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QuailRun POWER

Quail Run Energy

Emergency Operating Plans

Executive Summary

IAW TAC §25.53

Prepared by

NAES

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Quail Run Energy

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3	Maintenance Manager
4	Plant Engineer / NERC Compliance Manager
5	Environmental Health and Safety Manager
6	Main Control Room

Table of Contents

1. PURPOSE

This executive summary has been developed for Quail Run Energy Center located in Odessa, Texas to ensure compliance with Chapter 25 of the Public Utility Commission of Texas, Substantive Rules Applicable to Electric Service Providers, Subchapter C, Quality of Service. §25.53. Electric Service Emergency Operations Plans.

Quail Run Energy Center is defined below as a Power Generation Company per §25.5(82).

2. EOP AND EXECUTIVE SUMMARY ANNUAL REVIEW REQUIREMENTS

A. TAC §25.53 requires that the emergency operating plans (EOPs) are continuously maintained. For any instances in which a change to the EOPs is required, they must be made without delay. All changes should be referenced to current revision TAC §25.53 to verify all requirements are met.

B. An annual review and updated of all EOPs is conducted prior to March 15th in order the meet the annual submittal requirements listed below.

C. An submittal to ERCOT and the PUC is required by March 15th annually with the following guidelines.:

1. If in the previous calendar year, a change is made to the EOP that materially affects how the entity would respond to an emergency must:

    a. File with the commission an executive summary that (1) describes the changes to the contents or policies in the EOP (2) includes updated reference to specific sections and page numbers to the EOPs that correspond with the requirements of the rule (3) includes the record of distribution (4) contains the affidavit required by §25.53 (c)(4)(C)

    b. File with the commission a complete revised copy of the EOP with all confidential portions removed

    c. Submit to ERCOT its revised unredacted EOP in its entirety.

2. If in the previous calendar year, no changes were made to the EOP that materially affects how the entity would respond to emergency must file with the commission:

    a. A pleading that documents any changes to the list of emergency contacts as provided per requirement §25.53 (c)(4)(B)

    b. An attestation from the entity's highest- ranking representative, official, or officer with binding authority over the entity stating that the entity did not make a change to its EOP that materially affects how the entity would respond to an emergency

    c. The affidavit required by §25.53 (c)(4)(C)

3. With the annual submittal, the following additional information is required:

a. A record of distribution that contacts the following in table format:

(2) Titles and names of persons in the entity receiving access to and training on the EOP

(3) Dates of access to or training on the EOP

b. A list of primary and, if possible, backup emergency contacts for the entity including identification of specific individuals who can immediately address urgent requests and questions from the commission during an emergency.

c. Affidavit from the entity's highest-ranking representative, official, or officer with binding authority over the entity is required to affirm the following:

(2) relevant operating personnel are familiar with and have received training on the applicable contents and execution of the EOP, and such personnel are instructed to follow the applicable portions of the EOP except to the extent deviations are appropriate as a result of specific circumstances during the course of an emergency

(3) The EOP has been reviewed and approved by the appropriate executives.

(4) Drills have been conducted to the extent required by the standard.

(5) The EOP or an appropriate summary has been distributed to local jurisdictions as needed

(6) The entity maintains a business continuity plan that addresses returning to normal operations after disruptions caused by an incident

(7) The entity's emergency management personnel who are designated to interact with local, state, and federal emergency management officials during emergency events have received the latest IS-100, IS-200, IS-700, and IS-800 National Incident Management System training.

D. Each entity must conduct or participate in at least one drill each calendar year to test its EOP.

1. Following the annual drill, must assess the effectiveness of its emergency response and revise its EOP(s) as necessary.

2. An entity conducting an annual drill must, at least 30 days prior to the date of at least one drill per calendar year, notify the commission staff, using the

method and form prescribed by the commission staff on the commission's website, and the appropriate TDEM district coordinators.

a. For PUC contact use eopdrillnotice@puc.texas.gov

b. For TDEM contact we utilize the region 4 contact listed on the TDEM website https://www.tdem.texas.gov/regions/region-4

3. If an entity has activated its EOP in response to an emergency, it is not required to conduct or participate in a drill the calendar year in which the EOP was activated.

3. EOP EXECUTIVE SUMMARY

Quail Run Energy Center EOPs are summarized below with the applicable section and page numbers of each procedure referenced as applicable.

A. **COMMUNICATION PLAN** - TAC 25.53(d)(2)

See AMP-101 Communications - Attachment 1.

B. **PRE-IDENTIFIED SUPPLIES FOR EMERGENCY** RESPONSE - TAC 25.53(d)(3)

See PEP-003-Cold Weather Plan – Attachment 2 page 4

See PEP-004-Hot Weather Plan – Attachment 3 page 14

See PEP-007-Severe Weather Plan – Attachment 5 page 8

C. **STAFFING PLAN DURING EMERGENCIES** - TAC 25.53(d)(4)

Refer to the following procedures for staffing plans associated to the corresponding procedure:

PEP-003 Cold Weather Plan – Attachment 2 pages 4 and page 7

PEP-004 Hot Weather Plan – Attachment 3 page 5

PEP-007 Severe Weather Plan – Attachment 5 page 8

SMP -20 Influenza and Pandemic Response – Attachment 6 pages 5,6,7,8, 9

D. **SEVERE WEATHER PROCEDURES** - TAC 25.53(d)(5)

The following procedures are referenced to identify weather related hazards.

