TABLE 3.2.7
Instrumentation for Control Room Habitability Protection

Function	Trip Settings	Total No. of Instrument Channels per Trip System	Minimum No. of Operating Instrument Channels per Trip System (1)	Minimum No. of Trip Systems	Required Conditions*
Chlorine	≤ 1.0 ppm	X 2 (2)	X 2	2	A, B or C
Radiation	≤ 2 mR/hr	1	1	2	A, B or C

Notes:

(1) An instrument channel may be bypassed for testing or preventive maintenance for up to eight hours.
(2) all instrument channels are shared by both trip systems.
* Required conditions when minimum conditions for operation are not satisfied.

A) With one trip system inoperable restore the system to an operable condition within 7 days or within 6 hours following the 7 days initiate and maintain operation of at least one control room emergency filtration system subsystem in the isolation mode of operation for an inoperable chlorine detector or the pressurization mode of operation for an inoperable radiation monitor.

B) With two trip systems inoperable, within 1 hour initiate and maintain operation of at least one control room emergency filtration system subsystem in the isolation mode of operation for an inoperable chlorine detector or the pressurization mode of operation for an inoperable radiation monitor.

C) Within 24 hours reduce reactor water temperature to below 212°F.

U S Nuclear Regulatory Commission
February 19, 1987
Attachment (3)

This attachment consists of revised Technical Specification pages for our License Amendment Request dated April 3, 1984 as revised through Revision No. 3.

Page revisions resulting from approved NRC License Amendments subsequent to the April 3, 1984 application are shown on these pages.

This is a complete and updated replacement for Exhibit B.

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3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS
F. Recirculation Pump Trip and Alternate Rod Injection Initiation. Whenever the reactor is in the RUN mode, the Limiting Conditions for Operation for the instrumentation listed in Table 3.2.5 shall be met.	
G. Safeguards Bus Voltage Protection Whenever the safeguards auxiliary electrical power system is required to be operable by Specification 3.9, the Limiting Conditions for Operation for the Instrumentation listed in Table 3.2.6 shall be met.	
H. Instrumentation for Safety/Relief Valve Low-Low Set Logic Whenever the safety/relief valves are required to be operable by Specification 3.6.E, the Limiting Conditions for Operation for the Instrumentation listed in Table 3.2.7 shall be met.	
I. Instrumentation for Control Room Habitability Protection When irradiated fuel is in the reactor vessel and the reactor water temperature is above 212°F, the limiting conditions for operation for the instrumentation for control room habitability protection listed in Table 3.2.9 shall be met.	

TABLE 3.2.9
Instrumentation for Control Room Habitability Protection

Function	Trip Settings	Total No. of Instrument Channels per Trip System	Minimum No. of Operating Instrument Channels per Trip System (1)	Minimum No. of Trip Systems	Required Conditions*
Chlorine	≤1.0 ppm	2(2)	2	2	A, B or C
Radiation	≤2 mR/hr	1	1	2	A, B or C

Notes:

(1) An instrument channel may be bypassed for testing or preventive maintenance for up to eight hours.

(2) All instrument channels are shared by both trip systems.

* Required conditions when minimum conditions for operation are not satisfied.

A) With one trip system inoperable restore the system to an operable condition within 7 days or within 6 hours following the 7 days initiate and maintain operation of at least one control room emergency filtration system subsystem in the isolation mode of operation for an inoperable chlorine detector or the pressurization mode of operation for an inoperable radiation monitor.

B) With two trip systems inoperable, within 1 hour initiate and maintain operation of at least one control room emergency filtration system subsystem in the isolation mode of operation for an inoperable chlorine detector or the pressurization mode of operation for an inoperable radiation monitor.

C) Within 24 hours reduce reactor water temperature to below 212°F.

