight the possible meander of the plume. Lateral contours are not shown.
- 5.12.15 Special Reports will generate text reports of input and output parameters which can be printed and will start the Form 1 input process
- 5.12.16 Dose Summary provides the simplified dose and release summary including affected sector and affected ERPAs in a single page. This is probably the most useful report and is shown in Figure 16 below.



IPEC  
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IMPLEMENTING  
PROCEDURES

NON-QUALITY RELATED  
PROCEDURE

IP-EP- 340

Revision 7

REFERENCE USE

Page 27 of 84

Figure 16 Example: MIDAS Dose Summary Report

Dose Assessment and PAR Summary

1 / 1 85% Business Objects

---

**Dose Assessment Summary** Indian Point Station Unit 2

---

Name: Run Time: 08:07 AM Date: 13-Apr-17

---

Current Meteorological Data		Current Active Release Locations	
Wind Direction (from):	321 °	<input checked="" type="checkbox"/> Release From Plant Vent	
Wind Speed (m/s):	5.6	<input type="checkbox"/> Release From the Air Ejectors	
Stability Class:	A	<input type="checkbox"/> Release From the Main Steam Lines	
		<input type="checkbox"/> Release From the Containment	
		Remaining Release Duration (hours): 4.0	

---

Current Release Rates


Noble Gases (Ci/sec):	Particulates (Ci/sec):	Radioiodines (Ci/sec):
1.0E+03	1.0E-01	1.0E-01

---

Peak Values PAG Exceeded

	Site Bndry	2 Miles	5 Miles	10 Miles
Integrated Dose @ 4 hours (mrem)	TEDE : 1.6E+03	6.9E+01	2.8E+01	1.3E+01
	Thy CDE : 3.5E+02	1.7E+01	7.1E+00	3.4E+00
Current Dose Rate (mrem/hr)	TEDE : 6.6E+02	2.4E+01	*	*
	ThyCDE : 6.1E+01	3.0E+00	*	*
* Plume may not have arrived yet or has already passed				
Dispersion (sec/m <sup>3</sup> )	X/Q: 1.4E-06	7.0E-08	3.2E-08	1.7E-08

Page 1 of 1 4/13/2017 8:08:43AM

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>28</u> of <u>84</u></b>

- 5.12.17 Ingestion Summary provides information on the dose and concentrations through the ingestion pathways the longer term response.
- 5.12.18 Met/Rad Summary provides a summary page of the meteorological conditions used and the readings from any radiation or effluent monitors used for the projection
- 5.12.19 RMP provides a summary report for the calculated values at offsite radiation monitoring points
- 5.12.20 Projection Summary provides a summary of the dose compared to PAG and dose broken out by pathway
- 5.12.21 Plume Arrival provides a tabular estimate of the arrival time of the plume at various distances based on assumption of last meteorological data persists
- 5.12.22 Ingestion Pathway displays a plume of the ingestion pathway concentrations for based on the isotopes and pathways selected using the yellow buttons below
- 5.12.23 X/Q (chi over Q) displays various dispersion parameter plots based on the selection from the yellow button below.
- 5.12.24 XX Miles activates an input box to change the downwind distance limit of the calculation.
  - a. This actually recalculates the plume, not just resizes the display.
  - b. This can be useful to improve the display precision for close in to the plant.
  - c. End Run will exit the current calculation.
  - d. An exit option menu will appear as shown in Figure 17 below

Figure 17 Example: MIDAS Exit Option Menu





**NOTE:**

Depending on the initial menu choice, not all of these four exit menu choices will be available.

- e. Run Next Time Step will rerun the current calculation with new data for a new 15 minute average. If the next 15 minute interval is not yet available, the choice will be red with a count down timer
- f. Save run and exit will save all of the parameters for the current run to the computer hard drive in a file based on the name the user enters in the box at the top and then terminate MIDAS.

**NOTE:**

In order for 'RECAP' in the main startup screen to redisplay runs, the runs MUST have been saved using this process


- g. Exit without saving will terminate MIDAS and not save a RECAP file
- h. Save without exit will save the RECAP file and return to the main startup menu

### 5.13 Using MIDAS results

**NOTE:**

If more than one location is experiencing a release, select New Multiple Accident Run radial button on the initial MIDAS Startup / Menu Screen (described in Section 5.14) and use the combined, Multi-Accident Dose Summary Report to obtain the combined doses before comparing results. (Use the manual Dose Assessment Worksheet as a backup method if needed).

- 5.13.1 MIDAS results should be compared to existing limits and protective action guidelines to determine appropriate response.
- 5.13.2 Use EP-410 to determine protective action recommendations based on MIDAS dose assessment results
- 5.13.3 Use the PART1 communication system to complete notifications
- 5.13.4 Release rates calculated by MIDAS that exceed technical specification limits need to be identified in the notifications.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	NON-QUALITY RELATED PROCEDURE	IP-EP- 340	Revision 7
	REFERENCE USE	Page <u>30</u>	of <u>84</u>

#### 5.14 Multiple Accident Run (Simultaneous Release Point Dose Projection from CCR or EOF)

**NOTE:**

If more than one location is experiencing a release, select New Multiple Accident Run radial button on the initial MIDAS Startup / Menu Screen. This function of MIDAS will allow entry of up to 5 different accident releases occurring simultaneously from Unit 2 and Unit 3.

**NOTE:**

The Multiple Accident feature of MIDAS can be run from either the CCR or from the EOF in the AUTO or MANUAL mode.

**NOTE:**

First select either the CCR or the EOF and the AUTO mode. Then select Start New Multiple Accident Run radial button as shown in Figure 18. The instructions which follow are for calculations performed using the AUTO Mode.

Figure 18 Example: MIDAS Startup/Menu Screen Showing Multiple Accident Run selection (Automatic Version)



MIDAS - Accident Dose Calculation - Sheet #1 MIDAS-NUVersion:1.5.16.010714

**Start New Multiple Accident Run**

Site Selection: Indian Point Unit Selection: Unit 2

CCR EOF

AUTOMATIC MANUAL SIMULATION


**Recap Previous Run** Recap Multiple Accident Run

Date/Time	Plant	Notes(Description)
*		

Delete Selected Recap Purge Recap files

Set Map Defaults Exit OK

- 5.14.1 Select CCR or EOF and then Automatic radial button, then Start NEW Multiple Accident Run radial button. Then press GREEN "OK" button.
- 5.14.2 Enter brief run title in GREEN box (22 characters, maximum).
- 5.14.3 Begin with "Select Accident Run 1" and enter type of calculation to be performed from pull-down selection list and corresponding Unit number. (The example in Figure 19 is Menu H – Auto Enhanced dose projection).

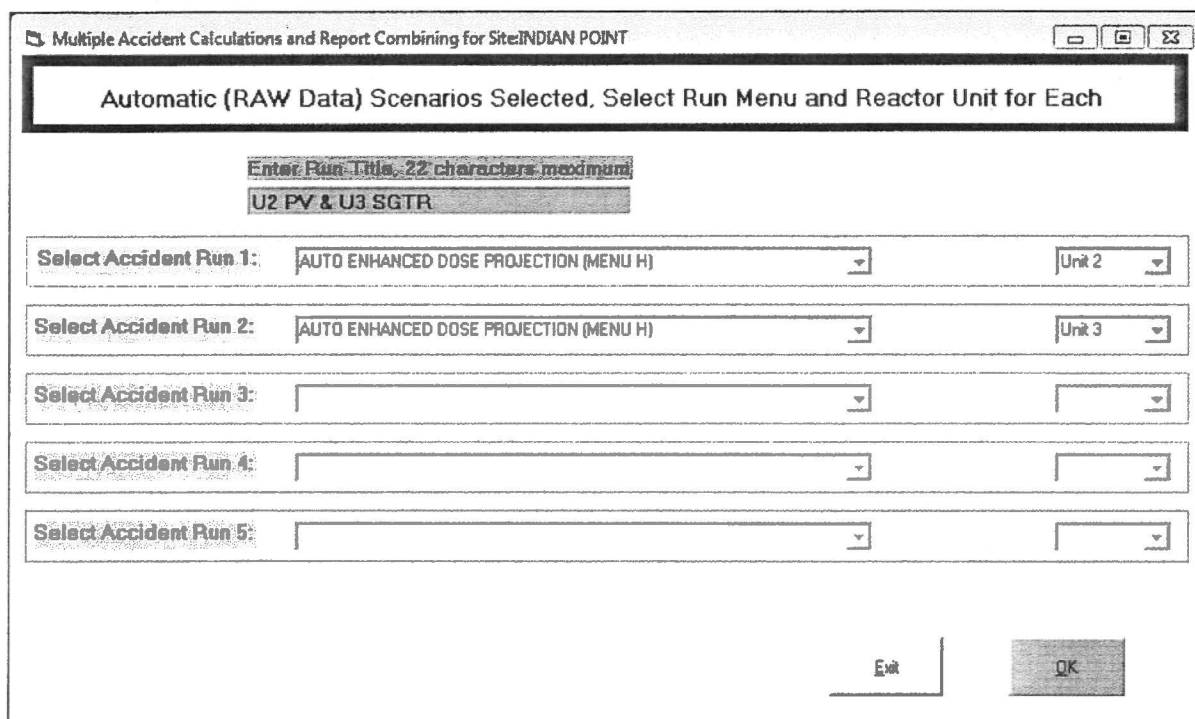
 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>32</u> of <u>84</u></b>

5.14.4 Proceed to "Select Accident Run 2" and again enter type of calculation from pull-down selection list and corresponding Unit number (see Figure 19)

5.14.5 Enter up to 3 other release locations, type of calculation and corresponding Unit number.

5.14.6 When entries are complete, press the GREEN "OK" button.

Figure 19 Example: MIDAS Multiple Accident Scenario Selection (Automatic Version)



Multiple Accident Calculations and Report Combining for Site: INDIAN POINT

Automatic (RAW Data) Scenarios Selected, Select Run Menu and Reactor Unit for Each

Enter Run Title, 22 characters maximum  
U2 PV & U3 SGTR

Select Accident Run 1: AUTO ENHANCED DOSE PROJECTION (MENU H) Unit 2

Select Accident Run 2: AUTO ENHANCED DOSE PROJECTION (MENU H) Unit 3

Select Accident Run 3: Unit

Select Accident Run 4: Unit

Select Accident Run 5: Unit

Exit OK

5.14.7 If the message in Figure 20 is displayed, press "YES". (Click GREEN Box).


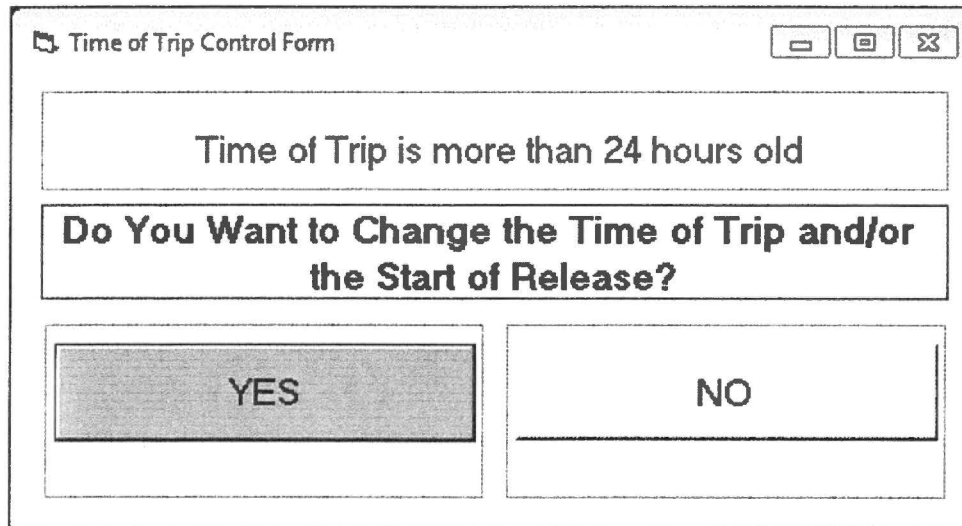
 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	NON-QUALITY RELATED PROCEDURE	IP-EP- 340      Revision 7
	REFERENCE USE	Page <u>33</u> of <u>84</u>

Figure 20 Example: MIDAS Multiple Accident - Setting Times for First Release Point (Automatic Version)



Time of Trip Control Form

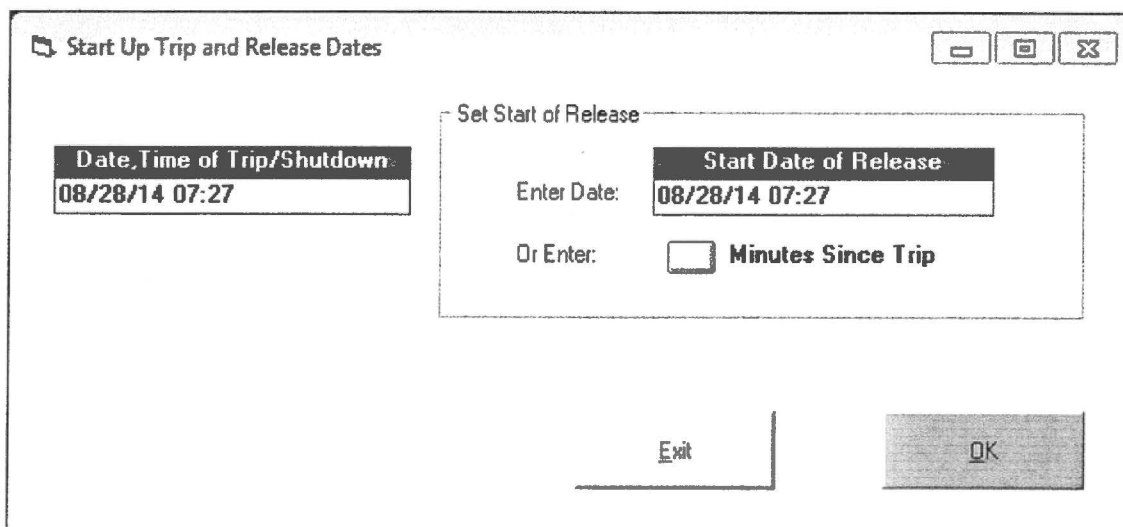
Time of Trip is more than 24 hours old

**Do You Want to Change the Time of Trip and/or the Start of Release?**

**YES**      **NO**

- 5.14.8 Enter the time of reactor trip and start of release for the unit corresponding to Accident Run 1 (Unit 2 or Unit 3) and press "OK". (See Figure 21, which is for the first release point calculation).

Figure 21 Example: MIDAS Multiple Accident - Setting Times (Automatic Version)



Start Up Trip and Release Dates

Date, Time of Trip/Shutdown:  
08/28/14 07:27

Set Start of Release

Start Date of Release  
Enter Date: 08/28/14 07:27

Or Enter: ☐ Minutes Since Trip

Exit      OK



IPEC  
EMERGENCY  
PLAN  
IMPLEMENTING  
PROCEDURES

NON-QUALITY RELATED  
PROCEDURE

IP-EP- 340

Revision 7

REFERENCE USE

Page 34 of 84

5.14.9 Enter time for start of exposure (See Figure 22 which assumes the current time).

5.14.10 Press "NEXT" down arrow

Figure 22 Example: MIDAS Multiple Accident Scenario Selection (Automatic Version)

MIDAS - Accident Dose Calculation INDIAN POINT Unit 2 Menu: H Sheet #2 Version:1.5.16.010714

Meteorological  
Automatic (raw)

Release Points  
☒ [1] PLNT VNT  
☐ [2] CAEJ  
☐ [3] STM LINE  
☐ [4] VAP CONT

Initial Display Radius: 16.0 mi

08/28/14 07:29:08

DONE

Start Date of Exposure  
08/28/14 07:23

Exposure Times (hrs) to be Calculated  
[1] 0.25  
[2] 2.00  
[3] 4.00  
[4] 24.00

NEXT

Projected Dose  
Accumulated Historical Dose  
Accumulated Last 96 Hr Dose

5.14.11 Verify that current live met data is being displayed on the Meteorological spreadsheet and press "OK" (see Figure 23).

Figure 23 Example: MIDAS Meteorological Data spreadsheet (Automatic Version)

Automated Edit Sheet #4

Meteorological Raw Data

Site ID: IP  
Unit ID: U2  
Menu: H

Timing	Hr	Mn	SP010 (m/s)	DIR104 (deg)	DTG010 (deg s) or PS A-G	RAIN1 L M H (in/15min)
	01:00	1.5	12	-8.4	0.00	
	01:15	1.9	9	-8.9	0.00	
	01:30	2.1	6	-8.9	0.00	
	01:45	1.7	243	-8.7	0.00	
	02:00	1.7	254	-8.9	0.00	
	02:15	2.1	17	-8.8	0.00	
	02:30	2.6	13	-8.8	0.00	
	02:45	2.5	258	-8.8	0.00	
	03:00	2.2	15	-8.9	0.00	
	03:15	2.1	356	-8.9	0.00	
	03:30	2.1	329	-8.8	0.00	
	03:45	2.2	348	-8.8	0.00	
	04:00	2.2	345	-8.8	0.00	
	04:15	1.8	338	-8.7	0.00	
	04:30	2.2	321	-8.8	0.00	
	04:45	1.9	301	-8.6	0.00	
	05:00	1.7	331	-8.6	0.00	
	05:15	1.5	324	-8.4	0.00	
	05:30	1.3	275	-8.4	0.00	
	05:45	1.4	9	-8.2	0.00	
	06:00	2.1	359	-8.6	0.00	
	06:15	1.5	16	-8.4	0.00	
	06:30	1.8	2	-8.7	0.00	
	06:45	1.8	19	-8.4	0.00	
	07:00	2.6	356	-8.8	0.00	
	07:15	2.1	243	-8.5	0.00	

Release Start/Current Time

Copy Cell Down Copy Data Indicators Show Forecast

Saves to CSV Restore From CSV Cancel Previous Screens Copy Paste Clear OK



IPEC  
EMERGENCY  
PLAN  
IMPLEMENTING  
PROCEDURES

NON-QUALITY RELATED  
PROCEDURE

IP-EP- 340

Revision 7

REFERENCE USE

Page 35 of 84

5.14.12 On Radiation Monitor & Flow spreadsheet, verify appropriate monitor reading is displayed. Enter flow rate data if required. (In this case R-27 release rate is from the release point of interest – see Figure 24).

Figure 24 Example: MIDAS Rad Monitor & Flow Data spreadsheet (Automatic Version)

Rad Monitor & Flow Data Edit Sheet #3

Date: 08/28/14 Radiation Monitor & Flow Raw Data Site ID: IP Unit ID: U2 Monic: H

Timing	Hr	Min	R-44B Release (pCi/cc)	VCONTACT Release (rem/hr)	PUNVENT Flow (cfm)	R-27 Release (pCi/sec)
	01	30	2.41E-06			
	01	45	3.30E-06			
	02	00	2.23E-06			
	02	15	2.68E-06			
	02	30	2.19E-06			
	02	45	2.87E-06			
	03	00	2.22E-06			
	03	15	2.28E-06			
	03	30	1.82E-06			
	03	45	2.59E-06			
	04	00	2.12E-06			
	04	15	3.58E-06			
	04	30	3.83E-06			
	04	45	1.22E-06			
	05	00	3.28E-06			
	05	15	2.43E-06			
	05	30				8.65E+02
	05	45	2.62E-06			
	06	00	2.95E-06			
	06	15	1.29E-06			
	06	30	2.64E-06			
	06	45				5.49E+02
	07	00	2.28E-06			
Release Start/Current Time						4.52E+02

Copy Cell Down Copy Data Collection Copy under Red Row Data Collection

Save to CSV Restore From CSV Cancel Previous Screen Copy Paste Filter OK

NOTE: Enter a blank (space bar) to remove a Vent Monitor from this Run. Does not apply to Flow monitor.

5.14.13 On the release mix spreadsheet, select "EVENT TREE", followed by selection of Accident Type and Core Condition from pull-down selection lists.

