D1010222

Design Criteria

Ginna Station

Control Room Emergency Air Treatment System (CREATS)
and Control Room Emergency Heating/Cooling System

Rochester Gas and Electric Corporation

89 East Avenue

Rochester, New York 14649

PCR # 2000-0024

Rev. 1

Date 11/11/03

Prepared by Daniel J. Crowley 10/30/03
Assigned Engineer Date

Reviewed by R Davis 11/5/03
Quality Assurance Date

Approved by [signature] 11/11/03
Engineering Manager Date

Category 4.6.7.1
Reviewed [initials]

REVISION CONTROL

Revision Number	Affected Sections	Description of Revision and Reason for Change
0	All pages, including attachments A & B	Original Issue
1	1.5.1.2	Corrected typographical error
	2.6.1	Explain reason for higher KW of heat capacity
	3.5	Corrected typographical error
	5.0	Clarified seismic classification
	9.9	Flexible connectors to be allowed, not required
	13.6	Delete bump potection
	14.1	Drawing # changed
	15.4	Disable existing switch on Turbine deck
	16.1	Consolidated SI stripping req'ts. for fans & dampers
	16.3.4	Damper switch & indication arrangement
	16.4.3	Change manual pushbutton requirements
	17.0	Added section 17.3 to clarify security requirements
	19.2	CIE & Design Verification process to consider these hazards
	Attachment A	Corrected typographical errors
		Throught out the document the acronym 'CRECS' was deleted, and 'Emergency' mode (consistent with ITS) replaced 'Accident'.

1.0 Modification Description & Scope

1.1 Reasons:

Modification of the Control Room HVAC system will occur for the following reasons:

A) Industry experience with tracer gas testing to validate Control Room inleakage assumptions indicates a need to reduce the potential for unfiltered air inleakage to the Control Room.

B) The existing single train of Control Room HVAC severely limits the amount of on-line maintenance & repair that can be performed.

C) The existing single train relies upon the Non-Safety Related chilled water and instrument air systems, and is susceptible to single failure (loss of 'A' train power). A redundant, 1E powered system is desired to ensure that the Control Room remains habitable during recovery from a Design Basis Accident.

D) Potential implementation of unit power uprate and longer fuel cycles will require additional margin between existing predicted doses and the dose limits of GDC 19.

1.2 Description

The modification will install two new trains of Safety Related, Seismic Category I Control Room Emergency Air Treatment System (CREATS) and Control Room Emergency Heating/Cooling System in the Relay Room Annex. These systems will normally be in standby and the existing Control Room HVAC system will continue to provide heating, cooling, & ventilation in normal modes of operation. Upon an EMERGENCY signal the new CREATS and Emergency Heating/Cooling system will actuate, the normal HVAC system fans will trip, and Control Room Emergency Zone (CREZ) isolation dampers will isolate the normal HVAC system from the CREZ. The modification will also enhance the boundaries of the Control Room Emergency Zone (CREZ) to ensure conformance with inleakage assumptions that affect the predicted radiological dose and toxic gas exposure under various accident conditions.

1.3 Scope

The scope of this project includes the following:

1.3.1 Install new CREATS & Emergency Heating/Cooling systems in the Relay Room Annex.

1.3.2 Provide 1E power and controls for the new CREATS & Emergency Heating/Cooling systems.

1.3.3 Install new supply and return ductwork between the Control Room and the new CREATS & Emergency Heating/Cooling system located in the Relay Room Annex.

1.3.4 Install new supply and return air ductwork above the suspended ceiling in the Control Room.

1.3.5 Replace the outside air duct located above the ceiling in the Control Room.

1.3.6 Install an additional isolation damper in the Control Room lavatory exhaust duct, and install four new isolation dampers in the existing supply & return air ducts located in the Control Building stairwell.

1.3.7 Modify ductwork to route exhaust air from the Control Room to a location outside of the Control Building (it is currently discharged into the Control Building Air Handling Room)

1.3.8 Modify controls for the existing Control Room HVAC system.

1.4 Implementation

Scope section 1.3.1 will be awarded as a "turn-key" contract for a vendor to design, fabricate, furnish, install, and field test the new CREATS & Emergency Heating/Cooling systems in the Relay Room Annex. All other scope items in section 1.3 will be designed, installed, and tested by RG&E.

1.5 System / Component Functions

1.5.1 SAFETY RELATED FUNCTIONS

The new systems include or affect components that support the following SC-3 functions:

Rule 3.1.3.11 Provide actuation or motive power for SC-1, SC-2, or SC-3 components

Rule 3.1.3.12 Provide information or controls to ensure capability for manual or automatic actuation of nuclear safety functions required of SC-1, SC-2, or SC-3 components.

Rule 3.1.3.13 Supply or process signals or supply power required for SC-1, SC-2, or SC-3 components to perform their required nuclear safety functions.

Rule 3.1.3.14 Provide a manual or automatic interlock function to ensure or maintain proper performance of nuclear safety functions required of SC-1, SC-2, or SC-3 components.

Rule 3.1.3.15 Provide emergency ventilation and cooling to ensure proper performance of nuclear Safety functions required of SC-1, SC-2, or SC-3 components.

A new rule safety related rule (tentatively identified as 3.1.3.22) is planned to be added to the Q-list and will represent the following function:

Rule 3.1.3.22 Maintain control room temperature and radiation levels conducive to continuous occupancy during any normal or accident conditions.

1.5.1.1 The heating coils installed within CREATS shall maintain the Control Room above the UFSAR minimum temperature of 50°F to support human habitability and equipment operation, under the new rule 3.1.3.22.

