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ROBERT C. MECREDY
Vice President
Nuclear Operations

July 21, 2000

U.S. Nuclear Regulatory Commission
Document Control Desk
Attn: Guy S. Vissing
Project Directorate I-1
Washington, D.C. 20555

Subject: Application for Amendment to Facility Operating License
Control Room Emergency Air Treatment System (CREATS) Applicability Change (LCO 3.3.6 and 3.7.9)
Rochester Gas and Electric Corporation
R.E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Vissing:

The enclosed License Amendment Request (LAR) proposes to revise the Ginna Station Improved Technical Specifications (ITS) associated with the Control Room Emergency Air Treatment System (CREATS) Actuation Instrumentation (LCO 3.3.6) and Control Room Emergency Air Treatment System (CREATS) (LCO 3.7.9).

The LAR is being proposed since Rochester Gas and Electric (RG&E) has determined, based on control room dose calculations, that the CREATS Actuation Instrumentation and CREATS are not required to be operable to meet GDC 19 while in MODES 5 and 6 except during core alterations and fuel movement.

In order to support a planned refueling outage which will commence in September 2000, RG&E requests approval of this LAR by October 1, 2000. This will allow for removal of a temporary modification that has been installed in support of a Generic Letter 91-18 issue and will allow for resolution of any preventative/corrective maintenance issues which may result from a planned control room envelope barrier inspection. We further request that upon NRC approval, the LAR should be considered effective immediately and implemented within 30 days.

Very truly yours,

Robert C. Mecredy

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Attachments:

I. License Amendment Request
II. No Significant Hazards Consideration Determination
III. Environmental Impact Consideration Determination
IV. Marked up copy of R.E. Ginna Nuclear Power Plant Improved Technical Specifications
V. Proposed Revised R.E. Ginna Nuclear Power Plant Improved Technical Specifications
VI. Design Analysis DA-NS-2000-057, Gas Decay Tank Rupture Offsite and Control Room Doses

xc: Mr. Guy S. Vissing (Mail Stop 8C2)
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Rochester Gas and Electric Corporation	)	Docket No. 50-244
(R.E. Ginna Nuclear Power Plant)	)	

APPLICATION FOR AMENDMENT
TO OPERATING LICENSE

Pursuant to Section 50.90 of the regulations of the U.S. Nuclear Regulatory Commission (the "Commission"), Rochester Gas and Electric Corporation ("RG&E"), holder of Facility Operating License No. DPR-18, hereby requests that the Improved Technical Specifications set forth in Appendix A to that license be amended. This request for change in Improved Technical Specifications is to revise the Control Room Emergency Air Treatment System (CREATS) Actuation Instrumentation (LCO 3.3.6) and CREATS (LCO 3.7.9) requirements to remove these systems from applicability during plant MODES 5 and 6 except during core alterations and fuel movement.

A description of the amendment request, necessary background information, and justification of the requested change are provided in Attachments I and VI. The no significant hazards consideration determination is provided as Attachment II. The environmental impact consideration determination is provided as Attachment III. A marked up copy of the current Ginna Station Improved Technical Specifications which shows the requested change is set forth in Attachment IV. The proposed revised Improved Technical Specifications are provided in Attachment V.

The evaluations set forth in Attachments I and III demonstrate that the proposed change does not involve a significant change in the types or a significant increase in the amounts of effluents or any change in the authorized power level of the facility. The proposed change also does not involve a significant hazards consideration, as documented in Attachment II.

WHEREFORE, Applicant respectfully requests that Appendix A to Facility Operating License No. DPR-18 be amended in the form attached hereto as Attachment V.

Rochester Gas and Electric Corporation

By _____
Robert C. Mecredy
Vice President
Nuclear Operations Group

Subscribed and sworn to before me
on this 21st day of July, 2000.

_____
Notary Public

SHARON P. SORTINO
Notary Public, State of New York
Registration No. 01SO6017755
Monroe County
Commission Expires December 21, 2000

Attachment I
R.E. Ginna Nuclear Power Plant

LICENSE AMENDMENT REQUEST
CONTROL ROOM EMERGENCY AIR TREATMENT SYSTEM (CREATS) ACTUATION INSTRUMENTATION AND CREATS APPLICABILITY CHANGE

This attachment provides a description of the amendment request and necessary justification for the proposed changes. The attachment is divided into four sections as follows. Section A identifies all changes to the current Ginna Station Improved Technical Specifications (ITS) while Section B provides the background and history associated with the changes being requested. Section C provides detailed justification for the proposed changes. Section D lists all references used in Attachments I, II, and III.

A. DESCRIPTION OF AMENDMENT REQUEST

This License Amendment Request (LAR) proposes to revise Ginna Station ITS to remove the requirement for the CREATS and the CREATS actuation instrumentation during plant MODES 5 and 6. The changes are summarized below and shown in Attachments IV and V.

1. LCO 3.3.6

   a. The Applicability section will be revised to remove the reference to MODES 5 and 6, and to add a reference to CORE ALTERATIONS.

   b. Condition C will be revised to remove the reference to MODES 5 and 6, and to add a reference to CORE ALTERATIONS. The Required Action to restore channels(s) to OPERABLE status immediately will be removed.

2. LCO 3.7.9

   II The Applicability section will be revised to remove the reference to MODES 5 and 6, and to add a reference to CORE ALTERATIONS.

   II Condition D will be revised to remove the reference to MODES 5 and 6, and to add a reference to CORE ALTERATIONS.

   II Condition F will be revised to remove the reference to MODES 5 and 6, and to add a reference to CORE ALTERATIONS. The Required Action to restore one isolation damper to OPERABLE status immediately will be removed.

B. BACKGROUND

B.1 History

On February 13, 1996, the NRC issued Amendment No. 61 (Reference 1) to the Ginna Station Technical Specifications. This amendment replaced the existing Ginna Station Technical Specifications in their entirety with ITS that were based on NUREG-1431, Standard Technical Specifications for Westinghouse Plants. Included within the ITS was a more restrictive change to the CREATS applicability requirements. Previously, the existing TS required the CREATS to be operable only when equal to or greater than 350°F. The applicability in ITS was revised to require the CREATS to be operable in Modes 1 through 6 and during movement of irradiated fuel assemblies. Additionally, the existing TS at the time required the CREATS detection systems (radiation and toxic gas) to be operable at all times. The applicability change for CREATS was proposed to correct the discrepancy between the CREATS requirements and the CREATS actuation instrumentation requirements in the existing TS. The radiological concern during Modes 5 and 6 was the lack of a current control room dose analysis for the potential failure of a waste gas decay tank. As a result, the only time that the control room envelope can be opened, other than access doors, is when the reactor is defueled.

Due to the heightened awareness in the industry surrounding control room envelopes, RG&E has been actively pursuing the implementation of a control room barrier inspection program. To perform preventative/corrective maintenance on the barriers as the result of the inspection or to perform plant modifications would require the reactor to be offloaded under the current ITS. One example of this type of issue is a currently installed temporary modification to a flexible connection on the CREATS which was installed as a compensatory measure under Generic Letter 91-18. The removal of this temporary modification and replacement of the flexible connection can only be performed when the reactor is defueled. The refueling outage planned for September 2000 does not include offloading the core. As such, removal of the temporary modification can not be implemented until the following refueling outage in the spring of 2002. This long time frame in which a temporary modification is installed conflicts with Ginna Station management expectations and the expectations of GL 91-18. To offload the reactor core for the sole purpose of removing a temporary modification on the control room ventilation system is an increase in the risk of the potential for a fuel handling event. The discussion which follows shows that the CREATS is not required to meet GDC 19 limits in MODES 5 and 6 except during core alterations and fuel movement. Consequently, approval of this LAR would support removal of a temporary modification and provide the ability to implement an improved preventative maintenance program or modification of the control room envelope.

No hardware changes are required as a result of this Improved Technical Specification change.

C. JUSTIFICATION OF CHANGES

This section provides the justification for all changes described in Section A above and shown on Attachments IV and V. The justifications are organized based on whether the change is: more restrictive (M), less restrictive (L), administrative (A), or the requirement is relocated (R). The justifications listed below are also referenced in the technical specification(s) which are affected (see Attachment IV).

C.1 More Restrictive

M.1 The Applicability for LCO 3.3.6 and LCO 3.7.9, and Condition C of LCO 3.3.6 and Condition D and F of LCO 3.7.9, will be revised to include "during CORE ALTERATIONS". This requirement is currently implied as the suspension of core alterations is a Required Action of the referenced Conditions. As described in the section for Less Restrictive change L.1, CREATS is not required during Modes 5 and 6 with respect to waste gas decay tank failures. However, CREATS must remain in service during core alterations and fuel movement in the event of a fuel handling accident to ensure GDC limits are met within the control room (Reference 4).

C.2 Less Restrictive

L.1 The Applicability for LCO 3.3.6 and LCO 3.7.9, and Condition C of LCO 3.3.6 and Condition D and F of LCO 3.7.9, will be revised to delete Modes 5 and 6 from these sections. As described in the bases for these LCOs, CREATS is currently required to be operable in Modes 5 and 6 due to the potential for a rupture of a waste gas decay tank (which is the limiting tank failure) or a fuel handling accident. RG&E has evaluated the requirements for the CREATS system in Modes 5 and 6, and determined that the system is not required to mitigate the consequences of a waste gas decay tank failure. An analysis has been performed which shows that not taking credit for the CREATS results in control room doses well within the limits specified in 10 CFR 50, Appendix A, GDC 19 and the guidance provided by the NRC in NUREG-0737 (Reference 2) Section II.B.2, Dose Rate Criteria, and NUREG-0800 (Reference 3) Section 6.4, Control Room Habitability Program. This analysis is provided in attachment VI. This is consistent with NUREG-1431, which allows for Applicability requirements in these plant Modes to be site specific.

L.2 The Required Action and Completion Time of Condition C of LCO 3.3.6 will be revised to delete Required Action C.1, which requires immediately initiating action to restore a channel of CREATS detection to operable status. This is a result of removing Modes 5 and 6 from the Applicability section, as the remaining Required Actions place the plant outside of the LCO Mode of Applicability. This is consistent with the design of NUREG-1431 (i.e., Required Actions must either limit the time in the specified condition or require an exit from the Mode of Applicability).

L.3 The Required Action and Completion Time of Condition F of LCO 3.7.9 will be revised to delete required Action F.1, which requires immediately initiating action to restore one CREATS isolation damper to operable status. This is a result of removing Modes 5 and 6 from the Applicability section, as the remaining Required Actions place the plant outside of the LCO Mode of Applicability. This is consistent with the design of NUREG-1431 (i.e., Required Actions must either limit the time in the specified condition or require an exit from the Mode of Applicability).

There are no administrative (A) or relocated (R) changes associated with this LAR.

D. REFERENCES

1. Letter from Allen R. Johnson (NRC) to Robert C. Mecredy (RG&E), "ISSUANCE OF AMENDMENT NO. 61 TO FACILITY OPERATING LICENSE NO. DPR-18, R. E. GINNA NUCLEAR POWER PLANT", February 13, 1996.

2. NUREG-0737 Clarification of TMI Action Plan Requirements.

3. NUREG-0800, Standard Review Plan.

4. Letter from Allen R. Johnson (NRC) to Robert C. Mecredy (RG&E), "ISSUANCE OF AMENDMENT NO. 62 TO FACILITY OPERATING LICENSE NO. DPR-18, R. E. GINNA NUCLEAR POWER PLANT", dated April 1, 1996.

Attachment II
R.E. Ginna Nuclear Power Plant

No Significant Hazards Consideration Evaluation

The proposed changes to the Ginna Station Improved Technical Specifications as identified in Attachment I Section A and justified by Section C have been evaluated with respect to 10 CFR 50.92(c) and shown not to involve a significant hazards consideration as described below. This attachment is organized based on Attachment I Section C.

Evaluation of More Restrictive Changes

The more restrictive changes (which is a conservative characterization, as these changes are implied by the current specifications) associated with amending the Applicability section for LCO 3.3.6 and LCO 3.7.9, and Condition C of LCO 3.3.6 and Condition D and F of LCO 3.7.9, to include "during CORE ALTERATIONS", do not involve a significant hazards consideration as discussed below:

1) Operation of Ginna Station in accordance with the proposed changes does not involve a significant increase in the probability or consequences of an accident previously evaluated. The changes add a conservative Mode of Applicability for the Control Room Emergency Air Treatment System (CREATS) and CREATS actuation instrumentation. This does not increase the probability of an accident previously evaluated since the CREATS and CREATS actuation instrumentation themselves are not accident initiators. The proposed changes are consistent with the guidance of NUREG-1431 and provide assurance that the CREATS is in the conservative mode of operation for a response to an accident. Therefore, the probability or consequences of an accident previously evaluated are not significantly increased.