TABLE 4.2.1 - Continued

Minimum Test and Calibration Frequency for Core Cooling, Rod Block and Isolation Instrumentation

Instrument Channel	Test (3)	Calibration (3)	Sensor Check (3)
SAFEGUARDS BUS VOLTAGE			
1. Degraded Voltage Protection	Note 1	Quarterly	Not applicable
2. Loss of Voltage Protection	Note 1	Once/Operating Cycle	Not applicable
SAFETY/RELIEF VALVE LOW-LOW SET LOGIC			
1. Reactor Scram Sensing	Once/Shutdown (8)	-	-
2. Reactor Pressure - Opening	Once/3 months	Once/Operating Cycle	Once/day
3. Reactor Pressure - Closing	Once/3 months	Once/Operating Cycle	Once/day
4. Discharge Pipe Pressure	Once/3 months	Once/Operating Cycle	-
5. Inhibit Timer	Once/3 months	Once/Operating Cycle	-
CONTROL ROOM HABITABILITY PROTECTION			
1. Chlorine	Monthly (5)	18 months	Daily
2. Radiation	Monthly (5)	18 months	Daily

Bases:

3.2 In addition to reactor protection instrumentation which initiates a reactor scram, protective instrumentation has been provided which initiates action to mitigate the consequences of accidents which are beyond the operators ability to control, or terminate a single operator error before it results in serious consequences. This set of Specifications provides the limiting conditions of operation for the primary system isolation function, initiation of the emergency core cooling system, and other safety related functions. The objectives of the Specifications are (i) to assure the effectiveness of the protective instrumentation when required by preserving its capability to tolerate a single failure of any component of such systems even during periods when portions of such systems are out of service for maintenance, testing, or calibration, and (ii) to prescribe the trip settings required to assure adequate performance. This set of Specifications also provides the limiting conditions of operation for the control rod block system.

Isolation valves are installed in those lines that penetrate the primary containment and must be isolated during a loss of coolant accident so that the radiation dose limits are not exceeded during an accident condition. Actuation of these valves is initiated by protective instrumentation shown in Table 3.2.1 which senses the conditions for which isolation is required. Such instrumentation must be available whenever primary containment integrity is required. The objective is to isolate the primary containment so that the guidelines of 10 CFR 100 are not exceeded during an accident.

The instrumentation which initiates primary system isolation is connected in a dual bus arrangement. Thus, the discussion given in the bases for Specification 3.1 is applicable here.

The low reactor water level instrumentation is set to trip when reactor water level is 10'6" (7" on the instrument at 100% rated thermal power) above the top of the active fuel. This trip initiates closure of Group 2, and 3 primary containment isolation valves. Reference Section 7.7.2.2 FSAR. For a trip setting of 10'6" above the top of the active fuel, the valves will be closed before perforation of the clad occurs even for the maximum break in that line and therefore the setting is adequate.

The low low reactor water level instrumentation is set to trip when reactor water level is 6'6" above the top of the active fuel. This trip initiates closure of the Group 1 Primary containment isolation valves, Reference Section 7.7.2.2 FSAR, and also activates the ECC systems and starts the emergency diesel generator.

open and instrumentation drift has caused the nominal 80-psi blowdown range to be reduced to 60 psi. Maximum water leg clearing time has been calculated to be less than 6 seconds for the Monticello design. Inhibit timers are provided for each valve to prevent the valve from being manually opened less than 10 seconds following valve closure. Valve opening is sensed by pressure switches in the valve discharge line. Each valve is provided with two trip, or actuation, systems. Each system is provided with two channels of instrumentation for each of the above described functions. A two-out-of-two-once logic scheme ensures that no single failure will defeat the low-low set function and no single failure will cause spurious operation of a safety/relief valve. Allowable deviations are provided for each specified instrument setpoint. Setpoints within the specified allowable deviations provide assurance that subsequent safety/relief valve actuations are sufficiently spaced to allow for discharge line water leg clearing.

Control room habitability protection assures that the control room operators will be adequately protected against the effects of accidental releases of toxic substances, thus assuring that the Monticello Nuclear Generating Plant can be operated or shutdown safely. A study conducted by Bechtel Power Corporation concluded that of the onsite and offsite potential toxic chemical hazards, only chlorine required automatic detection and isolation to prevent incapacitation of control room operators. All other chemicals were determined to have at least two minutes between detection and possible incapacitation. Protection for these toxic chemicals is provided through operator training.

Although the operator will set the set points within the trip settings specified in Tables 3.2.1 through 3.2.9, the actual values of the various set points can differ appreciably from the value the operator is attempting to set. The deviations could be caused by inherent instrument error, drift of the set point, etc. Therefore, these deviations have been accounted for in the various transient analyses and the actual trip settings may vary by the following amounts:

References:

1. "Average Power Range Monitor, Rod Block Monitor and Technical Specifications Improvement (ARTS) Program for Monticello Nuclear Generating Plant", NEDC-30492-P, April, 1984.