1.5.1.2 The Emergency Cooling system shall maintain the Control Room below the UFSAR maximum temperature of 104°F to support human habitability and equipment operation, under the new rule 3.1.3.22. The system will be designed to maintain the Control Room at a comfortable temperature for operators, approximately 70 -74°F. Because most instruments and controls in the Control Room are rated for service up to 120°F; the Emergency Cooling System is not required for equipment concerns under SC-3 rule 3.1.3.15.

1.5.1.3 CREATS isolation dampers shall isolate the Control Room for radioactive gas or toxic (chlorine & ammonia) release accident scenarios in order to limit Control Room operators' exposure to these airborne contaminants, under the new rule 3.1.3.22. Isolation will be provided by dampers AKD02, AKD03, AKD21, AKD22, AKD23, & AKD24.

1.5.1.3.1 Radioactive gas monitors providing the CREATS isolation signal are Safety Related.

Toxic gas monitors providing the CREATS isolation signal are Safety Significant.

1.5.1.4 The pressure boundary function of new CREATS ductwork and other components (damper, filter, fan, & instrument housings) is safety related under the new rule 3.1.3.22.

1.5.1.5 The CREATS system shall filter the recirculated Control Room air during accident conditions so that radiation exposure to the control room personnel does not exceed limits of GDC'19, under the new rule 3.1.3.22.

1.5.2 SAFETY SIGNIFICANT FUNCTIONS

The new systems include or affect components that support the following Safety Significant (SS) functions:

Rule 3.1.4.2 Fire detection, suppression, principal barriers and mitigation systems and components used to protect safety related or safe shutdown equipment (see RG&E Ginna Station QA Manual Appendix D for Quality requirements)

Rule 3.1.4.13 Maintain an atmosphere in the main control room conducive to continuous occupancy during any mode of normal operation or event.

The current rule 3.1.4.13 shown above is planned to be revised as follows:

Rule 3.1.4.13 Maintain ~~an atmosphere in the main~~ control room atmosphere conducive to continuous occupancy during ~~any mode of~~ normal plant operation ~~or event~~ and following the postulated chlorine or ammonia spills.

1.5.2.1 The existing Control Room HVAC system will remain in place to provide heating & cooling of the CREZ during normal (unisolated) modes of operation, under the revised safety significant rule 3.1.4.13. The pressure boundary function of the existing Control room HVAC system ductwork and other components (damper, filter, fan, & instrument housings) up to, but not including, new isolation dampers AKD21, AKD22, AKD23, & AKD24 will be safety significant under the revised rule 3.1.4.13.

1.5.2.2 The new CREATS system shall include fire protection features to prevent, identify, and mitigate fire so that the spread of smoke and fire is restricted in accordance with fire protection requirements. These functions will be Safety Significant under rule 3.1.4.2. The existing Control Room HVAC system includes fire protection features that will remain Safety Significant under the same rule.

1.5.2.3 The CREATS system shall limit airborne toxic chemicals entering the control room during events and normal conditions to ensure that the toxic chemical exposure to the control room personnel does not exceed acceptable limits to support human habitably in accordance with NUREG 0737, Item III.D.3. Toxic gas monitors providing the CREATS isolation signal are Safety Significant under the revised rule 3.1.4.13.

1.5.2.4 The existing Control Room HVAC system will provide a purge mode of operation in which a maximum amount of fresh air is supplied to the Control Room, while an equal amount is exhausted from the Control Room. This function is designed to purge smoke or other toxins from the Control Room, and supports rule 3.1.4.2

1.5.3 NON-SAFETY RELATED FUNCTIONS

1.5.3.1 The existing 2000 CFM CREATS fan & filters (AKF07 & AKP01) will no longer have a Safety Related function and may be removed or abandoned in place.

1.5.3.2 The Emergency cooling system will reduce Control Room humidity when it's cooling coil temperature is low enough to condense moisture from the airstream. However, there will be no humidity controls for the system; the cooling function will be controlled by Control Room thermostat(s) only, and the function of reducing humidity will be Non-Safety Related.

1.6 MODES OF OPERATION

1.6.1 NORMAL

The existing CR HVAC system will provide heating, cooling, and fresh air to the Control Room.

1.6.2 EMERGENCY

The Control Room HVAC will be isolated and both new 100% capacity trains of CREATS will filter and recirculate 6000 CFM (±10%) of Control Room air. EMERGENCY mode shall be initiated by radiation monitors, toxic gas monitors, Safety Injection (SI), or manual actuation in the Control Room. The new trains of CREATS will not have a pressurized mode of operation, but a pressurized mode may be provided in the future. The existing CREATS filter and fan (AKF07 & AKP01) will be disconnected and may be removed or abandoned in place.

1.6.3 EMERGENCY HEATING/COOLING

Two new 100% capacity Control Room Emergency Heating/Cooling Systems will automatically cool the Control Room, as needed, whenever the CREATS system is in operation. Emergency Heating/Cooling systems shall be 1E powered, and shall strip upon SI.

1.6.4 PURGE

The existing Control Room HVAC system will have a purge mode of operation in which the maximum amount of fresh air and exhaust air is provided. This mode will be over-ridden by an EMERGENCY signal but, with local operator action, a purge flow can also be established from an alternate source (Relay Room Annex) while in the EMERGENCY mode of operation.

2.0 Performance Requirements

2.1 The CREATS system shall recirculate 6000 (+/- 10%) CFM of filtered air through the Control Room.

2.2 The new CREATS carbon filters shall assure a minimum 1/4 second residence time while filtering 6600 CFM (nominal 6000 CFM flow + 10% measurement uncertainty).

2.2.1 The CREATS carbon filter shall be equipped with a minimum of 10 individual sample canisters or a suitably equivalent method for obtaining representative samples of carbon for laboratory testing.

2.3 CREZ isolation dampers AKD02, AKD03, AKD21, AKD22, AKD23, & AKD24 shall close in response to an isolation signal from radiation monitors, toxic gas monitors, SI, or manual actuation. Time elapsed from presence of contaminant at the detector to closure of the dampers shall be less than that allowed in the most limiting Control Room dose calculation.