2) Operation of Ginna Station in accordance with the proposed changes does not create the possibility of a new or different kind of accident from any accident previously evaluated. The proposed change for a new mode of applicability does not of itself involve a physical alteration of the plant or change in the methods governing normal plant operation. The change only involves a conservative increase in the requirement of when the CREATS and CREATS actuation instrumentation are operable. Therefore, the possibility for a new or different kind of accident from any accident previously evaluated are not created.

3) Operation of Ginna Station in accordance with the proposed changes does not involve a significant reduction in a margin of safety. The proposed change requires the CREATS and CREATS actuation instrumentation to be in the conservative mode of operation for a response to an accident. The change adds conservatism as determined by the guidance of NUREG-1431. Therefore, this change does not involve a significant reduction in a margin of safety.

Based upon the preceding information, it has been determined that the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated, create the possibility of a new or different kind of accident from any accident previously evaluated, or involve a significant reduction in a margin of safety. Therefore, it is concluded that the proposed changes meet the requirements of 10 CFR 50.92(c) and do not involve a significant hazards consideration.

Evaluation of Less Restrictive Changes

The less restrictive changes associated with amending the applicability sections for LCO 3.3.6 and LCO 3.7.9, and Condition C of LCO 3.3.6 and Condition D and F of LCO 3.7.9, to delete Modes 5 and 6 from these sections do not involve a significant hazards consideration as discussed below:

1) Operation of Ginna Station in accordance with the proposed changes does not involve a significant increase in the probability or consequences of an accident previously evaluated. The changes are the result of an analysis performed of the control room dose consequences which could occur as the result of a potential waste gas decay tank failure. This does not increase the probability of an accident previously evaluated since the Control Room Emergency Air Treatment System (CREATS) and CREATS actuation instrumentation themselves are not accident initiators. The results of the analysis show that if no credit is taken for the CREATS, the control room doses remain well within the limits specified in 10 CFR 50, Appendix A, GDC 19 and the guidance provided by the NRC in NUREG-0737 Section II.B.2, Dose Rate Criteria, and NUREG-0800 Section 6.4, Control Room Habitability Program. The proposed Mode of Applicability change is consistent with the guidance of NUREG-1431 which allows plant-specific changes with respect to Modes 5 and 6. Therefore, the probability or consequences of an accident previously evaluated are not significantly increased.

2) Operation of Ginna Station in accordance with the proposed changes does not create the possibility of a new or different kind of accident from any accident previously evaluated. The proposed changes associated with the modes of applicability for the CREATS and CREATS actuation instrumentation are not of themselves nor do they affect potential accident initiators. Therefore, the possibility for a new or different kind of accident from any accident previously evaluated are not created.

3) Operation of Ginna Station in accordance with the proposed changes does not involve a significant reduction in a margin of safety. The proposed changes remove the requirements for the control room ventilation system, which has been shown by analysis to not be required to meet regulatory limits. The changes are consistent with the guidance of NUREG-1431. Therefore, these changes do not involve a significant reduction in a margin of safety.

Based upon the preceding information, it has been determined that the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated, create the possibility of a new or different kind of accident from any accident previously evaluated, or involve a significant reduction in a margin of safety. Therefore, it is concluded that the proposed changes meet the requirements of 10 CFR 50.92(c) and do not involve a significant hazards consideration.

The less restrictive change associated with amending the Required Action and Completion Time of Condition C of LCO 3.3.6 and Condition F of LCO 3.7.9 to remove a required action, do not involve a significant hazards consideration as discussed below:

1) Operation of Ginna Station in accordance with the proposed changes does not involve a significant increase in the probability or consequences of an accident previously evaluated. The proposed changes to remove a required action of restoring equipment to operable status do not affect the probability of an accident as the Control Room Emergency Air Treatment System (CREATS) and CREATS actuation instrumentation, in and of themselves, have no failure modes or effects which are precursors to accidents. The proposed changes do not introduce any new failure modes or effects to any other system or component which is a precursor to an accident. The remaining Required Actions within the referenced Conditions place the plant outside of the Mode of Applicability for these systems. Therefore, the probability or consequences of an accident previously evaluated are not significantly increased.

2) Operation of Ginna Station in accordance with the proposed changes does not create the possibility of a new or different kind of accident from any accident previously evaluated. The changes do not of themselves involve a physical alteration of the plant or change in the methods governing normal plant operation. The proposed changes create no new functional interactions with existing plant equipment nor do they introduce any new failure modes or mechanisms which could lead to reactor core damage or fission product release. Therefore, because the changes do not affect any system that can act as an accident precursor, the possibility for a new or different kind of accident from any accident previously evaluated are not created.

3) Operation of Ginna Station in accordance with the proposed changes does not involve a significant reduction in a margin of safety. The proposed changes remove requirements for restoring systems which are no longer required. The changes are consistent with the guidance of NUREG-1431. Therefore, these changes do not involve a significant reduction in a margin of safety.

Based upon the preceding information, it has been determined that the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated, create the possibility of a new or different kind of accident from any accident previously evaluated, or involve a significant reduction in a margin of safety. Therefore, it is concluded that the proposed changes meet the requirements of 10 CFR 50.92(c) and do not involve a significant hazards consideration.

Attachment III
R.E. Ginna Nuclear Power Plant

Environmental Impact Consideration Determination

RG&E has evaluated the proposed changes and determined that:

1. The changes do not involve a significant hazards consideration as documented in Attachment II; and

2. The changes do not involve a significant change in the types or significant increase in the amounts of any effluent that may be released offsite since no physical changes are being made to the facility related to offsite releases; and

3. The changes do not involve a significant increase in individual or cumulative occupational radiation exposure since analysis has shown that any potential exposure is well within regulatory guidance.

Accordingly, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed changes is not required.

Attachment IV
R.E. Ginna Nuclear Power Plant

Proposed Revised R.E. Ginna Nuclear Power Plant
Improved Technical Specifications

Included pages:

3.3-41
3.3-42
B 3.3-147 *
B 3.3-148 *
B 3.3-150 *
3.7-20
3.7-21
3.7-22
B 3.7-67*
B 3.7-69*
B 3.7-70*
B 3.7-71*

* These bases pages are being provided for information only to show the changes that RG&E intends to make following approval of the LAR. The bases are under RG&E control for all changes in accordance with Specification 5.5.13. RG&E requests that the NRC document acceptance of these bases changes in the SER.

3.3 INSTRUMENTATION

3.3.6 Control Room Emergency Air Treatment System (CREATS) Actuation Instrumentation

LCO 3.3.6 The CREATS actuation instrumentation for each Function in Table 3.3.6-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4, 5, and 6,
During movement of irradiated fuel assemblies
During CORE ALTERATIONS.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one channel inoperable.	A.1 --------NOTE-------- The control room may be unisolated for ≤ 1 hour every 24 hours while in this condition. ---------- Place CREATS in Mode F.	1 hour
B. Required Action and associated Completion Time of Condition A not met in MODE 1, 2, 3, or 4.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A not met in MODE 5 or 6, or during movement of irradiated fuel assemblies. or during CORE ALTERATIONS	C.1 Initiate action to restore channel(s) to OPERABLE status. AND C.2 (1) Suspend CORE ALTERATIONS. AND C.3 (2) Suspend movement of irradiated fuel assemblies.	Immediately Immediately Immediately

It has been demonstrated that the CREATS is not required in the event of a waste gas decay tank rupture (Ref. ...).

BASES

APPLICABLE SAFETY ANALYSES (continued)

In MODES 5 and 6, and during movement of irradiated fuel assemblies, the CREATS ensures control room habitability in the event of a fuel handling accident or waste gas decay tank rupture accident.

or during CORE ALTERATIONS

The CREATS Actuation Instrumentation satisfies Criterion 3 of the NRC Policy Statement.

LCO

The LCO requirements ensure that instrumentation necessary to initiate the CREATS is OPERABLE.

1. Manual Initiation

The LCO requires one train to be OPERABLE. The train consists of one pushbutton and the interconnecting wiring to the actuation logic. The operator can initiate the CREATS Filtration train at any time by using a pushbutton in the control room. This action will cause actuation of all components in the same manner as any of the automatic actuation signals required by this LCO.

2. Automatic Actuation Logic and Actuation Relays

The LCO requires one train of Actuation Logic and Actuation Relays to be OPERABLE. Actuation logic consists of all circuitry housed within the actuation system, including the initiation relay contacts responsible for actuating the CREATS.

3. Control Room Radiation Intake Monitor

The LCO specifies single channels of iodine (R-38), noble gas (R-36), and particulate (R-37) of the Control Room Intake Monitors to ensure that the radiation monitoring instrumentation necessary to initiate the CREATS filtration train and isolation dampers remains OPERABLE.

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, 3, and 4, the CREATS actuation instrumentation must be OPERABLE to control operator exposure during and following a Design Basis Accident.

In MODE 5 or 6, the CREATS actuation instrumentation is required to cope with the release from the rupture of a waste gas decay tank.

During movement of irradiated fuel assemblies or during CORE ALTERATIONS, the CREATS actuation instrumentation must be OPERABLE to cope with the release from a fuel handling accident.

ACTIONS

The most common cause of channel inoperability is failure or drift of the bistable or process module sufficient to exceed the tolerance allowed by the plant specific calibration procedures. Typically, the drift is found to be small and results in a delay of actuation rather than a total loss of function. This determination is generally made during the performance of a COT, when the process instrumentation is set up for adjustment to bring it within specification. The "as left" Trip Setpoint must be within the tolerance specified by the calibration procedure. If the "as found" Trip Setpoint exceeds the limits specified in Table 3.3.6-1, the channel must be declared inoperable immediately and the appropriate Condition entered.

A Note has been added to the ACTIONS indicating that separate Condition entry is allowed for each Function. The Conditions of this Specification may be entered independently for each Function listed in Table 3.3.6-1 in the accompanying LCO. The Completion Time(s) of the inoperable channel/train of a Function will be tracked separately for each Function starting from the time the Condition was entered for that Function.

(continued)

BASES

ACTIONS (continued)

B.1 and B.2

Condition B applies when the Required Action and associated Completion Time of Condition A has not been met and the plant is in MODE 1, 2, 3, or 4. The plant must be brought to a MODE that minimizes accident risk. To achieve this status, the plant must be brought to MODE 3 within 6 hours and MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

C.1 and C.2 and C.3

Condition C applies when the Required Action and associated Completion Time of Condition A has not been met in MODE 5, or 6, or during movement of irradiated fuel assemblies. Actions must be initiated immediately to restore the inoperable channel(s) to OPERABLE status to ensure adequate isolation capability in the event of a waste gas decay tank rupture. Movement of irradiated fuel assemblies and CORE ALTERATIONS must also be suspended immediately to reduce the risk of accidents that would require CREATS actuation. This places the plant in a condition that minimizes risk. This does not preclude movement of fuel or other components to a safe position.

SURVEILLANCE REQUIREMENTS

A Note has been added to the SR Table to clarify that Table 3.3.6-1 determines which SRs apply to which CREATS Actuation Functions.

(continued)

3.7 PLANT SYSTEMS

3.7.9 Control Room Emergency Air Treatment System (CREATS)

LCO 3.7.9 The CREATS shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4, 5, and 6, L.1
During movement of irradiated fuel assemblies, 2
During CORE ALTERATIONS. M.1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CREATS filtration train inoperable.	A.1 Restore CREATS filtration train to OPERABLE status.	48 hours
	OR	
	A.2 ---------NOTE-------- The control room may be unisolated for ≤ 1 hour every 24 hours while in this condition. ----------	
	Place isolation dampers in CREATS Mode F.	48 hours
B. --------NOTE--------- Separate Condition entry allowed for each damper. ---------- One CREATS isolation damper in one or more outside air flowpaths inoperable.	B.1 Restore isolation damper to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. Required Action and associated Completion Time of Condition A or B not met in MODE 1, 2, 3, or 4.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 5.	36 hours
D. Required Action and associated Completion Time of Condition A or B not met in MODE 5 or 6 or during movement of irradiated fuel. L.1 M.1	D.1	Place OPERABLE isolation damper(s) in CREATS Mode F.	Immediately
	OR		
	D.2.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	D.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
E. Two CREATS isolation dampers for one or more outside air flow paths inoperable in MODE 1, 2, 3, or 4.	E.1	Enter LCO 3.0.3.	Immediately

or during CORE ALTERATIONS

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Two CREATS isolation dampers for one or more outside air flow paths inoperable in MODE 5 or 6 or during movement of irradiated fuel assemblies. or during CORE ALTERATIONS	F.1 Initiate actions to restore one isolation damper to OPERABLE status. AND F.2 (1) Suspend CORE ALTERATIONS. AND F.3 (2) Suspend movement of irradiated fuel assemblies.	Immediately Immediately Immediately

L.1 M.1 L.3

BASES

BACKGROUND (continued)

CREATS Mode F

This is the CREATS configuration following the detection of a toxic gas as indicated by the chlorine or ammonia detectors, or high radiation as detected by R-36 (gas), R-37 (particulate), or R-38 (iodine). Upon receipt of an actuation signal, the system aligns itself consistent with Mode C except that two dampers in each air supply path are isolated.