5.14.14 Press "OK" (see Figure 25).

Figure 25 Example: MIDAS Mix spreadsheet (Automatic Version)

Mix Edit Sheet #7


Date: 08/28/14 Mix Spreadsheet Percent of each Isotope Site ID: IP Unit ID: U2 Monic: H

Timing	Hr	Min	Already Decayed (Y/N)	Total Percent	H-3	C-14	AR-41	ER-83M	ER-85M	ER-85	ER-87	ER-90	ER-93	ER-98	XE-133M
	05	15													
	05	30													
	05	45													
	06	00													
	06	15													
	06	30													
	06	45													
	07	00													
Release Start/Current Time Exposure Start			NO	100.00					4.6095	0.1076	9.0263	13.0602			0.1921
	07	15													
	07	30													
	07	45													
	08	00													
	08	15													
	08	30													
	08	45													
	09	00													
	09	15													
	09	30													
	09	45													
	10	00													
	10	15													
	10	30													
	10	45													
	11	00													
	11	15													

Copy Cell Down Use Last Mix Copy Paste Clear

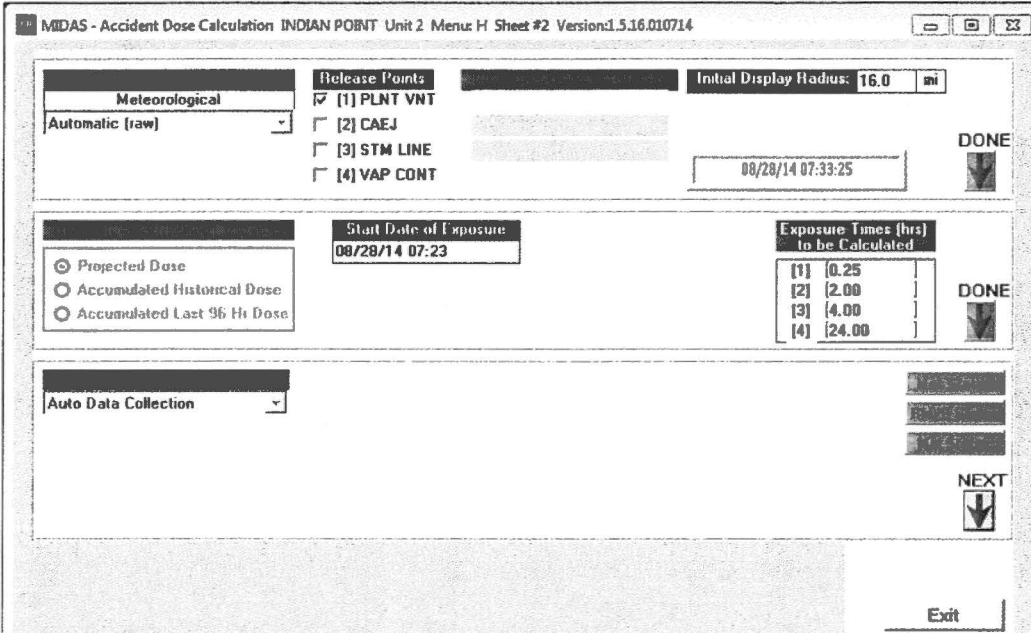
Save to CSV Restore From CSV Previous Screen Event Tree OK

Note: Cell C-14: 10000 Note: Cell E-10: 10000

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	NON-QUALITY RELATED PROCEDURE		IP-EP- 340	Revision 7
	REFERENCE USE		Page	<u>36</u> of <u>84</u>

5.14.15 Press "NEXT" down arrow (see Figure 26)

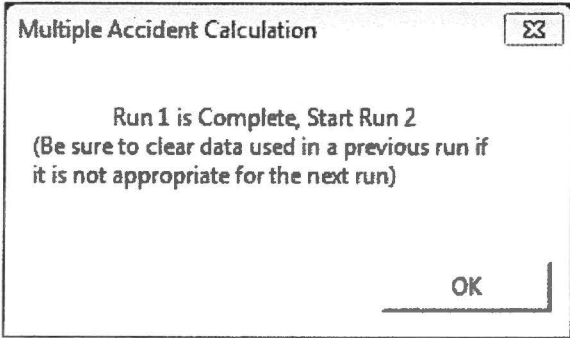
Figure 26 MIDAS Entry Status Display (Automatic Version)



5.14.16 If all boxes are green, then select GREEN "Start Calculation" button. MIDAS will then compute the doses for Accident Run 1

5.14.17 MIDAS will then display a message as shown in Figure 27

Figure 27 Example: Multiple Accident calculation status message





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**IP-EP- 340**

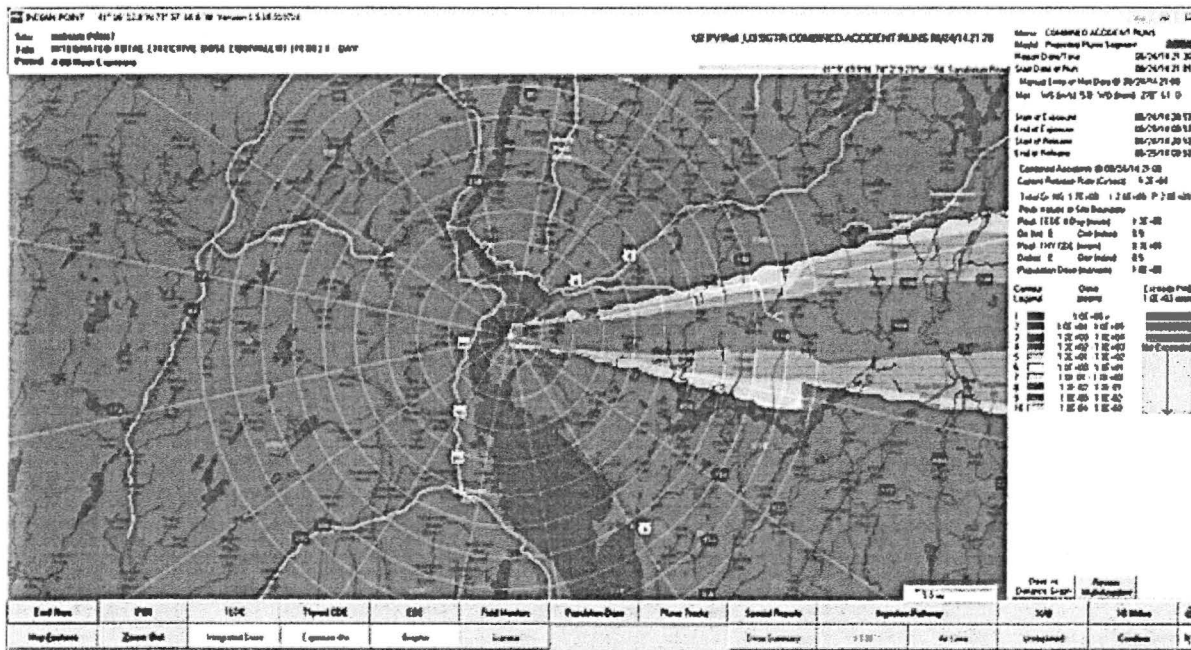
**Revision 7**

**REFERENCE USE**

**Page 37 of 84**

- 5.14.18 After pressing "OK", then MIDAS will prompt for release and mix input for Accident Run 2 as was done for the previous Accident Run.
- 5.14.19 Enter appropriate rad monitor/flow and nuclide mix inputs.
- 5.14.20 Enter the appropriate time of shutdown and start of release for the affected unit if different for the previous Accident Run.
- 5.14.21 If all boxes are green, then select GREEN "Start Calculation" button. MIDAS will then compute the doses for Accident Run 2
- 5.14.22 MIDAS will then generate a combined plume map for the multiple releases as shown in Figure 28

Figure 28 Example: Multiple Accident Combined Plume Map



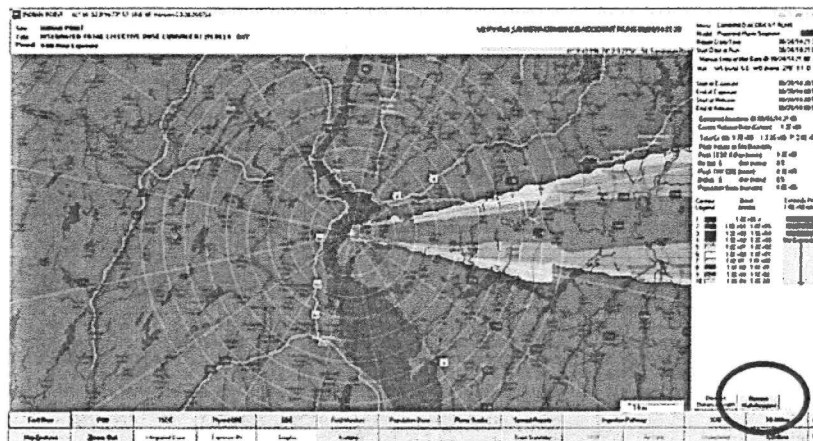
- 5.14.23 To obtain the combined NYS Part 2 Form and Dose Summary Report, select "Special Reports", "Dose Summary" and then press "Confirm". The combined Dose Summary Report is shown in Figure 29.

Figure 29 Example: Multiple Accident Combined Dose Summary Report  
(Unit 2 Plant Vent and Unit 3 SGTR)

Multi - Accident Dose Assessment Summary		Indian Point Station			
Name:		Run Time: 09:01 PM Date: 24-Aug-14			
<b>Current Meteorological Data</b>		<b>Current Active Release Locations</b>			
Wind Direction (from):	270 °	<input checked="" type="checkbox"/> Release From Plant Vent			
Wind Speed (m/s):	5.0	<input type="checkbox"/> Release From the Air Ejectors			
Stability Class:	D	<input checked="" type="checkbox"/> Release From the Main Steam Lines			
		<input type="checkbox"/> Release From the Containment			
		Remaining Release Duration (hours): 4.0			
<b>Current Release Rates</b>					
Noble Gases (Ci/sec):	1.2E+04	Particulates (Ci/sec):	1.8E+01		
		Radiiodines (Ci/sec):	1.8E+01		
<b>Peak Values - PAG Exceeded</b>					
Integrated Dose @ 4 hours (mrem)	TEDE:	She Baldy	2 Miles	5 Miles	10 Miles
	Thy CDE:	1.3E+05	5.1E+04	1.6E+04	4.5E+03
Current Dose Rate (mrem/hr)	TEDE:	4.7E+04	1.4E+04	*	*
	Thy CDE:	1.6E+05	2.6E+04	*	*
* Plume may not have arrived yet or has already passed					

- 5.14.24 Results of the combined Dose Summary Report can be manually transferred to a blank NYS RECS Part 2 report, if required.
- 5.14.25 To review computed doses from individual release points, press the ORANGE "Review Multi Accident" button and select each release location (Accident Run) of interest. A plume map will be generated, and a separate Dose Summary Report may be selected for display. (See Figures 30 and 31).

Figure 30 Example: Multiple Accident Combined Map  
(Unit 2 Plant Vent and Unit 3 SGTR)




 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>39 of 84</b>

Figure 31 Example: Multiple Accident Combined Map  
(Unit 2 Plant Vent and Unit 3 SGTR)



**NOTE:**

The computed TEDE and Child Thyroid CDE results from individual accident release points from Unit 2 and Unit 3 will be differ slightly from combined results since the release points are physically separated. This difference becomes smaller at longer distances from the site.

## 6.0 INTERFACES

6.1 IP-EP-310, Dose Assessment

6.2 IP-EP-240, Security


6.3 IP-EP-410, Protective Action Recommendations

## 7.0 RECORDS

All logs, completed forms, and other records generated during an actual emergency **SHALL** be considered quality records and maintained for the life of the plant.


## 8.0 REQUIREMENTS AND COMMITMENT CROSS-REFERENCE

None

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	NON-QUALITY RELATED PROCEDURE	IP-EP- 340	Revision 7
	REFERENCE USE	Page <u>40</u>	of <u>84</u>

## 9.0 ATTACHMENTS

- 9.1 Event trees
- 9.2 Flow charts
- 9.3 Plant and Site Specific Parameters
- 9.4 Quick Guide for MIDAS Operation – Auto G: Plant Vent Quick Dose (CCR)
- 9.5 Quick Guide for MIDAS Operation – Auto J: SGTR Quick Dose (CCR)
- 9.6 Quick Guide for MIDAS Operation – Auto H: Enhanced Dose Projection SGTR (EOF)
- 9.7 Quick Guide for MIDAS Operation – Auto H: Enhanced Dose Projection (EOF)
- 9.8 Quick Guide for MIDAS Operation – Auto H: Enhanced Dose Projection (offsite)
- 9.9 Quick Guide for MIDAS Operation – Manual B: Enhanced Dose Projection (EOF)
- 9.10 Quick Guide for MIDAS Operation – Multiple Accident (EOF)
- 9.11 Quick Guide for MIDAS Operation – Multiple Accident (CCR)
- 9.12 Quick Guide for MIDAS Part 1 Form Generator

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	NON-QUALITY RELATED PROCEDURE	IP-EP- 340	Revision 7
	REFERENCE USE	Page <u>41</u>	of <u>84</u>

## Attachment 9.1

### Event Trees

Page 1 of 1

- 1.0 Accident type – four choices
  - 1.1 Containment release
  - 1.2 Steam Generator Tube Rupture
  - 1.3 Containment Bypass
  - 1.4 Spent Fuel Pool release
- 2.0 Core Condition – six choices in two sets of three – one set applies to operating core accidents, one set to spent fuel
  - 2.1 For containment, containment bypass, and Steam Generator releases:
    - 2.1.1 Gap release 15-30 min – represents 5 % core activity release from gap activity with some core damage
    - 2.1.2 In-vessel severe core damage uncover >30 minutes – represents core melt in vessel
    - 2.1.3 Normal coolant with 100x spike – normal coolant activity with iodines and particulates multiplied by 100 to represent worst case normal trip
  - 2.2 For spent fuel pool releases:
    - 2.2.1 Zircaloy Fire in one three month batch
    - 2.2.2 Gap release from one three month batch
    - 2.2.3 Gap release from a full pool
- 3.0 Tube Leak Rate – two choices - used for the steam generator tube rupture to identify the RCS to steam side transfer rate
  - 3.1 1 tube at high pressure – initial condition of a single full tube failure
  - 3.2 Charging pump flow – lower pressure condition assuming equilibrium with one



IPEC  
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PLAN  
IMPLEMENTING  
PROCEDURES

NON-QUALITY RELATED  
PROCEDURE

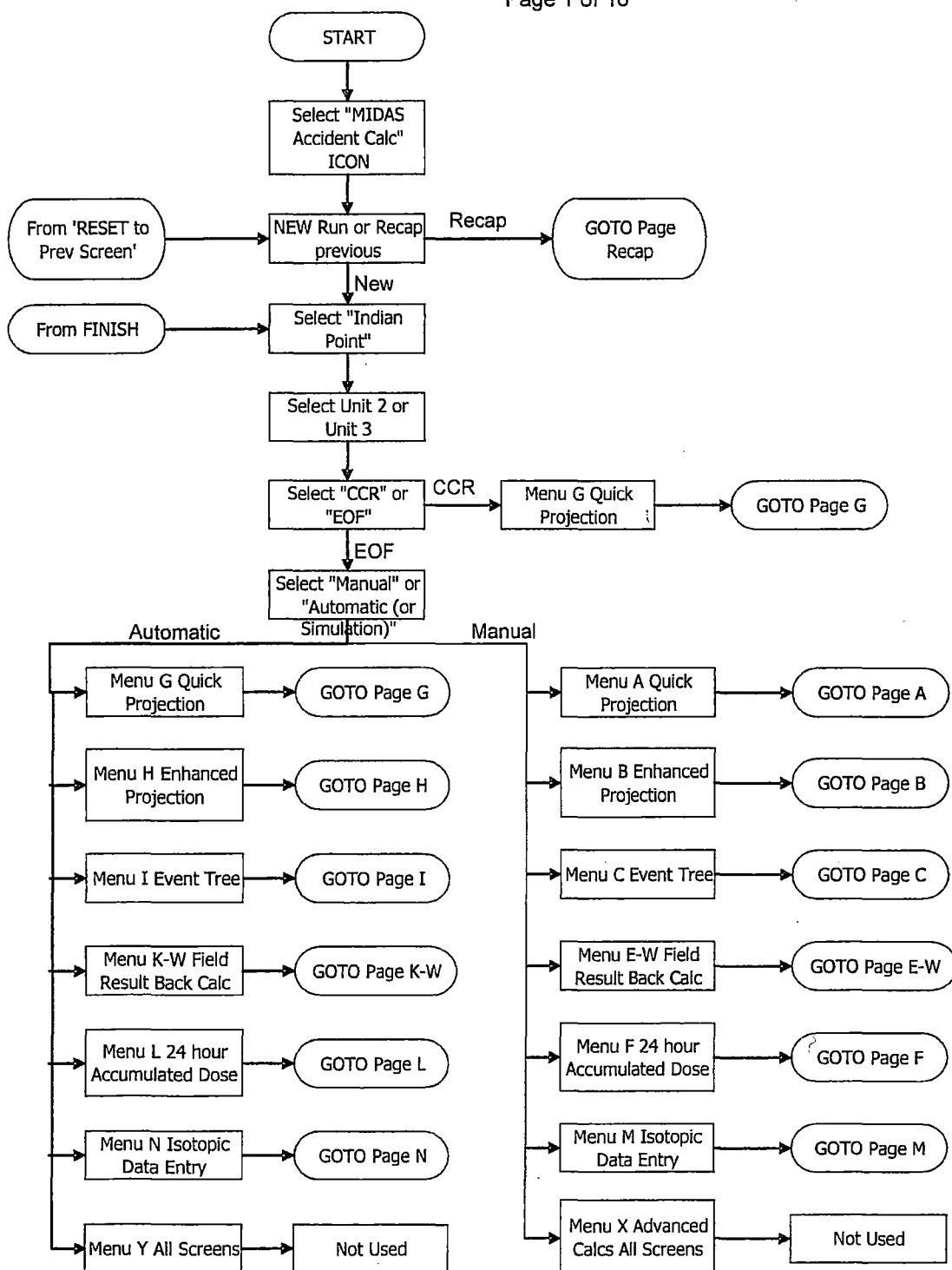
IP-EP- 340

Revision 7

REFERENCE USE

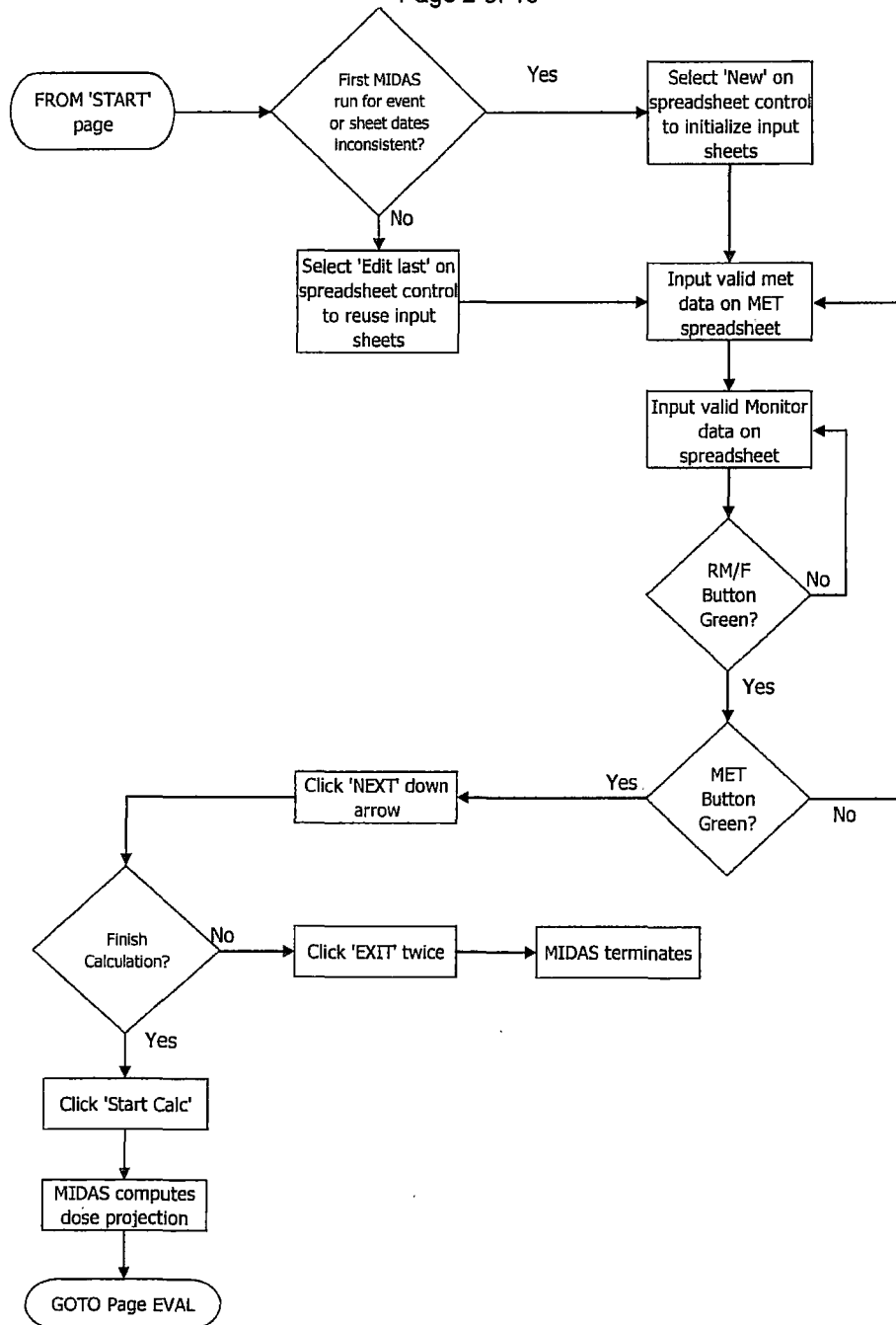
Page 42 of 84

Attachment 9.2  
**Flow Charts**  
Page 1 of 16





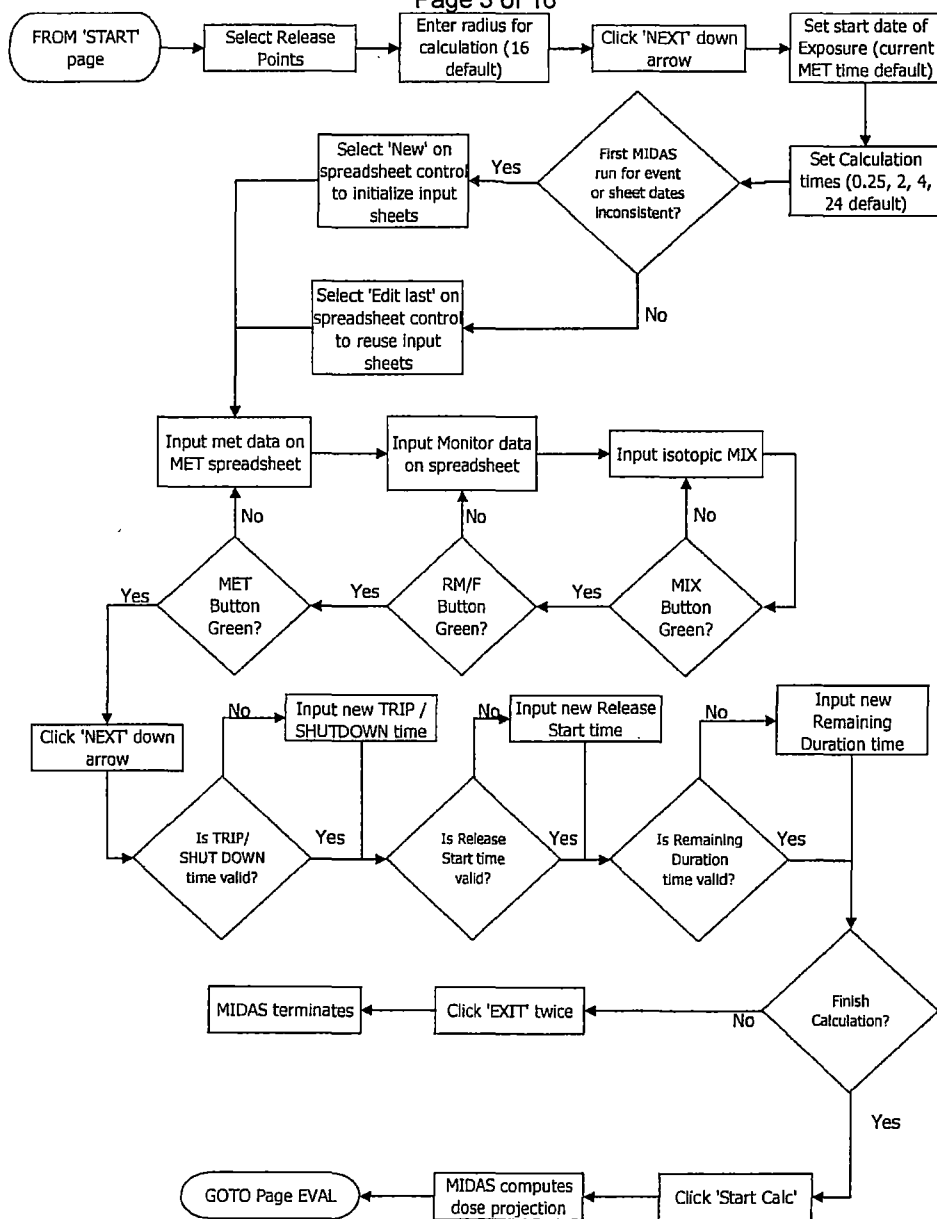
Attachment 9.2  
Flow Charts Menu A  
Page 2 of 16