2.3.1 CREZ boundary leakage, including leakage through isolation dampers, ductwork, and structural barriers, shall be minimized. Control Room dose calculations assume that only 300 CFM of unfiltered air leaks into the Control Room.

2.4 Time elapsed from initiation of the signal to start of the CREATS fans shall be less than that allowed in the most limiting Control Room dose calculation.

2.5 In the normal mode of operation outside air flow into the Control Room shall be between 350 and 2000 CFM (reference 3.33). The 2000 CFM upper limit affects transport time, damper isolation time requirements, and assumptions in the Control Room dose calculations.

2.6 In all modes of operation the heating and cooling shall be controlled automatically by a thermostat.

2.6.1 Each train of CREATS shall include heaters of minimum 18.6 KW capacity. This capacity will maintain the Control Room at approximately 72°F assuming 2°F outside air, internal heat gains, and 300 CFM of outside air entering the Control Room (reference 3.34). Additional heating capacity may be provided to accommodate the heating effect needed if a future pressurization mode results in flow of more cold outside air into the CREZ.

2.6.2 The Emergency Cooling systems shall have the cooling capacity required with outdoor ambient conditions of 89°F DB & 73°F WB(reference 3.30), indoor conditions of 72°F & 50% RH, and 300 CFM of unfiltered & unconditioned outside air brought into the Control Room.

3.0 Codes, Standards and Regulatory Requirements

The following codes and standards are either partially or in whole applicable to this modification. Refer to the appropriate section of the design criteria to determine the extent of the standard application.

3.1 USNRC Regulatory Guide 1.29, "Seismic Design Classification"

3.2 USNRC Regulatory Guide 1.52, "Design, Testing, and Maintenance Criteria for Post Accident Engineered-Safety-Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants"

3.3 USNRC Regulatory Guide 1.140, "Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants"

3.4 "SMACNA, Sheet Metal and Air Conditioning Contractors' National Association, Inc. for Ductwork Design and System Balancing"

3.5 ANSI/AWS D1.1, latest edition, "Structural Welding Code"

3.6 ANSI N45.2.2, "Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants"

3.7 AISC, "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings", 8th edition.

3.8 IEEE 323, "Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations"

3.9 IEEE 344, "Seismic Qualification of Class 1E Electric Equipment for Nuclear Power Generating Equipment"

3.10 UL-900, "Standard for Safety of Air Filter Units"

3.11 ASME N509-1989; Nuclear Power Plant Air Cleaning Units and Components

3.12 ASME N510-1989; Testing of Nuclear Air Treatment Systems

3.13 NUREG 0737 Clarification of TMI Action Plan Requirements, Item III.D.3.4, Control Room Habitability

3.14 ASME AG-1-1997; Code on Nuclear Air and Gas Treatment

3.15 RG 1.92 Combining Modal Response and Spatial Components in Seismic Response Analysis, Rev. 1, 1976

3.16 American Iron and Steel Institute; Cold-Formed Steel Design Manual, 1983 Edition.

3.17 ASME B&PV Code Section III-1974

3.18 NUREG 0700, Human-System Interface Design Review Guidelines, Rev. 1; 1996

3.19 10CFR50, Appendix A, GDC 19 – Control Room

3.20 10CFR50 – Appendix R

3.21 10CFR 50.49 - Environmental Qualification

3.22 NRC SECY 77-439, Single Failure Criteria, 8/17/77

3.23 Regulatory Guide 1.97, Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident.

3.24 ANSI A58.1 1982

3.25 NFPA 13, latest edition at time of installation/manufacturing

3.26 AIF-GDC 1

3.27 IEEE-384-1981

3.28 IEEE-383-1974

3.29 RG&E Design Analysis DA-EE-98-157, Rev. 0; "Cable Sizing Criteria"

3.30 ASHRAE Handbook - Fundamentals, 1997.

3.31 RG&E EWR 10182 Design Criteria, Rev. 1, "Generic Design Criteria"

3.32 RG&E EWR 2512 Design Criteria, Rev. 5, "Seismic Upgrade Program"

3.33 SEV-1153 Safety Evaluation for MDCN 2019; Pneumatic Controls Modification to Allow Fresh Air into Control Room.

3.34 RG&E Design Analysis DA-ME-2000-038, Rev. 0; "Control Room Heat Generation & Winter Heat Load"

3.35 NUREG 0908; "Acceptance Criteria for the Evaluation of Nuclear Power Reactor Security Plans".

4.0 **Design Conditions**

All applicable Design Conditions are included in section 2.0.

5.0 **Load Conditions**

5.1 New components (fans, ductwork, dampers, & supports) installed by this modification shall be Seismic Category I, per RG 1.29 section C.1.n.

5.2 Structural Load Conditions and allowable stress criteria for existing structures are defined in section 9.

5.3 Mechanical system load conditions for existing equipment are defined in Attachment B.

6.0 **Environmental Conditions**

6.1 Environmental conditions currently found in the Ginna UFSAR are listed below and, unless noted otherwise, shall be the conditions assumed for this modification.

6.1.1 **Control Room**

Normal operation (MODES 1 and 2):

Temperature	50°F to 104°F (usually 70°F to 78°F)
Pressure	0 psig
Humidity	60% (nominal)
Radiation	Negligible

Accident Conditions:

Temperature	< 104°F
Pressure	0 psig
Humidity	60% (nominal)
Radiation	Negligible
Flooding	Not applicable

6.1.2 **Relay Room & Relay Room Annex**

The UFSAR does not currently list environmental conditions for the Relay Room Annex where the new CREATS & Emergency Heating/Cooling equipment will be installed. The conditions specified for the Relay Room will be used and the UFSAR shall be changed accordingly prior to closeout of this PCR.