See PEP-003 – Cold Weather Plan – Attachment 2

See PEP-004 – Hot Weather Plan – Attachment 3

See PEP-006 – Emergency Water Plan – Attachment 4 for drought and water emergencies

See PEP-007 – Severe Weather Plan – Attachment 5 - Addresses High Winds, Thunderstorms, Tornadoes, Hurricanes, and Earthquakes

E. **WEATHER ANNEX** - TAC 25.53(e)(2)(A)

The following procedures are additionally used to respond to weather emergencies

See PEP-003 – Cold Weather Plan – Attachment 2

See PEP-004 – Hot Weather Plan – Attachment 3

See PEP-007 – Severe Weather Plan – Attachment 4

F. **WATER SHORTAGE ANNEX** - TAC 25.53(e)(2)(B)

See PEP-006 – Emergency Water Plan – Attachment 4

G. **RESTORATION OF SERVICE** - TAC 25.53(e)(2)(C)

Quail Run Energy Center is not a black start facility If the plant should trip and all power is lost from grid, then it will be necessary to wait until power is restored to the plant before attempting restart of the gas turbine. It will be necessary to start the emergency diesel generator to provide sustained power to critical loads. The following procedures will be used to respond to the event.

- EOP-3 - CTG Emergency Trip - Attachment 7
- EOP-6 - Loss of Auxiliary AC Power - Attachment 8
- OP-106 Plant Startup – Attachment 9
- OP-201 Combustion Turbine Operation – Attachment 10
- PEP–009 Priorities for Recovery of Generation

H. **PANDEMIC MANAGEMENT PLAN OVERVIEW** - TAC 25.53(E)(2)(C)

The Quail Run Energy Center developed SMP-20 – Influenza Pandemic Response Plan - was developed to identify and prioritize critical operations of the facility and provide appropriate response guidelines. Additionally, it includes plans for staffing and preparation for possible pandemic.

See SMP-20 – Influenza and Pandemic Response Plan - Attachment 6

I. **HURRICANE ANNEX** –

NA FOR QUAIL RUN

J. **CYBERSECURITY PLAN** – TAC 25.53(e)(2)(F)

Cybersecurity is of the facility is covered by NERC Standard CIP-003-8 Cyber Security – Security Management Controls. Quail Run Energy Center has developed the following procedures and attachments to address Cybersecurity

RCP-NERC-CIP-003 Security Management Controls Procedure
RCP-NERC-CIP-003-ATT-A-Cyber Security Policy
RCP-NERC-CIP-003-ATT-B-Cyber Security Awareness
RCP-NERC-CIP-003-ATT-D-Electronic Access Controls
RCP-NERC-CIP-003-ATT-E-Cyber Security Incident Response Plan
RCP-NERC-CIP-003-ATT-F-Cyber Security Incident Attestation Form
RCP-NERC-CIP-003-ATT-G-CSIRP Test and Review
RCP-NERC-CIP-003-ATT-H-Leadership
RCP-NERC-CIP-003-ATT-I-Access Control List
RCP-NERC-CIP-003-ATT-J-TCA & RM Plan
RCP-NERC-CIP-003-ATT-K-TCA-RM Form
RCP-NERC-CIP-003-ATT-L-CIP Exceptional Circumstances
RCP-NERC-CIP-003-ATT-M-CIP Exceptional Circumstances Form

K. **PHYSICAL SECURITY PLAN** TAC 25.53(e)(2)(G)

Physical security of the facility is covered by NERC Standard CIP-003-8 Cyber Security – Security Management Controls. Quail Run Energy Center has developed the following procedures and attachments to address Physical Security.

RCP-NERC-CIP-003 Security Management Controls Procedure
RCP-NERC-CIP-003-ATT-C-Physical Security Controls

See Attachment 11 to refer to applicable sections listed above.

L. **OTHER EMERGENCY RESPONSE PROCEDURES** TAC 25.53(e)(2)(H)

Quail Run Maintains ERP-01- Emergency Response Plans as its initial entry emergency response procedure.

This procedure contains guidance for Emergency Response Organization, Emergency Contacts, Hazardous Waste Operations and Emergency Response, Fire Response, Chemical Spills, Medical Emergencies, Physical and Cybersecurity Threats, Gas Pipeline Emergencies, along with required training.