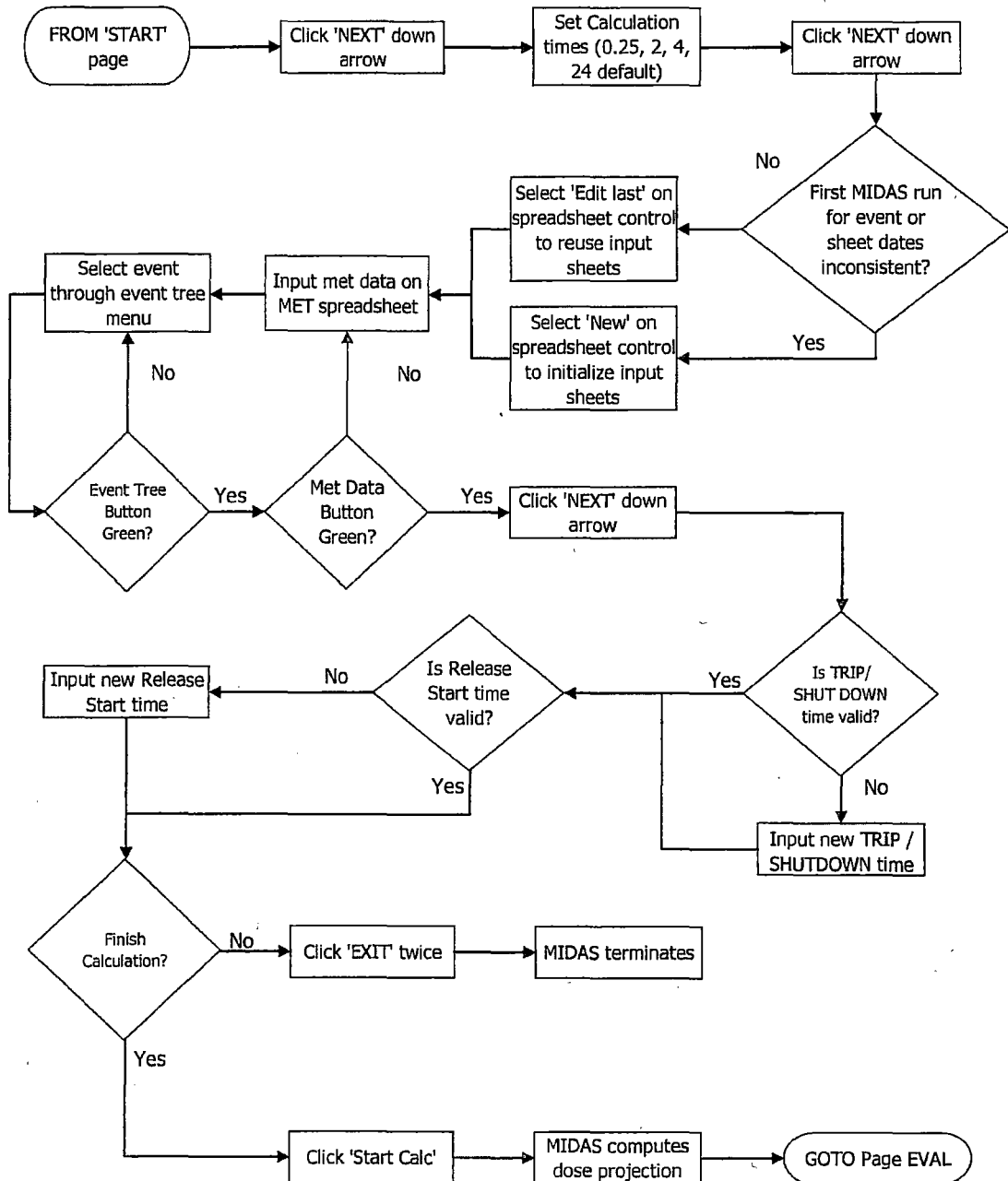
Attachment 9.2  
Flow Charts Menu B

Page 3 of 16



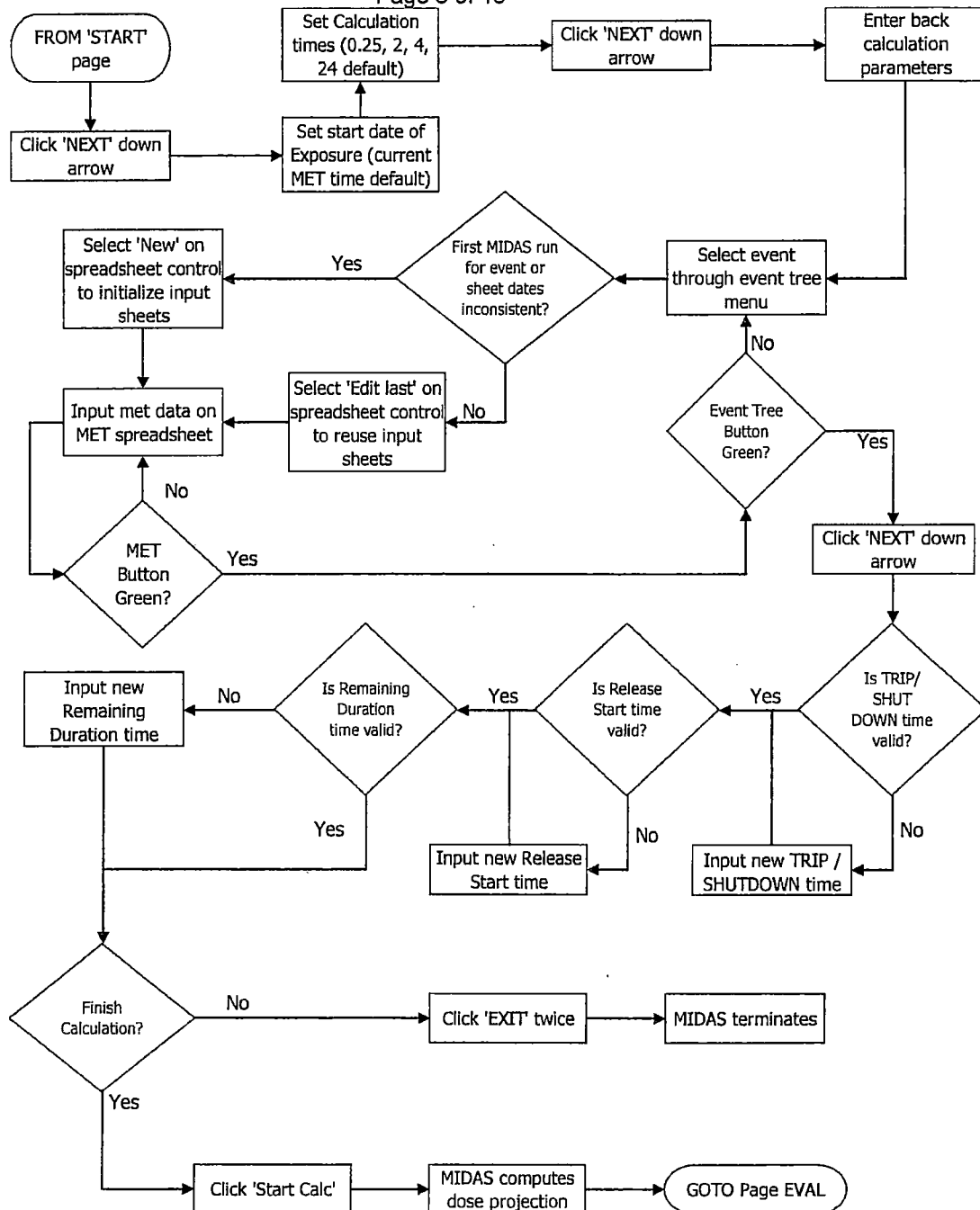


Attachment 9.2  
Flow Charts Menu C  
Page 4 of 16



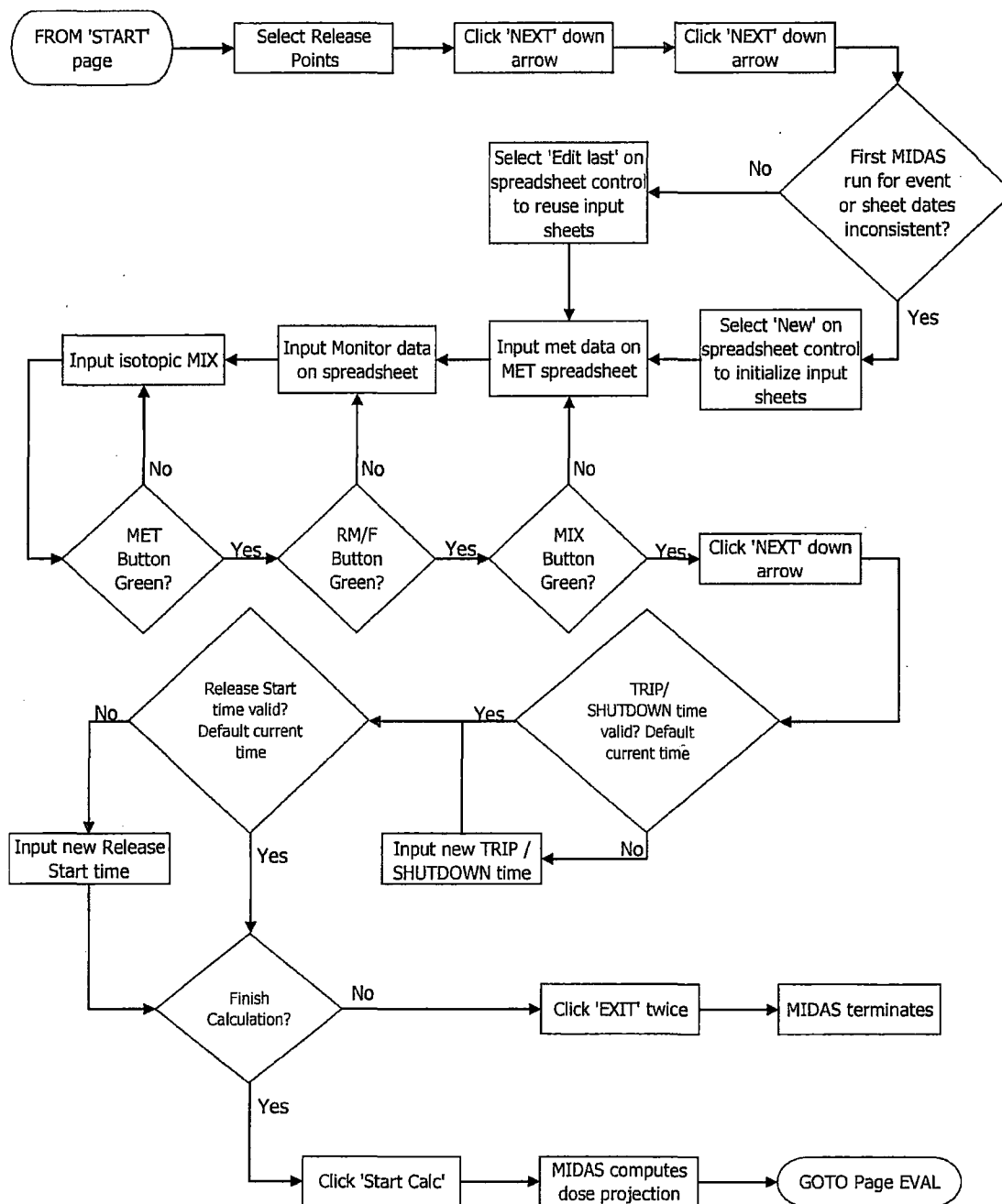


**Attachment 9.2**  
**Flow Charts Menu E – W**  
Page 5 of 16



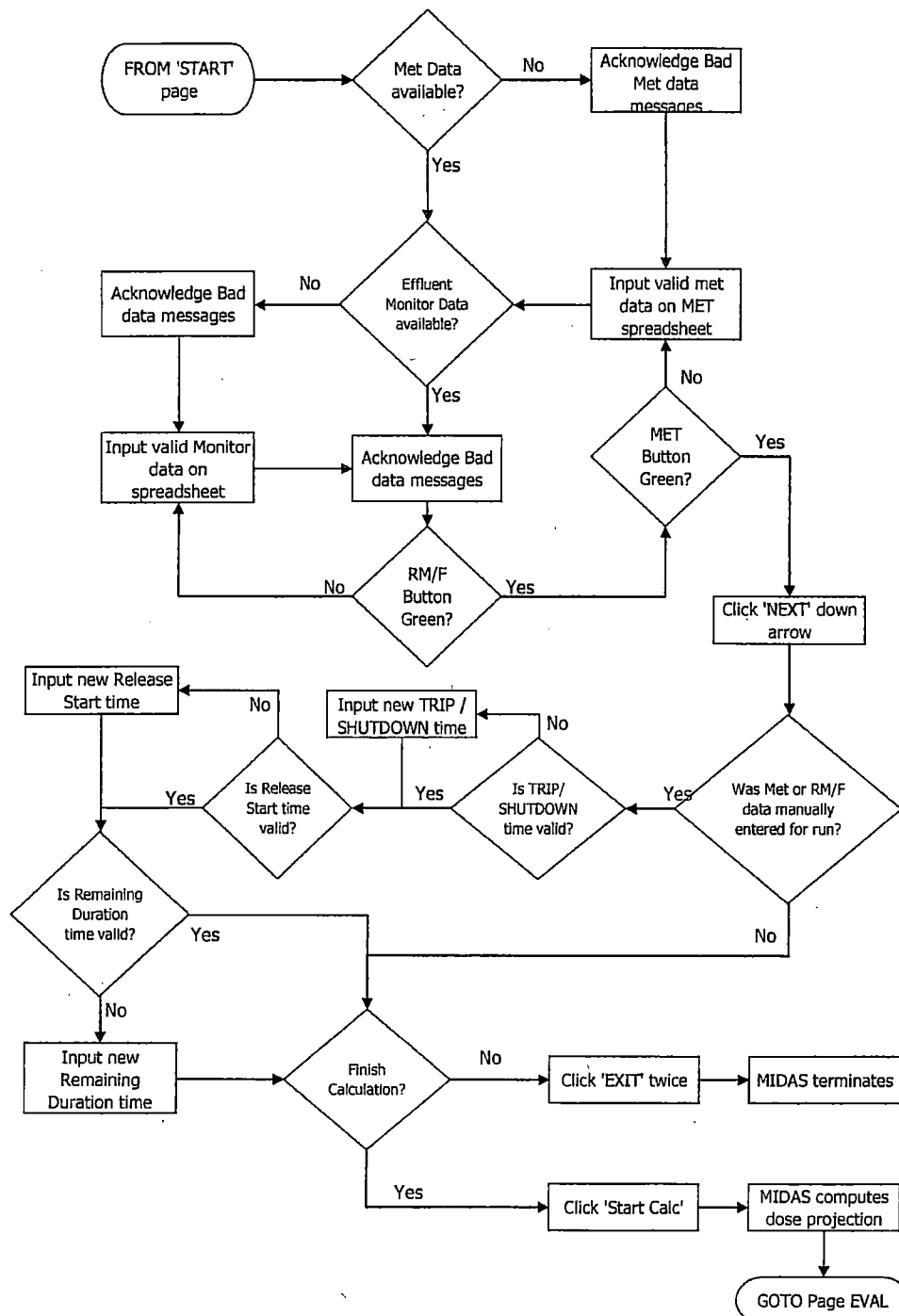


Attachment 9.2  
Flow Charts Menu F  
Page 6 of 16





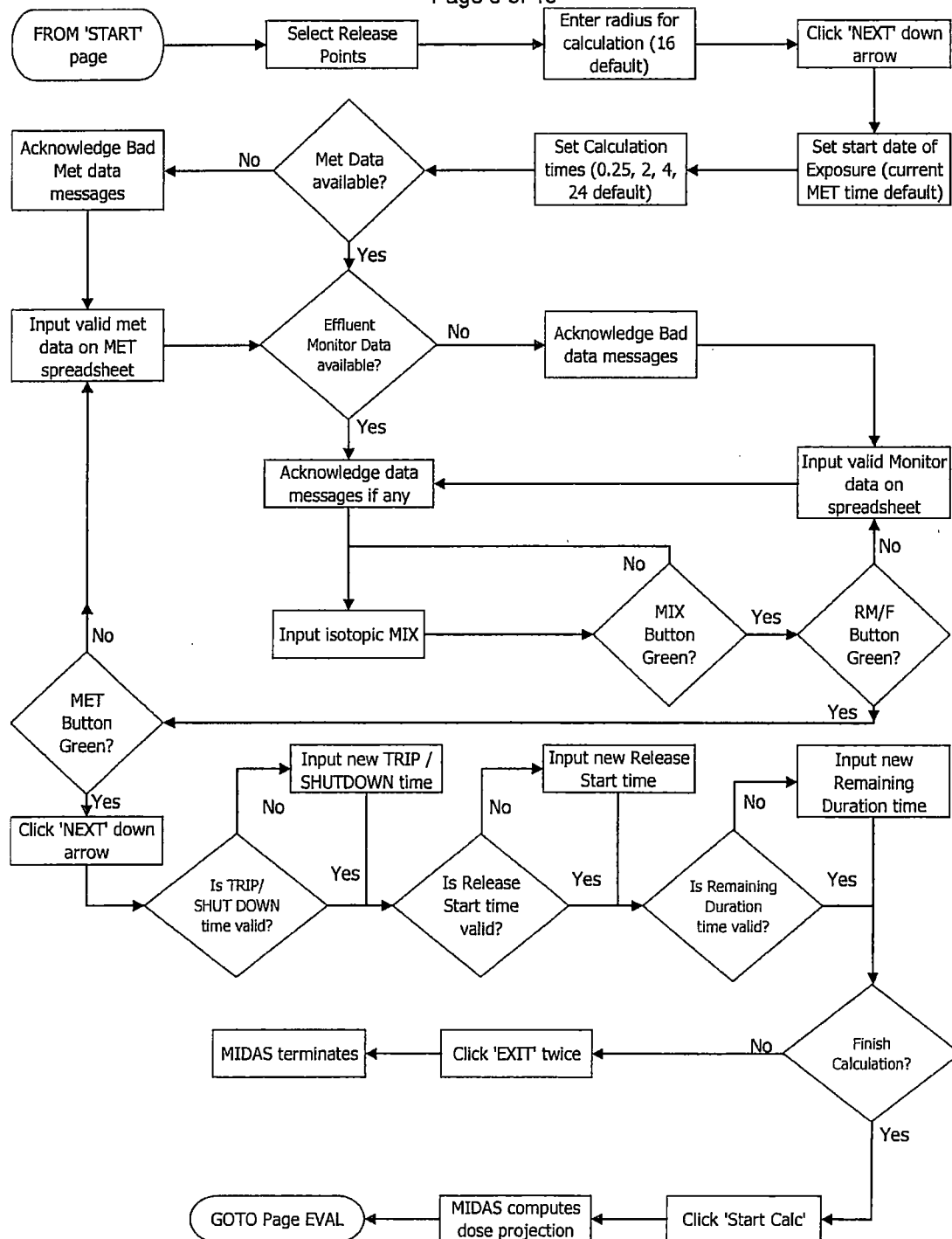
**Attachment 9.2**  
**Flow Charts Menu G**  
Page 7 of 16