Normal operation (MODES 1 and 2):

Temperature	50°F to 104°F
Pressure	0 psig
Humidity	60% (nominal)
Radiation	Negligible

Accident Conditions:

Temperature	< 104°F
Pressure	0 psig
Humidity	60% (nominal)
Radiation	Negligible
Flooding	Not applicable

6.1.3 **Control Building Air Handling Room**

Normal operation (MODES 1 and 2):

Temperature	50°0F to 104°F
Pressure	0 psig
Humidity	60% (nominal)
Radiation	Negligible

Accident Conditions:

Temperature	< 104°F
Pressure	0 psig
Humidity	60% (nominal)
Radiation	Negligible
Flooding	3 feet (estimated for a service water line leak).

7.0 Interface Requirements

7.1 The modification will interface with the following plant systems:

Control Room HVAC system

Battery Room Ventilation System for Hydrogen control

Instrument Air system for damper and heater control

Class 1E 125 VDC power

Class 1E 480V vital power

Control Room Radiation monitor actuation circuit(s)

Control Room Toxic Gas Monitor (CRTGM) actuation circuit(s)

Engineered Safety System Actuation System for Emergency Diesel load shedding

Fire Protection

7.2 The modification will interface with the following plant structures:

Control Building (Seismic Category I) including the Control Room, Control Building Air Handling Room, Relay Room, & Relay Room Annex.

Cable Tunnel (Seismic Category I)

Auxiliary Building (Seismic Category I)

8.0 Material Requirements

8.1 There are no special material requirements associated with this modification. All materials and coatings shall be compatible with the performance and with the environmental requirements of the component or system in which they are used.

9.0 Mechanical Requirements

9.1 The code of construction for all new equipment shall be ASME AG-1 and, for equipment not addressed by that code (eg. filter housings), ANSI N509-1989. In the event that any conflict exists with AG-1; this Design Criteria or the applicable RG&E Specification shall govern.

9.2 The CREATS carbon filters shall be 4" deep, Type III, and equipped with a minimum of 10 individual sampler canisters or a suitably equivalent method for obtaining representative samples of carbon for laboratory testing.

9.2.1 Preheating of air entering the carbon filters is not required since reduced filter efficiency caused by moisture is accounted for in the Ginna dose analysis.

9.3 The new CREATS fans shall be direct drive.

9.4 Balancing dampers shall be provided for each train of CREATS.

9.5 Arrangement of equipment shall include a straight section of duct, unobstructed by fittings or components, with a length that allows accurate measurement of airflow through the system.

9.6 New piping and pipe supports shall be designed in accordance with the requirements of reference 3.32 (EWR 2512, see attachment B).

9.7 Modification to existing piping and pipe supports shall be in accordance with the requirements of reference 3.31 (EWR 10182).

9.8 New damper and duct support seismic loads shall be determined following the piping system analysis methodology in Attachment B. However, new duct stresses shall be evaluated using methods presented in the American Iron and Steel Institute (AISI) "Cold-Formed Steel Design Manual" as defined in AG-1. Duct stresses shall meet the acceptance criteria in ASME AG-1. Duct support stresses shall be evaluated using AISC Steel Construction Manual 8th edition, except Attachment C shall be used for loading combinations and stress criteria.

9.9 Attachment of any new dampers or ductwork to the existing system may be done using flexible connectors for mechanical isolation. In locations where new equipment is connected new dead weight supports shall also be installed, as necessary, to provide equivalent support for the existing ductwork.

10.0 Hydraulic Requirements

10.1 Hydraulic losses in piping and HVAC systems shall be considered and evaluated as part of the system design process to ensure the new and modified systems meet their performance/design requirements and all equipment is operated within its design parameters.

11.0 Structural Requirements

11.1 In accordance with UFSAR section 1.8.2.7 and reference 3.1; the new CREATS, Emergency Heating/Cooling systems, and new Control Room Emergency Zone isolation dampers AKD03, AKD21, AKD22, AKD23, & AKD24 shall all be seismic Category I, and 10CFR50 Appendix B QA requirements shall be applied.

11.2 Standard RG&E seismic conduit supports shall be utilized for all new conduit runs wherever possible. If custom supports are required, they shall be designed in accordance with Attachment A.

11.3 Pipe Support requirements are addressed in the Mechanical Requirements sections 9.6 & 9.7.

12.0 Chemistry Requirements

12.1 All new materials shall be evaluated to ensure they do not adversely impact Ginna Control room habitability.

12.2 All new materials and consumables shall be evaluated by the Ginna Material Control program.

13.0 Electrical Requirements

13.1 Power sources

13.1.1 The new train A & B CREATS fans, heaters, dampers, and Emergency Heating/Cooling system components shall be powered from a respective train A & B, Class 1E source.

13.1.2 Electric damper actuators and/or SOVs for new isolation dampers AKD21 & AKD23 shall be powered from a train 'A' Class 1E source.

13.1.3 Electric damper actuators and/or SOVs for new isolation dampers AKD22 & AKD24 shall be powered from a train 'B' Class 1E source.

13.1.4 Electric damper actuators and/or SOVs for new isolation damper AKD03 shall be powered from a train 'A' Class 1E source. (Existing SOV 14922S for existing damper AKD02 is powered from 'B' train)

13.1.5 After the new CREATS system is in service the existing 2000 CFM CREATS fan (AKF07) will no longer have a Safety Related function; it's power supply from MCC K shall be removed and made spare.

13.2 Electrical Analyses & Design requirements

13.2.1 The effects of all load increases or decreases shall be considered and shown to be within the margins allowed by the current loading analyses.

13.2.2 All components shall be suitable for service at the required voltages. Any new heaters may be sized for nominal bus voltage since heating would not be required until after the LOCA injection phase when bus voltage is assumed to be restored to nominal values.