See attachment 12 for ERP-01

M. **AFFIDAVIT –** TAC 25.53(c)(4)(C)

See Attachment 17

Attachment 1

AMP-101 COMMUNICATIONS

Attachment 2

PEP-003-COLD WEATHER PLAN

Attachment 3

PEP-004 – HOT WEATHER PLAN

Attachment 4

PEP-006 – EMERGENCY WATER PLAN

Attachment 5

PEP-007 – SEVERE WEATHER PLAN

PEP-009 PRIORITIES for RECOVERY OF GENERATION

Attachment 6

PEP-009 PRIORITIES for RECOVERY OF GENERATION

Attachment 7

SMP-20 INFLUENZA AND PANDEMIC REPSONSE

Attachment 8

EOP-3- CTG EMERGENCY TRIP

Attachment 9

EOP-6- LOSS OF AUXILIARY AC POWER

Attachment 10

OP-106 PLANT STARTUP

Attachment 11

OP-201 – COMBUSTION TURBINE OPERATION

Attachment 12

CIP-003 CYBER AND PHYSICAL SECURITY

Attachment 13

ERP-01 EMERGENCY RESPONSE PLANS

Attachment 14

ANNUAL TRAINING RECORD

Attachment 15

EMERGENCY CONTACTS LIST

Facility Emergency Contacts

Person/Organization	Primary Phone Number	Secondary Phone Number
Plant Manager Primary Emergency Coordinator Andy Duncan	(432) 272-8572	(
Operations Manager Secondary Emergency Coordinator Scott Garner	(432) 272-8514	(432) 352-3615 (cell)
Maintenance Manager Pablo Chaves	(432) 272-8515	(432) 209-3657 (cell)
Environmental, Health & Safety Manager Linda Talbot	(432) 272-8578	(225) 235-4295 (cell)
Plant Engineer / NERC Compliance Manager Edward Nielsen	(432) 272-8530	(786) 348-3691 (cell)
Control Room	(432) 272-8525	

Attachment 16

AFFIDAVIT

General Business Administrative Policies

Administration Manual Program (AMP)

Introduction

Purpose:

The purpose of these policies is to provide guidance for miscellaneous aspects of Business Administration at NAES operated facilities that are not covered in other NAES policies.

Scope:

All NAES Personnel, All Site Personnel

Description:

This Administration Manual Program (AMP) document is a compiled version of the former AMP-101, 103, 105, 106, 109, 110, and 111 documents.

Policy

1 GENERAL BUSINESS ADMINISTRATION

The Plant Manager and Operations Director are jointly responsible for ensuring effective performance of the power plant office and coordination with the NAES HQ Departments and Client/Owner's Representatives, as-well-as the organization and execution of the following power plant business functions:

- Community Relations
- Reporting
- Solicitations
- Travel and Business Expense
- Plant Computer Equipment
- Back-up Data
- Site Security
- Removable Media

② COMMUNITY RELATIONS

A. NAES Plant Staff members may participate in community related memberships or events as a community member.

B. NAES Plant Staff members are prohibited from representing the plant or the Client/Owner without prior explicit approval.

C. NAES encourages NAES Plant Employees to propose participation in various community related activities to the Client/Owner for approval.

D. NAES Plant Employees are prohibited from granting interviews or providing written statements to the Media. (Newspaper, TV, Magazine, etc.)

E. NAES Plant Employees are to forward all requests from the Media to the Client/Owner representative.

③ REPORTING

Required reporting for each NAES operated plant is established by the following:

1. **O&M Agreement**

   The O&M agreement provides specific requirements for periodic reporting to the Client/Owner for plant performance statistics and status commentary.

2. **Regulatory**

   a. Locally issued operating permits (air emissions, water discharge, etc.) and Federal Regulations (CFR, NERC, OSHA) require specific reporting on varying frequencies.

   b. A current Compliance Calendar is maintained in Gensuite by all plants to ensure all required regulatory reporting is scheduled, completed, signed, and submitted to the appropriate agency prior to the due date.

3. **NAES Corporate**

   NAES Corporate reporting is conducted and recorded in Gensuite. This includes Monthly Metrics, and the following event driven reports:

   - Incident Reporting (as specified in AMP-108)
   - Root Cause Analysis (as specified in AMP-108A)
   - Injury / Illness or Near Miss incidents (as specified in SMP-14)
   - Property or Equipment Damage incidents

- Issues and Actions - I&A Lists - a.k.a. Action Tracking System (ATS) application in Gensuite.

4. **NAES Policies & Procedures**

   NAES requires that all reporting be conducted as explicitly outlined in our policy and procedure manuals.

④ SOLICITATIONS

A. NAES policy prohibits solicitation and distribution on its premises by non-employees.

B. NAES permits and limits solicitation and distribution on its premises by employees if:

   1. Such activities, when left unrestricted, may:

      a. Interfere with its normal operations

      b. Be detrimental to employee efficiency

      c. Frustrate Client/Owners

   2. NAES may authorize fund drives by employees on behalf of charitable organizations or for employee gifts.

      a. Employees can volunteer to assist in these drives

      b. Employees are not discriminated against because of unwillingness to participate.

   3. Solicitation by or involving employees are subject to the following restrictions:

      a. The sale of merchandise is prohibited on the Plant Site

      b. Distribution of literature can only take place in break / lunch rooms; distribution in work areas is prohibited.

      c. Distribution of literature or solicitation during the working time of either the Solicitor or the target employee(s) is prohibited. This can only occur during work breaks of both parties.

      d. Putting solicitation literature on Plant bulletin boards is prohibited. The preferred location for this literature is on break / lunch tables.

⑤ TRAVEL & BUSINESS EXPENSES

A. All NAES employees are required to comply with the company Travel and Business Expenses Policy (CP33).

   1. If plant personnel are instructed by the client to comply with the client's policy, the Operations Director must be notified, and the Client/Owner's policy must be reviewed by NAES Corporate Accounting.

   2. CP33 Travel and Business Expenses Policy has been distributed to the NAES Sharepoint directory for each plant and located on the Travel page on NAES Sharepoint.

B. Refer to NAES Sharepoint for more travel and business expense items.

   1. Example: NAES Expense Report Template and Check Request Form for cash advances.

      Sharepoint Link

C. For any questions about Egencia that are not covered in the CP33 Travel and Business Expenses Policy, please email NAESTravel@naes.com.