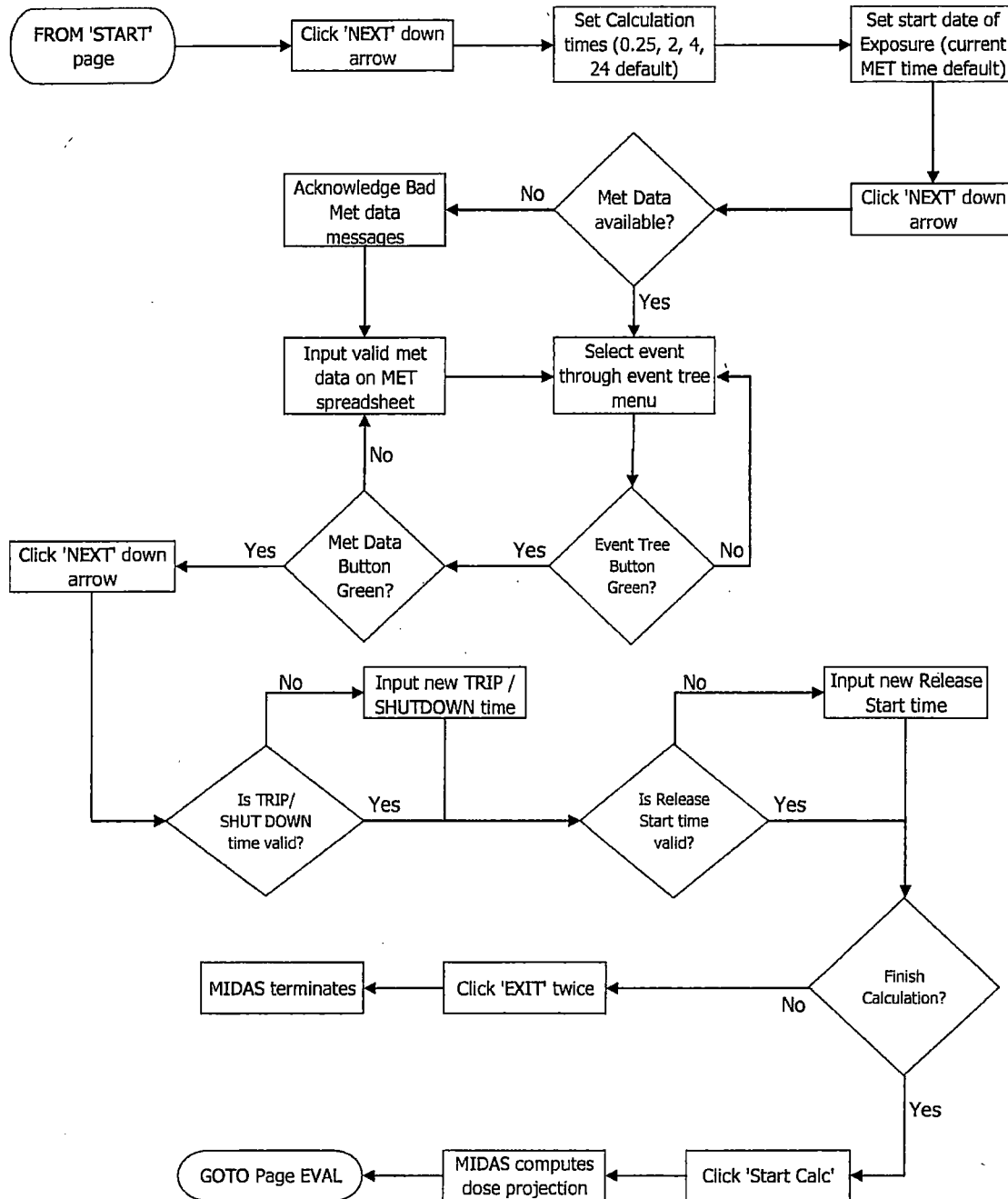
Attachment 9.2  
Flow Charts Menu H

Page 8 of 16



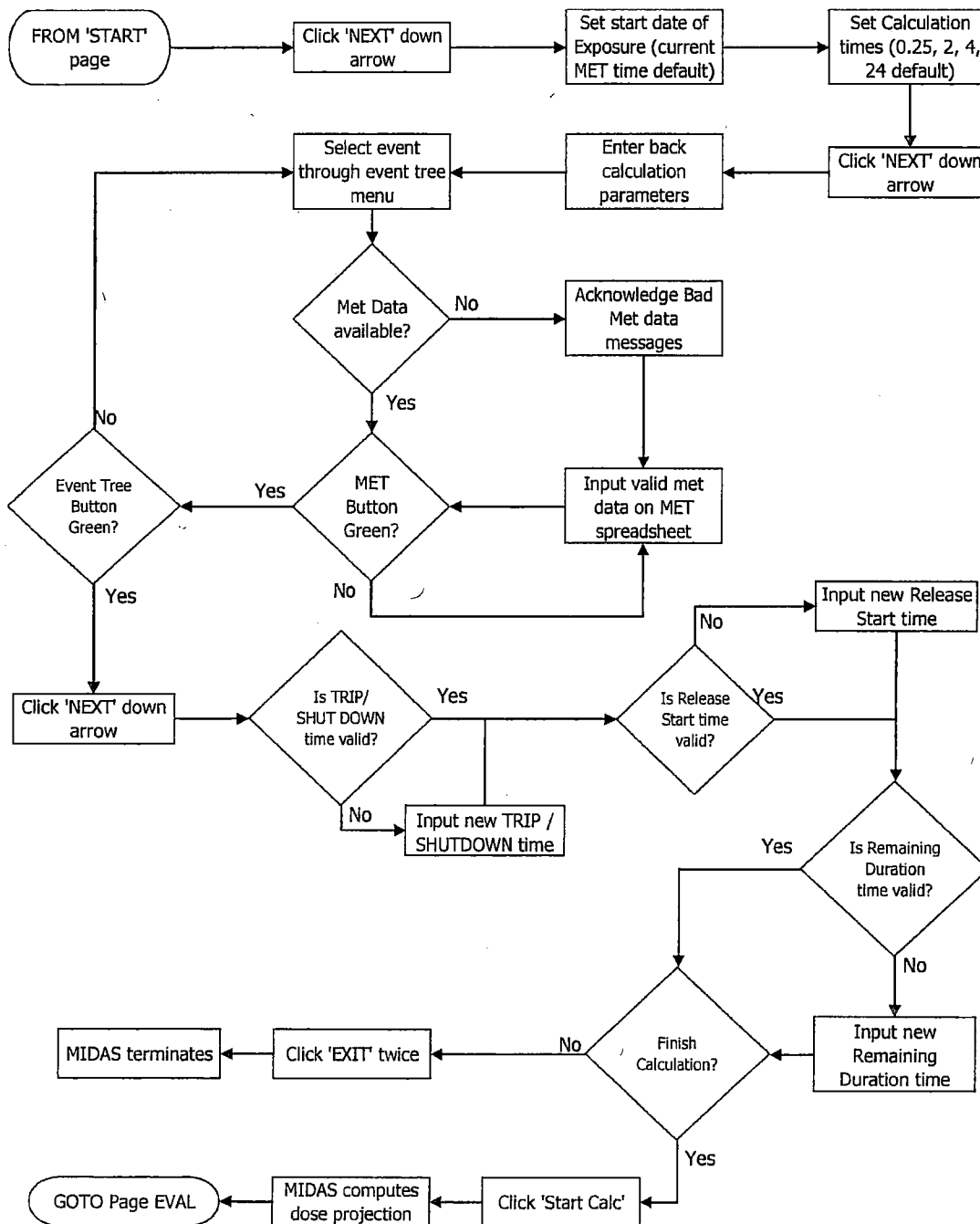


Attachment 9.2  
Flow Charts Menu I  
Page 9 of 16



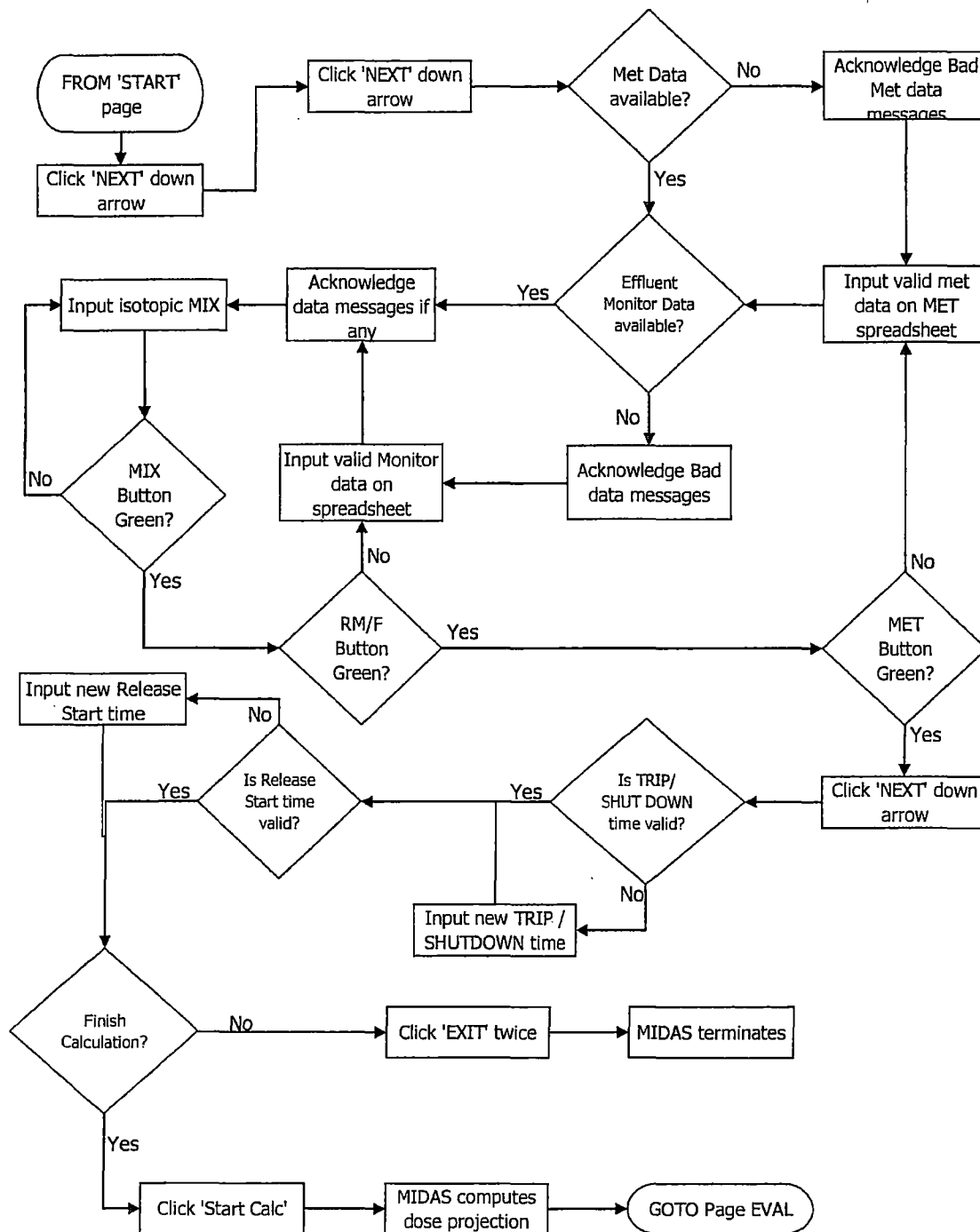


Attachment 9.2  
Flow Charts Menu K – W  
Page 10 of 16



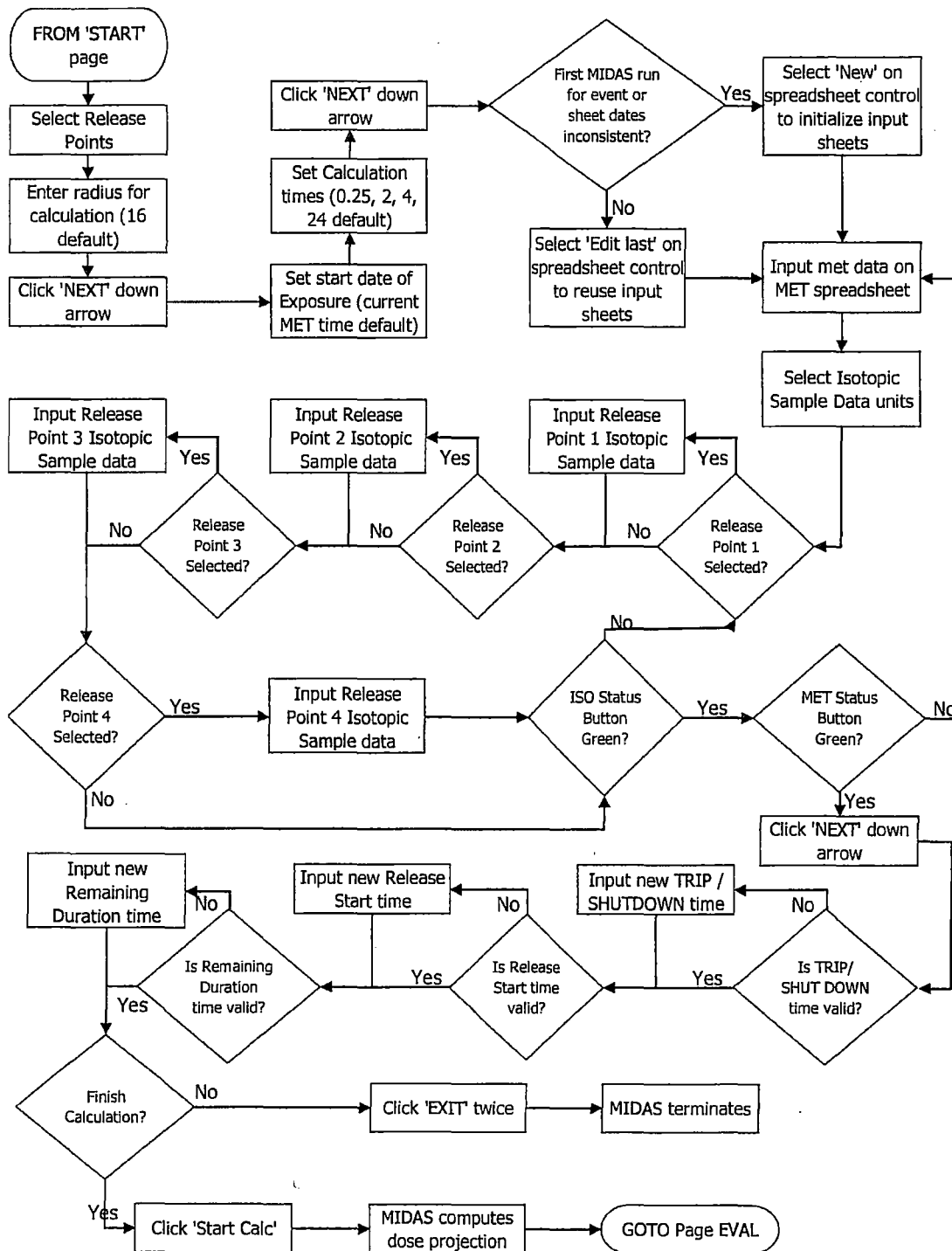


Attachment 9.2  
Flow Charts Menu L  
Page 11 of 16





Attachment 9.2  
Flow Charts Menu M  
Page 12 of 16





**IPEC  
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PLAN  
IMPLEMENTING  
PROCEDURES**

**NON-QUALITY RELATED  
PROCEDURE**

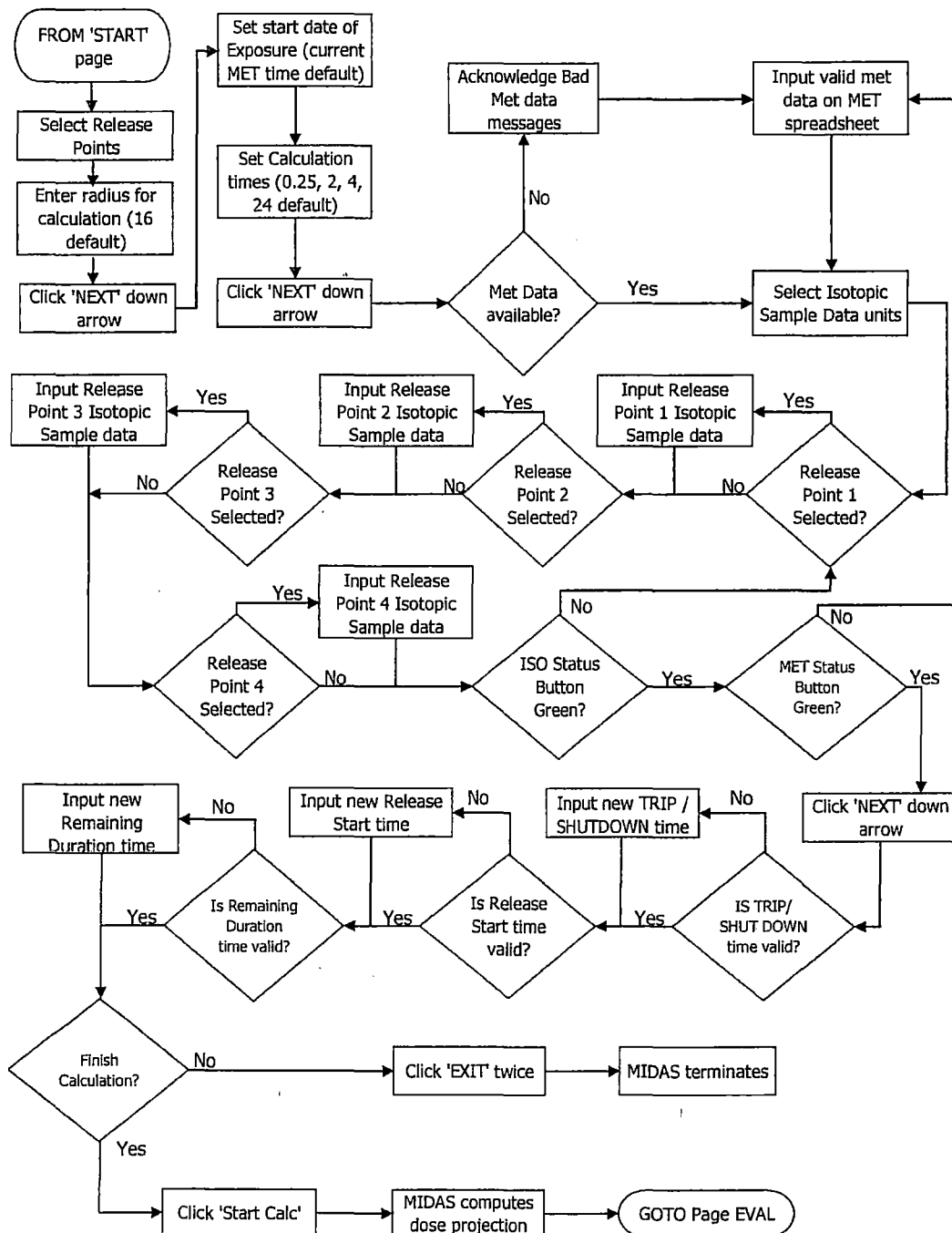
**IP-EP- 340**

**Revision 7**

**REFERENCE USE**

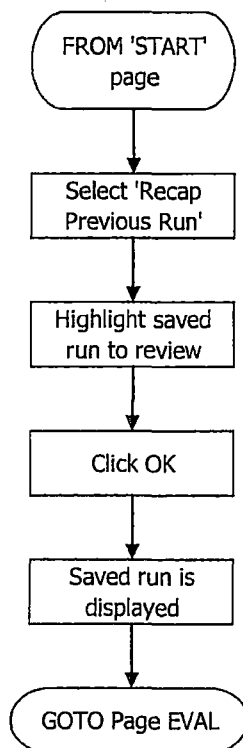
**Page 54 of 84**

**Attachment 9.2  
Flow Charts Menu N  
Page 13 of 16**





**Attachment 9.2**  
**Flow Charts Recap**  
Page 14 of 16





**IPEC  
EMERGENCY  
PLAN  
IMPLEMENTING  
PROCEDURES**

**NON-QUALITY RELATED  
PROCEDURE**

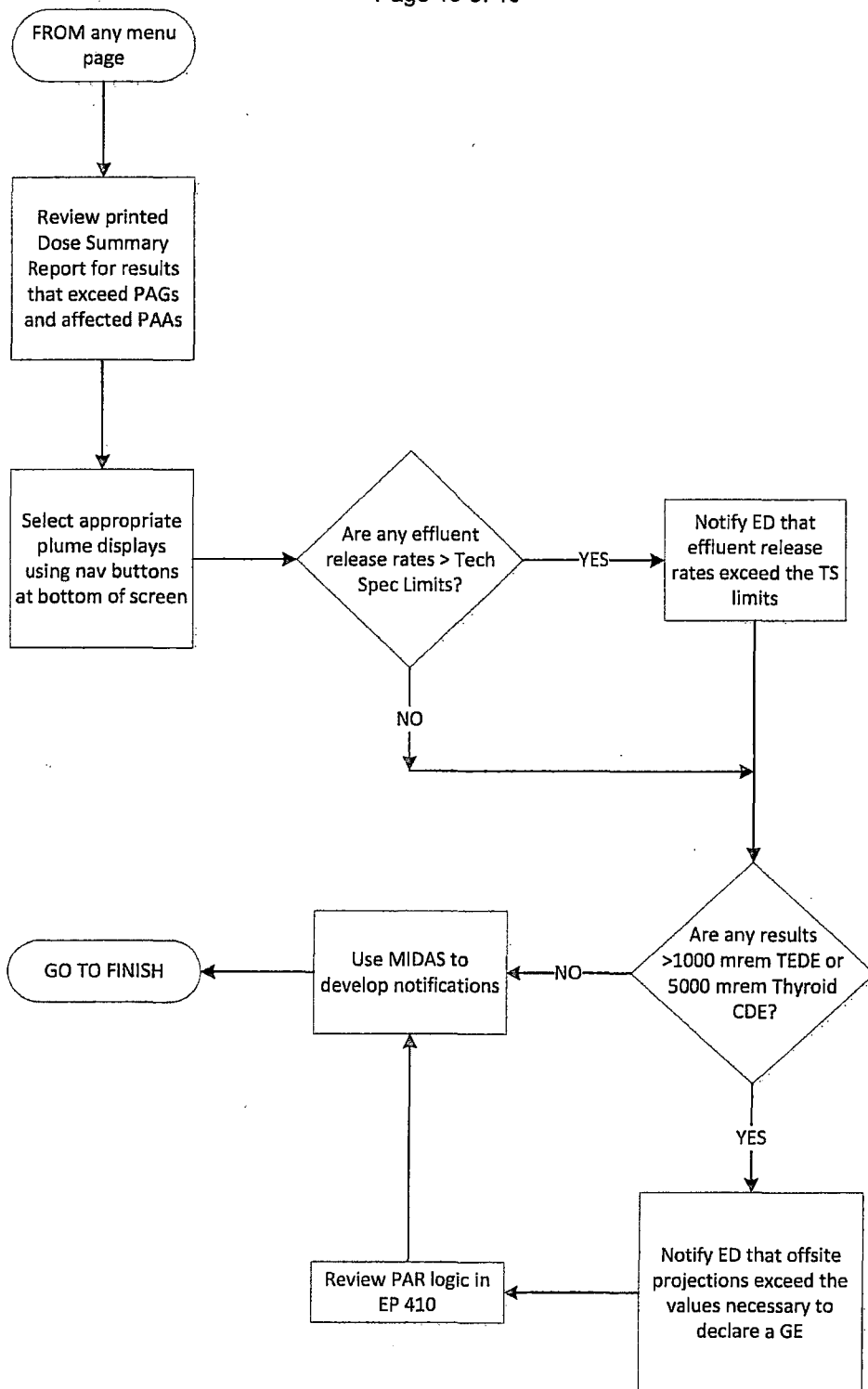
**IP-EP- 340**

**Revision 7**

**REFERENCE USE**

**Page 56 of 84**

**Attachment 9.2  
Flow Charts Eval**  
Page 15 of 16





**IPEC  
EMERGENCY  
PLAN  
IMPLEMENTING  
PROCEDURES**

**NON-QUALITY RELATED  
PROCEDURE**

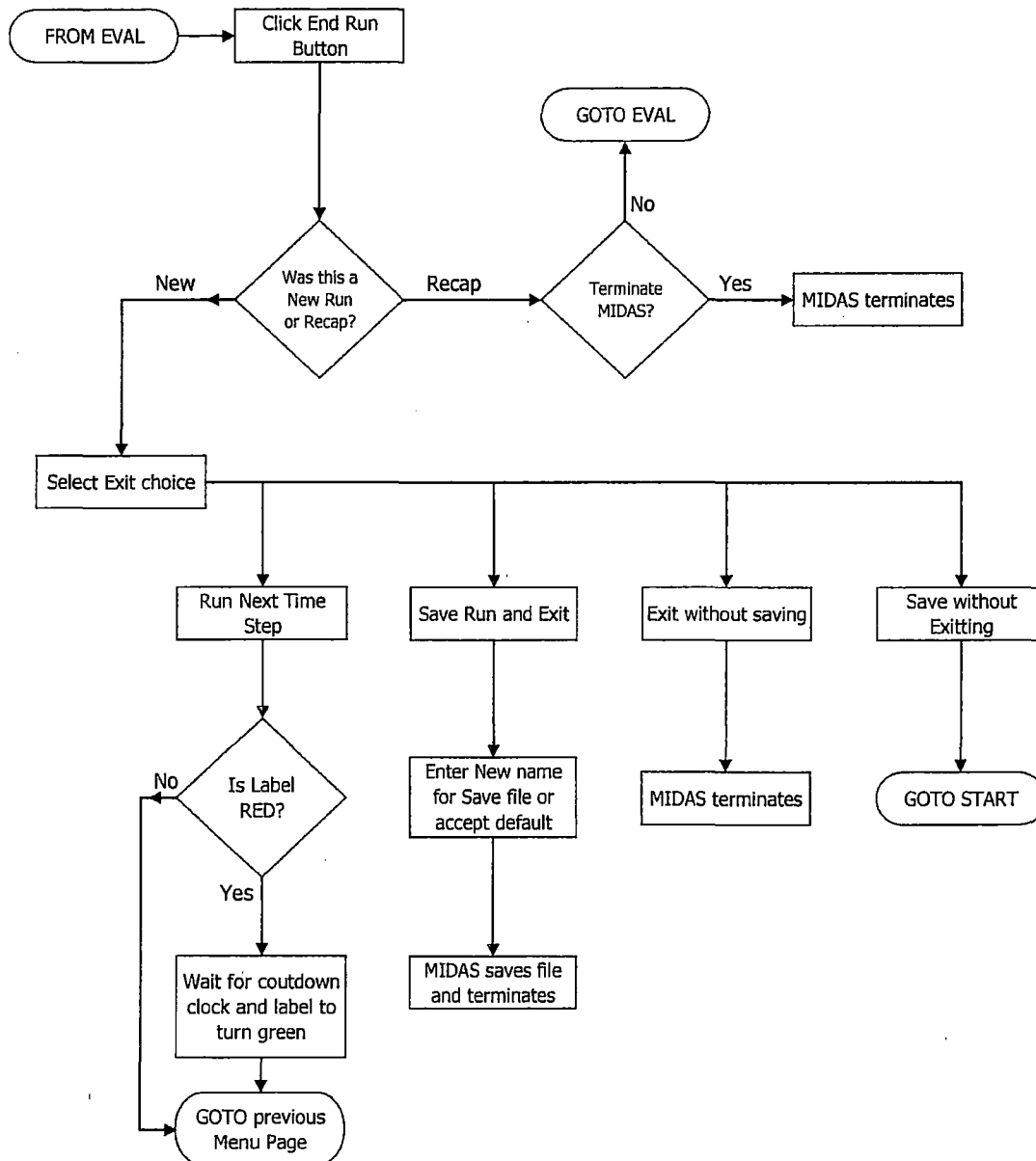
**IP-EP- 340**

**Revision 7**

**REFERENCE USE**

**Page 57 of 84**

**Attachment 9.2  
Flow Charts Finish  
Page 16 of 16**





**IPEC  
EMERGENCY  
PLAN  
IMPLEMENTING  
PROCEDURES**

**NON-QUALITY RELATED  
PROCEDURE**

**IP-EP- 340**

**Revision 7**

**REFERENCE USE**

**Page 58 of 84**

**Attachment 9.3  
Plant and Site Specific Parameters**

Page 1 of 1

Radiation monitors, flow data, and conversion factors

**Unit 2**

Monitor	Units	Conversion	Range low	Range hi	Flow units	Flow lo	Flow hi
R-44G	uCi/cc	1	1.00E-06	1	CFM	0	200000
R-27	uCi/sec	1	1	1.00E+13	CFM	0	200000
R-45	uCi/cc	1	1.00E-07	1	CFM	0	100
R-25	R/hr	0	1.00E+01	1.00E+07	CFM	0	2000
R-26	R/hr	0	1.00E+01	1.00E+07	CFM	0	2000
R-28	Cpm	2.70E-03	1.00E+00	5.00E+06	MLB/HR	50	1.00E+06
R-29	Cpm	2.70E-03	1.00E+00	5.00E+06	MLB/HR	50	1.00E+06
R-30	Cpm	2.70E-03	1.00E+00	5.00E+06	MLB/HR	50	1.00E+06
R-31	Cpm	2.70E-03	1.00E+00	5.00E+06	MLB/HR	50	1.00E+06

**Unit 3**

Monitor	Units	Conversion	Range low	Range hi	Flow units	Flow lo	Flow hi
R-14G	uCi/cc	1	1.00E-06	0.1	CFM	0	150000
R-27	uCi/sec	1	1.10E+01	1.00E+13	CFM	0	150000
R-15	uCi/cc	1	1.00E-06	1.00E+00	CFM	0	100
R-25	R/hr	0	1.00E+01	1.00E+08	CFM	0	2000
R-26	R/hr	0	1.00E+01	1.00E+08	CFM	0	2000
R62A	uCi/cc	1	1.00E-03	1.00E+03	MLB/HR	50	5.00E+06
R62B	uCi/cc	1	1.00E-03	1.00E+03	MLB/HR	50	5.00E+06
R62C	uCi/cc	1	1.00E-03	1.00E+03	MLB/HR	50	5.00E+06
R62D	uCi/cc	1	1.00E-03	1.00E+03	MLB/HR	50	5.00E+06

**Met data**

Data priority	Release point	Speed	Direction	Stability class	precipitation
Primary	Ground	SPD 10	DIR10	DT 60-10	Rain1

**Release Points – both units**

Point	Type
1 – station vent	Ground
2 – condenser offgas	Ground
3 – steam dumps	Ground
4 – containment leakage	Ground



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PROCEDURES

NON-QUALITY RELATED  
PROCEDURE

IP-EP- 340

Revision 7

REFERENCE USE

Page 61 of 84

**Attachment 9.5**  
**Quick Guides for MIDAS Operation**

Page 1 of 2

CCR –Auto J

(Used for Steam Generator Tube Rupture Quick Dose)

- 1) Start MIDAS by double clicking on the "MIDAS Accident Calcs" ICON
- 2) MIDAS Accident Dose Calculation menu will display after a few seconds
- 3) Select/verify the correct UNIT, upper right
- 4) Select CCR
- 5) Select Automatic
- 6) In the 'Accident Run Menu Selection' select: "AUTO QUICK DOSE SGTR (MENU J)"
- 7) Click green OK button, bottom right

**NOTE:**

A warning message may be displayed that there is at least one good monitor, but NO data is available for a release point, this is because there is data missing for EITHER the station vent or condenser offgas. **IF** this message is displayed, **THEN** select OK to continue.

- 8) MIDAS will display a 'Meteorological Edit' Spreadsheet. DATA should be automatically populated. **IF** data is NOT present, **THEN** type in current displayed data from met tower display or other source.
- 9) Click on green OK button.
- 10) **IF** data was changed, **THEN** click green YES on 'data collection values control form'.
- 11) MIDAS will display a 'Rad Monitor & Flow Data Edit' sheet. DATA should be automatically populated. **IF** radiation monitor (steam line) data is NOT present, **THEN** type in current displayed data from control room indications, MRPDAS or other data source.
- 12) Click on the flow box for corresponding (steam line) radiation monitor.

**NOTE:**

Safeties and Relief valves must be entered in whole numbers.

- 13) Click on the dropdown menu to receive a pop-up to determine steam flow.
  - a. Enter the appropriate number of safeties AND relief valves that are lifting.
  - b. Select whether the steam driven Aux Feed Pump is "ON" or "OFF" by clicking the OFF/ON toggle button.
  - c. Click OK
- 14) Ensure a steam release flow value is entered for the current time corresponding to the radiation monitor of interest.



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PROCEDURES

NON-QUALITY RELATED  
PROCEDURE

IP-EP- 340

Revision 7

REFERENCE USE

Page 62 of 84

**Attachment 9.5**  
**Quick Guides for MIDAS Operation**

Page 2 of 2

CCR –Auto J

(Used for Steam Generator Tube Rupture Quick Dose)

**NOTE:**


A warning message will be displayed if a steam flow value is not entered for the current time. IF this message is displayed, enter the appropriate steam flow inputs on the dropdown menu.

- 15) Click OK on the Rad Monitor & Flow Data Edit Spreadsheet
- 16) A map of a plume plot will be displayed. There are many possible combinations of information that could be displayed. **IF** a different display is needed / desired, **THEN** use the toggle buttons at the bottom of the map to get the desired configuration AND click the purple CONFIRM button bottom to bring up the appropriate display.
- 17) Click GRAY "SPECIAL REPORTS" button. It will turn green and the button below it will turn yellow.
- 18) The default label for the yellow button is "Dose Summary". **IF** the button reads something different from Dose Summary, **THEN** click the yellow button below SPECIAL REPORTS until it reads "Dose Summary"
- 19) Click the purple CONFIRM button.
- 20) Select "Part 2 Form Only" radio button.

**NOTE:**

Selecting "Yes, Emergency Director has Approved this report" indicates the Part 2 form will be approved by the Emergency Director. This allows population of the Part 2 form with the Emergency Director's name to allow for electronic distribution.

- 21) A Part 2 input form will be displayed. Fill in appropriate areas of the form. Yellow highlighted areas are REQUIRED. Ensure time of trip matches the NYS Part 1 Form.
- 22) Click OK to generate a PDF for Emergency Director approval.
- 23) Obtain the Emergency Director's approval of the Part 2. The form can be printed if required.
- 24) The Part 2 can be faxed and/or emailed to locations by clicking the "Fax NYS Form" and "Email NYS Form" buttons at the top of the page as directed by the Emergency Director.
- 25) Click on the window "X", upper right, the MIDAS dose summary will be shown. Click on the window "X" to close the summary.
- 26) On the MIDAS plume display page, click "END RUN" bottom left, to terminate this run. This will allow closing MIDAS or running another calculation.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>63</u> of <u>84</u></b>

**Attachment 9.6**  
**Quick Guides for MIDAS Operation**

Page 1 of 4

EOF –Auto H

(For Steam Generator Tube Rupture)

- 1) Start MIDAS by double clicking on the "MIDAS Accident Calcs" ICON
- 2) MIDAS Accident Dose Calculation menu will display after a few seconds
- 3) Select/verify the correct UNIT, upper right
- 4) Select EOF
- 5) Select Automatic
- 6) In the 'Accident Run Menu Selection' select: "AUTO ENHANCED DOSE PROJECTION (MENU H)"
- 7) Click green OK button, bottom right
- 8) **IF** a popup appears asking "Do You Want to Change the Time of Trip and/or the Start of Release", **THEN**:
  - a. select "YES".
  - b. Click on the date and time in the 'Date, Time of Trip/Shutdown' box
  - c. Set time of Trip. Click OK
  - d. Click OK on the 'Start Up Trip and Release Dates' menu.
- 9) Un check Release Points 1 (Plant Vent) and 2 (CAEJ). STM Line should be the only release point selected
- 10) Click the gray "NEXT" button
- 11) Click the gray "NEXT" button


**NOTE:**

During the initial MIDAS Run, a warning message may be displayed stating "Warning – Mix Scenario File Must Be Initialized, Current Time Plus 24 hour dates are not in the file, Proceed with Initialization?" select "Yes" to continue.

**NOTE:**

A warning message may be displayed that there is at least one good monitor, but NO data is available for a release point, this is because there is data missing for EITHER the station vent or condenser offgas. Click OK to continue.

- 12) MIDAS will display a 'Meteorological Edit' Spreadsheet. Data should be automatically populated. **IF** data is NOT present, **THEN** type in current displayed data from met tower display or other source. Click on green OK button.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>		<b>IP-EP- 340      Revision 7</b>	
	<b>REFERENCE USE</b>		<b>Page</b>	<b>64    of    84</b>


**Attachment 9.6**  
**Quick Guides for MIDAS Operation**  
 Page 2 of 4  
 EOF –Auto H  
 (For Steam Generator Tube Rupture)

- 13) **IF** data was changed, **THEN** click green YES on 'data collection values control form'.
- 14) MIDAS will display a 'Rad Monitor & Flow Data Edit' sheet. DATA should be automatically populated. **IF** radiation monitor data is NOT present, **THEN** type in current displayed data from control room indications, MRPDAS or other data source.