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS

3.17 CONTROL ROOM HABITABILITY

Applicability:

Applies to the control room ventilation system equipment necessary to maintain habitability.

Objectives:

To assure the control room is habitable both under normal and accident conditions.

Specification:

A. Control Room Ventilation System

1. Except as specified in 3.17.A.2 and 3.17.A.3 below, both trains of the control room ventilation system shall be operable, including all components required to maintain air temperature, humidity, air flow, and outside air isolation, whenever irradiated fuel is in the reactor vessel and reactor water temperature is greater than 212°F.

2. With one control room ventilation train inoperable, restore the inoperable train to operable status within seven days or be in hot shutdown within the next 12 hours following the seven days and in cold shutdown within the following 24 hours.

4.17 CONTROL ROOM HABITABILITY

Applicability:

Applies to the periodic testing requirements of systems required to maintain control room habitability.

Objectives:

To verify the operability of equipment related to control room habitability.

Specification:

A. Control Room Ventilation System

1. At least once per 18 months verify that the control room isolates on detection of chlorine.

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS
3. With both control room ventilation trains inoperable, restore at least one train to operable status within 24 hours or be in hot shutdown within the next 12 hours following the 24 hours and in cold shutdown within the following 24 hours.	
B. Control Room Emergency Filtration System	B. Control Room Emergency Filtration System
1. Except as specified in 3.17.B.1.a or 3.17.B.1.b below, two control room emergency filtration system filter trains shall be operable whenever irradiated fuel is in the reactor vessel and reactor coolant temperature is greater than 212°F.	1. At least once per month, initiate from the control room 1000 cfm (±10%) flow through both trains of the emergency filtration treatment system. In addition within 2 hours from the time that one train is made or found to be inoperable for any reason and daily thereafter for the next succeeding seven days, initiate from the control room 1000 cfm (±10%) flow through the operable train.
a. When one control room emergency filtration system filter train is made or found to be operable, for any reason, restore the inoperable train to operable status within seven days or be in hot shutdown within the next 12 hours following the seven days and in cold shutdown within the following 24 hours.	
b. When both filter trains of the control room emergency filtration system are inoperable, restore at least one train to operable status within 24 hours or be in hot shutdown within the next 12 hours following the 24 hours and in cold shutdown within the following 24 hours.	

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS
2. Performance Requirement	2. Performance Requirement Tests
a. Periodic Requirements	a. At least once per 720 hours of system operation; or once per operating cycle, but not to exceed 18 months, whichever occurs first; or following painting, fire, or chemical release while the system is operating that could contaminate the HEPA filters or charcoal adsorbers, perform the following:
(1) The results of the in-place DOP tests at 1000 cfm (±10%) on HEPA filters shall show ≤1% DOP penetration.	(1) In-place DOP test the HEPA filter banks.
(2) The results of in-place halogenated hydrocarbon tests at 1000 cfm (±10%) on charcoal banks shall show ≤1% penetration.	(2) In-place test the charcoal adsorber banks with halogenated hydrocarbon tracer.
(3) The results of laboratory carbon sample analysis shall show ≥90% methyl iodine removal efficiency when tested at 130°C, 70% R.H.	(3) Remove one carbon test canister from the charcoal adsorber. Subject this sample to a laboratory analysis to verify methyl iodide removal efficiency.
b. The system shall be shown to be operable with:	b. At least once per operating cycle, but not to exceed 18 months, the following conditions shall be demonstrated for each emergency filtration system train:
(1) Combined filter pressure drop ≤8 inches water.	(1) Pressure drop across the combined filters of each train shall be measured at 1000 cfm (±10%) flow rate.
(2) Inlet heater power output ≥4kW.	(2) Operability of inlet heater at nominal rated power shall be verified.
(3) Automatic initiation upon receipt of a high radiation signal.	