   1. For any other questions regarding CP33, please email Accounting.Help@naes.com

⑥ PLANT COMPUTER EQUIPMENT

The Plant Manager and Operations Director are responsible for ensuring that the computer hardware and software have compatibility between plant equipment and plant headquarters. NAES headquarters shall be contacted for guidance and to ensure incompatibility problems are avoided.

Protect computers with surge suppressors to protect equipment from potential damage. At a minimum, critical systems (including servers) are to be protected in the event of a power loss.

⑦ BACKUP DATA

A. Data and Software Programs are required to be backed up. Refer to Appendix A.

B. Each user is responsible for backing up their PC to the server at least weekly or as designated by the Plant Manager.

C. The Plant Manager will be responsible for ensuring that the file server is backed up.

D. Back-up is to be reviewed and confirmed annually. All PC application software inventoried annually.

E. The Plant Manager or designee will routinely audit the back-up process to ensure compliance and verify the back-up process is working and the data is being backed up and is valid and usable.

⑧ SITE SECURITY

Each NAES operated facility has unique security considerations, therefore site specific security equipment, apparatus and procedures must meet the needs and preferences of the Customer and designed as such.

A. The following site security policies are common to of all NAES operated site specific security programs and procedures, primarily for safety reasons:

1. Only the following have unrestricted access to the facility:

    a. Plant Employees hired to work at the facility

    b. The Client/Owner's employees

    c. Law Enforcement personnel

    d. Emergency Response personnel

2. Only authorized non-employees are allowed to enter the plant site.

    a. "Authorized" is defined as having explicit invitation from a plant employee and approval of Plant Management.

3. All plant visitors are required to fill out the Plant Visitor Log sheet or sign in kiosk with:

    a. Date

    b. Entry Time & Departure Time

    c. Name of the organization they represent

    d. Name of the plant employee they are visiting

4. Hired Contractors or Consultants are only allowed in safety sensitive areas after completion of the Plant Safety Policy Introduction / Training course.

> **NOTE:**
> Completion of Certificate of Insurance, Terms and Conditions, and SMP-26 safety contractor approval as specified in AMPs and SMPs.

5. Authorized non-employees may only enter safety sensitive areas around plant equipment when accompanied by an employee.

6. Unaccompanied Authorized non-employees may only enter plant administration office areas.

    a. Delivery vendors may only enter areas pre-authorized for delivery of their goods. (warehouse, chemical storage tanks, etc.)

7. All organized tours with various general public groups are restricted to:

    a. Plant Roadways

    b. Administration Offices

    c. Control Rooms (Only if the areas can accommodate groups without getting closer than 6 feet from any plant control equipment.)

⑨ REMOVABLE MEDIA

A. Connection of personal computer devices to critical plant cyber assets is prohibited.

1. Personal Computer Devices include but are not limited to:

    a. Phones

    b. USB devices

    c. Cameras

    d. Laptops

2. Critical Plant Cyber Assets are:

    a. The Distributed Control System (DCS)

    b. Turbine Controllers

c. Any other equipment process controllers

Attachments

STD AMP-101 General Business Administrative Policies - Attachment A - R0

Revision Management

Revision History Log:

Revision #:	Date:	Nature of Change:	Recorded By:
R0	9/26/2019 8:01 AM	Final QC prior to Publication Conducted - Moved to R0 - Published to Portal	Bo Barker
D1.0	5/14/2019 8:44 AM	New document	Kerby Duewel

NAES	Plant Emergency Plan	
Number: **PEP-003**	Subject: **Cold Weather Plan**	
Approved for use by:	Current Issue: **Revision 5 (R5)**	Issue Date: **27 SEP 22**

TABLE OF CONTENTS

REFERENCES	Rev.	Date
QR-OP-108 Cold Weather Response	05	10/12/2021
Reliability Guideline Generating Unit Winter Weather Readiness – Current Industry Practices		
Texas Administrative Code Substantive Rules, Chapter 25 Subchapter C, Article 25.53 (c)		06/2014
ERCOT Nodal Protocol 3.21 (2)	00	06/2013

DOCUMENT REVISION HISTORY

Rev	Rev Date	Description of Changes / Comments
-	12/01/14	Initial Release
1	03/09/15	Quail Run Addition
2	11/01/2018	Plant Manager Update
3	01/22/2019	Checklist Additions, Administrative Corrections
4	10/12/2021	Minor formatting changes. Updated Winter Operations roster.
5	9/26/2022	Updated Winter Operations roster

1. INTRODUCTION

Recognizing that proper preparation and planning are essential to ensure reliability during extreme weather conditions, NAES has established the following Cold Weather Plan to address Power Plant weatherization.

The North American Electric Reliability Corporation (NERC) Reliability Guideline for Generating Unit Winter Weather Readiness – Current Industry Practices provides electric utilities and power generation companies with guidance on how to maintain facility reliability during winter weather conditions.

Note: Following two items apply only to facilities in Texas:

The Texas Administrative Code (TAC), Substantive Rules Chapter 25, Subchapter C, Article 25.53 (c) requires electric utilities and power generation companies to prepare and file an emergency operations plan. Weatherization plans and procedures are required by the emergency operations plan.

ERCOT Nodal Protocol 3.21(2) requires each Resource Entity to provide a current weatherization plan for each Generation Resource. The weatherization plan must include a description of the Generation Resource's ability to withstand extreme cold, a description of materials and devices used to ensure operation during extreme weather, and practices and procedures undertaken in preparation for winter and summer.