Normally open air supply isolation dampers are arranged in series so that the failure of one damper to close will not result in a breach of isolation.

The air entering the control room is continuously monitored by radiation and toxic gas detectors. One detector output above the setpoint will cause actuation of the emergency radiation state or toxic gas isolation state, as required. The actions of the toxic gas and high radiation state (Mode F) are more restrictive, and will override the actions of the emergency radiation state (Mode B or C). Only the high radiation state CREATS Mode F is addressed by this LCO.

APPLICABLE SAFETY ANALYSES

The location of components and CREATS related ducting within the control room envelope ensures an adequate supply of filtered air to all areas requiring access. The CREATS provides airborne radiological protection for the control room operators in MODES 1, 2, 3, and 4, as demonstrated by the control room accident dose analyses for the most limiting design basis loss of coolant accident and steam generator tube rupture (Ref. 3). This analysis shows that with credit for the CREATS, or with credit for instantaneous isolation of the control room coincident with the accident initiator and no CREATS filtration train available, the dose rates to control room personnel remain within GDC 19 limits.

In MODES 5 and 6, and during movement of irradiated fuel assemblies, the CREATS ensures control room habitability in the event of a fuel handling accident, or waste gas decay tank rupture accident.

or during CORE ALTERATIONS

It has been demonstrated that the CREATS is not required in the event of a waste gas decay tank rupture (Ref. ...).

(continued)

BASES

LCO (continued)

In addition, the control room boundary must be maintained, including the integrity of the walls, floors, ceilings, ductwork, and access doors. Opening of the access doors for entry and exit does not violate the control room boundary. An access door may be opened for extended periods provided a dedicated individual is stationed at the access door to ensure closure, if required (i.e., the individual performs the isolation function), the door is able to be closed within 30 seconds upon indication of the need to close the door, and the CREATS filtration train is OPERABLE.

APPLICABILITY

In MODES 1, 2, 3, and 4, the CREATS must be OPERABLE to control operator exposure during and following a DBA.

In MODE 5 or 6, the CREATS is required to cope with the release from the rupture of a waste gas decay tank.

During movement of irradiated fuel assemblies, the CREATS must be OPERABLE to cope with the release from a fuel handling accident.

or during CORE ALTERATIONS

ACTIONS

A.1 and A.2

With the CREATS filtration train inoperable, action must be taken to restore OPERABLE status within 48 hours or isolate the control room from outside air. In this Condition, the isolation dampers are adequate to perform the control room protection function but no means exist to filter the release of radioactive gas within the control room. The 48 hour Completion Time is based on the low probability of a DBA occurring during this time frame, and the ability of the CREATS dampers to isolate the control room.

Required Action A.2 is modified by a Note which allows the control room to be unisolated for $\leq$ 1 hour every 24 hours. This allows fresh air makeup to improve the working environment within the control room and is acceptable based on the low probability of a DBA occurring during this makeup period.

(continued)

BASES

ACTIONS (continued)

B.1

With one CREATS isolation damper inoperable for one or more outside air flow paths, action must be taken to restore OPERABLE status within 7 days. In this Condition, the remaining OPERABLE CREATS isolation damper is adequate to perform the control room protection function. However, the overall reliability is reduced because a single failure in the OPERABLE CREATS isolation damper could result in loss of CREATS function. The 7 day Completion Time is based on the low probability of a DBA occurring during this time period, and ability of the remaining isolation damper to provide the required isolation capability.

C.1 and C.2

In MODE 1, 2, 3, or 4, if the Required Actions of Conditions A or B cannot be completed within the required Completion Time, the plant must be placed in a MODE that minimizes accident risk. To achieve this status, the plant must be placed in at least MODE 3 within 6 hours, and in MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

D.1 , D.2.1, and D.2.2

In MODE 5 or 6 or during movement of irradiated fuel assemblies, if the Required Actions of Conditions A or B cannot be completed within the required Completion Time, action must be taken to immediately place the OPERABLE isolation damper(s) in CREATS Mode F. This action ensures that the remaining damper(s) are OPERABLE, that no failures preventing automatic actuation will occur, and that any active failure would be readily detected.

or during CORE ALTERATIONS

(continued)

BASES

ACTIONS

D.1 , D.2.1, and D.2.2 (continued)

An alternative to Required Action D.1 is immediately suspend activities that could result in a release of radioactivity that might enter the control room. This requires the suspension of CORE ALTERATIONS and the suspension of movement of irradiated fuel assemblies. This places the plant in a condition that minimizes risk. This does not preclude the movement of fuel or other components to a safe position.

E.1

In MODE 1, 2, 3, or 4, if both CREATS isolation dampers for one or more outside air flow paths are inoperable, the CREATS may not be capable of performing the intended function and the plant is in a condition outside the accident analyses. Failure of the integrity of the control room boundary (i.e., walls, floors, ceilings, ductwork or access doors) also results in a condition outside the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

F.1, and F.2, and F.3

In MODE 5 or 6 or during movement of irradiated fuel assemblies, with two CREATS isolation dampers for one or more outside air flow paths inoperable, action must be taken immediately to restore one isolation damper in each affected air supply path to OPERABLE status. In addition, action must be taken immediately to suspend activities that could result in a release of radioactivity that might enter the control room. This requires the suspension of CORE ALTERATIONS and the suspension of movement of irradiated fuel assemblies. This places the plant in a condition that minimizes accident risk. This does not preclude the movement of fuel or other components to a safe position.

or during CORE ALTERATIONS

(continued)

Attachment V
R.E. Ginna Nuclear Power Plant

Proposed Revised R.E. Ginna Nuclear Power Plant
Improved Technical Specifications

Included pages:

3.3-41
3.3-42
3.7-20
3.7-21
3.7-22

3.3 INSTRUMENTATION

3.3.6 Control Room Emergency Air Treatment System (CREATS) Actuation Instrumentation

LCO 3.3.6 The CREATS actuation instrumentation for each Function in Table 3.3.6-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4,
During movement of irradiated fuel assemblies,
During CORE ALTERATIONS.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more Functions with one channel inoperable.	A.1	--------NOTE-------- The control room may be unisolated for ≤ 1 hour every 24 hours while in this condition. ---------- Place CREATS in Mode F.	1 hour
B. Required Action and associated Completion Time of Condition A not met in MODE 1, 2, 3, or 4.	B.1 <u>AND</u> B.2	Be in MODE 3. Be in MODE 5.	6 hours 36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A not met during movement of irradiated fuel assemblies or during CORE ALTERATIONS.	C.1 Suspend CORE ALTERATIONS. AND C.2 Suspend movement of irradiated fuel assemblies.	Immediately Immediately

3.7 PLANT SYSTEMS

3.7.9 Control Room Emergency Air Treatment System (CREATS)

LCO 3.7.9 The CREATS shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4,
During movement of irradiated fuel assemblies,
During CORE ALTERATIONS.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CREATS filtration train inoperable.	A.1 Restore CREATS filtration train to OPERABLE status. OR A.2 ---------NOTE-------- The control room may be unisolated for ≤ 1 hour every 24 hours while in this condition. ---------- Place isolation dampers in CREATS Mode F.	48 hours 48 hours
B. --------NOTE--------- Separate Condition entry allowed for each damper. ---------- One CREATS isolation damper in one or more outside air flowpaths inoperable.	B.1 Restore isolation damper to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. Required Action and associated Completion Time of Condition A or B not met in MODE 1, 2, 3, or 4.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 5.	36 hours
D. Required Action and associated Completion Time of Condition A or B not met during movement of irradiated fuel or during CORE ALTERATIONS.	D.1	Place OPERABLE isolation damper(s) in CREATS Mode F.	Immediately
	OR		
	D.2.1	Suspend CORE ALTERATIONS.	Immediately
		AND	
	D.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
E. Two CREATS isolation dampers for one or more outside air flow paths inoperable in MODE 1, 2, 3, or 4.	E.1	Enter LCO 3.0.3.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Two CREATS isolation dampers for one or more outside air flow paths inoperable during movement of irradiated fuel assemblies or during CORE ALTERATIONS.	F.1 Suspend CORE ALTERATIONS. AND F.2 Suspend movement of irradiated fuel assemblies.	Immediately Immediately

Attachment VI
R.E. Ginna Nuclear Power Plant

Design Analysis DA-NS-2000-057
Gas Decay Tank Rupture Offsite and Control Room Doses

Design Analysis

Gas Decay Tank Rupture Offsite and Control Room Doses

Ginna Station

Rochester Gas and Electric Corporation
89 East Avenue
Rochester, New York 14649

DA-NS-2000-057

Revision 0

7/20/00
Approval Date

Prepared by: _____ 7/12/00
Assigned Engineer Date

Reviewed by: _____ 7-20-00
Independent Reviewer Date

DA-NS-2000-057 Approval Memorandum

The purpose of this memorandum is to provide documentation that the attached vendor calculation has been reviewed and accepted by RG&E. The following are comments associated with Calculation Number 2000-03, rev 0.

1) The format of the attached calculation has been verified to include all of the attributes of a design analysis as required by RG&E Engineering Procedure EP-3-P-0122, "Design Analysis", though the structure of the calculation is in a slightly different order.

2) Two typographical errors have been corrected on page 12.

3) The integrated dose to the operator are for a 24 hour period. Since an operator would not be present in the control room for the entire 24 hours the calculated values are conservative.

4) As determined by the analysis, a larger flow rate of ventilation is beneficial in purging the control room of the release. Therefore larger flow rates are bounded by this analysis.

5) The analyses results have been cross checked to confirm that the magnitude of the results are correct.

6) The input assumptions listed in Table 1 of the calculation have been reviewed and are consistent with the values listed in the UFSAR or are more restrictive, such as control room isolation time and makeup air flow rate.

Approved by: _____ 7-20-00

Independent Reviewer Date

KEN RUBIN ENTERPRISES

CALCULATION COVER SHEET

Client & Project: Rochester Gas and Electric, Ginna Station	**Page 1 of** 50
Calculation Title: Gas Decay Tank Rupture Offsite and Control Room Doses	

Calculation Number	**Purchase Order**	**Optional Task Number**
2000-03 Rev 0	500001917	

Prepared By	**Signature and Date**
Ken Rubin	July 12, 2000

CALCULATION SHEET

Calculation No.	Purchase Order	Optional Task No.	Page 2
2000-03, Rev. 0	500001917		

Identification of Computer Programs

HABIT 1.0

Operating System and platform: Windows 98, Pentium ///

Computer Output

Run #	Run ID	Run Date	Run Time	Description
1a		7/11/2000		no CR isolation, puff release, 1800 cfm
1b		7/11/2000		no CR isolation, puff release, 2200 cfm
2a		7/11/2000		10 sec isolation, puff release, 1800 cfm
2b		7/12/2000		10 sec isolation, puff release, 2200 cfm
3a		7/11/2000		no CR isolation, 2 hr release, 1800 cfm
3b		7/11/2000		no CR isolation, 2 hr release, 2200 cfm
4a		7/11/2000		10 sec isolation, 2 hr release, 1800 cfm
4b		7/11/2000		10 sec isolation, 2 hr release, 2200 cfm

CALCULATION SHEET

Calculation No.	Purchase Order	Optional Task No.	Page 3
2000-03, Rev. 0	500001917		

CONTENTS

1. *Purpose/Objective*

The purpose of this calculation is to determine offsite and control room doses due to a Gas Decay Tank (GDT) rupture.

2. *Background/Introduction*

UFSAR Section 15.7 (Reference 1) currently addresses only the offsite consequences of a GDT rupture. The UFSAR cites the recommendation of NUREG-0133 (Reference 2) to limit the contents of the GDT such that in the event of a tank rupture, the dose at the exclusion area boundary (EAB) is less than 0.5 rem. The Reference 1 analysis assumes 100,000 Ci of equivalent Xe-133, and the resulting γ-body dose at the exclusion boundary is 0.4 rem.