13.2.3 All Non-Safety Related cables and loads fed from a Safety Related source of power shall be electrically isolated from the source of power with qualified isolation devices in accordance with the requirements of IEEE 384-1981.

13.3 Cable Routing Requirements

13.3.1 Cable installed in conduit does not increase the fixed combustible loading of the area in which it is installed.

13.3.2 Routing of Nuclear Safety Related raceway shall ensure that the function of the enclosed cables is not affected by vibration, abnormal heat or stress.

13.4 Cable Construction Requirements

Cable construction shall adhere to the requirements of Section 7.4 of reference 3.29.

All Nuclear Safety Related cables shall be protected from physical damage during normal operation.

All cable installed in harsh environments for components required to remain operable under accident conditions shall have IEEE 383-1974 LOCA certification.

13.5 Cable Ampacity and Derating

The ampacity and derating of cables in conduit and cable trays shall adhere to the requirements of Section 7.5 of reference 3.29.

13.6 Electrical Equipment

Cable support grips and/or internal equipment wire/cable ties shall be required to the extent practical in order to reduce stress on the terminations and facilitate safe access to the equipment.

To the extent practical, Safety Related electrical components shall not be located within zone of direct impingement from High Energy Line Break (HELB) unless said components have been specifically designed to withstand a HELB or other protective measures are provided.

14.0 Layout and Arrangement Requirements

14.1 The new CREATS and Emergency Heating/Cooling systems shall be located inside, and on the roof of, the Relay Room Annex. Equipment arrangement details are provided on RG&E drawings 33013-3000 & 33013-3001. Equipment layout shall include access for removal, repair, and maintenance as necessary.

14.2 The arrangement of controls on the Auxiliary Benchboard (ABB) and the system's sequence of operation shall be approved by the GARD team, in accordance with procedure EP-3-P-133.

15.0 Operational Requirements

15.1 One or both new trains of CREATS & Emergency Heating/Cooling systems may be started manually at the Auxiliary Benchboard (ABB) without isolating the CREZ.

15.2 Manual CREZ isolation shall work as described in section 16.

15.3 The new purge mode of Control Room HVAC system operation shall be manually actuated at the ABB only; the need for existing pneumatic control valves located inside the Control Room kitchen shall be eliminated.

15.4 The existing switch on column F12 outside the Control Room can trip the normal CR HVAC fans, and shall be disabled. This is because of concern for a switch located in a Non-Vital controlling an ESF ventilation system, and because it is not needed in the Fire Response Plan procedures because they routinely trip loads at the associated breaker instead of a control switch.

15.5 The existing need for the manual control of heaters in the EMERGENCY mode of operation shall be eliminated.

16.0 *Instrumentation and Control Requirements*

16.1 Safety Injection (SI) interlocks

16.1.1 This modification shall add the necessary interlocks to make an SI signal isolate the CREZ, actuate CREATS, and trip the existing supply & return air fans AKF03 & AKF08.

16.1.2 The new CREATS fans and all damper actuators requiring power to allow CREATS air flow shall remain energized during an SI signal, they shall NOT be stripped by an SI signal. Other dampers required to isolate the CREZ shall fail to the closed position upon loss of motive force.

16.1.3 To preserve D/G loading margin during the injection phase of a LOCA, the new electric heaters and the new Emergency Cooling system components (compressor & condensing fan) in both trains shall strip upon an SI signal. This is acceptable because thermal transients in the Control Room will develop slowly and in all scenarios the EOPs reset SI early enough to allow the Emergency Heating/Cooling system to maintain or restore a reasonable temperature in the Control Room.

16.2 Radiation Monitor, Toxic Gas Monitor, and manual isolation interlocks.

16.2.1 Actuation of a Control Room outside air intake Radiation Monitor, a Control Room Toxic Gas Monitor, or manual isolation at the ABB shall isolate the CREZ, actuate CREATS, and trip the existing supply & return air fans AKF03 & AKF08.

16.2.2 Any remaining interlocks of area radiation monitor R-1 with CREZ isolation and CREATS actuation circuitry shall be removed.

16.2.3 Pneumatic controls and/or solenoid valves that are no longer needed for the existing Control Room HVAC system shall be removed.

16.3 Instruments & alarms

16.3.1 Two thermostats shall be located in the Control Room, each controlling a train of Emergency Heating/Cooling systems when power is available to them and the associated CREATS fan is running.

16.3.2 The ABB shall provide indication of a low flow condition for each train of CREATS. Each indicator shall respond to a separate device that qualitatively indicates flow through it's respective train of CREATS.

16.3.3 The ABB shall provide indication of a high temperature sensed in the flow stream of either train's charcoal filter.

16.3.4 The ABB shall include indication of the closed status of each of the three flow paths isolated by dampers AKD02, AKD03, AKD21, AKD22, AKD23, & AKD24. The indication shall come from switches that positively indicate damper position when closed.

16.3.5 The ABB shall include indication of the open or closed status of each train's discharge isolation damper. The indication shall come from end switches that are mounted on the respective dampers or actuators.

16.3.6 Ductwork shall include access ports for insertion of portable instruments used to measure CREATS airflow. Ports shall be located in a straight run of duct at a maximum distance from upstream & downstream fittings or components that would create a non-uniform velocity profile.

16.4 Controls

16.4.1 At the ABB each CREATS fan shall have a manual switch with a green, and a red, indicating light.

16.4.2 The existing pistol-grip switch for the Control Room Air Handling Unit shall remain, along with the red & green lights indicating supply & return air fan status.

16.4.3 At the ABB two redundant switches or pushbuttons shall provide the manual isolation feature, either device shall actuate CREATS and close both trains of isolation dampers. Manual isolation reset capability shall also be provided at the ABB.