2. PURPOSE

The Cold Weather Plan is a plan to guide activities required to prepare for winter weather conditions and also satisfies the requirements of several outside agencies. The focus is on maintaining facility reliability and preventing cold weather related outages.

3. OBJECTIVE

It is the responsibility and policy NAES personnel to develop and implement a robust Cold Weather Plan to maintain the readiness and reliability of this facility during freezing weather. This plan should be reviewed periodically to incorporate industry best practices and lessons learned for continuous improvement.

4. REFERENCE POLICIES

Substantive Rules Applicable to Electric Service Providers {PUCT 25.53 (c) (2) (C)}.

OP-108 Cold Weather Response

5. COLD WEATHER PLAN PREPARATION

The NERC Reliability Guideline for Generating Unit Winter Weather Readiness provides the following guidance on the key points to consider when developing a Cold Weather Plan and the Winter Weather Checklists that will be used to ensure your facility is ready for winter weather each year:

- Review facility CMMS to ensure adequate annual preventative work orders exist for freeze protection and winter weather preparedness.

- Ensure all freeze protection, winter weather preparedness preventative work orders, or both are completed prior to the onset of the winter season or exceptions listed where applicable.

- Ensure all critical site specific problem areas have adequate protection to ensure operability during a severe winter weather event. Emphasize the points in the plant where equipment freezing would cause a generating plant trip, derate, or failure to start.

- Develop a list of critical instruments and transmitters that require increased surveillance during severe winter weather events.

- Consider the effect of wind chill when applying freeze protection. Considerations include but are not limited to:

    - Insulation thickness, quality and proper installation
    - Heat trace capability and electrical continuity/ground faults
    - Wind breaks

- Heaters and heat lamps

- Inspect building penetrations, windows, doors, fan louvers, and other openings for potential exposure of critical equipment to the elements.

- Supplemental equipment – Prior to the onset of the winter season, ensure adequate inventories of all commodities, equipment and other supplies that would aid in severe winter weather event preparation or response, and that they are readily available to plant staff. Supplemental equipment might include:

    - Tarps
    - Portable heaters
    - Scaffolding
    - Temporary enclosures
    - Temporary insulation
    - Plastic rolls
    - Handheld welding torches
    - Snow removal equipment
    - Blankets
    - Extension cords
    - Kerosene/propane
    - Portable generators
    - Portable lighting
    - Instrumentation tubing
    - Ice removal chemicals and equipment
    - Cold weather PPE

- Staffing

    - On-call personnel will be readily available during severe winter weather events.

- Institute operator rounds utilizing cold weather checklists to verify critical equipment is protected – i.e. pumps running, heaters operating, igniters tested, barriers in place, temperature gauges checked, etc.

- Consider pre-warming, early start-up, or both of scheduled units prior to a forecasted severe winter weather event.

- Place in service critical equipment such cooling towers, auxiliary boilers etc. where freezing weather could adversely impact operations or forced outage recovery.

6. COLD WEATHER PLAN POLICIES

The main purpose of this plan is to prepare for winter season operating problems largely caused by freezing weather. The following procedures will be executed annually. Plant personnel shall prepare areas and equipment to reduce the possibility of operating restriction or damage to equipment and systems and minimize the risk of forced outages or derates.

Operation and maintenance personnel will use checklist forms, maintained as Appendix PEP-003-A of this plan, to:

- Inspect and verify heat trace circuits are functioning correctly. This inspection may include checking for loose connections, broken wires, corrosion, and other damage to the integrity of electrical insulation which could lead to the heat trace malfunctioning. Measure heat trace amperage and voltage, if possible, to determine whether the circuits are producing the design output.

- Inspect exterior piping, valves and sensing lines and associated heat tracing, wiring, insulation, controls, etc.

- Inspect transmitters/controllers and sensing lines. Inspect associated heat tracing, wiring, insulation, controls, etc.

- Inspect instrument air system and lines to remove moisture, prevent moisture from freezing and disabling dampers, actuators, etc. Inspect associated heat tracing, wiring, insulation, controls, etc.

- Inspect heaters on rotating equipment, electrical equipment, verify operation of backup equipment, and verify proper lubrication oil temperatures.

- Identify temporary heaters and/or freeze protection requirements. Safety precautions for temporary heaters may be found in Appendix PEP-003-B.

- Monitor cooling tower for ice formation and rotate fans as needed.

A list of areas requiring temporary heat or freeze protection is to be identified by plant personnel. Operations and maintenance personnel will review this list and portable heaters, such as salamanders, or windbreaks will be ordered, staged, and proper fuel

allocated to maintain the portable heaters. Checklists should be completed annually, approximately one month prior to the typical arrival of freezing weather.

7. ANNUAL REVIEW

An annual meeting should be scheduled around the end of the third quarter of each year to review/update this plan and to kick of the seasonal preparedness planning for winter weather. Activities that should be conducted during this annual review are:

- Review lessons learned from previous winter operation.
- Conduct table top exercise/drill to ensure personnel readiness.
- Review best practices available from NAES, NERC, ERCOT and other resources.
- Review freeze protection systems.
- Identify current winter weather supply inventories.
- Review and update equipment/system checklists and/or operating procedures.
- Identify action items, work orders, and responsibility for preparing for and updating this plan.
- Complete and distribute the annual updated Cold Weather Plan.