3. *Approach*

The first part of the calculation is to verify the curies of Xe-133 assumed to be contained in the GDT. This will be accomplished by calculating the dose at the EAB due to 100,000 curies of Xe-133. If the dose exceeds 0.5 rem, the inventory will be appropriately reduced. If the dose is less than 0.5 rem, the 100,000 Ci will be used for the CR dose calculations. The dose at the EAB will be calculated by hand.

The Xe-133 source term will be used to determine the control room doses. This calculation will be done with the TACT5/CONHAB code modules of the HABIT code package.

4. Assumptions and Limitations

Assumptions

The analysis assumptions are summarized in Table 1.

Limitations

No limitations have been identified.

5. *Acceptance Criteria*

5.1 Offsite Dose Acceptance Criteria

The body exposure to an individual at the exclusion area boundary (EAB) will not exceed 0.5 rem (Reference 2).

5.1 Control Room Dose Criteria (Reference 4)

The dose limits for an individual stationed inside the control room are as follows:

γ-body: 5 rem
β-skin: 30 rem (75 rem with protective clothing)

6. *Calculation*

6.1 GDT Inventory

The UFSAR (Reference 1, Section 15.7.1.4) indicates that the γ-body dose at the EAB, due to the release of 100,000 Ci of equivalent Xe-133, is approximately 0.4 rem. The offsite body dose (D_{Xe-133}) is written as follows:

$$D_{Xe-133} = 0.25 A_i \overline{E}_i \frac{X}{Q}$$

Where:

A_i	=	100,000 Ci of Xe-133
$\overline{E}_i$	=	average gamma energy for Xe-133, 0.03 MeV (Reference 1, Table 15.7-1, "Parametric Input")
X/Q	=	0-2 hour atmospheric dispersion factor for the EAB, 4.8×10^{-4} sec/m^3, (Reference 5)

Note that the body dose calculations provided in Reference 5 use the dose conversion factors from ICRP30, rather than average gamma energy. However, the Reference 1 offsite dose calculations are assumed to be based on $\overline{E}_i$.

$$D_{Xe-133} = 0.25 * 100{,}000 * 0.03 * 0.00048$$

= 0.36 rem

This dose is consistent with the UFSAR value of approximately 0.4 rem. Thus, the UFSAR dose assumption is confirmed, a release of 100,000 Ci of equivalent Xe-133 results in a body dose at the EAB that is less than 0.5 rem.

6.2 Control Room Dose

In order to determine the sensitivity of the control room dose to the duration of the activity release and to the make-up air flow rate, the following cases have been identified:

Case	A	B
Case1, no isolation, puff activity release	1800 cfm normal make-up	2200 cfm normal make-up
Case 2, 10 second isolation, puff activity release	1800 cfm normal make-up, 300 cfm emergency mode make-up	2200 cfm normal make-up, 300 cfm emergency mode make-up
Case 3, no isolation, 2 hour activity release	1800 cfm normal make-up	2200 cfm normal make-up
Case 4, 10 second isolation, 2 hour activity release	1800 cfm normal make-up, 300 cfm emergency mode make-up	2200 cfm normal make-up, 300 cfm emergency mode make-up

Release Rate

Two activity releases are assumed. The first is an instantaneous "puff" release. The second is a 2 hour activity release.

TACT5 can't model an instantaneous puff release. However, the puff can be simulated by assuming a short release duration, in this case, 10 seconds.

The flow rate from the GDT to the environment is written as follows:

$$Q = -\ln\left(\frac{A_t}{A_0}\right)\frac{V}{t}$$

Where:

Q	=	flow rate from tank to environment, cfm
A_t/A_0	=	ratio of activity remaining in the GDT after time t to the initial activity in the GDT. Arbitrary value of 0.001 will result in the release of ~99.9% of the initial inventory in time t.
V	=	volume of GDT, 470 ft^3 (Reference 6)
t	=	duration of the activity release, hours

The calculations are done in the Mathcad worksheet that follows:

AoverA0 := 0.001 v := 470 ft^3

t := 10 sec

$$Q := -\ln(AoverA0)\frac{v}{t}$$

$$Q = 1.948 \cdot 10^4 \ \frac{ft^3}{min}$$

t := 2 hr

$$Q := -\ln(AoverA0)\frac{v}{t}$$

$$Q = 27.0554 \ \frac{ft^3}{min}$$

Flow rate for t=10 seconds (0.00278 hours): 19,480 cfm
Flow rate for t=2 hours: 27.055 cfm (Rounded to 27.06 cfm in TACT5 input)

The TACT5 output files are used to verify the flow rates. The following output is from Case 1, which uses the 10 second "puff release".

```
ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 2.780E-03
(HRS)

 ISO NAM       Form    ENV.     GDT

 XE 133      ELEM.  9.990E+04 9.944E+01
```

99.9% of the initial activity was released.

The following output is from Case 3, which uses the 2 hour activity release.

```
ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 2.000E+00
(HRS)

 ISO NAM       Form    ENV.     GDT

 XE 133      ELEM.  9.974E+04 9.879E+01
```

99.74% of the initial activity was released. The release is less than 99,900 Ci due to depletion of the inventory by radioactive decay.

Thus, the flow rates for the puff and 2 hour releases are confirmed.

Note: The complete TACT5 output file is included in the Appendix.

Code Input

Selected TACT5 and CONHAB input screens are shown in Figures 1 through 11. In particular, the source term convention show here for the GDT rupture differs from that of the LOCA shown in Reference 5. The CONHAB input follows previous practice.

7. *Results*

The calculated control room body and skin doses, in rem, are summarized below:

Case	A		B	
	Body	Skin	Body	Skin
Case1, no isolation, puff activity release	9.910E-03	6.759E-01	9.883E-03	6.741E-01
Case 2, 10 second isolation, puff activity release	5.831E-02	3.977E+00	7.114E-02	4.852E+00
Case 3, no isolation, 2 hour activity release	9.861E-03	6.726E-01	9.850E-03	6.718E-01
Case 4, 10 second isolation, 2 hour activity release	1.025E-02	6.989E-01	1.037E-02	7.073E-01

The doses shown above are peak values, which occur during the 2 - 24 time period. The limiting results are shaded.

8. *Conclusions and Recommendations*

All calculated doses are less than the guideline values stated in Section 5.

It is recommended that doses reported to the NRC be increased by 5% and rounded-up. This will provide margin for future small changes in the calculated dose under the revised 10 CFR 50.59 criteria. The suggested reporting values are shown below.

Case	A		B	
	Body	Skin	Body	Skin
Case1, no isolation, puff activity release	1.1E-02	7.1E-01	1.1E-02	7.1E-01
Case 2, 10 second isolation, puff activity release	6.2E-02	4.2E+00	7.5E-02	5.1E+00
Case 3, no isolation, 2 hour activity release	1.1E-02	7.1E-01	1.1E-02	7.1E-01
Case 4, 10 second isolation, 2 hour activity release	1.1E-02	7.4E-01	1.1E-02	7.5E-01

9. *References*

1. R. E. Ginna, UFSAR Section 15.7, "Radioactive Releases from a Subsystem or Component," Rev. 15, 10/99.

2. NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," Section 5.6.1.

3. Draft RG&E calculation, DA-NS-2000-033, Rev. 0, "Design Analysis Ginna Station Control Room Dose Simulation PCR 96-125."

4. NUREG-0800, Section 6.4, "Control Room Habitability System," Rev. 2, July 1981.

5. "R. E. Ginna LOCA Dose Analysis Kit," Ken Rubin Enterprises, Sept. 1997.

6. R. E. Ginna, UFSAR Section 11.3.2.2.2, "Gas Decay Tanks."

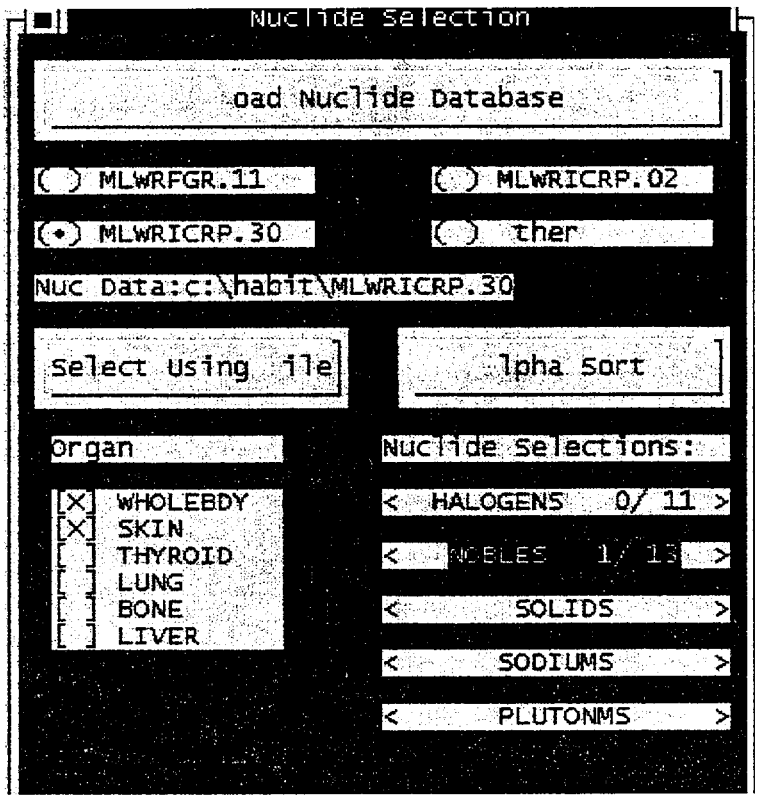
10. Tables and Figures

Table 1 - Input Assumptions

Gas Decay Tank Rupture
Offsite and Control Room Dose Calculations

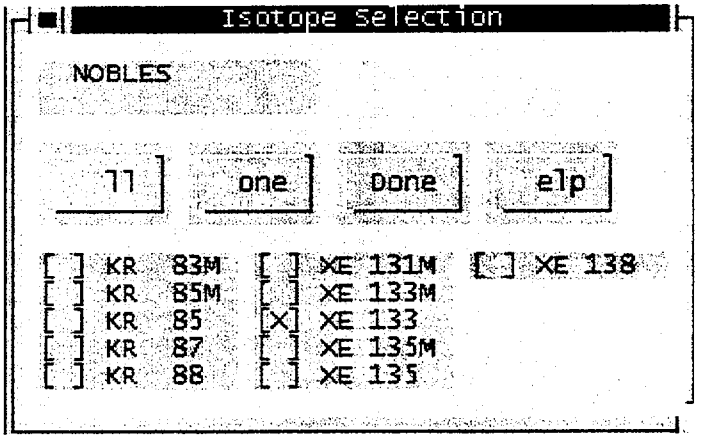
Parameter	Value	Sensitivity	Comment
Inventory of equivalent Xe-133 in GDT, Ci	100,000	hi	Assumed value results in a body dose at the EAB of less than 0.5 rem. Also used for CR dose calculations.
Fraction of GDT inventory released to the environment	~0.999	hi	Offsite and CR dose calculations
GDT volume, ft^3	470	n/a	Reference 6
Duration of activity release:			
Offsite dose calculation	instan - taneous puff		
Control room dose calculation (2 cases)	10 sec. 2 hours		10 sec. release duration simulates a puff release
Control room HVAC volume, ft^3	32,590		Reference 3, p 21
Control room air flow and isolation:			
Operating Mode 1			
make-up, cfm	2000±10%	to be determined	
isolation time, sec	n/a		no isolation
Operating Mode 2			
normal make-up, cfm	2000±10%	TBD	
make-up after isolation, cfm	300		300 cfm is the maximum flow rate
isolation time, sec	10		
Atmospheric Dispersion Factors, sec/m^3:			
Exclusion boundary (0-2 hr)	4.8×10^{-4}	hi	Reference 5
Control room (0-8 hr)	6.95×10^{-4}	hi	Reference 1, Section 15.7.3.4.2
Control Room Occupancy Factor	1.0		Applies to all time steps. Value of 1 indicates continuous occupancy.