- 15) Click on the flow box for corresponding radiation monitor.

**NOTE:**

Safeties and Relief valves must be entered in whole numbers.

- 16) Click on the dropdown menu to receive a pop-up to determine steam flow.
  - a. Enter the appropriate number of Safeties and relief valves that are lifting.
  - b. Select whether the Aux Feed Pump is "ON" or "OFF" by clicking the OFF/ON toggle button.
  - c. Click OK
- 17) **IF** Release Start (Red Highlighted Time) is prior to Current Time (Blue Highlighted Time), **THEN** repeat step 16 until steam flow is populated for all times from release start to current time.
- 18) Click OK on the Rad Monitor & Flow Data Edit Spreadsheet
- 19) **IF** radiation monitor data was changed **THEN** click the green YES on 'data collection values control form'
- 20) 'Spreadsheet Control' pop-up will appear.
  - a. **IF** it is the first MIDAS calculation for the event, **THEN** select "New"
  - b. **IF** it is a subsequent run, **THEN** select "Edit Last"
  - c. Click OK
  - d. **IF** "New" was selected, **THEN** a popup will appear saying "You are about to Destroy Previously Entered Data!" Select OK
- 21) MIDAS will display a 'Mix Edit' spreadsheet. The data will **NOT** be automatically populated.
  - a. Select the pink event tree button to display a pop-up.
  - b. From the Accident Type dropdown menu, select "Steam Generator Tube Rupture"
  - c. From the Core Condition drop down menu select a core condition.
  - d. Click OK

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page 65</b>	<b>of 84</b>

**Attachment 9.6**  
**Quick Guides for MIDAS Operation**

Page 3 of 4

EOF –Auto H


(For Steam Generator Tube Rupture)

- 22) **IF** Release Start (Red Highlighted Time) is prior to Current Time (Blue Highlighted Time), **THEN** use the Copy and Paste buttons to populate the Mix in all rows from release start to current time.
- 23) Select OK on the 'Mix Edit' spreadsheet
- 24) Click the gray "NEXT" button.
- 25) Verify the Date and Time of Shutdown and Start Date of Release are correct
  - a. **IF** the time of Release Start is incorrect, **THEN:**
    - i. Click on the date in the 'Start Date of Release box'
    - ii. Set to correct Date and Time
    - iii. Click OK
    - iv. A popup will appear saying "You have changed the Start of Release. You MUST ensure that applicable data exist for all time steps beginning with the new Start of Release by reviewing Met Status, RM/F Status, Mix Status, Time of Trip." Click OK.
  - b. **IF** the time of Shutdown is incorrect, **THEN:**
    - i. Click on the Date in the 'Date, Time of Trip/Shutdown' box
    - ii. Set the correct Date and Time
    - iii. Select OK
- 26) Select the "Start Calc" button.

**NOTE:**

**IF** data was collected since the start of the MIDAS run, **THEN** a popup will appear asking if you would like to continue with Current Data (Preferred Selection) or Restart with new data. Make a selection to continue.

- 27) A map of a plume plot will be displayed. There are many possible combinations of information that could be displayed. **IF** a different display is needed / desired, **THEN** use the toggle buttons at the bottom of the map to bring up the appropriate display and click the purple CONFIRM button bottom.
- 28) Click gray "SPECIAL REPORTS" button. It will turn green and the button below it will turn yellow.
- 29) The default label for the yellow button is "Dose Summary". **IF** the button reads something different from Dose Summary, **THEN** click the yellow button below SPECIAL REPORTS until it reads "Dose Summary".
- 30) Click purple CONFIRM button.
- 31) To complete ONLY a Part 2, select "Part 2 Only".


 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>		<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>		<b>Page</b>	<b><u>66</u> of <u>84</u></b>

**Attachment 9.6**  
**Quick Guides for MIDAS Operation**  
 Page 4 of 4  
 EOF –Auto H  
 (For Steam Generator Tube Rupture)

**NOTE:**

Selecting "Yes, Emergency Director has Approved this report" indicates the Part 2 form will be approved by the Emergency Director. This allows population of the Part 2 form with the Emergency Director's name.


- 32) A Part 2 input form will be displayed. Fill in appropriate areas of the form. Yellow highlighted areas are REQUIRED.
- 33) Click OK to generate a PDF for Emergency Director approval.
- 34) Obtain the Emergency Director's approval of the Part 2. The form can be printed if required.
- 35) The Part 2 can be emailed and/or faxed to locations, as directed by the Emergency Director, by clicking the "Fax NYS Form" and "Email NYS Form" buttons at the top of the page.
- 36) Click on the window "X", upper right, the MIDAS dose summary will be shown. Click on the window "X" to close the summary.
- 37) On the MIDAS plume display page, click "END RUN" bottom left, to terminate this run. This will allow closing MIDAS or running another calculation.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	NON-QUALITY RELATED PROCEDURE	IP-EP- 340      Revision 7
	REFERENCE USE	Page <u>67</u> of <u>84</u>

**Attachment 9.7**  
**Quick Guides for MIDAS Operation**

Page 1 of 3  
EOF –Auto H


- 1) Start MIDAS by clicking on the "MIDAS Accident Calcs" ICON
- 2) MIDAS Accident Dose Calculation menu will display after a few seconds
- 3) Select/verify the correct UNIT, upper right
- 4) Select EOF
- 5) Select Automatic
- 6) Using the 'Accident Run Menu Selection' section Select: "AUTO ENHANCED DOSE PROJECTION (MENU H)"
- 7) Click green OK button, bottom right
- 8) **IF** the time of reactor trip is greater than 24 hours, **THEN** MIDAS will prompt the user to set the time of trip and time of release start. This is usually encountered on the initial run during an event.
- 9) MIDAS will begin to step through a four-part input panel, beginning with a release point prompt. Turn on or off release points by clicking in the check boxes.
- 10) Click the gray NEXT down arrow button. It will turn green.
- 11) The next section of the input panel will display the current met time as the start of exposure, and four time periods for displaying results. Unless there is a particular reason to change them, leave these values as MIDAS assigns them. Click the GRAY DOWN ARROW to continue. It will turn green.
- 12) The FIRST time a calculation is run for the event, there may be several 'initialization' prompts. Select YES to initialize the data collection sheets if prompted.
- 13) MIDAS will display a 'Meteorological Edit' Spreadsheet. DATA should be automatically populated. Click on green OK button.
- 14) **IF** data is NOT present, **THEN** type in current displayed data from met tower display. **IF** data was changed, **THEN** click green YES on 'data collection values control form'
- 15) If a warning message is displayed that there is at least one good monitor, but NO data is available for release a point, this is because there is data missing for EITHER the station vent or condenser offgas. Select OK to continue.
- 16) MIDAS will display a 'Rad Monitor & Flow Data Edit' sheet. DATA should be automatically populated. In Unit 2 enter station vent flow rate. This value is not automated. Click the green OK button.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>68 of 84</b>

**Attachment 9.7**  
**Quick Guides for MIDAS Operation**

Page 2 of 3  
EOF –Auto H


- 17) **IF** data is NOT present, **THEN** type in current displayed data from control room indications, MRPDAS or other data source. **IF** data was changed, **THEN** click green 'YES on 'data collection values control form'
- 18) MIDAS will display a 'Mix Edit' sheet. DATA in the mix sheet is not automatically populated.
- 19) Type in current available mix data or use the EVENT TREE button to define the mix. Click the green OK button
- 20) The third section of the input panel will display.
- 21) IF the 'MET STATUS', 'RM/F STATUS', and 'MIX STATUS' buttons are green, MIDAS has accepted all input as valid. Click on the gray NEXT arrow. It will turn green.
- 22) IF any of the 'MET STATUS', 'RM/F STATUS', and 'MIX STATUS' buttons are red, MIDAS has determined that there is incomplete or invalid data for that input. Click on the red button to review or modify the input. MIDAS will NOT proceed to dose calculation of any of these buttons are still red.
- 23) The fourth part of the input panel will display. Date Time of trip is normally set once at the beginning of the event to the actual trip time. Start date of release should be set to the time when actual plant release began. Remaining duration should default to 4, or should be changed if there is good information on the expected duration until termination of the release.
- 24) Click the green START CALC button.
- 25) A map of a plume plot will be displayed. There are many possible combinations of information that could be displayed. Check the YELLOW boxes at the bottom to verify what information is being displayed and click these buttons to change the display.
- 26) IF a different display is needed / desired, click purple CONFIRM button bottom right after changing yellow button selections
- 27) Click GRAY "SPECIAL REPORTS" button. It will turn green and the button below it will turn yellow.
- 28) Click the yellow button below SPECIAL REPORTS unless/until it reads "Dose Summary". Click purple CONFIRM button.
- 29) A Part 2 input form will be displayed. Fill in ALL yellow areas of the form and click OK.
- 30) Obtain the Emergency Director's approval of the Part 2.
- 31) The Part 2 can be emailed and/or faxed to locations by clicking the "Fax NYS Form" and "Email NYS Form" buttons at the top of the page. The forms can also be printed.