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS
	(3) Verify that on a simulated high radiation signal, the train switches to the pressurization mode of operation and the control room is maintained at a positive pressure with respect to the outside atmosphere at the design flow rate of 1000 cfm.
3. Post Maintenance Requirements	3. Post Maintenance Testing
a. After any maintenance or testing that could affect the HEPA filter or HEPA filter mounting frame leak tight integrity, the results of the in-place DOP tests at 1000 cfm (±10%) on HEPA filters shall show ≤1% DOP penetration.	a. After any maintenance or testing that could affect the leak tight integrity of the HEPA filters, perform in-place DOP tests on the HEPA filters.
b. After any maintenance or testing that could affect the charcoal adsorber leak tight integrity, the results of in-place halogenated hydrocarbon tests at 1000 cfm (±10%) on charcoal adsorber banks shall show ≤1% penetration.	b. After any maintenance or testing that could affect the leak tight integrity of the charcoal adsorber banks, perform halogenated hydrocarbon tests on the charcoal adsorbers.

3.17 Bases

A. Control Room Ventilation System

The Control Room Ventilation System provides air conditioning and heating as required to maintain a suitable environment in the control room. The main control room is normally slightly pressurized and it is possible to have 0 to 100% recirculation of conditioned air. The system is designed to maintain 50% relative humidity and a temperature of 78°F dry bulb in the summer and 72°F dry bulb in the winter. The Control room Ventilation System may be isolated from external air supply by manual action from the control room or automatic action. Automatic action includes isolation on detection of chlorine.

B. Control Room Emergency Filtration System

The Control Room Emergency Filtration System assures that the control room operators will be adequately protected against the effects of radioactive leakage which may by-pass secondary containment following a loss of coolant accident or radioactive releases from a steam line break accident. The system is designed to isolate and slightly pressurize the control room on a high radiation signal in the ventilation air. Two completely redundant trains are provided.

Each train has a filter unit consisting of a prefilter, HEPA filters, and charcoal adsorbers. The HEPA filters remove particulates from the Control Room pressurizing air and prevent clogging of the iodine adsorbers. The charcoal adsorbers are installed to remove any radioiodines from the pressurizing air. The in-place test results should indicate a HEPA filter leakage of less than 1% through DOP testing and a charcoal adsorber leakage of less than 1% through halogenated hydrocarbon testing. The laboratory carbon sample test results should indicate a radioactive methyl iodide removal efficiency of at least 90% under test conditions more severe than expected accident conditions. System flows should be near their design values. The verification of these performance parameters combined with the qualification testing conducted on new filters and adsorber provide a high level of assurance that the Emergency Filtration System will perform as predicted in reducing potential doses to plant personnel below those levels stated in Criterion 19 of Appendix A to 10 CFR 50.

Dose calculations have been performed for the Control Room Emergency Filtration System which show that, assuming 90% standby gas treatment system adsorption and filtration efficiency and 90% control room emergency filtration system adsorption and filtration efficiency, whole body and organ doses remain within the NRC guidelines of 5 rem and 30 rem, respectively.

4.17 Bases

A. Control Room Ventilation System

Demonstrating automatic isolation of the control room using simulated accident signals assures control room isolation under accident conditions.

B. Control Room Emergency Filtration System

Pressure drop across the combined HEPA filters and charcoal adsorbers of less than 8 inches of water at the system design flow rate will indicate that the filters and adsorbers are not clogged by excessive amounts of foreign matter.

The frequency of tests and sample analysis is necessary to show that the HEPA filters and charcoal adsorbers can perform as evaluated. A charcoal adsorber tray which can accommodate a sufficient number of representative adsorber sample modules for estimating the amount of penetration of the system adsorbent through its life is installed. Sample modules will be installed with the same batch characteristics as the system adsorbent and will be withdrawn for the methyl iodide removal efficiency tests. Each module withdrawn will be replaced or blocked off. If test results are unacceptable, all adsorbent in the train is replaced. Any HEPA filters found defective are replaced.

In-place testing procedures will be established utilizing applicable sections of ANSI N510 - 1975 standard as a procedural guideline only.

2. A program shall be implemented to reduce leakage from systems outside containment that would or could contain highly radioactive fluids during a serious transient or accident to as low as practical levels. This program shall include the following:

   a. Provisions establishing preventive maintenance and periodic visual inspection requirements, and

   b. Integrated leak test requirements for each system at a frequency not to exceed refueling cycle intervals.

   A program acceptable to the Commission was described in a letter dated December 31, 1979, from L O Mayer, NSP, to Director of Nuclear Reactor Regulation, "Lessons Learned Implementation".