Figure 1 - TACT5 Nuclide Selection



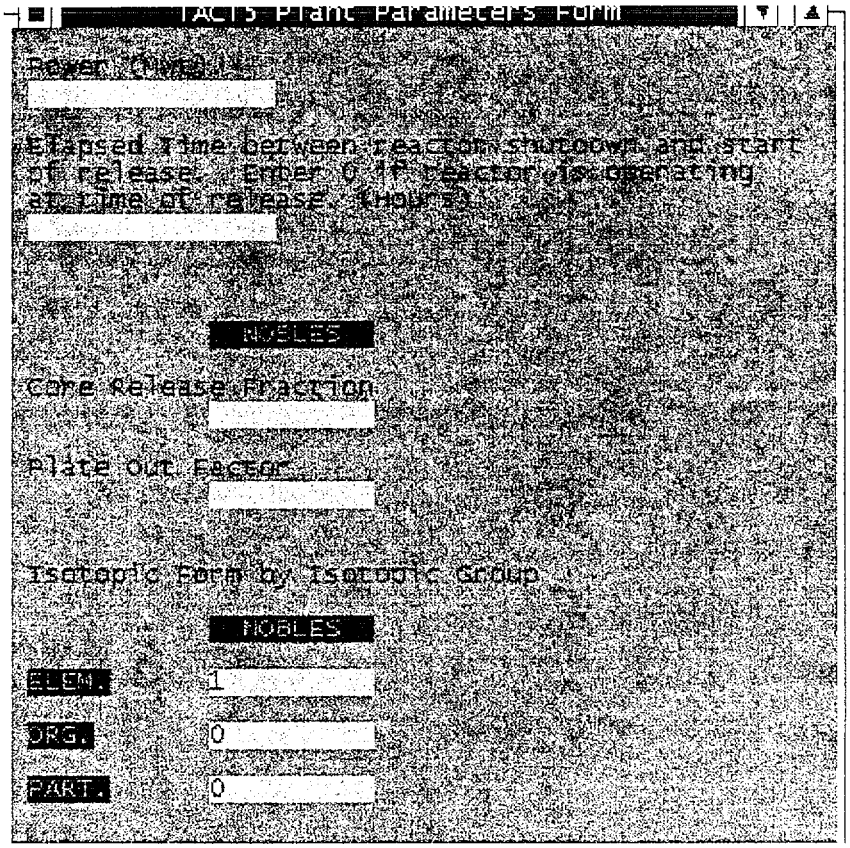
The nuclide selection window shows the selection of the ICRP-30 dose conversion factors, whole body and skin doses and 1 noble gas nuclide. Note that the analyses shown in Reference 5 use a custom data library (MLWGINNA.30), which has Ginna-specific source term values. The GDT rupture uses the Curie distribution option rather than the internal source term data (see Figure 4). Applies to all cases.

Figure 2 - Isotope Selection



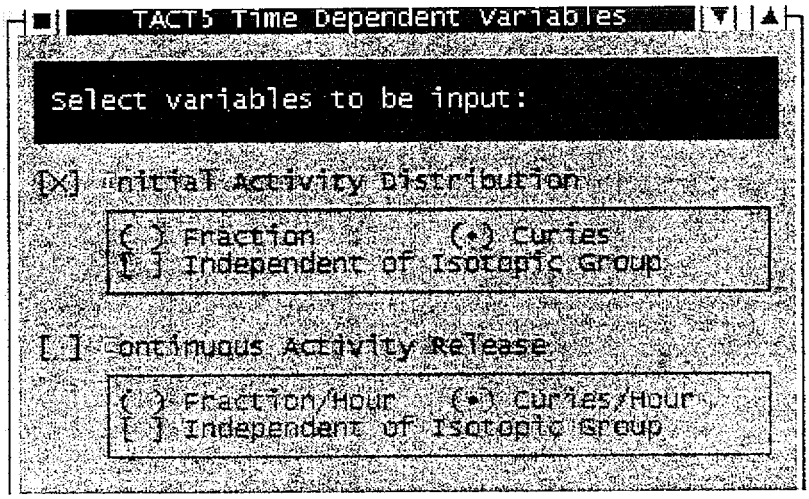
This window shows the selection of Xe-133. Applies to all cases.

Figure 3 - Plant Parameters



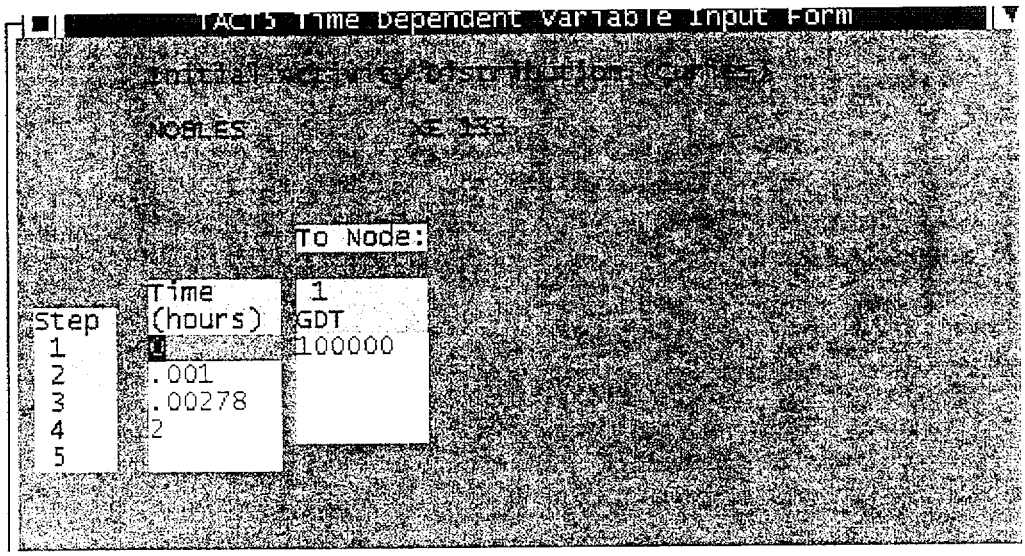
This figure shows the isotopic form is 100% noble gas. Core power and release fraction are not used with the selection of the Ci distribution option (see Figure 4). Plate-out does not apply to noble gases. This figure applies to all cases.

Figure 4 - Time Dependent Variables



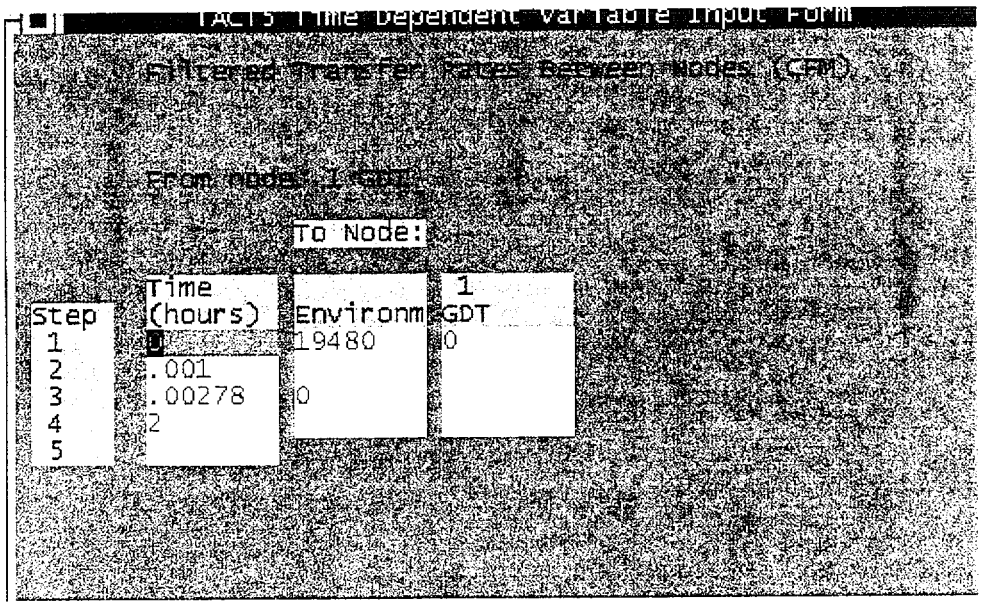
This window shows the selection of the Initial Activity Distribution, "Curies" option. Note that this is different from the Reference 5 input, which uses the "Fraction" option. Applies to all cases.

Figure 5 - Initial Activity Distribution, Curies



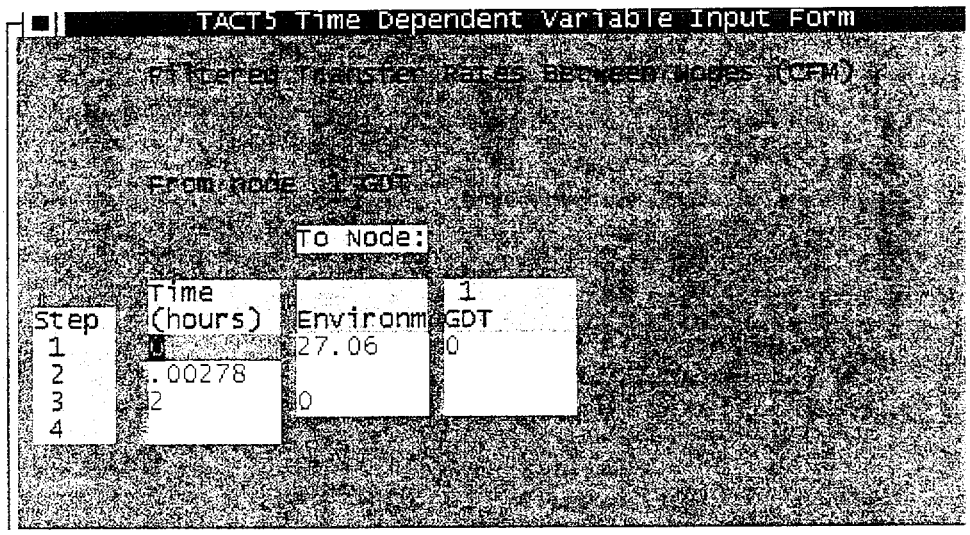
This window shows the initial activity distribution (time = 0) of 100,000 Ci of Xe-133 into the GDT volume. Applies to all cases.

Figure 6 - Transfer Rates (CFM) - Puff Release



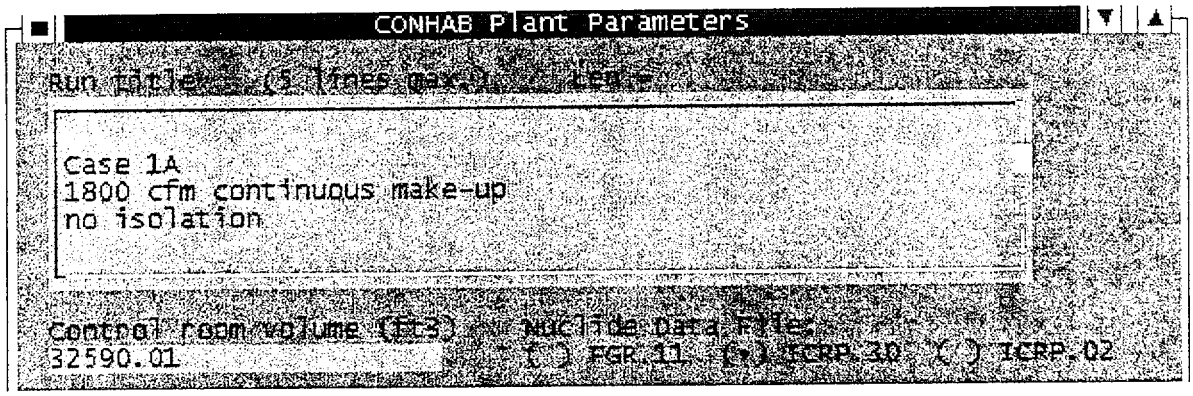
This window shows the transfer rate from the GDT to the environment (19,480 cfm) for the puff release. The transfer starts at t=0 and ends at t=0.00278 hours (10 sec.). Applies to puff release cases (Cases 1 and 2).

Figure 7 - Transfer Rates (CFM) - 2 Hour Activity Release



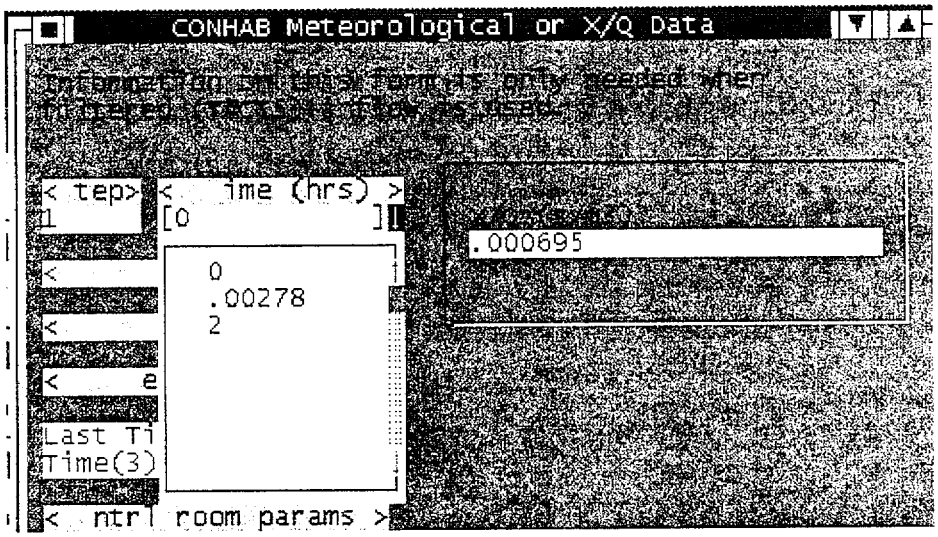
This window shows the transfer rate from the GDT to the environment (27.06 cfm) for the 2-hour release. The transfer starts at t=0 and ends at t=2 hours. Applies to 2-hour release cases (Cases 3 and 4). Note that the calculated value is 27.055 cfm, but the TACT5 input processor rounds the value up to 27.06 cfm.