8. COLD WEATHER PLAN MANAGEMENT STAFF PROCEDURES

- Annually update and distribute copies of the Cold Weather Plan to NAES Operations personnel.

Note: Following two items apply only to facilities in Texas:

- Obtain approval of the Declaration of Completion of Generation Resource Weatherization Preparations.
- Provide electronic copies of the Cold Weather Plan and Declaration of Completion of Generation Resource Weatherization Preparations form to Compliance Manager for submittal to ERCOT, no later than November 30, and record evidence of submittal to ERCOT and acceptance by ERCOT.

9. COLD WEATHER PLAN ANNUAL IMPLEMENTATION

Annual implementation of the Cold Weather Plan should be scheduled around the beginning of the fourth quarter of each year, following the annual update of the plan. Activities that should be conducted during this annual implementation are:

- Complete Cold Weather Plan action items, identified during the annual plan review, by mid-November.
- Complete a revision of equipment and system Cold Weather Checklists by mid-November.

> **NOTE**
>
> The Cold Weather Checklists, prepared prior to the facility's first winter and maintained as Appendix PEP-003-A of this plan, will be used to verify readiness of equipment and systems that may cause generation outage or curtailment resulting from freezing weather. The Cold Weather Checklists will verify operation of equipment and systems when freezing weather is eminent.

- Communicate Cold Weather Plan responsibilities to appropriate personnel by early-November.
- Complete the Cold Weather Checklists verifications annually by the end of November.
- Provide training to staff responsible for implementation of Cold Weather Plan by the end of November.
- Provide record of training to the Training Coordinator to record evidence of training.
- Establish staff responsibilities to monitor weather and weather alerts.
- Control Room Operator will discuss the weather forecast at the beginning of each shift during shift turnover to keep all personnel alerted to possible winter conditions.
- Communicate and implement freezing weather advisories.
    - Note in shift logs that a winter advisory has been implemented.
    - Note in shift logs when the winter advisory is released.
- Implement operating controls during extreme freezing weather advisories.
- Complete the Cold Weather checklists immediately following the implementation of a winter weather advisory.
- Assure adequate staff for readiness implementation.
- Impose restriction on maintenance activities during advisories.
- Update emergency call out List.

10. SEASONAL END OF COLD WEATHER PLAN

- Communicate end of Cold Weather Plan implementation to facility personnel.
- Document lessons learned / best practices.

APPENDIX PEP- 003-A Cold Weather Checklists

Complete by November 15 (Exceptions Listed)

	Completion Date
Cold weather plan reviewed with plant manager signature	
Cold weather plan review with employees and sign off sheet attached	
Gas turbine 1-4 tuning complete	
Heat trace initial operational check and space heater checks complete	
Heat trace amperage PM complete and spreadsheet updated	
Pre-winter supply checklist complete (Warehouse, HRSG1-4)	
Block 1 freeze protection walk down complete and reviewed for accuracy	
Block 2 freeze protection walk down complete and reviewed for accuracy	
Control room freeze protection checklist complete and reviewed for accuracy	
Critical transmitters walk down complete	
Insulation installed on Block 1 (exceptions listed)	
Insulation installed on Block 2 (exceptions listed)	
Air System Checks	
Table top drills complete	
Critical transmitter thermal gun checks	
Lessons learned identified from previous year and documented	

Exceptions:

Winter Operations

Plant: Quail Run Energy

Do not Sign this Page!

Patterson, John	/		Mooney, James	/	
Mechanical Maint. Tech	Signature	Date	Auxiliary Plant Operator	Signature	Date
Bell, Randy	/		Garner, Scott	/	
System Technician	Signature	Date	Operations Manager	Signature	Date
Baze, Derrick	/		Procter, Wade	/	
Auxiliary Plant Operator	Signature	Date	Control Room Operator	Signature	Date
Espinoza, Ryan	/		Chaves, Pablo	/	
Auxiliary Plant Operator	Signature	Date	Maintenance Manager	Signature	Date
Pate, Cliff	/		Duncan, Andy	/	
Lead Control Room Operator	Signature	Date	Plant Manager	Signature	Date
Santa, Mark	/		Galvan, Cruz	/	
Control Room Operator	Signature	Date	Auxiliary Plant Operator	Signature	Date
Breazeale, Kenneth	/		Benbow, Jeffrey	/	
Mechanical Maint. Tech	Signature	Date	IC&E Technician	Signature	Date
Juan Carrillo	/		Nielsen, Ed	/	
Auxiliary Plant Operator	Signature	Date	Plant Engineer	Signature	Date
Jaime Rendon	/				
Auxiliary Plant Operator	Signature	Date			
Brian Austin	/				
Auxiliary Plant Operator	Signature	Date			
Hooks, Kelby	/				
Control Room Operator	Signature	Date			
Linda Talbot	/				
EH&S Specialist	Signature	Date			
Valdez, Jorge	/				
Mechanical Maint. Tech	Signature	Date			

GT1 Tuning Completed (as needed) Date_____

GT2 Tuning Completed (as needed) Date_____

GT3 Tuning Completed (as needed) Date_____

GT4 Tuning Completed (as needed) Date_____

Heat Trace Initial Operational and Space Heater Checks

Ops check the following heaters

Place heater in hand, ensure unit begins heating, place in AUTO where applicable

Diesel fire pump room, AUTO setpoint of 68F	☐
Electric fire pump room, AUTO setpoint of 68F	☐
Water plant east/west heaters (on east wall), place in AUTO setpoint of 68F	☐