17.0 Access and Administrative Control Requirements

17.1 Compensatory measures shall be provided whenever security barriers may be compromised during construction phases.

17.2 Impact of construction activities upon continuous operations in the Control Room shall be minimized.

17.3 Security has two primary concerns for access to the Control Room; unauthorized access, and bullet resistance.

17.3.1 In accordance with the Ginna Physical Security Plan unauthorized access shall be prevented by equipping any vital barrier openings with security bars "of construction and fastening of sufficient strength such that the barrier is not lessened"; the largest open area shall meet requirements of NUREG 0908 (ref. 3.35).

17.3.2 In accordance with the Ginna Physical Security Plan all vital barriers shall be designed to a minimum Level 4 bullet resistance, and openings or penetrations in the barrier shall not diminish the penetration resistance of the vital area barrier

18.0 Redundancy, Diversity and Separation Requirements

The CREATS and Emergency Heating/Cooling system trains shall be installed with adequate independence, redundancy, capacity, and testability such that a single failure will not prevent the system from performing its safety related function.

The power source requirements defined in section 13.1 assure that redundant components are powered from diverse sources such that failure of a single train of 1E power will not cause a failure of both trains to perform their function.

18.1 Redundancy

Redundancy shall be designed into the safety related functions associated with the CREATS system and any interfacing safety related system. Single failures shall be evaluated for each system. The criteria in NRC SECY 77-439 shall be used for evaluating failures except as noted below:

- Passive and active failures of electrical and I&C systems shall be considered. Cable shorts are not considered credible failures for Ginna unless generated by external events such as fires and HELB. Spurious operation (active or passive) of electrical devices such as contacts, switches and relays are considered credible failures for Ginna.

- Only active failures shall be considered for mechanical systems at Ginna. Failure of a check valve or backdraft damper to activate is considered a passive failure for Ginna.

- If a system train is out of service for short term testing or maintenance, a single failure need not be considered in the other train during the inoperable period per ANSI/ANS-58.9-1981 section 4.3.

18.2 Separation of Redundant Circuits

Cables and equipment that are replaced or added by this PCR shall meet the separation criteria of IEEE 384 to the maximum extent practicable given the existing plant configuration. Where the separation requirements of IEEE 384 cannot be met, the following separation methodology shall be followed:

18.2.1 All components requiring redundant cabling, as well as the cabling for redundant components, have been identified and the redundant power, instrumentation, and control cables are run separately.

18.2.2 Logic output control and power cables for the operation of redundant components in safety-related or engineered safety features systems are routed separately, except where cable trays converge at the MCB and ABB. The location of redundant component wiring in the MCB & ABB requires that these cables converge in this area.

18.2.3 Equipment and circuits required for safe shutdown shall meet the requirements for 10CFR50 Appendix R.

19.0 <u>Failure Effects Requirements</u>

19.1 Those systems and components of reactor facilities which are essential to the prevention or to the mitigation of the consequences of nuclear accidents which could cause undue risk to the health and safety of the public shall be designed, fabricated, and erected to performance standards that will enable such systems and components to withstand, without undue risk to the health and safety of the public, the forces that might reasonably be imposed by the occurrence of an extraordinary natural phenomenon such as earthquake, tornado, flooding condition, high wind, or heavy ice. The design bases so established shall reflect:

(a) appropriate consideration of the most severe of these natural phenomena that have been officially recorded for the site and the surrounding area and

(b) an appropriate margin for withstanding forces greater than those recorded to reflect uncertainties about the historical data and their suitability as a basis for design. (AIF-GDC 1)

19.2 The failures of structures, systems, and components important to safety and their potential effects on the accidents and events these SSCs are designed to withstand, shall be considered, and subsequently evaluated and documented if necessary. The following internal and external hazards and RG&Es analysis of these hazards shall be evaluated for the proposed modifications.

- temperature
- humidity
- radiation
- jet impingement
- pressure
- hazardous materials
- wind and snow loads
- environmental Qual
- pipe whip
- sabotage
- missiles (internal, external)
- heavy loads
- toxic gases
- tornados
- seismic
- flooding

- fires

19.2.1 This modification shall evaluate any potential new failure modes other than those previously identified in the Ginna UFSAR sections 3.3 through 3.11 and shall ensure that they do not adversely impact the current plant design. New failure modes include the potential leakage of refrigerant from Emergency Cooling system cooling coils into the Control Room.

20.0 Test Requirements

20.1 Post-modification acceptance testing shall prove that the new systems meet the requirements described in previous sections 2 (Performance), 15 (Operational), & 16 (Instrumentation & Control).

21.0 Accessibility, Maintenance, Repair and Inservice Inspection Requirements

21.1 The installed systems shall include access doors and clearance necessary for removal and replacement of all filters, including overhead clearance for the bulk carbon adsorbers.

21.2 The new fans, dampers, & actuators shall have adequate access for inspection, monitoring, service, repair and replacement.

21.3 The Emergency Cooling system cooling coil location and connections to adjacent ductwork shall allow access to the coils for inspection and/or replacement of the coils without the need for welding or grinding.

22.0 Personnel Requirements

22.1 Personnel and procedures used in construction and testing shall be qualified in accordance with the applicable code of construction.

23.0 Transportability Requirements

23.1 Ductwork, housings, and other large components may be shipped knocked down for field assembly after being placed inside the Relay Room Annex.

24.0 Fire Protection Requirements

24.1 Heat detectors located in the CREATS airstream shall alarm in the Control Room. A fire response procedure shall direct operators to verify a high temperature and, if required, connect a fire hose to the charcoal filter's deluge system header in order to douse the fire.

24.2 The suppression system shall be designed for the flow and pressure available from a hose routed into the Relay Room Annex from hydrant #11 outside the Relay Room Annex or from the closest hose reel located in the Turbine Building.