Figure 8 - CONHAB Plant Parameters



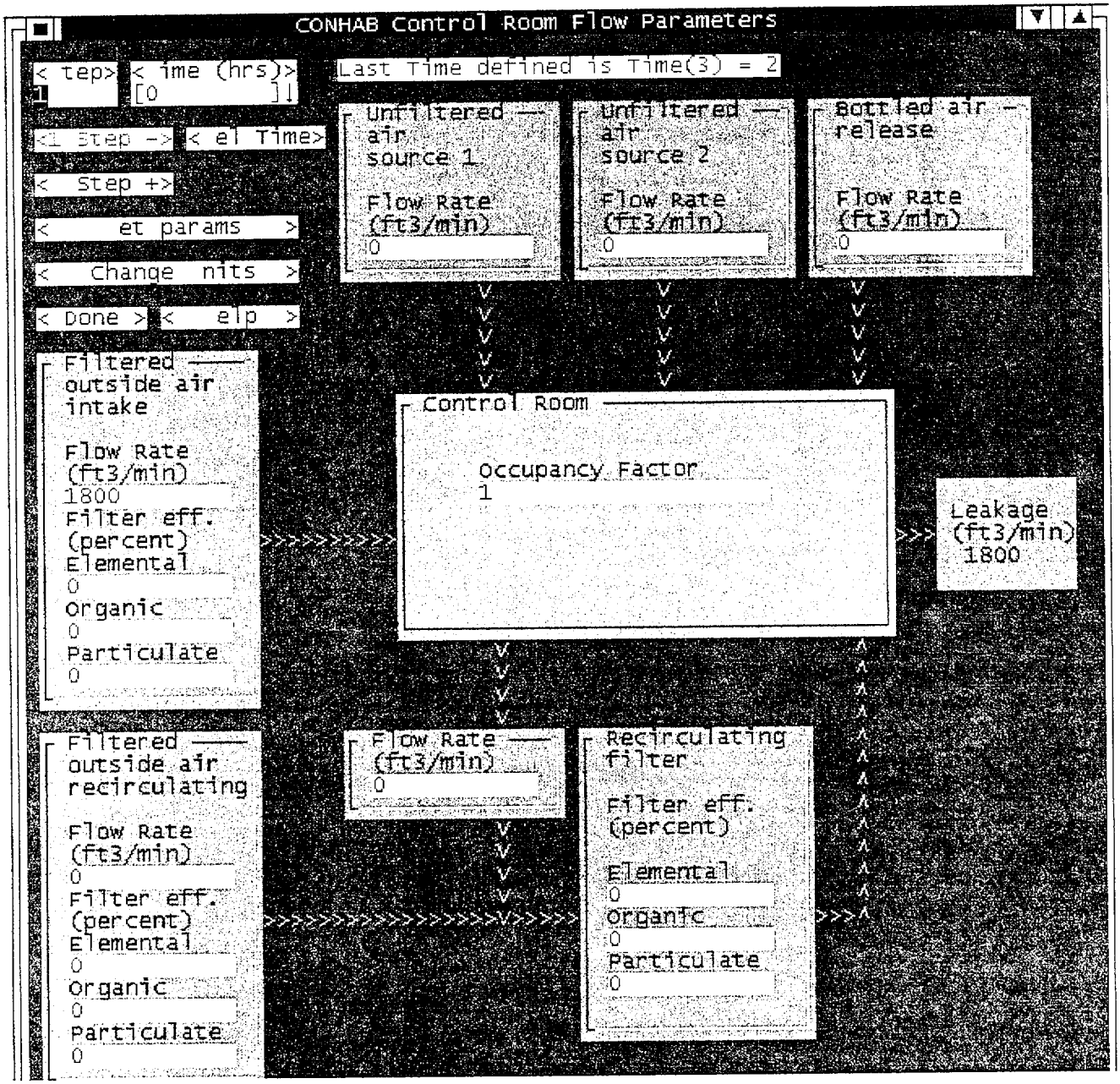
This window shows the title information for Case 1A. The control room volume and the selection of the ICRP 30 data file apply to all cases.

Figure 9 - X/Q Input



This window shows the time step and X/Q input. Only one X/Q value is used. This input applies to all cases.

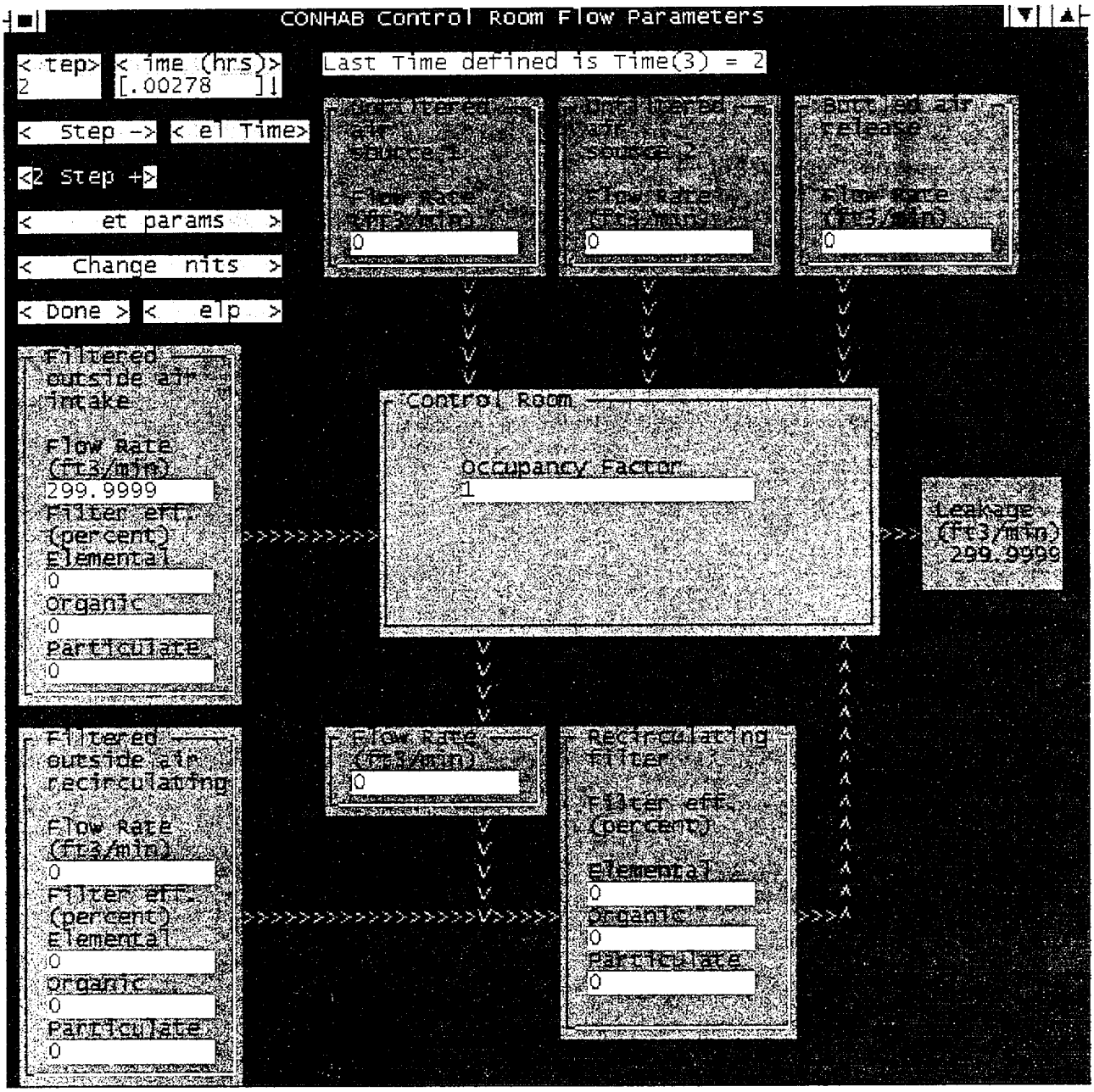
Figure 10 - Control Room Flow Rates



This window shows the make-up flow rate and the occupancy factor for the initial time step. The occupancy factor is 1.0 for all times. This input applies to the "A" cases. The "B" cases are input with 2200 cfm in place of 1800 cfm.

Cases 1 and 3 do not isolate and, thus, use the initial flow rate for the duration of the calculation. The input for Cases 2 and 4 (with isolation) is shown in Figure 11.

Figure 11 - Control Room Flow Rates



This window shows the input for the 10 second time step. The make-up flow rate after isolation is 300 cfm. This input applies to the cases with isolation (Cases 2 and 4).

11. APPENDIX

This appendix contains TACT5 and CONHAB input and output files.

TACT5 tabular data file for Cases 1 and 2 (puff activity release)

```
                                TACT  V
                           HABIT Version 3/1/15/94
                       NUCLEAR REGULATORY COMMISSION
                         SEVERE ACCIDENT ISSUES BRANCH
                      DATE   7/11/2000    TIME  13: 7:27

                        MODEL SUMMARY FOR CASE    1


 TACT5A release.
 HABIT release design specification file 16:12:13 06-25-2000

 Gas Decay Tank

 Puff activity release

 100,000 Ci of Xe-133
  Time steps for use by CONHAB
1                                TIME INDEPENDENT INPUT
                                   CASE NUMBER   1


                                     NODES  NSTEP
                                       1      4

                                OUTPUT CONTROL PARAMETER
                                   I        1    2    3    4    5
                               IPRINT(I)    1    1    1    1    1

                               NUMBER OF DOSE EVALUATION POINTS -   3


                            POWER (MWT)     REACTOR SHUTDOWN TIME (HRS)
                              0.000E+00               0.000E+00


    FRACTION OF ACTIVITY RELEASED FROM CORE TO CONTAINMENT BY ISOTOPIC GROUP
           NOBLES
         0.000E+00


                      PLATEOUT FACTOR FOR ACTIVITY RELEASED FROM
  CORE TO CONTAINMENT BY ISOTOPIC GROUP
           NOBLES
         0.000E+00


    FRACTION OF CORE INVENTORY AIRBORNE IN THE CONTAINMENT BY ISOTOPIC GROUP
           NOBLES
        0.000E+00
```

ISOTOPIC SPLIT BY GROUP

	ELEM.	ORG.	PART.
NOBLES	1.000E+00	0.000E+00	0.000E+00

VOLUME OF NODES (CU FT)

GDT
4.700E+02

1 DATA FROM NUCLIDE FILE C:\RGEGDT\GDT_1A\1A---T5A.NUC !TACT5 nuclide selection file

ISOTOPE NAME	SOURCE SPLIT	SOURCE (CI/MWT)	DOSE CONVERSION FACTORS WHOLEBDY
XE 133	ELE	5.62E+04	5.772E-03

TIME DEPENDENT INPUT
CASE NUMBER 1

TIME DEPENDENT INPUT
CASE NUMBER 1

TIME INTERVAL	0	0	0	0	2	0.00000E+00	1.00000E-03
INITIAL CURIES	1	0	1	0	1	1.00000E+05	
TRANSFER CFM	0	0	0	1	2	1.94800E+04	0.00000E+00
TRANSFER PERCENT	0	0	0	1	2	0.00000E+00	-9.99000E+02
X/Q	0	0	0	0	3	4.80000E-04	0.00000E+00
0.00000E+00							
TIME INTERVAL	0	0	0	0	2	1.00000E-03	2.78000E-03
TIME INTERVAL	0	0	0	0	2	2.78000E-03	2.00000E+00
TRANSFER CFM	0	0	0	1	2	0.00000E+00	-9.99000E+02
TIME INTERVAL	0	0	0	0	2	2.00000E+00	2.00000E+00

ACTIVITIES (CI) AT END OF TIME STEP 1

CASE NUMBER 1

STEP START TIME AT 0.000E+00 (HRS) STEP END TIME AT 1.000E-03 (HRS)

ACTIVITY DISTRIBUTION IN THE NODES MODELED
BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT
NOBLES	ELEM.	8.317E+03	8.317E+03	8.317E+03

ACTIVITY CONTRIBUTION TO THE ENVIRONMENT FROM EACH NODE MODELED
FOR THE PLANT BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT
NOBLES	ELEM.	9.168E+04	9.168E+04	9.168E+04

ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 1.000E-03 (HRS)

ISO NAM	Form	ENV.	GDT
XE 133	ELEM.	9.168E+04	8.317E+03

DOSES FOR TIME STEP 1
CASE NUMBER 1

STEP START TIME AT 0.000E+00 (HRS) STEP END TIME AT 1.000E-03 (HRS)

PERCENT OF DOSE CONTRIBUTION FROM EACH NODE
BY CHEMICAL/PHYSICAL FORM AND GROUP

ORGAN	GROUP	FORM	TOTAL BY	TOTAL BY	GDT
WHOLEBDY	NOBLES	ELEM.	1.000E+02	1.000E+02	1.000E+02

EXCLUSION BOUNDARY

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.
WHOLEBDY	2.540E-01	2.540E-01	0.000E+00	0.000E+00

LOW POPULATION ZONE

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.