 <b>Entergy®</b> <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>69</u> of <u>84</u></b>

**Attachment 9.7**  
**Quick Guides for MIDAS Operation**

Page 3 of 3  
EOF –Auto H


- 32) Click on the window "X", upper right, the MIDAS dose summary will be shown. Click on the window "X" to close the summary.
- 33) On the MIDAS plume display page, click "END RUN" bottom left, to terminate this run. This will allow closing MIDAS or running another calculation.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>70</u> of <u>84</u></b>

**Attachment 9.8**  
**Quick Guides for MIDAS Operation**

Page 1 of 2  
Offsite users –Auto H


- 1) Log into the Entergy Citrix Server process and connect to the MIDAS server.
- 2) Start MIDAS by clicking on the "MIDAS Accident Calcs" ICON
- 3) MIDAS Accident Dose Calculation menu will display after a few seconds
- 4) Select/verify the correct UNIT, upper right
- 5) Select EOF
- 6) Select Automatic
- 7) Using the 'Accident Run Menu Selection' section Select: "AUTO ENHANCED DOSE PROJECTION (MENU H)"
- 8) Click green OK button, bottom right
- 9) MIDAS will begin to step through a four-part input panel, beginning with a release point prompt. Turn on or off release points by clicking in the check boxes.
- 10) Click the NEXT down arrow button. It will turn green.
- 11) The next section of the input panel will display the current met time as the start of exposure, and for time periods for displaying results. Unless there is a particular reason to, leave these values as MIDAS assigns them. Click the GRAY DOWN ARROW to continue. It will turn green.
- 12) The FIRST time a calculation is run for the event, there may be several 'initialization' prompts. Select YES to initialize the data collection sheets if prompted.
- 13) MIDAS will display a 'Meteorological Edit' Spreadsheet. DATA should be automatically populated. Click on green OK button.
- 14) If data is NOT present, type in current displayed data from met tower display. IF data was changed click green YES on 'data collection values control form'
- 15) MIDAS will display a 'Rad Monitor & Flow Data Edit' sheet. DATA should be automatically populated. In Unit 2 enter station vent flow rate. This value is not automated. Click on green OK button.
- 16) If data is NOT present, type in current displayed data from control room indications, MRPDAS or other data source. IF data was changed click green YES on 'data collection values control form'
- 17) IF a warning message is displayed that there is only good data for one release point, this is because there is data missing for at least ONE of the release points selected earlier. Select YES to continue, NO to review rad monitor and flow data.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>71</u> of <u>84</u></b>

**Attachment 9.8**  
**Quick Guides for MIDAS Operation**


Page 2 of 2  
Offsite users –Auto H

- 18) MIDAS will display a 'Mix Edit' sheet. DATA in the mix sheet is not automatically populated.
- 19) Type in current available mix data or use the EVENT TREE button to define the mix. Press the green OK button
- 20) The third section of the input panel will display.
- 21) IF the 'MET STATUS', 'RM/F STATUS', and 'MIX STATUS' buttons are green, MIDAS has accepted all input as valid. Click on the gray NEXT arrow.
- 22) IF any of the 'MET STATUS', 'RM/F STATUS', and 'MIX STATUS' buttons are red, MIDAS has determined that there is incomplete or invalid data for that input. Click on the red button to review or modify the input. MIDAS will not proceed to dose projection if any of these buttons are red.
- 23) The fourth part of the input panel will display. Date Time of trip is normally set once at the beginning of the event to the actual trip time. Start date of release should be set to the time when actual plant release began. Remaining duration should default to 4, or should be changed if there is good information on the expected duration until termination of the release.
- 24) Click the green START CALC button.
- 25) A map of a plume plot will be displayed. There are many possible combinations of information that could be displayed. Check the YELLOW boxes at the bottom to verify what information is being displayed and click these buttons to change the display.
- 26) IF a different display is needed / desired, click purple CONFIRM button bottom right after changing yellow button selections
- 27) Click GRAY "SPECIAL REPORTS" button. It will turn green and the button below it will turn yellow.
- 28) Click the yellow button below SPECIAL REPORTS unless/until it reads "Dose Summary". Click purple CONFIRM button.
- 29) The MIDAS dose summary will be shown. Click on the window "X" to close the summary.
- 30) On the MIDAS plume display page, click "END RUN" bottom left, to terminate this run. This will allow closing MIDAS or running another calculation.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b> <b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page    72    of    84</b>

**Attachment 9.9**  
**Quick Guides for MIDAS Operation**  
 Page 1 of 2  
**MANUAL B – no automated data**

- 1) IF connecting from Offsite, Log into the Entergy Citrix Server process and connect to the MIDAS server.
- 2) Start MIDAS by clicking on the "MIDAS Accident Calcs" ICON
- 3) MIDAS Accident Dose Calculation menu will display after a few seconds
- 4) Select/verify the correct UNIT, upper right
- 5) Select EOF
- 6) Select MANUAL
- 7) Using the 'Accident Run Menu Selection' section Select: "MANUAL ENHANCED DOSE PROJECTION (MENU B)"
- 8) Click green OK button, bottom right
- 9) MIDAS will begin to step through a four-part input panel, beginning with a release point prompt. Turn on or off release points by clicking in the check boxes.
- 10) Click the NEXT down arrow button
- 11) The next section of the input panel will display the current met time as the start of exposure, and for time periods for displaying results. Unless there is a particular reason to, leave these values as MIDAS assigns them. Click the GRAY DOWN ARROW to continue.
- 12) The FIRST time a calculation is run for the event, there may be several 'initialization' prompts. Select YES to initialize the data collection sheets if prompted.
- 13) MIDAS will display a 'Meteorological Edit' Spreadsheet. DATA WILL NOT be automatically populated. Enter met data and click on the green OK button.
- 14) MIDAS will display a 'Rad Monitor & Flow Data Edit' sheet. DATA WILL NOT be automatically populated.
- 15) Type in current displayed data from control room indications, MRPDAS or other data source and click on the green OK button
- 16) IF a warning message is displayed that there is only good data for one release point, this is because there is data missing for at least ONE of the release points selected earlier. Select YES to continue, NO to review rad monitor and flow data.
- 17) MIDAS will display a 'Mix Edit' sheet. DATA in the mix sheet is not automatically populated.
- 18) Type in current available mix data or use the EVENT TREE button to define the mix. Press the green OK button

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>		<b>IP-EP- 340      Revision 7</b>	
	<b>REFERENCE USE</b>		<b>Page    <u>73</u>    of    <u>84</u></b>	

**Attachment 9.9**  
**Quick Guides for MIDAS Operation**

Page 2 of 2  
Manual B – no automated data

- 19) The third section of the input panel will display.
- 20) IF the 'MET STATUS', 'RM/F STATUS', and 'MIX STATUS' buttons are green, MIDAS has accepted all input as valid. Click on the gray NEXT arrow.
- 21) IF any of the 'MET STATUS', 'RM/F STATUS', and 'MIX STATUS' buttons are red, MIDAS has determined that there is incomplete or invalid data for that input. Click on the red button to review or modify the input. MIDAS will not proceed to dose projection if any of these buttons are red.
- 22) The fourth part of the input panel will display. Date Time of trip is normally set once at the beginning of the event to the actual trip time. Start date of release should be set to the time when actual plant release began. Remaining duration should default to 4, or should be changed if there is good information on the expected duration until termination of the release.
- 23) Click the green START CALC button.
- 24) A map of a plume plot will be displayed. There are many possible combinations of information that could be displayed. Check the YELLOW boxes at the bottom to verify what information is being displayed and click these buttons to change the display.
- 25) IF a different display is needed / desired, click purple CONFIRM button bottom right after changing yellow button selections
- 26) Click GRAY "SPECIAL REPORTS" button. It will turn green and the button below it will turn yellow.
- 27) Click the yellow button below SPECIAL REPORTS unless/until it reads "Dose Summary". Click purple CONFIRM button.
- 28) IF connected to a MIDAS Server from OFFSITE, The MIDAS dose summary will be shown. Click on the window "X" to close the summary.
- 29) IF using an ENTERGY MIDAS computer, A Part 1 input from will be displayed. Fill In ALL yellow areas of the form and click OK
- 30) A part1 and part 2 form will be displayed. Click on the arrow buttons top left to toggle between the part 1 and part 2
- 31) The part1 and part 2 can be printed or faxed.
- 32) Click on the window "X", upper right, the MIDAS dose summary will be shown. Click on the window "X" to close the summary.
- 33) On the MIDAS plume display page, click "END RUN" bottom left, to terminate this run. This will allow closing MIDAS or running another calculation.

**Entergy®****IPEC  
EMERGENCY  
PLAN  
IMPLEMENTING  
PROCEDURES****NON-QUALITY RELATED  
PROCEDURE****IP-EP- 340****Revision 7****REFERENCE USE****Page 74 of 84**

**Attachment 9.10**  
**Quick Guides for MIDAS Operation**

Page 1 of 3  
EOF Multiple-Accident – AUTO

**NOTE:**

If more than one location is experiencing a release, select New Multiple Accident Run radial button on the initial MIDAS Startup / Menu Screen. This function of MIDAS will allow entry of up to 5 different accident releases occurring simultaneously from Unit 2 and Unit 3.


**NOTE:**

This Multiple Accident feature of MIDAS can be run from either the CCR or from the EOF in the AUTO or MANUAL mode. The instructions which follow are for calculations performed using the AUTO Mode.

- 1) Select EOF
- 2) Select "AUTOMATIC" radial button.
- 3) Select "Start New Multiple Accident Run" radial button. (The Unit No. does not need to be selected at this point). Then press GREEN "OK" button.
- 4) When scenario selection screen is displayed, enter brief run title in GREEN box (22 characters, maximum).
- 5) Begin with "Select Accident Run 1" and enter type of calculation to be performed from pull-down selection list and corresponding Unit number . (e.g., Use Menu H – Auto Enhanced dose projection). The table below can be used to track the different runs.
- 6) Proceed to "Select Accident Run 2" and again enter type of calculation from pull-down selection list and corresponding Unit number.
- 7) Enter up to 3 other release locations, type of calculation and corresponding Unit number.

	Type of Release	Unit
Accident Run 1		
Accident Run 2		
Accident Run 3		
Accident Run 4		
Accident Run 5		

- 8) When entries are complete, press the GREEN "OK" button.
- 9) If message prompt for changing the time of trip and/or release is displayed, press "YES". (Click GREEN Box).

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>75</u> of <u>84</u></b>


**Attachment 9.10**  
**Quick Guides for MIDAS Operation**  
 Page 2 of 3  
 EOF Multiple-Accident – AUTO

- 10) Enter the time of reactor trip and start of release for the unit corresponding to Accident Run 1 (Unit 2 or Unit 3) and press "OK".
- 11) Press the "NEXT" down arrow.
- 12) Press the "NEXT" down arrow.
- 13) Verify that current live met data is being displayed on the Meteorological spreadsheet and press "OK".
- 14) On Radiation Monitor & Flow spreadsheet, verify appropriate monitor reading is displayed. Enter flow rate data if required. Press "OK"
- 15) **IF** this is the first run for this unit, **THEN** select "New" on the Spreadsheet Control popup.
- 16) **IF** this is a subsequent for the accident run, **THEN** select "Edit Last" on the Spreadsheet Control popup.
- 17) On Mix Edit spreadsheet, select "EVENT TREE", followed by selection of Accident Type **AND** Core Condition from pull-down selection lists.
- 18) Press "OK".
- 19) Press "NEXT" down arrow.
- 20) If all required boxes are green, then select GREEN "Start Calc" button. MIDAS will then compute the doses for Accident Run 1.
- 21) MIDAS will then display a message that the first run is complete, Start Run 2. Press "OK".

**NOTE:**

For runs 2-5, within the initial assessment, the Spreadsheet Control popup that appears is for that specific run and new should be selected because this is the first run for the accident on the specific unit.

- 22) After pressing "OK", then MIDAS will prompt for release and mix input for Accident Run 2 as was done for the previous Accident Run.
- 23) Enter appropriate rad monitor/flow and nuclide mix inputs.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>76 of 84</b>

**Attachment 9.10**  
**Quick Guides for MIDAS Operation**

Page 3 of 3


EOF Multiple-Accident – AUTO

- 24) Press "NEXT" down arrow.
- 25) **IF** the time of trip and start of release for this run is different from the previous run, **THEN** enter the appropriate time of shutdown and start of release for the affected unit
- 26) **IF** all boxes are green, **THEN** select GREEN "Start Calc" button. MIDAS will then compute the doses for Accident Run 2
  - 27) MIDAS will then generate a combined plume map for the multiple releases.
- 28) Click gray "SPECIAL REPORTS" button. It will turn green and the button below it will turn yellow.
- 29) The default label for the yellow button is "Dose Summary". IF the button reads something different from Dose Summary, THEN click the yellow button below SPECIAL REPORTS until it reads "Dose Summary". Click purple CONFIRM button.
- 30) Select NYS RECS Part 2 report radial button, complete yellow areas and press "OK".
- 31) Check contents of generated Part 2 report, print out, have report approved and then send by fax and e-mail.
- 32) Press top "X" button in upper right-hand portion of screen to display combined Dose Summary Report.
- 33) Results of the combined Dose Summary Report should be manually transferred to a blank NYS RECS Part 2 report, if required.

**NOTE:**

The computed TEDE and Child Thyroid CDE results from individual accident release points from Unit 2 and Unit 3 will differ slightly from combined results since the release points are physically separated. This difference becomes smaller at longer distances from the site.

- 34) To review computed doses from individual release points, press the ORANGE "Review Multi Accident" button and select each release location (Accident Run) of interest. A plume map will be generated, and a separate Dose Summary Report may be selected for display.
- 35) To terminate Multiple Accident Run, press top "X" button in upper right-hand portion of screen and select "Terminate Multiple Accident Run". The run will be automatically saved.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>77 of 84</b>

**Attachment 9.11**  
**Quick Guides for MIDAS Operation**  
 Page 1 of 3  
 CCR Multiple-Accident – AUTO

**NOTE:**

If more than one location is experiencing a release, Multiple Accident will allow entry of up to 5 different accident releases occurring simultaneously from Unit 2 and Unit 3.

**NOTE:**

The Multiple Accident feature of MIDAS can be run from either the CCR or from the EOF in the AUTO or MANUAL mode. The instructions which follow are for calculations performed using the AUTO Mode.

- 1) Open the MIDAS Software with the MIDAS Accident Calcs Icon.
- 2) Select CCR
- 3) Select "AUTOMATIC" radial button.
- 4) Select "Start New Multiple Accident Run" radial button. (The Unit No. does not need to be selected at this point).
- 5) Press GREEN "OK" button.
- 6) When the scenario selection screen(Multiple Accident Calculation Selections) is displayed, enter a brief run title in the GREEN box on the right (22 characters, maximum).
- 7) Begin with "Select Accident Run 1" and enter type of calculation to be performed from pull-down selection list and corresponding Unit number . (e.g., Use Menu G – Auto Quick Dose Plant Vent).
- 8) Proceed to "Select Accident Run 2" and again enter type of calculation from pull-down selection list and corresponding Unit number. Repeat this process for up to 3 other release locations. Use the table below to track calculations for each accident run:

	Type of Release	Unit
Accident Run 1		
Accident Run 2		
Accident Run 3		
Accident Run 4		
Accident Run 5		

- 9) When entries are complete, press the GREEN "OK" button.



**Attachment 9.11**  
**Quick Guides for MIDAS Operation**

Page 2 of 3  
CCR Multiple-Accident – AUTO

**NOTE:**


If you enter or change data in a spreadsheet, then a popup may appear asking if you would like to keep the changes that were made. Click the Green YES button to keep the data to be used in future calculations.

- 10) Verify that current live met data is being displayed on the Meteorological Edit spreadsheet OR IF data is not present THEN, enter current met data.
- 11) Press "OK".

**NOTE:**

A warning message may be displayed that there is at least one good monitor, but NO data is available for a release point, this is because there is data missing for EITHER the station vent or condenser offgas. IF this message is displayed, THEN select OK to continue.

- 12) On Radiation Monitor & Flow spreadsheet, verify appropriate monitor reading is displayed. Enter flow rate data if required. Press "OK"
- 13) A popup stating that the run is complete will appear. Click the green OK button to start the next accident run.
- 14) On Radiation Monitor & Flow spreadsheet, verify appropriate radiation monitor reading is displayed. Enter flow rate data if required. Press "OK"
- 15) Press the Gray "NEXT" button on the MIDAS screen.
- 16) Repeat steps 11-13 for Accident runs 3-5 as required. Once all data has been entered for all runs, MIDAS will then generate a combined plume map for the multiple releases.
- 17) Click GRAY "SPECIAL REPORTS" button. It will turn green and the button below it will turn yellow.
- 18) The default label for the yellow button is "Dose Summary". IF the button reads something different from Dose Summary, THEN click the yellow button below SPECIAL REPORTS until it reads "Dose Summary". Click purple CONFIRM button.
- 19) Select "Part 2 Form Only" report radio button
- 20) A Part 2 input form will be displayed. Fill in appropriate areas of the form. Yellow highlighted areas are REQUIRED.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>79</u> of <u>84</u></b>

**Attachment 9.11**  
**Quick Guides for MIDAS Operation**  
 Page 3 of 3  
 CCR Multiple-Accident – AUTO

- 21) Click OK to generate a PDF for Emergency Director approval.
- 22) The Part 2 can be faxed and .or emailed to locations by clicking the "Fax NYS Form" and "Email NYS Form" buttons at the top of the pages as directed by the Emergency Director.
- 23) Press top "X" button in upper right-hand portion of screen to display combined Dose Summary Report. Press the "X" on the Dose Summary Report to return to the map.

**NOTE:**

The computed TEDE and Child Thyroid CDE results from individual accident release points from Unit 2 and Unit 3 will differ slightly from combined results since the release points are physically separated. This difference becomes smaller at longer distances from the site.

- 24) To review computed doses from individual release points, press the ORANGE "Review Multi Accident" button and select each release location (Accident Run) of interest. A plume map will be generated, and a separate Dose Summary Report may be selected for display.
- 25) To terminate Multiple Accident Run, press top "X" button in upper right-hand portion of screen and select "Terminate Multiple Accident Run". The run will be automatically saved.

**Entergy****IPEC  
EMERGENCY  
PLAN  
IMPLEMENTING  
PROCEDURES****NON-QUALITY RELATED  
PROCEDURE****IP-EP- 340****Revision 7****REFERENCE USE****Page 80 of 84**

**Attachment 9.12**  
**Quick Guides for MIDAS Operation**  
Page 1 of 5  
Part 1 Generator Guidance

**NOTE:**

This guide is intended to be used as needed when generating a NYS Part 1 Form. It does not need to be followed step by step, but referenced as needed to gain understanding of the operation of the part 1 form generator.

**1** Radiological Emergency Data Form - Input VERSION 2

This is an ☐ At ☐ IPEC SITE Reactor Status Reactor Shutdown Date

Notification #: ☐ Unit 2 Unit 2 ☐ 12/09/17 16:22  
☐ Unit 3 Unit 3 ☐ 12/09/17 16:22

**2** EAL #: FG1.1 ☐ Anticipated Release duration <1 hour ☐ Release duration >1 hour Emergency Classification  
This Emergency Classification declared on: 12/09/17 16:22 **GENERAL EMERGENCY**

**3** Brief Event Description: Loss of 2 of 3 fission product barriers with actual or potential loss of the third barrier. Protective actions will be recommended for the public.

**4** ☐ No Release to Atmosphere ☒ Release to Atmosphere of Radioactive Materials due to the Classified Event:  
☐ No Release to Water ☒ Release to Water of Radioactive Materials due to the Classified Event:

**5** Is this an INITIAL PAR? ☒ Yes ☐ No Has the PAR Changed since the last report? ☒ Yes ☐ No  
Is this an Rapidly Progressing Severe Accident? ☒ Yes ☐ No


**6** PAR Determination  
☒ Evacuate and implement KI Plan for the 2 mile radius and 2 to 5 miles downwind sectors (default)  
☐ Evacuate and implement KI Plan for the 2 mile radius and 2 to 10 miles downwind sectors  
☐ Do Not Expand PAR for current conditions

**7** Previous PAR. Includes implementation of KI Plan  
Select Additional or Previously Affected EVACUATION 2-5 mile sectors  
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16  
Select Additional or Previously Affected EVACUATION 2-10 mile sectors  
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16  
Select Additional or Previously Affected SHELTER-IN-PLACE 2-5 mile sectors  
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16  
Select Additional or Previously Affected SHELTER-IN-PLACE 5-10 mile sectors  
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

**8** Meteorological Data  
Wind Direction Enter Wind Direction Wind Speed (m/s) Enter Wind Speed Stability Class Enter Stability Class

Reported By: Enter Communicator Name at Telephone Number: Enter number at location  
☒ Yes, Emergency Director has Approved this report ☐ No Approval

EXIT OK

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>81</u> of <u>84</u></b>

**Attachment 9.12**  
**Quick Guides for MIDAS Operation**  
 Page 2 of 5  
 Part 1 Generator Guidance

**NOTE:**


To the extent possible, the Part 1 form is intended to be filled out from top to bottom and left to right. Once the initial Part 1 form is generated, the form generator may be left open to complete subsequent Part 1 forms without filling out the entire form again. If the user has any questions in correctly revising an open Part 1 form, it is recommended that the user exit from the Part 1 form generator and begin a new form.

1. Block #1 Guidance:

- a. Enter whether the event is an:
  - i. Actual Emergency
  - ii. Exercise
  - iii. Emergency Termination
    1. Selection of Emergency Termination will generate a popup with wording that will be added to the EAL description field of the form. This wording can be edited based on the event
- b. Enter the location that is affected by the event
- c. Enter the status of Unit 2 and Unit 3.
  - i. If a unit is shutdown, enter the time of shutdown.
    1. This time will not change throughout the event.
    2. **IF** the Unit is shut down, **THEN** Inform the Dose Assessor of the time of shut down.
- d. Enter a number for the Notification #. The initial notification will be #1 and each follow-up notification will be a sequential whole number (1, 2, 3, etc.).

2. Block #2 Guidance:

- a. Enter the EAL number exactly as written on the EAL Chart.
  - i. The Emergency Classification will automatically populate based on the EAL.
  - ii. The Brief Event Description will populate with a generic pre-determined non-technical description for that EAL.
- b. Enter the Declaration Time.
  - i. This time will not change on follow-up notifications.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>82 of 84</b>

**Attachment 9.12**  
**Quick Guides for MIDAS Operation**  
 Page 3 of 5  
 Part 1 Generator Guidance

**NOTE:**

The Part 1 generator initially defaults to an assumed atmospheric release. If there is "No Release to Atmosphere" selected in Block 3, then the following selections for release duration do not apply and will not be displayed.


- c. **IF** a General Emergency EAL has been entered, and **IF** a release to the atmosphere is occurring, **THEN** select whether the release is:
  - i. Anticipated Release duration <1 hour.
    - 1. This selection should only be made if it is known that the release will be stopped within an hour of the release start time (e.g., controlled short-term VC purge related to or required by the event, or the source of the release is known and release termination is imminent).
    - 2. This selection will **ONLY** enable a Shelter-in-Place Protective Action Recommendation (PAR) to be generated.
  - ii. Release duration >1 hour.
    - 1. This selection should be made if the release duration is unknown.
    - 2. This selection will enable evacuation PARs to be generated.

**NOTE:**

In Block 3 , **IF** a General Emergency is declared AND **IF** no release is selected, **THEN** the Part 1 generator will not prompt for a selection of any of the choices below.