3. A program shall be implemented which will ensure the capability to accurately determine the airborne iodine concentration in essential plant areas under accident conditions. This program shall include the following:

   a. Training of personnel,

   b. Procedures for monitoring, and

   c. Provisions for maintenance of sampling and analysis equipment.

   A program acceptable to the Commission was described in a letter dated December 31, 1979, from L O Mayer, NSP, to Director of Nuclear Reactor Regulation, "Lessons Learned Implementation".

4. A program shall be implemented which will ensure the capability to obtain and analyze reactor coolant, radioactive iodines, and particulates in plant gaseous effluents and containment atmosphere samples under accident conditions. The program shall include:

   a. Training of personnel

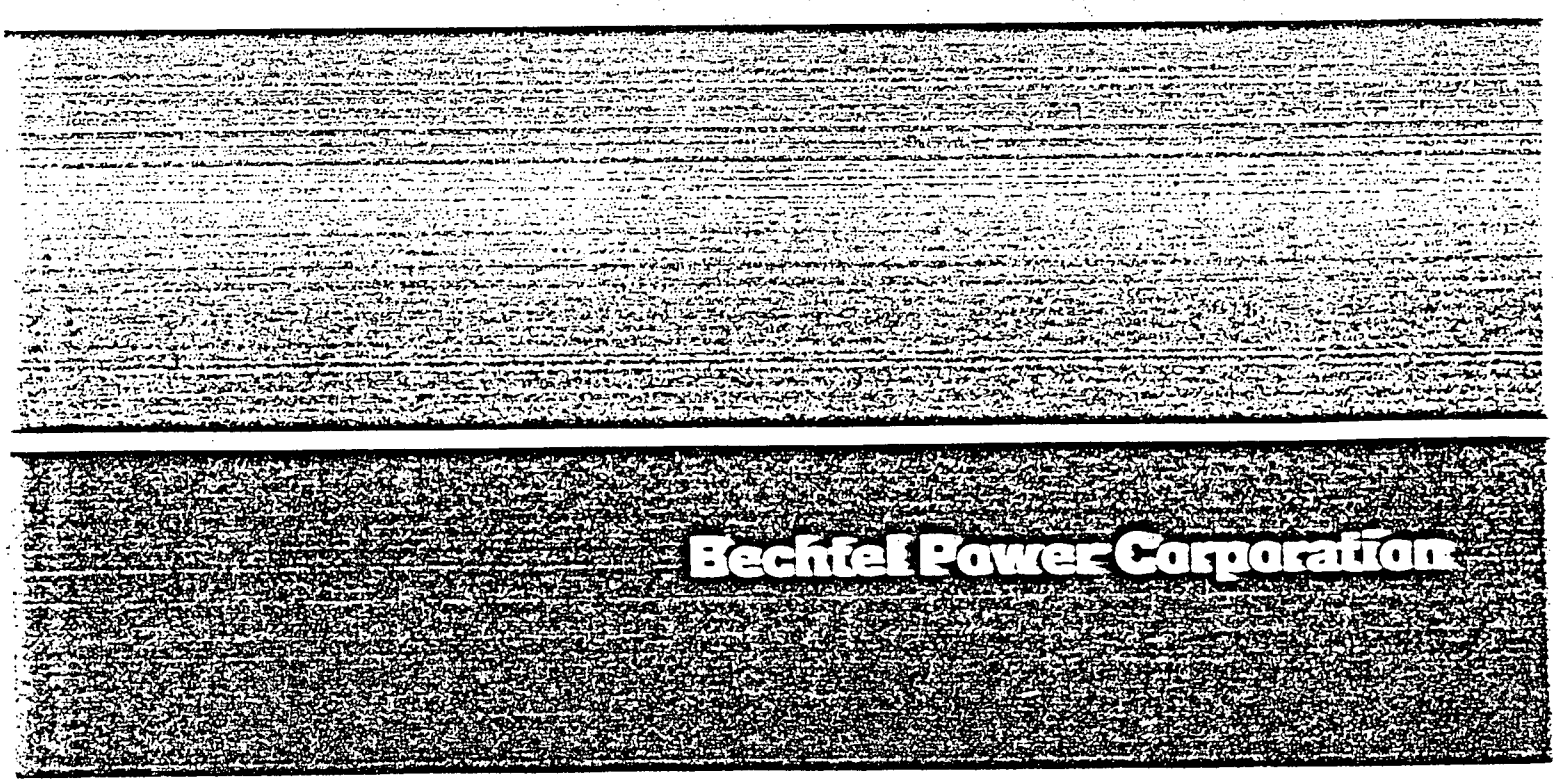
   b. Procedures for sampling and analysis

   c. Provisions for maintenance of sampling and analysis equipment

U S Nuclear Regulatory Commission
February 19, 1987
Attachment (1)