ST5 52-G building, AUTO setpoint of 68F	☐
ST5 52-G building, Switchgear/Bus duct space heater - ON	☐
ST5 52-G building, HVAC #1 - ON	☐
ST5 52-G building, HVAC #2 - ON	☐

ST6 52-G building, AUTO setpoint of 68F	☐
ST6 52-G building, Switchgear/Bus duct space heater - ON	☐
ST6 52-G building, HVAC #1 - ON	☐
ST6 52-G building, HVAC #2 - ON	☐

☐

GT1 PEECC gas valve compart. space htr.	☐
GT2 PEECC	☐
GT3 PEECC gas valve compart. space htr.	☐
GT4 PEECC gas valve compart. space htr.	☐

Ensure the following breakers are in AUTO

GT1	PEECC Turbine compartment heaters	☐
	PEECC Accessory compartment space heaters	☐
	PEECC Generator space heater	☐
	PEECC Lube oil tank immersion heater	☐

GT2	PEECC Turbine compartment heaters	☐
	PEECC Accessory compartment space heaters	☐
	PEECC Generator space heater	☐
	PEECC Lube oil tank immersion heater	☐

ST5	Heat trace panel	(480V)	Panel 15P714 - 480v ckt #37 (west wall)	❐
	Space heater		SW corner, Disconnect ON	❐
	Space heater		NE corner, Disconnect ON	❐

GT3	PEECC Turbine compartment heaters	❐
	PEECC Compartment heaters	❐
	PEECC Accessory compartment space heaters	❐
	PEECC Generator space heater	❐
	PEECC Lube oil tank immersion heater	❐

GT4	PEECC Turbine compartment heaters	❐
	PEECC Compartment heaters	❐
	PEECC Accessory compartment space heaters	❐
	PEECC Generator space heater	❐
	PEECC Lube oil tank immersion heater	❐

ST6	HT-6	Panel 16P714 - 480v ckt# 30 (west wall)	❐
	HT-6 XFMR	Panel 16P714 - 480v ckt# 28 (west wall)	❐
	HT-6 Heat Trace	Panel 16P714 - 480v ckt# 26 (west wall)	❐
	Space heater	SW corner, Disconnect ON	❐
	Space heater	NE corner, Disconnect ON	❐

BOP	EDG1 block heaters (not labeled - ensure all circuits ON)	❐
	EDG2 water jacket heater (CKT #3)	❐
	Diesel fire pump heater #2 (NE wall) Disconnect ON	❐
	Diesel fire pump block heater (feel block for warmth)	❐
	Electric fire pump local heater Disconnect #1 ON	❐
	Electric fire pump local heater Disconnect #2 ON	❐

Place heat trace panels in HAND, observe indications/faults

HTPP 1	❐
HTPP 2	❐
HTPP STG5	❐
HTTP BOP	❐
HTPP (Inside CT1 MCC)	❐
HTPP 3	❐
HTTP 4	❐
HTTP STG6	❐

When ambient temps reach 40F ensure heat trace panels are ON in AUTO and transmitter cabinet heaters work

HTPP 1	❐
HTPP 2	❐
HTPP STG5	❐
HTTP BOP	❐
HTPP (Inside CT1 MCC)	❐
HTPP 3	❐
HTTP 4	❐
HTTP STG6	❐

HRSG1
Amp
Readings

Breaker	Circuit		Year	Year
1 & 3	1	Tube Bundle to Sample Shack		
2 & 4	2	Tube Bundle to Sample Shack		
5 & 7	3	Tube Bundle to Sample Shack		
6 & 8	4	Tube Bundle to Sample Shack		
9 & 11	5	Tube Bundle to Sample Shack		
10 & 12	6	Tube Bundle to Sample Shack		
13 & 15	7	Tube Bundle to Sample Shack		
14 & 16	8	Spare		
17	9	HP Coldfill		
18	10	331A, LP Stm Hdr, Blr Drns		
19	11	HP Coldfill		
20	12	PIT-1212		
21	13	M/U Water to Waterwash skid, WW discharge		
22	14	Cond't Pump Discharge Line		
23	15	CCW In/Out @ Turbine, Fogger skid, fogger tubing		
24	16	Fuel Gas Skid (no longer in service)		
25	17	City Water		
26	18	CCW Outlet from BFW Pp, CCW Inlet to BFW Pp		
27	19	CCW In/Out to Sample Shack		
28	20	Boiler Drns, LP Superheater Drain		
29	21	330B, Blr Drns, HP B/D, HP SH Drn, HP Stm Hdr		
30	22	HP Fill Line Drn, FT-300, City Water, HP Feed flow		
31	23	Boiler Drns		
32	24	FT-304, B/D Line @IBD tank, Sample Cond't Bundle, LP Drum M/U		
33	25	FT-305, p-305, LP Stm Hdr		
34	26	LP Blr Drns, CBD Pot		
35	27	PDT-319, LP Recirc Pp lines, LP Recirc Disch, PIT-1114, BFW Press		
36	28	City Water		
37	29	Attemp Vlv Ph 1C, Cond't Line Ph 1 Htr#41		
38	30	LT-306A/B HP Drum Lvl, PT-306 HP Drum Press, HP Sight Glass		
39	31	FT-303, FT-301, PT-303		
40	32	CBD line on top of HRSG-1		
41	33	LT-314A/B Drum Lvl, PT-314 LP Drum Press, PDT-325 Catalyst DP		
42	34	Drum Fill, Blowdown Vlvs, Exh Press Xmtr		