OTHER X/Q

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.

ACTIVITIES (CI) AT END OF TIME STEP 2

CASE NUMBER 1

STEP START TIME AT 1.000E-03 (HRS) STEP END TIME AT 2.780E-03 (HRS)

ACTIVITY DISTRIBUTION IN THE NODES MODELED
BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT
NOBLES	ELEM.	9.944E+01	9.944E+01	9.944E+01

ACTIVITY CONTRIBUTION TO THE ENVIRONMENT FROM EACH NODE MODELED
FOR THE PLANT BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT
NOBLES	ELEM.	8.218E+03	8.218E+03	8.218E+03

ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 2.780E-03 (HRS)

ISO NAM	Form	ENV.	GDT
XE 133	ELEM.	9.990E+04	9.944E+01

DOSES FOR TIME STEP 2
CASE NUMBER 1

STEP START TIME AT 1.000E-03 (HRS) STEP END TIME AT 2.780E-03 (HRS)

PERCENT OF DOSE CONTRIBUTION FROM EACH NODE
BY CHEMICAL/PHYSICAL FORM AND GROUP

ORGAN	GROUP	FORM	TOTAL BY	TOTAL BY	GDT
WHOLEBDY	NOBLES	ELEM.	1.000E+02	1.000E+02	1.000E+02

EXCLUSION BOUNDARY

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.
WHOLEBDY	2.277E-02	2.768E-01	0.000E+00	0.000E+00

LOW POPULATION ZONE

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.

OTHER X/Q

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.

ACTIVITIES (CI) AT END OF TIME STEP 3

CASE NUMBER 1

STEP START TIME AT 2.780E-03 (HRS) STEP END TIME AT 2.000E+00 (HRS)

ACTIVITY DISTRIBUTION IN THE NODES MODELED
BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT
NOBLES	ELEM.	9.836E+01	9.836E+01	9.836E+01

ACTIVITY CONTRIBUTION TO THE ENVIRONMENT FROM EACH NODE MODELED
FOR THE PLANT BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT

ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 2.000E+00 (HRS)

ISO NAM	Form	ENV.	GDT
XE 133	ELEM.	9.990E+04	9.836E+01

EXCLUSION BOUNDARY

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.
WHOLEBDY	0.000E+00	2.768E-01	0.000E+00	0.000E+00

LOW POPULATION ZONE

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.

OTHER X/Q

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.

ACTIVITIES (CI) AT END OF TIME STEP 4

CASE NUMBER 1

STEP START TIME AT 2.000E+00 (HRS) STEP END TIME AT 2.000E+00 (HRS)

ACTIVITY DISTRIBUTION IN THE NODES MODELED
BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT
NOBLES	ELEM.	9.836E+01	9.836E+01	9.836E+01

ACTIVITY CONTRIBUTION TO THE ENVIRONMENT FROM EACH NODE MODELED
FOR THE PLANT BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT

ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 2.000E+00 (HRS)

ISO NAM	Form	ENV.	GDT
XE 133	ELEM.	9.990E+04	9.836E+01

EXCLUSION BOUNDARY

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.
WHOLEBDY	0.000E+00	2.768E-01	0.000E+00	0.000E+00

LOW POPULATION ZONE

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.

OTHER X/Q

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.

PAGE 1

SUMMARY OF OFF-SITE DOSES

TACT5A release.

CALCULATION FOR WHOLEBDY DOSE (REMS)
SINGLE NODE CONTAINMENT WITH NO ESF

START TIME (HRS)	EXCLUSION RADIUS EACH STEP	EXCLUSION RADIUS ACCUM.	LOW POPULATION ZONE EACH STEP	LOW POPULATION ZONE ACCUM.	CONTROL ROOM EACH STEP	CONTROL ROOM ACCUM.
0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.780E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

PAGE 1

SUMMARY OF OFF-SITE DOSES

TACT5A release.

CALCULATION FOR WHOLEBDY DOSE (REMS)
MULTI NODE CONTAINMENT WITH ESF

START TIME (HRS)	EXCLUSION RADIUS EACH STEP	EXCLUSION RADIUS ACCUM.	LOW POPULATION ZONE EACH STEP	LOW POPULATION ZONE ACCUM.	CONTROL ROOM EACH STEP	CONTROL ROOM ACCUM.
0.000E+00	2.540E-01	2.540E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.000E-03	2.277E-02	2.768E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.780E-03	0.000E+00	2.768E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	2.768E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	TOTAL	2.768E-01	TOTAL	0.000E+00	TOTAL	0.000E+00

NO MORE CASES

END OF EXECUTION,

```
=======================================
=== TACT5, successful termination.  ===
=======================================
```

TACT5 tabular data for Cases 3 and 4 (2 hour activity release)

```
                                TACT  V
                          HABIT Version 3/1/15/94
                       NUCLEAR REGULATORY COMMISSION
                         SEVERE ACCIDENT ISSUES BRANCH
                      DATE   7/11/2000     TIME  13:33: 7

                        MODEL SUMMARY FOR CASE    1


 TACT5A release.
 HABIT release design specification file 16:12:13 06-25-2000

 Gas Decay Tank

 2 hour activity release

 100,000 Ci of Xe-133
  Time steps for use by CONHAB
1                                TIME INDEPENDENT INPUT
                                   CASE NUMBER   1


                                   NODES  NSTEP
                                     1      3

                                OUTPUT CONTROL PARAMETER
                                   I        1    2    3    4    5
                                IPRINT(I)   1    1    1    1    1

                                NUMBER OF DOSE EVALUATION POINTS -   3


                             POWER (MWT)     REACTOR SHUTDOWN TIME (HRS)
                               0.000E+00               0.000E+00


    FRACTION OF ACTIVITY RELEASED FROM CORE TO CONTAINMENT BY ISOTOPIC GROUP
           NOBLES
         0.000E+00


                        PLATEOUT FACTOR FOR ACTIVITY RELEASED FROM
  CORE TO CONTAINMENT BY ISOTOPIC GROUP
           NOBLES
         0.000E+00


    FRACTION OF CORE INVENTORY AIRBORNE IN THE CONTAINMENT BY ISOTOPIC GROUP
           NOBLES
        0.000E+00
```

ISOTOPIC SPLIT BY GROUP

	ELEM.	ORG.	PART.
NOBLES	1.000E+00	0.000E+00	0.000E+00

VOLUME OF NODES (CU FT)

GDT
4.700E+02

1 DATA FROM NUCLIDE FILE C:\RGEGDT\GDT_3A\3A---T5A.NUC !TACT5 nuclide selection file

ISOTOPE NAME	SOURCE SPLIT	(CI/MWT)	WHOLEBDY	DOSE CONVERSION FACTORS
XE 133	ELE	5.62E+04	5.772E-03	

TIME DEPENDENT INPUT
CASE NUMBER 1

TIME DEPENDENT INPUT
CASE NUMBER 1

TIME INTERVAL	0	0	0	0	2	0.00000E+00	2.78000E-03
INITIAL CURIES	1	0	1	0	1	1.00000E+05	
TRANSFER CFM	0	0	0	1	2	2.70600E+01	0.00000E+00
TRANSFER PERCENT	0	0	0	1	2	0.00000E+00	-9.99000E+02
X/Q	0	0	0	0	3	4.80000E-04	0.00000E+00
0.00000E+00							
TIME INTERVAL	0	0	0	0	2	2.78000E-03	2.00000E+00
TIME INTERVAL	0	0	0	0	2	2.00000E+00	2.00000E+00
TRANSFER CFM	0	0	0	1	2	0.00000E+00	-9.99000E+02

ACTIVITIES (CI) AT END OF TIME STEP 1

CASE NUMBER 1

STEP START TIME AT 0.000E+00 (HRS) STEP END TIME AT 2.780E-03 (HRS)

ACTIVITY DISTRIBUTION IN THE NODES MODELED
BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT
NOBLES	ELEM.	9.904E+04	9.904E+04	9.904E+04

ACTIVITY CONTRIBUTION TO THE ENVIRONMENT FROM EACH NODE MODELED
FOR THE PLANT BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT
NOBLES	ELEM.	9.557E+02	9.557E+02	9.557E+02

ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 2.780E-03 (HRS)

ISO NAM	Form	ENV.	GDT
XE 133	ELEM.	9.557E+02	9.904E+04

DOSES FOR TIME STEP 1
CASE NUMBER 1

STEP START TIME AT 0.000E+00 (HRS) STEP END TIME AT 2.780E-03 (HRS)

PERCENT OF DOSE CONTRIBUTION FROM EACH NODE
BY CHEMICAL/PHYSICAL FORM AND GROUP

ORGAN	GROUP	FORM	TOTAL BY	TOTAL BY	GDT
WHOLEBDY	NOBLES	ELEM.	1.000E+02	1.000E+02	1.000E+02

EXCLUSION BOUNDARY

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.
WHOLEBDY	2.648E-03	2.648E-03	0.000E+00	0.000E+00

LOW POPULATION ZONE

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.

OTHER X/Q

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	ACCUM.

ACTIVITIES (CI) AT END OF TIME STEP 2

CASE NUMBER 1

STEP START TIME AT 2.780E-03 (HRS) STEP END TIME AT 2.000E+00 (HRS)

ACTIVITY DISTRIBUTION IN THE NODES MODELED
BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT
NOBLES	ELEM.	9.879E+01	9.879E+01	9.879E+01

ACTIVITY CONTRIBUTION TO THE ENVIRONMENT FROM EACH NODE MODELED
FOR THE PLANT BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT
NOBLES	ELEM.	9.879E+04	9.879E+04	9.879E+04

ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 2.000E+00 (HRS)

ISO NAM	Form	ENV.	GDT
XE 133	ELEM.	9.974E+04	9.879E+01

DOSES FOR TIME STEP 2
CASE NUMBER 1

STEP START TIME AT 2.780E-03 (HRS) STEP END TIME AT 2.000E+00 (HRS)

PERCENT OF DOSE CONTRIBUTION FROM EACH NODE
BY CHEMICAL/PHYSICAL FORM AND GROUP

ORGAN	GROUP	FORM	TOTAL BY	TOTAL BY	GDT
WHOLEBDY	NOBLES	ELEM.	1.000E+02	1.000E+02	1.000E+02

EXCLUSION BOUNDARY

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	CALCULATED DOSE (REM) ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	UNREDUCED DOSE (REM) ACCUM.
WHOLEBDY	2.737E-01	2.763E-01	0.000E+00	0.000E+00

LOW POPULATION ZONE

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	CALCULATED DOSE (REM) ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	UNREDUCED DOSE (REM) ACCUM.

OTHER X/Q

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	CALCULATED DOSE (REM) ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	UNREDUCED DOSE (REM) ACCUM.

ACTIVITIES (CI) AT END OF TIME STEP 3

CASE NUMBER 1

STEP START TIME AT 2.000E+00 (HRS) STEP END TIME AT 2.000E+00 (HRS)

ACTIVITY DISTRIBUTION IN THE NODES MODELED
BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP	FORM	TOTAL BY	TOTAL BY	GDT
NOBLES	ELEM.	9.879E+01	9.879E+01	9.879E+01

ACTIVITY CONTRIBUTION TO THE ENVIRONMENT FROM EACH NODE MODELED
FOR THE PLANT BY CHEMICAL/PHYSICAL FORM AND GROUP

GROUP FORM TOTAL BY TOTAL BY GDT

ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 2.000E+00 (HRS)

ISO NAM Form ENV. GDT

XE 133 ELEM. 9.974E+04 9.879E+01

EXCLUSION BOUNDARY

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	CALCULATED DOSE (REM) ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	UNREDUCED DOSE (REM) ACCUM.
WHOLEBDY	0.000E+00	2.763E-01	0.000E+00	0.000E+00

LOW POPULATION ZONE

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	CALCULATED DOSE (REM) ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	UNREDUCED DOSE (REM) ACCUM.