MONTICELLO NUCLEAR GENERATING PLANT
OFFSITE CHLORINE GAS STUDY
SUMMARY OF RESULTS
CALCULATION NO. 10040-237-M001

Monticello Nuclear Generating Plant



MONTICELLO NUCLEAR GENERATING PLANT
OFFSITE CHLORINE GAS STUDY
SUMMARY OF RESULTS
CALCULATION NO. 10040-237-M001

September 1986

TASK:

The purpose of this study was to ascertain whether the existing EFT building chlorine detectors on the Monticello nuclear generating plant could be decommissioned without any safety impact to the plant after the proposed sodium hypochlorite system is put into operation and the onsite chlorine source is eliminated. Calculation #10040-237-M001, "Offsite Chlorine Sources" was prepared as part of this analysis.

CODES AND STANDARDS

Regulatory Guide 1.78 describes assumptions which are acceptable to the Regulatory Staff in assessing the habitability of the control room during and after a postulated external release of hazardous chemicals.

NUREG/CR-1741, "Models for the Estimation of Incapacitation Times Following Exposures to Toxic Gases or Vapors", discusses the incapacitation models employed in TOXGAS NE314. Explanations are given about applicability of each model and how the time to incapacitation is calculated.

Regulatory Guide 1.95 describes design features and procedures which are acceptable to the NRC staff for the protection of nuclear power plant control room operators against an accidental chlorine release.

CRITERIA

Criterion 4 of Appendix A to 10CRF50 requires, in part, that structures, systems, and components important to safety be designed to accommodate the effects of and to be compatible with, the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents. Criterion 19 requires that a control room be provided from which actions can be taken to operate the nuclear generating unit safely under normal conditions, and to maintain it in a safe condition under accident conditions. The release of a toxic gas near a nuclear power plant site could potentially result in the control room becoming uninhabitable.

GENERAL METHODS:

Present offsite liquefied chlorine gas shippers were identified through a review of calculation #1007, "Toxic Chemical Monitor Response Time", literature searches and a phone survey. The screening criteria from Regulatory Guide 1.78, "Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release," were applied to the offsite sources to determine whether a further, more detailed analysis was necessary, using the Bechtel TOXGAS NE314 computer code.

The incapacitation model was determined appropriate in determining control room habitability (Attachment 2). In all of the runs, it was assumed that there was no chlorine detector present to warn control room operators, but that protective breathing apparatus is available.

For the U.S. 10 Highway and Burlington Northern Railroad, TOXGAS was run with no credit for building wake, since there are no intervening buildings between the release point and the control room outside air intake: Odor detection of chlorine is 3.5 ppm. For compliance with Reg. Guide 1.78 operators should have at least 120 seconds from odor detection inside the control room to don protective breathing apparatus.

For the Interstate 94 case, a building wake effect was assumed, since the containment building lies in between the source and receptor points. X/Q values were hand calculated and used in the TOXGAS runs, with odor detection at 3.5 ppm. Operators should have at least 120 seconds from odor detection inside the control room to don protective breathing apparatus.

RESULTS

For postulated chlorine releases on the U.S. 10 Highway and Burlington Northern Railroad, control room operators would have more than 120 seconds after odor detection to don protective breathing masks before incapacitation would occur. Thus, no chlorine detector is necessary and no control room isolation would be necessary.

For a 1 ton release on Interstate 94, operators would have less than 120 seconds after odor detection until incapacitation occurred. Thus, both automatic detection and control room isolation are necessary.

ATTACHMENTS:

1) A copy of the telephone notes taken in the phone survey to identify offsite chlorine sources.
2) Phone notes, John Vella to Monica Vik, to verify the validity of the incapacitation model.