24.3 The combustible loading of new equipment installed in the Relay Room Annex shall be evaluated and included in the Fire Hazards Analysis and volume I of the Fire Protection Program Report.

25.0 Handling Requirements

25.1 Packing, shipping, and storage requirements shall be in accordance with the applicable section of the code of construction; ANSI AG-1 or N509.

26.0 Public Safety Requirements

26.1 There are no special Public Safety requirements associated with this modification.

27.0 Applicability

27.1 There are no special requirements for assuring materials, processes, parts, or equipment are suitable for their intended application.

28.0 Personnel Safety Requirements

28.1 All work for this modification shall be performed in accordance with the RG&E Safety manual.

ATTACHMENT A
STRUCTURAL LOADS AND STRESS ACCEPTANCE CRITERIA

A.1 STRUCTURAL LOAD CRITERIA

A.1.1 Dead Load - D

Dead loads will include the weight of the structure, the weight of permanently supported equipment (such as filters, fans, dampers, electrical cabinets, etc., as shown on the equipment vendor's drawings) and system components (such as piping, cable trays, conduit and ductwork). Dead loads are determined from construction drawings and based on field inspections conducted earlier in the program. The service loads will be included in the dead load. (Service load is the dead load of all equipment, i.e., filters, fans, dampers, piping, conduit, switchgear, etc., that is permanently in place on the structure).

A.1.2 Live Load - L

Live loads on all floors will be equal to the uniform live loads shown on the original plant drawings for normal and severe load cases. Twenty five (25) percent of the uniform live loads shown on the original plant drawings will be used for the Live Load, when considering extreme load cases, except on the Operating floor of the Turbine Building where 100 psf will be used for the Live load when considering extreme load cases.

A.1.3 Lateral Earth Pressure - H

The pressure exerted by the soil on the various structures.

A.1.4 Buoyant Force - F'

The buoyant force of the design basis flood.

A.1.5 Thermal Loads - T_o

Thermal loads from piping systems during normal operating or shutdown conditions, based on the most critical transient or steady state condition, are assumed to be equal to 2.5% of dead loads and are included in the overall dead load.

A.1.6 Pipe Reactions - R_o

Pipe reactions during normal operating or shutdown conditions based on the most critical transient or steady state condition are assumed to be equal to 2.5% of the dead loads and are included in the overall dead load.

A.1.7 Normal Wind Loads - W_n

Wind loads will be based upon the requirements of ANSI A58.1-1982. The design will be based on a 100 year wind of 75 mph at a height 30' above the ground.

A.1.8 Normal Snow Loads - S_n

Snow loads will be based upon the requirements of ANSI A58.1-1982. The design ground snow load shall be 40 psf. Drifting shall be considered.

A.1.9 Extreme Snow Load - S_n'

The extreme snow load specified for Ginna Station is based on the 48-hour maximum winter precipitation, equivalent to 50 psf added to the 100-year recurrence accumulated ground snow pack of 50 psf, resulting in a total roof load of 100 psf. Drifting will not be considered in this extreme load case.

A.1.10 Design Tornado - W

This design will consider all tornado loads and conditions that have a probable occurrence of at least once every 100,000 years. This probability corresponds to a tornado with a maximum wind speed of 132 mph.

Wind pressures (W_w) will be based on the procedure found in ANSI A58.1-1982 where p (design pressure) = q (Cp) (Gh) and $q=0.00256 * I * V^2 * K_z$.

In these equations:

V = maximum wind velocity (132 mph).
C_p = wind coefficients based on ANSI A58.1
G_h = Gust coefficient = 1.0
K_z = Velocity Pressure Exposure Coefficient based on ANSI A58.1.
I = Important Factor based on ANSI A58.1.

Forces due to differential pressure (W_p) shall be based on an internal pressure of +0.4 psig; however, utilization of existing vent area and installation of additional vent area may be used to reduce or eliminate this load.

Forces due to missile impacts (W_m) shall be based on two potential missiles. One is a 1 inch diameter steel rod, three feet long, weighing eight pounds, and having a horizontal velocity in any direction of 60% of the maximum wind speed. The second is a 13½ inch diameter wood telephone pole, 35 feet long, weighing 1,490 pounds and having a horizontal velocity in any direction of 40% of the maximum wind speed. Additionally, both missiles will be considered as having vertical velocities equal to 80% of their maximum horizontal velocities.

A.1.11 Operating Basis Earthquake (OBE) - E

Loads due to an OBE will be based on a maximum ground acceleration of 0.08g.

ATTACHMENT A
STRUCTURAL LOADS AND STRESS ACCEPTANCE CRITERIA

A.1.12 Safe Shutdown Earthquake (SSE) - E'

Loads due to an SSE will be based on a maximum ground acceleration of 0.20g.

A.2 Structural Load Combinations and Acceptance Criteria

The following load combinations and acceptance criteria will be considered in evaluating any modifications. These criteria were approved by the NRC as part of Phase 1 of the Structural Upgrade Program.

A.2.1 Load Combinations For Structural Steel

Load Case	Acceptance Criteria
1. $D + L + S_n$	1.0S (see Note 1)
2. $D + L + W$	1.0S
3. $D + L + E$	1.0S
4. $D + L + S_n + W$	1.6S
5. $D + L + S_n + E$	1.5S
6. $D + L + S_n + E'$	1.6S
7. $D + L + S'_n$	1.6S
8. $D + L + W_T$ (see Note 3)	1.6S

A.2.2 Load Combinations For Reinforced Concrete

Load Case	Acceptance Criteria
1. $1.4D + 1.7L + 1.7S_n$	U (see Note 2)
2. $1.4D + 1.7L + 1.7W$	U
3. $1.4D + 1.7L + 1.9E$	U
4. $D + L + S_n + W$	U
5. $D + L + S_n + E$	U
6. $D + L + S_n + E'$	U
7. $D + L + S'_n$	U
8. $D + L + W_t$ (see Note 3)	U