OTHER X/Q

ORGAN NAME	CALCULATED DOSE (REM) FOR THIS TIME STEP	CALCULATED DOSE (REM) ACCUM.	UNREDUCED DOSE (REM) FOR THIS TIME STEP	UNREDUCED DOSE (REM) ACCUM.

PAGE 1

SUMMARY OF OFF-SITE DOSES

TACT5A release.

CALCULATION FOR WHOLEBDY DOSE (REMS)
SINGLE NODE CONTAINMENT WITH NO ESF

START TIME (HRS)	EXCLUSION RADIUS EACH STEP	EXCLUSION RADIUS ACCUM.	LOW POPULATION ZONE EACH STEP	LOW POPULATION ZONE ACCUM.	CONTROL ROOM EACH STEP	CONTROL ROOM ACCUM.
0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.780E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

SUMMARY OF OFF-SITE DOSES

TACT5A release.

CALCULATION FOR WHOLEBDY DOSE (REMS)
MULTI NODE CONTAINMENT WITH ESF

START TIME (HRS)	EXCLUSION RADIUS EACH STEP	EXCLUSION RADIUS ACCUM.	LOW POPULATION ZONE EACH STEP	LOW POPULATION ZONE ACCUM.	CONTROL ROOM EACH STEP	CONTROL ROOM ACCUM.
0.000E+00	2.648E-03	2.648E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.780E-03	2.737E-01	2.763E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	2.763E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	TOTAL	2.763E-01	TOTAL	0.000E+00	TOTAL	0.000E+00

NO MORE CASES

END OF EXECUTION,

==========
=== TACT5, successful termination. ===
==========

CONHAB Input file for cases 1a and 3a ("A" cases, no isolation). The "B" case input is the same, except the make-up flow rate is 2200 cfm rather than **1800** cfm.

```
CONHAB release. Used by CHEM and CONHAB.
HABIT release design specification file 16:12:13 06-25-2000

Case 1A
1800 cfm continuous make-up
no isolation

STARTDATA:
          2           4           1      !Distance units & Flow Units used in
input, X/Q option flag
       -00.0      !Power level (MWt)
    922.8462      !Control room volume (m3)
       -00.0       -00.0       -00.0      !Core fractions:  Halogens (Elem.,
Org., Part.)
       -00.0       -00.0       -00.0      !Core fractions:  Nobles (Elem.,
Org., Part.)
       -00.0       -00.0       -00.0      !Core fractions:  Solids (Elem.,
Org., Part.)
       -00.0       -00.0       -00.0      !Core fractions:  Sodiums (Elem.,
Org., Part.)
       -00.0       -00.0       -00.0      !Core fractions:  Plutoniums (Elem.,
Org., Part.)
          0      .00278      !====== Start of step  1,  StartTime (hrs),
EndTime (hrs)
     .000695      !Manually entered X/Q
          0      !Flow rate from unfiltered intake source #1 (m3/s)
          0      !Flow rate from unfiltered intake source #2 (m3/s)
          0      !Bottled air flow rate (m3/s)
    .8495054      !Flow rate from filtered intake source #1 (m3/s)
          0           0           0      !Filter efficiencies #1, (Elem.,
Org., Part.)(fraction)
          0      !Flow rate from filtered intake source #2 (feeds recirc,
m3/s)
          0           0           0      !Filter efficiencies #2, (Elem.,
Org., Part.)(fraction)
          0      !Recirculation flow rate (m3/s)
          0           0           0      !Recirc. filter efficiencies ,
(Elem., Org., Part.)(fraction)
          1      !Control room occupancy factor
      .00278           2      !====== Start of step  2,  StartTime (hrs),
EndTime (hrs)
     .000695      !Manually entered X/Q
          0      !Flow rate from unfiltered intake source #1 (m3/s)
          0      !Flow rate from unfiltered intake source #2 (m3/s)
          0      !Bottled air flow rate (m3/s)
    .8495054      !Flow rate from filtered intake source #1 (m3/s)
          0           0           0      !Filter efficiencies #1, (Elem.,
Org., Part.)(fraction)
          0      !Flow rate from filtered intake source #2 (feeds recirc,
m3/s)
          0           0           0      !Filter efficiencies #2, (Elem.,
Org., Part.)(fraction)
```

```
           0       !Recirculation flow rate (m3/s)
           0            0            0       !Recirc. filter efficiencies ,
(Elem., Org., Part.)(fraction)
           1       !Control room occupancy factor
           2            2       !====== Start of step  3,  StartTime (hrs),
EndTime (hrs)
     .000695       !Manually entered X/Q
           0       !Flow rate from unfiltered intake source #1 (m3/s)
           0       !Flow rate from unfiltered intake source #2 (m3/s)
           0       !Bottled air flow rate (m3/s)
    .8495054       !Flow rate from filtered intake source #1 (m3/s)
           0            0            0       !Filter efficiencies #1, (Elem.,
Org., Part.)(fraction)
           0       !Flow rate from filtered intake source #2 (feeds recirc,
m3/s)
           0            0            0       !Filter efficiencies #2, (Elem.,
Org., Part.)(fraction)
           0       !Recirculation flow rate (m3/s)
           0            0            0       !Recirc. filter efficiencies ,
(Elem., Org., Part.)(fraction)
           1       !Control room occupancy factor
```

CONHAB Input File for Cases 2a and 4a (10 second isolation). The "B" case input is the same, except the initial make-up flow rate is 2200 cfm rather than 1800 cfm.

```
CONHAB release. Used by CHEM and CONHAB.
HABIT release design specification file 16:12:13 06-25-2000

Case 2A
1800 cfm make-up before isolation
300 cfm make-up after isolation

STARTDATA:
          2           4           1      !Distance units & Flow Units used in
input, X/Q option flag
       -00.0      !Power level (MWt)
    922.8463      !Control room volume (m3)
       -00.0       -00.0       -00.0      !Core fractions:  Halogens (Elem.,
Org., Part.)
       -00.0       -00.0       -00.0      !Core fractions:  Nobles (Elem.,
Org., Part.)
       -00.0       -00.0       -00.0      !Core fractions:  Solids (Elem.,
Org., Part.)
       -00.0       -00.0       -00.0      !Core fractions:  Sodiums (Elem.,
Org., Part.)
       -00.0       -00.0       -00.0      !Core fractions:  Plutoniums (Elem.,
Org., Part.)
          0      .00278      !====== Start of step  1,  StartTime (hrs),
EndTime (hrs)
     .000695      !Manually entered X/Q
          0      !Flow rate from unfiltered intake source #1 (m3/s)
          0      !Flow rate from unfiltered intake source #2 (m3/s)
          0      !Bottled air flow rate (m3/s)
    .8495054      !Flow rate from filtered intake source #1 (m3/s)
          0           0           0      !Filter efficiencies #1, (Elem.,
Org., Part.)(fraction)
          0      !Flow rate from filtered intake source #2 (feeds recirc,
m3/s)
          0           0           0      !Filter efficiencies #2, (Elem.,
Org., Part.)(fraction)
          0      !Recirculation flow rate (m3/s)
          0           0           0      !Recirc. filter efficiencies ,
(Elem., Org., Part.)(fraction)
          1      !Control room occupancy factor
      .00278           2      !====== Start of step  2,  StartTime (hrs),
EndTime (hrs)
     .000695      !Manually entered X/Q
          0      !Flow rate from unfiltered intake source #1 (m3/s)
          0      !Flow rate from unfiltered intake source #2 (m3/s)
          0      !Bottled air flow rate (m3/s)
    .1415842      !Flow rate from filtered intake source #1 (m3/s)
          0           0           0      !Filter efficiencies #1, (Elem.,
Org., Part.)(fraction)
          0      !Flow rate from filtered intake source #2 (feeds recirc,
m3/s)
          0           0           0      !Filter efficiencies #2, (Elem.,
Org., Part.)(fraction)
```

```
           0       !Recirculation flow rate (m3/s)
           0            0            0       !Recirc. filter efficiencies ,
(Elem., Org., Part.)(fraction)
           1       !Control room occupancy factor
           2            2       !====== Start of step  3,  StartTime (hrs),
EndTime (hrs)
     .000695       !Manually entered X/Q
           0       !Flow rate from unfiltered intake source #1 (m3/s)
           0       !Flow rate from unfiltered intake source #2 (m3/s)
           0       !Bottled air flow rate (m3/s)
    .1415842       !Flow rate from filtered intake source #1 (m3/s)
           0            0            0       !Filter efficiencies #1, (Elem.,
Org., Part.)(fraction)
           0       !Flow rate from filtered intake source #2 (feeds recirc,
m3/s)
           0            0            0       !Filter efficiencies #2, (Elem.,
Org., Part.)(fraction)
           0       !Recirculation flow rate (m3/s)
           0            0            0       !Recirc. filter efficiencies ,
(Elem., Org., Part.)(fraction)
           1       !Control room occupancy factor
```

CONHAB OUTPUT (SELECTED PORTIONS)

```
"Case 1A
 "
"1800 cfm continuous make-up
 "
"CUMULATIVE DOSE HISTORY"
 "BEGIN TIME",  "END TIME",  "WH BODY",  "SKIN",
    .0028,    2.0000, 9.889E-03,  6.745E-01
   2.0000,   24.0000, 9.910E-03,  6.759E-01
  24.0000,   48.0000, 9.910E-03,  6.759E-01

Case 1B
2200 cfm continuous make-up

CUMULATIVE DOSE HISTORY"
"BEGIN TIME",  "END TIME",  "WH BODY",  "SKIN
    .0028,    2.0000, 9.877E-03,  6.737E-01
   2.0000,   24.0000, 9.883E-03,  6.741E-01
  24.0000,   48.0000, 9.883E-03,  6.741E-01



Case 2A
1800 cfm make-up before isolation
300 cfm make-up after isolation

CUMULATIVE DOSE HISTORY"
"BEGIN TIME",  "END TIME",  "WH BODY",  "SKIN"
  .0028,    2.0000, 3.903E-02,  2.662E+00
 2.0000,   24.0000, 5.831E-02,  3.977E+00
24.0000,   48.0000, 5.831E-02,  3.977E+00

Case 2B
2200 cfm make-up before isolation
300 cfm make-up after isolation

CUMULATIVE DOSE HISTORY"
"BEGIN TIME",  "END TIME",  "WH BODY",  "SKIN"
  .0028,    2.0000, 4.762E-02,  3.248E+00
 2.0000,   24.0000, 7.114E-02,  4.852E+00
24.0000,   48.0000, 7.114E-02,  4.852E+00
```

Case 3A
1800 cfm continuous make-up

CUMULATIVE DOSE HISTORY"
"BEGIN TIME", "END TIME", "WH BODY", "SKIN"
1.9769, 2.0000, 9.734E-03, 6.639E-01
2.0000, 24.0000, 9.861E-03, 6.726E-01
24.0000, 48.0000, 9.861E-03, 6.726E-01

Case 3B
2200 cfm continuous make-up

CUMULATIVE DOSE HISTORY"
"BEGIN TIME", "END TIME", "WH BODY", "SKIN
1.9769, 2.0000, 9.776E-03, 6.668E-01
2.0000, 24.0000, 9.850E-03, 6.718E-01
24.0000, 48.0000, 9.850E-03, 6.718E-01

Case 4A - 1800 cfm before isolation
10 sec isolation - 300 cfm after isolation
2 hour activity release

CUMULATIVE DOSE HISTORY"
"BEGIN TIME", "END TIME", "WH BODY", "SKIN
1.9769, 2.0000, 6.248E-03, 4.261E-01
2.0000, 24.0000, 1.025E-02, 6.989E-01
24.0000, 48.0000, 1.025E-02, 6.989E-01

Case 4B - 2200 cfm before isolation
10 sec isolation - 300 cfm after isolation

CUMULATIVE DOSE HISTORY"
"BEGIN TIME", "END TIME", "WH BODY", "SKIN
1.9769, 2.0000, 6.331E-03, 4.318E-01
2.0000, 24.0000, 1.037E-02, 7.073E-01
24.0000, 48.0000, 1.037E-02, 7.073E-01