3. Block #3 Guidance:

- a. Select whether or not there is a release to atmosphere due to the classified event.
  - i. **IF** a release has been selected **THEN** the following options will be available:
    - 1. Release ABOVE federally approved operating Limits
    - 2. Release BELOW federally approved operating Limits
    - 3. Unmonitored release requiring further evaluation


 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>83 of 84</b>

**Attachment 9.12**  
**Quick Guides for MIDAS Operation**

Page 4 of 5

Part 1 Generator Guidance

- b. Select whether or not there is a release to water due to the classified event.
  - i. **IF** a release has been selected **THEN** the following options will be available:
    1. Release ABOVE federally approved operating Limits
    2. Release BELOW federally approved operating Limits
    3. Unmonitored release requiring further evaluation
4. Block #4 Guidance:
  - a. Answer whether this is an INITIAL PAR
    - i. An initial PAR is the first PAR of the event.
    - ii. This option is the only time that a Rapidly Progressing Severe Accident (RPSA) selection is available.
  - b. **IF** it is an INITIAL PAR, **THEN** answer whether the criteria for a RPSA have been met.
    - i. RPSA criteria are defined in IP-EP-410, Attachment 9.1.
  - c. If this is not the first PAR, select whether the PAR has changed since the last report.
    - i. If the PAR has not changed, it will not allow additional sectors to be added based on new metrological data.
    - ii. If the PAR has changed, it will automatically add new additional sectors based on new metrological data and the user will input previously affected sectors under Block 6.
5. Block #5 Guidance:
  - a. Select the PAR based on IP-EP-410. Some selections will not be available based on the selections that were previously made.
  - b. Sectors are automatically selected based on the Wind Speed, Direction, and Stability Class.
  - c. The Selection "Do Not Expand PAR for current conditions" does not update the PAR selection with the new Met Conditions. Use only if met conditions have changed but new downwind sectors are not affected by PARs.
6. Block #6 Guidance:
  - a. For notifications that are not the first PAR of the event, select the sectors that previously had a protective action associated with them.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP- 340</b>	<b>Revision 7</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b><u>84</u> of <u>84</u></b>

**Attachment 9.12**  
**Quick Guides for MIDAS Operation**

Page 5 of 5


**Part 1 Generator Guidance**

7. Block #7 Guidance:
  - a. Enter Meteorological Data (i.e., Direction, Speed, Stability Class).
8. Block #8 Guidance:
  - b. "Reported By" is the Communicator
  - c. The telephone number is a number that Offsite Response Organizations (ORO) can call.
  - d. "Yes, Emergency Director has Approved this report" must be selected to fax and email the Part 1 form to OROs.
  - e. Enter the Emergency Director's (ED) name
  - f. Select OK to generate a PDF of the Part 1 form

**NOTE:**

**CAREFULLY CHECK** the PDF printout to make sure that all times, event status, release status, new and previous PARs and affected sectors/distances and meteorological data are correct for current conditions. **IF** they are not, **THEN** exit from the Part 1 generator and begin a new Part 1 form.

9. Once approved by the ED, the form can be faxed and emailed to OROs by selecting the Fax and Email buttons.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-310</b> <b>Revision 19</b>
	<b>REFERENCE USE</b>	<b>Page</b> <u>1</u> <b>of</b> <u>22</u>

**CONTROLLED**

## Dose Assessment

Prepared by:

Dara Gray  
Print Name

*Dara Gray*  
Signature

10-1-19  
Date

Approval:


Frank J. Mitchell  
Print Name

*F. Mitchell*  
Signature

10-2-19  
Date


Effective Date: October 8, 2019

This procedure excluded from further LI-100 review

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>		<b>IP-EP-310</b>	<b>Revision 19</b>	
	<b>REFERENCE USE</b>		<b>Page</b>	<b><u>2</u></b>	<b>of <u>22</u></b>

## Table of Contents

1.0	PURPOSE .....	3
2.0	REFERENCES .....	3
3.0	DEFINITIONS.....	3
4.0	RESPONSIBILITIES.....	4
5.0	DETAILS.....	4
6.0	INTERFACES.....	10
7.0	RECORDS.....	10
8.0	REQUIREMENTS AND COMMITMENT CROSS-REFERENCE.....	10
9.0	ATTACHMENTS .....	10
9.1	SITE BOUNDARY $X_{\mu}/Q$ ( $m^{-2}$ ) BY PASQUILL STABILITY CATEGORY .....	11
9.2	$X_{\mu}/Q$ VALUES FOR OTHER DISTANCES ( $m^{-2}$ ) .....	13
9.3	REUTER-STOKES LOCATION $X_{\mu}/Q$ VALUES ( $m^{-2}$ ) .....	14
9.4	ACCIDENT MONITORING OF NOBLE GAS CONCENTRATION IN THE PLANT VENT .....	15
9.5	DETERMINATION OF NOBLE GAS RELEASE RATE - DISCUSSION.....	17
9.6	DETERMINATION OF NOBLE GAS TO IODINE CONCENTRATION AND DOSE RATE RATIOS FROM FIELD MONITORING DATA .....	19
9.7	USE OF CHEMISTRY SAMPLE TO DETERMINE RADIOIODINE RELEASE RATE & THYROID DOSE CONVERSION FACTOR .....	21

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-310</b>	<b>Revision 19</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>3 of 22</b>

## 1.0 PURPOSE


To describe the methods of estimating the whole body and thyroid dose to the offsite population in the event of an accidental release of radioactivity to the environment. A manual method of calculation is provided in case the computer method is unavailable.

## 2.0 REFERENCES

- 2.1 IP-EP-330, Airborne Sample Analysis
- 2.2 IP-EP-340, Meteorological Information and Dose Assessment System (MIDAS)
- 2.3 IP-EP-510, Meteorological, Radiological & Plant Data Acquisition System
- 2.4 IP-2 Manual Determination of Release Rate (Form EP-17)
- 2.5 IP-3 Manual Determination of Release Rate (Form EP-18)
- 2.6 Manual Dose Assessment Worksheet (Form EP-13)
- 2.7 IPEC Manual Dose Assessment Worksheet/Back-Calculating Release Rate from Field Data (Form EP-19)
- 2.8 IPEC Manual Dose Assessment Worksheet/Estimating Containment Activity via R-25 / 26 (Form EP-11)
- 2.9 Determination of Radioactive Airborne Concentrations (Form EP-32)

## 3.0 DEFINITIONS

- 3.1 Meteorological Information and Data Acquisition System (MIDAS) - the computer system that collects radiation monitor data, meteorological data, and calculates/displays offsite radiation doses.
- 3.2 Meteorological, Radiological, and Plant Data Acquisition System (MRP-DAS) – the system which provides meteorological, Reuter Stokes and certain plant parameter data (VC Temperature, VC Pressure, Plant Vent and VC High Radiation Monitors)
- 3.3 Total Effective Dose Equivalent (TEDE) – The sum of the Deep Dose Equivalent (DDE) and the Committed Effective Dose Equivalent (CEDE).
- 3.4 Committed Effective Dose Equivalent – The sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues.
- 3.5 Committed Dose Equivalent-Thyroid (CDE-Thy) - The committed dose from an intake of radioactive material to a body organ (i.e., thyroid).

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-310</b>	<b>Revision 19</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>4 of 22</b>

- 3.6 Site Boundary – For Dose Assessment and Protective Action Recommendation purposes, the Site Boundary is the closest distance at which members of the public would be exposed to a radioactive release. When the plume is traveling toward the water, the distance to the nearest point on the opposite side of Hudson River will be considered as the Site Boundary.
- 3.7 Release - as it is used at IPEC for Emergency Planning is defined as “A release of radioactive materials due to the classified event” (per NYS Radiological Emergency Data Form, Part 1 ).  
In accordance with the Part 1 form, “Release” is classified as one of the 4 following descriptions:
- A. NO Release
  - B. Release BELOW Federal Limits
  - C. Release ABOVE Federal Limits
  - D. Unmonitored Release Requiring Evaluation

#### 4.0 **RESPONSIBILITIES**

Dose Assessment staff in the Control Room (CR) and in the Emergency Operations Facility (EOF) are responsible for assessing actual and potential radioactive releases to the environment in an emergency.


#### 5.0 **DETAILS**

##### **NOTE**

All forms specified in Section 5.0 are provided in IP-EP-115.

- 5.1 Determine if there is a plant release above Federal Limits based on the following table:

Release Point	Unit	Rad Monitor	Reading that is >TS
Plant Vent	U2 or U3	R-27	1.3 E+5 uCi/sec
Plant Vent	U2	R-44	5.7 E-3 uCi/cc
Plant Vent	U3	R-14	4.0 E-3 uCi/cc
Main Steam Line – SGTR	U2	R-28, R-29, R-30, R-31	SGTR is considered a release > TS
Main Steam Line – SGTR	U3	R-62A, R-62B, R-62C, R-62D	
Hole in Containment	U2 or U3	R-25, R-26	1R/hr above background


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	<b>REFERENCE USE</b>		<b>Page</b>	<b><u>5</u></b>	<b>of <u>22</u></b>

- 5.2 Upon activation of the IPEC ERO and as the IPEC Plant Conditions require, perform dose assessment. When performing the Dose Assessment function, use MIDAS (IP-EP-340) as the primary method. If there is no access to a dose assessment software program, dose assessment is to be completed using Hand Calculations (Section 5.4).
- 5.3 Necessary information to perform Dose Assessment is available using MRP-DAS (IP-EP-510).
- 5.4 Hand calculations for dose assessment are to be performed if the necessary dose assessment software is not available. Perform hand calculations as follows:

**NOTE:**

**IF** a General Emergency has been declared, **THEN** use IP-EP-410 "Protective Action Recommendations" to determine what protective action recommendations should be conveyed to the ED/RAC. Ensure the EPM in the TSC is made aware of any Protective Action Recommendations.

- 5.4.1 Obtain the proper release rate calculation form (Form EP-17 for Unit 2 and Form EP-18 for Unit 3).
- 5.4.2 Determine radioactive release concentration or rate ( $\mu\text{Ci/cc}$ ,  $\mu\text{Ci/sec}$ , OR CPM) and enter onto the appropriate Release Rate calculation form (Form EP-17 for Unit 2 or Form EP-18 for Unit 3). Values determined from installed radiation monitors OR via a Chemistry sample may be entered directly into the Release Rate calculation form:
- a. **IF** a Chemistry sample is available, **THEN** use Attachment 9.7 to calculate the radioiodine release rate.
  - b. **IF** the plant vent survey is to be used, **THEN**:
    1. Follow guidance provided in Attachment 9.4, Accident Monitoring of Noble Gas Concentration in the Plant Vent.
    2. Convert contact field reading on the plant vent to  $\mu\text{Ci/cc}$  using conversion factor for appropriate time after shutdown, obtained from the appropriate Release Rate calculation form (Form EP-17 for Unit 2 and Form EP-18 for Unit 3).
  - c. **IF** back-calculating the Noble Gas release rate (NGRR) from field readings, **THEN** use Form EP-19.
  - d. **IF** using R-25 or R-26 to calculate the Noble Gas release rate (NGRR), **THEN** use Form EP-11.
  - e. **IF** back-calculating the release rate from airborne samples, **THEN** refer to IP-EP-330, Airborne Sample Analysis, and Attachment 9.5.


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	<b>REFERENCE USE</b>		<b>Page</b>	<b><u>6</u></b>	<b>of <u>22</u></b>

- 5.4.3 If Noble Gas concentrations ( $\mu\text{Ci/cc}$ ) are entered in the Release Rate calculation form (Form EP-17 for Unit 2 or EP-18 for Unit 3), use the proper equation(s) on the appropriate section of the Release Rate calculation form to calculate the Noble Gas Release Rate (NGRR).
- 5.4.4 Calculate the radioiodine release rate (Ci/sec) using the default equation (with the assumed NG/I ratio for the release point) on the appropriate Release Rate calculation form (Form EP-17 for Unit 2 and EP-18 for Unit 3).
- IF** a chemistry sample is available, **THEN** use Attachment 9.7 to:
- Calculate the radioiodine release rate, and
  - Determine the sample-specific thyroid dose conversion factor.
- 5.4.5 Obtain the appropriate  $X_{\mu}/Q_s$  from Attachment 9.1 or 9.2. Record these values on the Manual Dose Assessment Worksheet (Form EP-13).
- 5.4.6 Obtain meteorological data in accordance with IP-EP-510.
- 5.4.7 Enter the release rates (RR), wind speed (WS) AND appropriate constants on the Manual Dose Assessment Worksheet (Form EP-13).
- 5.4.8 Determine the TEDE (Whole Body) AND CDE-Thy dose rates at the site boundary, 2, 5, AND 10 mile distances. (Form EP-13)

**NOTE**

Use four (4) hours as the default release duration, unless information exists that clearly supports a different release duration.

- 5.4.9 Determine exposure rates if desired, at other distances utilizing the  $X_{\mu}/Q$  values from Attachment 9.2.
- 5.4.10 Determine required Protective Action Recommendations (Procedure IP-EP-410, Attachment 9.1), **IF** the projected or actual doses at any offsite location exceed the following:
- 1 Rem Integrated Dose TEDE, or
  - 5 Rem Integrated Dose CDE-Thy
- THEN:**
- If in the CR, inform the Shift Manager (SM)/Emergency Director (ED).
  - If in the Emergency Operations Facility (EOF)/ Alternate Emergency Operations Facility (AEOF), inform the Radiological Assessment Coordinator.

 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-310</b>	<b>Revision 19</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>7 of 22</b>

5.4.11 **IF** there is a radioactive release, **THEN** contact Chemistry / Environmental Personnel as time permits to determine if it is above the Reportable Quantities set forth in 40 CFR302, Appendix B. If so, ensure the reportability requirements specified in IP-SMM-LI-108 are met within 24 hours.

5.4.12 **IF** there is a radioactive release to the environment above Federal limits (using the table in step 5.1), **THEN** complete Parts I & II of New York State Radiological Data Form (Forms EP-1 and EP-2) These forms can be filled in by hand or refer to procedure IP-EP-340, "Meteorological Information and Dose Assessment System" to have MIDAS automatically print out these forms.

5.4.13 "New York State Radiological Emergency Data Form – Part II" (Form EP-2) **SHALL** be completed and transmitted:


- As soon as possible after it has been determined that a release above Federal Limits exists.
- If there is a significant change in the radioactive release.
- With updates approximately every 30 minutes; time interval may be lengthened with concurrence of offsite agencies.

5.4.14 **IF** electronic emailing and faxing using MIDAS is not operational, **THEN** process the NYS Radiological Emergency Data Form Parts I & II (Forms EP-1 and EP-2) as follows:


- Receive form(s) from the Offsite Communicator, verifying that the form(s) are signed by the Emergency Director (ED).
- Telecopy form(s) to NYS, Counties and JIC.
- Maintain Fax Report (printed from the fax machine) as record.
- Make and distribute copies of the form to NRC, FEMA, State and County representatives in the EOF.
- Return original form and 2 copies to the Offsite Communicator.

5.4.15 To help visualize plume location, MIDAS plume data can be displayed directly from the MIDAS program or a MIDAS shape file can be exported to a Geographical Information System mapping software program in the EOF for display. Use IP-EP-410, Attachment 9.4 or the overlay book cover for manual plume visualization on the overlay table.

5.5 In the EOF only:


 <b>IPEC EMERGENCY PLAN IMPLEMENTING PROCEDURES</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-310</b>	<b>Revision 19</b>
	<b>REFERENCE USE</b>	<b>Page</b>	<b>8 of 22</b>

- 5.5.1 Calculate projected doses using MIDAS, or manual methods.
- 5.5.2 If available, verify projected doses with actual field radiological data.
- 5.5.3 At the earliest time when offsite radioiodine concentration is available, calculate the ratios of noble gas to iodine concentrations and corresponding dose rates using Attachment 9.6. Report the concentration ratio to the stakeholders on the Part II Form, Field Measurement Section.
  - a. Obtain a closed window gamma reading in the plume (mrem/hr).
  - b. Obtain iodine concentration in the plume (uCi/cc).
  - c. Convert gamma dose rate to noble gas concentration.
  - d. Calculate the ratio of noble gas concentration to iodine concentration.
  - e. Calculate the ratio of whole body dose rate to thyroid dose rate.
    - 1. **IF** the dose rate ratio is about 0.2 or higher, **THEN** noble gas (whole body/TEDE) dose rates will be more limiting than iodine (CDE-Thy) dose rates. Evaluate protective actions for possible changes.
    - 2. **IF** the dose rate ratio is less than about 0.2, **THEN** iodine (CDE-Thy) dose rates will be more limiting than noble gas (whole body/TEDE) dose rates. Evaluate protective actions for possible changes.
- 5.5.4 **IF** offsite gamma dose rates are available, **THEN** verify release rates determined from plant data using the "IPEC Manual Dose Assessment Worksheet/Back-Calculating Release Rate from Field Data" (Form EP-19).
- 5.5.5 Review Site Perimeter surveys.
- 5.5.6 Review Field Surveys.
- 5.5.7 Review current and historical Reuter Stokes data, to determine if a release has occurred or is occurring. Attachment 9.3, "Reuter-Stokes Location  $X_{\mu}/Q$  Values" provides  $X_{\mu}/Q$  values for comparison purposes.
- 5.5.8 Exchange offsite monitoring and projected data with State and Counties.

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	<b>REFERENCE USE</b>		<b>Page</b>	<b><u>9</u></b>	<b>of <u>22</u></b>

5.5.9 If required, estimate release rates utilizing High Range Vapor Containment radiation monitors R-25/26 (Form EP-11).

5.5.10 If Core Damage Assessment results are available from the TSC, compare the results with the current dose assessment.

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	<b>REFERENCE USE</b>		<b>Page</b>	<b><u>10</u> of <u>22</u></b>

## 6.0 INTERFACES

- 6.1 IP-EP-410, Protective Action Recommendations
- 6.2 IP-EP-340, Meteorological Information and Dose Assessment System (MIDAS)
- 6.3 IP-EP-510, Meteorological, Radiological & Plant Data Acquisition System
- 6.4 Westchester, Rockland, Putnam, Orange County Radiological Emergency Response Plans
- 6.5 2-CY-3940, Plant Vent Sampling During Accident Conditions
- 6.6 3-CY-3920, Sampling Containment Atmosphere and Plant Vent During Accident Conditions
- 6.7 IP-SMM-LI-108, Event Notification and Reporting

## 7.0 RECORDS

Forms and reports completed during an actual emergency are permanent records.

## 8.0 REQUIREMENTS AND COMMITMENT CROSS-REFERENCE

IPEC Emergency Plan

## 9.0 ATTACHMENTS

- 9.1 Site Boundary  $X\mu/Q$  ( $m^{-2}$ ) by Pasquill Stability Category
- 9.2  $X\mu/Q$  ( $m^{-2}$ ) Values for Other Distances
- 9.3 Reuter-Stokes Location  $X\mu/Q$  ( $m^{-2}$ ) Values
- 9.4 Accident Monitoring of Noble Gas Concentration in the Plant Vent
- 9.5 Determination of Noble Gas Release Rate – Discussion
- 9.6 Determination of Noble Gas to Iodine Concentration and Dose Rate Ratios from Field Monitoring Data
- 9.7 Use of Chemistry Sample to Determine Radioiodine Release Rate and Thyroid Dose Conversion Factor



Attachment 9.1

**Site Boundary  $X_{\mu}/Q$  ( $m^2$ ) by Pasquill Stability Category**  
Cross Valley (Wind Direction from 210° – 348° or Wind Speed > 4 m/s)  
Sheet 1 of 2

<u>Sector</u>	<u>Wind From</u>	<u>Distance (Meters)</u>	<u>Pasquill Categories</u>						
			A	B	C	D	E	F	G
1*	168.7° to 191.2°	2977	5.5 E-7	9.0 E-7	5.7 E-6	2.1 E-5	4.3 E-5	1.1 E-4	2.0 E-4
2*	191.2° to 213.7°	3234	5.2 E-7	1.0 E-6	5.0 E-6	1.9 E-5	3.9 E-5	9.6 E-5	1.8 E-4
3	213.7° to 236.2°	716	3.6 E-6	2.0 E-5	5.3 E-5	1.5 E-4	2.7 E-4	4.9 E-4	7.1 E-4
4	236.2° to 258.7°	701	3.7 E-6	2.0 E-5	5.4 E-5	1.6 E-4	2.7 E-4	5.0 E-4	7.2 E-4
5	258.7° to 281.2°	762	3.2 E-6	1.8 E-5	4.8 E-5	1.4 E-4	2.5 E-4	4.7 E-4	6.8 E-4
6	281.2° to 303.7°	625	4.7 E-6	2.5 E-5	6.4 E-5	1.8 E-4	3.1 E-4	5.5 E-4	7.9 E-4
7	303.7° to 326.2°	610	4.9 E-6	2.6 E-5	6.6 E-5	1.9 E-4	3.2 E-4	5.6 E-4	8.0 E-4
8	326.2° to 348.7°	701	3.7 E-6	2.0 E-5	5.4 E-5	1.6 E-4	2.7 E-4	5.0 E-4	7.2 E-5
9	348.7° to 11.2°	1006	2.1 E-6	1.0 E-5	3.2 E-5	9.9 E-5	1.8 E-4	3.6 E-4	5.4 E-4
10	11.2° to 33.7°	1006	2.1 E-6	1.0 E-5	3.2 E-5	9.9 E-5	1.8 E-4	3.6 E-4	5.4 E-4
11	33.7° to 56.2°	488	7.7 E-6	3.6 E-5	8.8 E-5	2.5 E-4	4.0 E-4	6.7 E-4	9.2 E-4
12*	56.2° to 78.7°	2349	6.6 E-7	1.5 E-6	8.3 E-6	3.0 E-5	6.0 E-5	1.4 E-4	2.6 E-4
13*	78.7° to 101.2°	1802	8.1 E-7	3.2 E-6	1.3 E-5	4.3 E-5	8.5 E-5	1.9 E-4	3.3 E-4
14*	101.2° to 123.7°	1689	9.0 E-7	3.7 E-6	1.4 E-5	4.8 E-5	9.2 E-5	2.0 E-4	3.5 E-4
15*	123.7° to 146.2°	1432	1.2 E-6	5.1 E-6	1.9 E-5	6.1 E-5	1.2 E-4	2.4 E-4	4.0 E-4
16*	146.2° to 168.7°	1416	1.2 E-6	5.2 E-6	1.9 E-5	6.2 E-5	1.2 E-4	2.5 E-4	4.0 E-4

\* Plume for these sectors goes over the water before it touches public or private land. Site boundary in these cases is taken to be the landfall point at the sector center.