ATTACHMENT A
STRUCTURAL LOADS AND STRESS ACCEPTANCE CRITERIA

A.2.3 Load Combinations for Foundation Stability

Load Case	Acceptance Criteria Minimum Factors of Safety		
	Overturning	Sliding	Flotation
1. D + H + E	1.5	1.5	—
2. D + H + W	1.5	1.5	—
3. D + H + E'	1.1	1.1	—
4. D + H + W_t	1.1	1.1	—
5. D + F'	---	—	1.1

NOTES:

1. S = the allowable steel stress as defined by the AISC Manual
2. U = the required concrete strength to resist factored loads, as defined by ACI 349-85
3. $W_t = W_w$ or,
   $W_t = W_p$ or,
   $W_t = W_w + .5W_p$ or,
   $W_t = W_m$ or,
   $W_t = W_w + W_m$ or,
   $W_t = W_w + .5W_p + W_m$
4. When any load reduces the effect of other loads, the corresponding coefficient for that load shall be 0.9 if the load is always present or occurs simultaneously with the other load. Otherwise, the coefficient shall be zero.

A.2.4 The acceptance criteria for tornado missiles will be to ensure that the response of the structural system is within the capacity of the materials. Ductility ratios defined in ANSI 58.1 will be used as acceptance limits.

A.2.5 The acceptance criteria for the 188 mph tornado will be to ensure that the building remains stable.

W_T = Tornado loading
W_W = Tornado wind load
W_P = Tornado differential pressure load
W_M = Tornado missile

ATTACHMENT B
LOADING COMBINATIONS AND STRESS LIMITS FOR PIPING SYSTEMS
(EWR 2512 Design Criteria, Tables V-1 and VI-1)

1.0 LOAD COMBINATIONS AND STRESS LIMITS FOR SUPPORTS

Loading Combination		Stress Limits
Normal:	D or (5) D + F + T	≤ Working Stress (1)
Upset:	D ± E or (5) D + F + T ± E	≤ Working Stress (1)
Faulted:	D ± E' or (5) D + F + T_o ± E'	≤ Faulted Stress (2)

Deadweight and thermal are combined algebraically

D = Deadweight
T = Maximum operating thermal condition for system
F = Friction Load (3)
E = OBE (Inertia load + seismic differential support movement)
E' = SSE (Inertia load + seismic differential support movement)
T_o = Thermal - Operating Temperature

(1) Working stress allowable per Appendix XVII of ASME III.

(2) Faulted stress allowable per Appendix XVII, Subsection N, and Appendix F of ASME III and USNRC Regulatory Guide 1.124. Safety Class 1 supports will be evaluated and designed in accordance with Regulatory Guide 1.124.

(3) Whenever the thermal movement of the pipe causes the pipe to slide over any member of a support, friction shall be considered. The applied friction force applied to the support is lesser of μ W or the force generated by displacing the support an amount equal to the pipe displacement.

μ =.35

W =Normal load (excluding seismic) applied to the member on which the pipe slides.

(4) Expansive anchorages shall meet the requirements of NRC IE Bulletin 79-02.

(5) For each loading condition, the greater of the two load combinations shall be used.

ATTACHMENT B
LOADING COMBINATIONS AND STRESS LIMITS FOR PIPING SYSTEMS
(EWR 2512 Design Criteria, Tables V-1 and VI-1)

Component Standard Supports (New and Existing)

For a majority of the component standard supports, the loads given on the certified load capacity data sheets (LCD's), shall serve as the maximum allowable loads for the given condition.

U Bolt allowable loads will be based on finite element analyses using the criteria for bolts given in ASME Code Case 1644-4.

Rod hangers are generally single acting vertical supports, in the upward direction they are susceptible to an early buckling condition. Capacities therefore, in the upward direction are minimal. Consideration of this condition will be made within the evaluations of hangers. Capacities in the downward direction will continue to be obtained from applicable load capacity data sheets.

For component standard supports which do not have certified LCDS, the catalog allowable load at the time of manufacture will be prorated for the various loading conditions by the same factor used for the same component with a LCDS. The prorated load shall serve as the maximum load for the given loading condition.

Supports Fabricated from Non Catalog Items

The stress limits for supports fabricated from non-catalog items shall be based on allowable stresses from ASME III, ANSI or ASTM material used. If the material is not known, it is assumed to be A-36 carbon steel.

ATTACHMENT B
LOADING COMBINATIONS AND STRESS LIMITS FOR PIPING SYSTEMS
(EWR 2512 Design Criteria, Tables V-1 and VI-1)

2.0 LOADING COMBINATIONS AND STRESS LIMITS FOR PIPING

		Loading Combinations	Stress Limits
1. Deadweight:		Design Pressure + Deadweight	$P_m \le S_h$ $P_L + P_B \le S_h$
2. OBE Seismic:		Design Pressure + Deadweight + Design Earthquake Loads (OBE)	$P_m \le 1.2\ S_h$ $P_L + P_B \le 1.2\ S_h$
3. SSE:		Operating Pressure + Deadweight + Maximum Potential Earthquake Loads (SSE)	$P_m \le 1.8\ S_h$ $P_L + P_B \le 1.8\ S_h$
4. Thermal:	A.	Maximum Operating Thermal + OBE Displacements	SE S_A
	B.	Design Pressure + Deadweight + Maximum Operating + OBE Displacements	$P_L + P_B \le S_h + S_A)$

Where:

P_m = primary general membrane stress; or stress intensity

P_L = primary local membrane stress; or stress intensity

P_B = primary bending stress; or stress intensity

S_S, S_h = allowable stress from USAS B31.1 Code for pressure piping

S_E = thermal expansion stress from USAS B31.1 Code for pressure piping