Attachment 9.1

Sheet 2 of 2

**Site Boundary  $X_{\mu}/Q$  ( $m^{-2}$ ) by Pasquill Stability Category**  
Up Valley Plumes (wind speed  $\leq 4$  m/s) Wind Direction from  $102^{\circ} - 209^{\circ}$  (1)

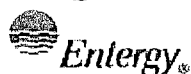
<u>Pasquill Categories</u>						
A	B	C	D	E	F	G
5.2 E-7	1.0 E-6	5.0 E-6	1.9 E-5	3.9 E-5	9.6 E-5	1.8 E-4

**Site Boundary  $X_{\mu}/Q$  ( $m^{-2}$ ) by Pasquill Stability Category**  
Down Valley Plumes (wind speed  $\leq 4$  m/s) Wind Direction from  $349^{\circ} - 101^{\circ}$  (2)

<u>Pasquill Categories</u>						
A	B	C	D	E	F	G
3.7 E-6	1.0 E-5	3.2 E-5	9.9 E-5	1.8 E-4	3.6 E-4	5.4 E-4

(1) Plume centerline will always cross the site boundary at Sector 2. Therefore, the Sector 2  $X_{\mu}/Q$  values are used.

(2) Plume centerline will cross the site boundary at either Sector 8 (Pasquill Category A) or Sector 10 (for Pasquill Category B – G)




Attachment 9.2

X<sub>μ</sub>/Q Values for other Distances (m<sup>-2</sup>)


Sheet 1 of 1

<u>Miles</u>	<u>Distance (Meters)</u>	<u>Pasquill Categories</u>						
		A	B	C	D	E	F	G
1.0	1608	9.5 E-7	4.0 E-6	1.5 E-5	5.0 E-5	9.0 E-5	2.1 E-4	3.4 E-4
1.5	2412	6.3 E-7	2.1 E-6	1.1 E-5	2.0 E-5	5.4 E-5	1.3 E-4	2.2 E-4
<b>2.0</b>	<b>3216</b>	<b>5.2 E-7</b>	<b>8.3 E-7</b>	<b>5.0 E-6</b>	<b>1.9 E-5</b>	<b>3.9 E-5</b>	<b>9.6 E-5</b>	<b>1.8 E-4</b>
2.5	4020	4.4 E-7	5.8 E-7	3.5 E-6	1.4 E-5	3.7 E-5	7.0 E-5	1.7 E-4
3.0	4824	3.6 E-7	5.0 E-7	2.8 E-6	1.0 E-5	2.2 E-5	5.7 E-5	1.3 E-4
3.5	5628	3.2 E-7	4.2 E-7	2.0 E-6	8.1 E-6	1.8 E-5	4.7 E-5	1.1 E-4
4.0	6432	2.8 E-7	3.7 E-7	1.6 E-6	6.8 E-6	1.5 E-5	4.0 E-5	9.4 E-5
4.5	7236	2.6 E-7	3.5 E-7	1.4 E-6	5.8 E-6	1.3 E-5	3.5 E-5	7.3 E-5
<b>5.0</b>	<b>8040</b>	<b>2.4 E-7</b>	<b>3.2 E-7</b>	<b>1.2 E-6</b>	<b>5.1 E-6</b>	<b>1.1 E-5</b>	<b>3.1 E-5</b>	<b>6.7 E-5</b>
5.5	8844	2.1 E-7	3.1 E-7	9.9 E-7	4.4 E-6	1.0 E-5	2.8 E-5	5.9 E-5
6.0	9648	2.0 E-7	2.7 E-7	8.3 E-7	3.8 E-6	9.1 E-6	2.5 E-5	5.4 E-5
6.5	10452	1.9 E-7	2.5 E-7	7.5 E-7	3.5 E-6	8.2 E-6	2.3 E-5	5.0 E-5
7.0	11256	1.8 E-7	2.4 E-7	6.7 E-7	3.2 E-6	7.5 E-6	2.1 E-5	4.7 E-5
7.5	12060	1.7 E-7	2.3 E-7	6.1 E-7	3.0 E-6	6.9 E-6	1.9 E-5	4.3 E-5
8.0	12864	1.6 E-7	2.2 E-7	5.5 E-7	2.7 E-6	6.3 E-6	1.8 E-5	4.1 E-5
8.5	13668	1.5 E-7	2.1 E-7	5.0 E-7	2.5 E-6	5.8 E-6	1.7 E-5	3.8 E-5
9.0	14472	1.5 E-7	2.0 E-7	4.6 E-7	2.3 E-6	5.5 E-6	1.6 E-5	3.6 E-5
9.5	15276	1.4 E-7	1.9 E-7	4.2 E-7	2.1 E-6	5.4 E-6	1.5 E-5	3.4 E-5
<b>10.0</b>	<b>16080</b>	<b>1.4 E-7</b>	<b>1.8 E-7</b>	<b>4.0 E-7</b>	<b>2.1 E-6</b>	<b>5.3 E-6</b>	<b>1.5 E-5</b>	<b>3.4 E-5</b>

	<b>IPEC SITE EMERGENCY PLAN IMPLEMENTING PROCEDURE</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-310      Revision 18</b>
		<b>REFERENCE USE</b>	<b>Page <u>14</u>      Of <u>22</u></b>

Attachment 9.3  
**Reuter-Stokes Location  $X\mu/Q$  Values ( $m^{-2}$ )**  
Sheet 1 of 1

		Stability Class						
Sector Monitor Distance (m)		A	B	C	D	E	F	G
1	3226	5.3E-7	8.4E-7	5.1E-6	1.9E-5	4.0E-5	9.8E-5	1.8E-4
2	3379	5.2E-7	8.3E-7	5.0E-6	1.8E-5	3.9E-5	9.7E-5	1.7E-4
3	2574	6.3E-7	1.2E-6	7.3E-6	2.6E-5	5.3E-5	1.2E-4	2.4E-4
4	1448	1.2E-6	4.6E-6	1.8E-5	6.1E-5	1.1E-4	2.4E-4	3.9E-4
5	1287	1.4E-6	6.4E-6	2.3E-5	7.3E-5	1.4E-4	2.8E-4	4.4E-4
6	643	4.3E-6	2.2E-5	6.0E-5	1.8E-4	3.0E-4	5.5E-4	7.7E-4
7	643	4.3E-6	2.2E-5	6.0E-5	1.8E-4	3.0E-4	5.5E-4	7.7E-4
8	804	2.9E-6	1.7E-5	4.5E-5	1.3E-4	2.4E-4	4.5E-4	6.6E-4
9	1126	1.8E-6	8.5E-6	2.6E-5	8.1E-5	1.5E-4	3.2E-4	4.9E-4
10	1287	1.4E-6	6.4E-6	2.3E-5	7.3E-5	1.4E-4	2.8E-4	4.4E-4
11	1287	1.4E-6	6.4E-6	2.3E-5	7.3E-5	1.4E-4	2.8E-4	4.4E-4
12	2494	6.4E-7	1.3E-6	7.5E-6	2.7E-5	5.6E-5	1.2E-4	2.4E-4
13	1870	8.0E-7	2.7E-6	1.2E-5	4.2E-5	8.1E-5	1.8E-4	3.2E-4
14	1870	8.0E-7	2.7E-6	1.2E-5	4.2E-5	8.1E-5	1.8E-4	3.2E-4
15	1648	9.4E-7	3.9E-6	1.5E-5	5.0E-5	9.7E-5	2.1E-4	3.6E-4
16	1770	8.4E-7	3.3E-6	1.3E-5	4.5E-5	8.8E-5	1.9E-4	3.4E-4

	<b>IPEC SITE EMERGENCY PLAN IMPLEMENTING PROCEDURE</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-310      Revision 18</b>
		<b>REFERENCE USE</b>	<b>Page    <u>15</u>      Of      <u>22</u></b>

Attachment 9.4

**Accident Monitoring of Noble Gas Concentrations in the Plant Vent**


Sheet 1 of 2

**NOTE**

1. The Operations Support Center (OSC) Rad/Chem Coordinator will determine which reading to obtain first; plant vent or back-up plant vent monitoring.
2. Locations and equipment may be different from Unit 2 or Unit 3

Radiation readings may be obtained on the plant vent by the following:

- a. Follow the provisions used by the OSC to plan and track team assignments.
- b. Use a telescoping radiation monitoring instrument (e.g. teletector or equivalent) to perform this function.
- c. As requested by OSC Rad/Chem Coordinator or Control Room (CR),  
**REPORT** radiation levels.
- d. Proceed to the Containment Airlock area.
- e. Using the fan-building wall for shielding, obtain radiation readings by Vapor Containment purge and exhaust ducts.
- f. **CAUTION**  
The door leading out to the plant vent area may lock when closed. To prevent being trapped in the plant vent area, **BLOCK OPEN THE DOOR** prior to going to the plant vent area.
- g. Proceed through the door to the plant vent area.
- h. Obtain radiation readings at the following locations:
  - i. 6 feet from the plant vent 10 feet above the floor.
  - j. Contact with the plant vent 10 feet above the floor.
- k. Notify the OSC or CR that radiation readings have been obtained and follow instructions as directed.

 <b>IPEC SITE EMERGENCY PLAN IMPLEMENTING PROCEDURE</b>	<b>NON-QUALITY RELATED PROCEDURE</b>		<b>IP-EP-310      Revision 18</b>	
	<b>REFERENCE USE</b>		<b>Page</b> <u>16</u>	<b>Of</b> <u>22</u>


Attachment 9.4

**Accident Monitoring of Noble Gas Concentrations in the Plant Vent**

Sheet 2 of 2

Backup plant vent monitoring readings may be obtained by the following:


- a. Request a team be dispatched to obtain and analyze Plant Vent Sample.
- b. **IF** a sample from the plant vent is required from Unit 2 **THEN** follow chemistry procedure 2-CY-3940 "Plant Vent Sampling During Accident Conditions"
- c. **IF** a sample from the plant vent is required from Unit 3 **THEN** follow Chemistry procedure 3-CY-3920 "Sampling Containment Atmosphere and Plant Vent During Accident Conditions"
- d. Report the results to the OSC or CR and **FOLLOW INSTRUCTIONS** as directed.

	IPEC SITE EMERGENCY PLAN IMPLEMENTING PROCEDURE	NON-QUALITY RELATED PROCEDURE	IP-EP-310      Revision 18
		REFERENCE USE	Page <u>17</u> Of <u>22</u>

Attachment 9.5  
**Determination of Noble Gas Release Rate – Discussion**  
Sheet 1 of 2

The following instrumentation/methodology can be used to determine the noble gas release rate.

- Plant vent monitor-low range (Direct Readout)
- Plant vent monitor-high range (Direct Readout)
- Plant vent survey-hand held instrument or remote readout
- Isotopic analysis of sample taken from release point
- Condenser air ejector monitor (Direct Readout).
- Main steam line monitors.
- Back-calculating a release rate based on actual field radiological data.
- Containment radiation monitors R-25 and R-26 to measure the source term within containment and to estimate potential releases from containment.
- Potential exposure to the population if a future release of the existing containment source term occurs, utilizing the following information:
  1. Containment pressure relief line contains three isolation valves (one in containment and two outside).
  2. Containment purge system contains two isolation valves on the Inlet Duct (one in containment and one outside).
  3. Containment purge system contains two isolation valves on the Exhaust Duct (one in containment and one outside).
  4. Weld Channel (WC) and Isolation Valve Seal Water System (IVSWS) are pressurized to ensure that during accident conditions, a pressure build up to **AT LEAST** 50 psi in containment would **NOT** cause a leak of radioactive material to the environment as long as the isolation valves remained in the closed position.


 <b>IPEC SITE EMERGENCY PLAN IMPLEMENTING PROCEDURE</b>	<b>NON-QUALITY RELATED PROCEDURE</b>		<b>IP-EP-310</b>	<b>Revision 18</b>
	<b>REFERENCE USE</b>		<b>Page 18</b>	<b>Of 22</b>

Attachment 9.5

**Determination of Noble Gas Release Rate – Discussion**  
Sheet 2 of 2

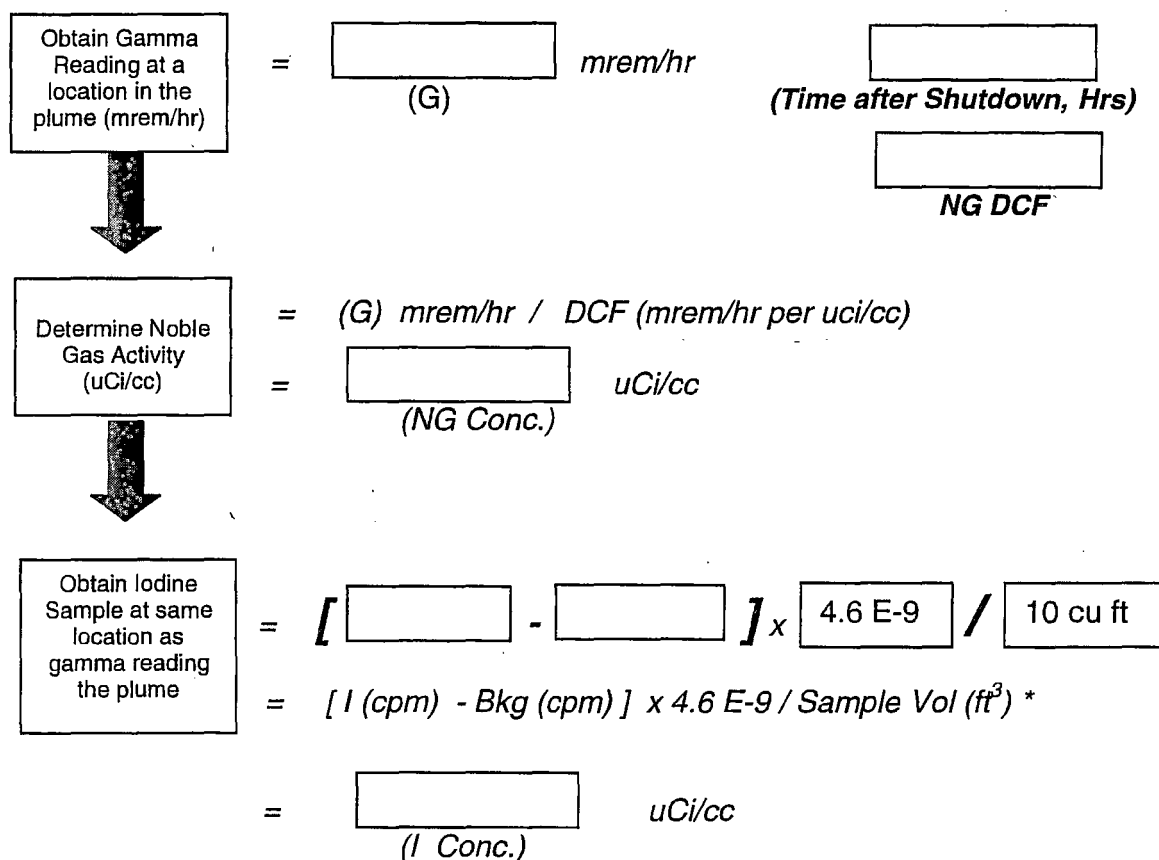
5. WITHOUT WC AND IVSWS, BUT with isolation valves closed, the containment leak rate is expected to be LESS THAN 0.1% of the containment volume per day (Tech Spec) WITH a pressure buildup to 50 psi inside containment. At lower pressures the leak rate would be smaller, approaching zero as the pressure differential approaches zero.
6. Containment Volume =  $2.6 \times 10^6 \text{ ft}^3 = 7.4 \times 10^{10} \text{ cc}$
7. For Post-Steam Generator Tube Rupture (SGTR) cool-down using blow-down situations, the determination of the gaseous release rate from the blowdown flash tank **SHALL** be accomplished by determining the noble gas concentration in the faulted SG blowdown (Chem sample  $\mu\text{Ci/cc}$ ) AND the blowdown rate (GPM).
8. Complete Form EP-32, Determination of Radioactive Airborne Concentrations by using the following general formula when applying Airborne Sample Data to determine concentration or release rate. This is for a 10 cubic foot sample.
  - a. NG Release Concentration,  $\mu\text{Ci/cc}$  =
 
$$\frac{\text{mR/hr in field}}{\text{DCF, mR/hr per } \mu\text{Ci/cc}}$$
  - b. NG Release Rate, Ci/sec =
 
$$\frac{\text{Concentration}(\text{Ci/m}^3) * \text{Wind Speed (m/sec)}}{X\mu/Q (\text{m}^{-2})}$$

Note That  $\mu\text{Ci/cc} = \text{Ci/m}^3$

 <b>IPEC SITE EMERGENCY PLAN IMPLEMENTING PROCEDURE</b>	<b>NON-QUALITY RELATED PROCEDURE</b>		<b>IP-EP-310</b>	<b>Revision 18</b>
	<b>REFERENCE USE</b>		<b>Page 19</b>	<b>Of 22</b>


Attachment 9.6  
**Determination of Noble Gas to Iodine Concentration and Dose Rate Ratios from  
Field Monitoring Data**  
Sheet 1 of 2

**Part 1 – Flow Chart – Gamma Dose Rates, and NG and Iodine Air Sample  
Concentrations**



\* Equation based on frisker efficiency (of about 0.0034 cpm/dpm) and the conversions of dpm to uCi and cu. ft. to cc.

NOBLE GAS DOSE CONVERSION FACTORS			
K1 Whole Body at Time After Shutdown for Noble Gas Dose			
Time after shutdown (hours)	Noble Gas DCF (mRem/hr per uCi/cc)	Time after shutdown (hours)	Noble Gas DCF (mRem/hr per uCi/cc)
0 - 1.5 Hours	4.7E+5	4.5 - 6.5 Hours	1.7E+5
1.5 - 2.5 Hours	2.8E+5	6.5 - 12.5 Hours	1.2E+5
2.5 - 3.5 Hours	2.3E+5	> 12.5 Hours	5.8E+4
3.5 - 4.5 Hours	2.0E+5		

 <b>IPEC SITE EMERGENCY PLAN IMPLEMENTING PROCEDURE</b>	<b>NON-QUALITY RELATED PROCEDURE</b>		<b>IP-EP-310</b>	<b>Revision 18</b>
	<b>REFERENCE USE</b>		<b>Page</b> <u>20</u>	<b>Of</b> <u>22</u>

Attachment 9.6  
**Determination of Noble Gas to Iodine Concentration and Dose Rate Ratios from  
Field Monitoring Data**  
Sheet 2 of 2

**Part 2 – Flow Chart – Ratio Determinations**

	<b>Concentration (uCi/cc)</b>	<b>Dose Conversion Factor (mrem/hr per uCi/cc)</b>	<b>Dose Rate (mrem/hour)</b>
<b>Noble Gas</b>			<i>(Whole Body)</i>
<b>Iodines*</b>		<b>8.0 E+8</b>	<b>(CDE-Thy)</b>
<b>Ratio NG/ Iodine (Whole Body/ CDE-Thy)</b>	<b>(1)</b>	<b>N/A</b>	<b>(2)</b>

\* Note: if time is > 24 hr, then use an iodine dose conversion factor of 2.6 E+9.


**(1) NG / Iodine Concentration Ratio:**

Use NG/I concentration ratio for future release rates for dose projection calculations.

**(2) Dose Rate Ratio:**

- **IF** the dose rate ratio is about 0.2 or higher, **THEN** noble gas (whole body/TEDE) dose rates will be more limiting than iodine (CDE-Thy) dose rates. (i.e., Whole Body/TEDE will reach PAG limit before iodine/ CDE-Thy).
- **IF** the dose rate ratio is less than about 0.2, **THEN** iodine (CDE-Thy) dose rates will be more limiting than noble gas (whole body/TEDE) dose rates. (i.e., CDE-Thy dose will reach PAG limit before Whole Body/TEDE).

*Note: The above calculation is for one location at one time a few hours after plant shutdown. If practical, 3 or more such determinations of NG/I ratios from multiple locations should be performed.*

 <b>IPEC SITE EMERGENCY PLAN IMPLEMENTING PROCEDURE</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-310</b>	<b>Revision 18</b>
	<b>REFERENCE USE</b>	<b>Page 21</b>	<b>Of 22</b>

Attachment 9.7  
**Use of Chemistry Sample to Determine Radioiodine Release Rate  
and Thyroid Dose Conversion Factor**  
Sheet 1 of 2

**Part 1 – Determine Radioiodine Release Rate Based on Chem. Sample**

Multiply [iodine uCi/cc] x [volume or mass release rate] x [constant] = iodine Ci/sec

**For plant vent or air ejector:**

<b>uCi/cc iodine</b>	<b>Cfm</b>	<b>Constant (1)</b>	<b>Iodine Ci/sec</b>
		4.70E-04	

**For main steam line release**

<b>uCi/cc iodine</b>	<b>lbm/hr</b>	<b>Constant (2)</b>	<b>Iodine Ci/sec</b>
		3.2 E-6	


**For steam generator blow down release**

<b>uCi/cc iodine</b>	<b>Gpm</b>	<b>Constant (3)</b>	<b>Iodine Ci/sec</b>
		6.30E-05	

(1) constant converts uCi/cc x cfm to Ci/sec, using Ci/uCi, cc/cu ft, and min/sec

(2) constant converts uCi/cc x lbm/hr to Ci/sec, using Ci/uCi, expected steam density, and hr/sec

(3) constant converts uCi/cc x gpm to Ci/sec, using Ci/uCi, cc/gal, and min/sec

	<b>IPEC SITE EMERGENCY PLAN IMPLEMENTING PROCEDURE</b>	<b>NON-QUALITY RELATED PROCEDURE</b>	<b>IP-EP-310    Revision 18</b>
		<b>REFERENCE USE</b>	<b>Page    <u>22</u>    Of    <u>22</u></b>

Attachment 9.7

**Use of Chemistry Sample to Determine Radioiodine Release Rate  
and Thyroid Dose Conversion Factor**

Sheet 2 of 2

<b>Determination of Iodine Dose Factor Based on Chem. Sample</b>			
<b>Sample Date</b>		<b>Sample Time</b>	
<b>Sample Description and Unit of Measurement (e.g., uCi/cc)</b>			
<b>Col. 1</b>	<b>Col. 2</b>	<b>Col. 3</b>	<b>Col. 4 = Col 2 x 3</b>
<b>Iodine Isotopes</b>	<b>Thyroid Dose Conv. Factor (K2)</b>	<b>Concentration of Iodine Isotopes</b>	<b>Weighted Conversion Factor</b>
I-131	2.60E+09		
I-132	1.50E+07		
I-133	4.40E+08		
I-134	2.60E+06		
I-135	7.60E+07		
<b>Total</b>	N/A		
K2 = mrad/hr per uCi/cc Iodine (mrad CDE-Thy per hour breathed)		<b>Wtd, K2 = sum of Col. 4 divided by sum of Col. 3</b>	