HRSG2 Amp Readings

Breaker	Circuit		Year	Year
1 & 3	1	Tube Bundle to Sample Shack		
2 & 4	2	Tube Bundle to Sample Shack		
5 & 7	3	Tube Bundle to Sample Shack		
6 & 8	4	Tube Bundle to Sample Shack		
9 & 11	5	Tube Bundle to Sample Shack		
10 & 12	6	Tube Bundle to Sample Shack		
13 & 15	7	Tube Bundle to Sample Shack		
14 & 16	8	Tube Bundle to Sample Shack		
17	9	Outlet CBD Exchanger @ IBD Tank		
18	10	Attemperation Vlv Ph 1A		
19	11	HP Coldfill		
20	12	PIT-1312		
21	13	Waterwash line to Access Comp		
22	14	City Water		
23	15	Demin to Fogger Skid, Fogger Pump Discharge		
24	16	Fuel Conditioning Skid (no longer in service)		
25	17	Suct Lines to Chem Pps, (Amine & Scavenger) FT-400, FT-404		
26	18	CCW Outlet from BFW Pp, CCW Inlet to BFW Pp		
27	19	Attemperation line Ph 1B, Cond't Line Ph 1 Ckt 40		
28	20	Boiler Drns		
29	21	HP B/D Drn, HP B/D, HP SH Drn, Cond't to Cond't Coll Drn, LP Stm Hdr		
30	22	PIT-1164, BFW to HP Drum, Attemp line to BFW, HP Coldfill		
31	23	LP Boiler Drns, LP Recirc Disch		
32	24	Tube Bundle to Cond't Line		
33	25	Cond't Line Ph 1 Ckt 39, FT-405, PT-405, HP B/D Drn		
34	26	HP B/D Line, Cond't to LP Drum, LP Boiler Steam Demin		
35	27	PDT-419, LP Recirc Pp, LP Recirc Disch, Attemp Line Boiler Feedwater		
36	28	City Water		
37	29	City Water		
38	30	LT-406A/B, PT-406 HP Drum Press, HP Hi/Low, HP Site Glass		
39	31	FT-403, HP Superheater Drn, HP Cond't Drn, PT-403, FT-401, HP Continuous B/D flow		
40	32	Drum Fill Lines to LP/HP		
41	33	LT 414A/B, PT 414 LP Drum Press, PDT-425 Catalyst DP Press, LP Drum Low Lvl, LP Siteglass, LP Drum Vent		
42	34	Exhaust Pressure		

ST5 Amp Readings

Breaker	Circuit		Year	Year
1 & 3	1	LP Phosphate Pumps HRSG-2 (Tube Bundle)		
2 & 4	2	HRSG-2 HP Phosphate Pump (Tube Bundle)		
5 & 7	3	O2 Scavenger Injection (Tube Bundle)		
6 & 8	4	Amine Injection (Tube Bundle)		
9 & 11	5	CW to Sample Shack (Tube Bundle)		
10 & 12	6	Sample Shack (Tube Bundle)		
13 & 15	7	Spare		
14 & 16	8	Spare		
17	9	PCV-1732 Line (MI Cable)		
18	10	Water to Waterwash skid		
19	11	City Water Drops/Ph 1 Chemical Eye Wash Station		
20	12	Hotwell Level Gauge, Press Release Valves, Hotwell Site Glass		
21	13	Steam Line Drains, XV2257, XV2252		
22	14	Flash Pipe Pump Piping		
23	15	HP/LP Pressure Transmitters PIT 1726/1706 (Tube Bundle)		
24	16	Vacuum Pumps A/B		
25	17	Vacuum Pumps A/B		
26	18	PCv-1732 Valve		
27	19	Curtain Valve, PCV-686A/B PIT 684		
28	20	LCV-601, LCV-602, Pressure Release Valves (Tube Bundle)		
29	21	PT-218-1, PT-218-2, PT-218-3, PT-511		
30	22	PT-213A, PT-213B, PT-213C		
31	23	Vacuum Pump A		
32	24	CCW Suction Pressure Gauge, CCW Discharge Pressure Gauge		
33	25	PIT-653, PIT-1726 Block Heater, PIT-1706 Block Heater		
34	26	Spare		
35	27	PIT-203-1, PT-203-2, PT-203-3, PIT 531		
36	28	Spare		
37	29	Spare		
38	30	Spare		
39	31	Spare		
40	32	Condensate Line Ckt 37		
41	33	Condensate Line Ckt 38		
42	34	Aux Boiler Demin Line		

HRSG3 Amp Readings

Breaker		Year	Year
1	Spare		
2	Tube Bundle to Sample Shack		
3	Tube Bundle to Sample Shack		
4	Spare		
5	Spare		
6	Spare		
7	Spare		
8	Spare		
9	Spare		
10	Bad Tube Bundle to Sample Shack		
11	City Water, Continuous B/D, TBD Exchanger Changer		
12	LP Drain Header, Boiler Drain		
13	Demin Water to Fogger Pumps		
14	PDT-319, Suction to LP Recirc, Disch LP Recirc, LP B/D, LP Drain, Boiler Drains, LP SH Drain		
15	HP Coldfill, Flow Transmitters off of LP Steam Header		
16	HP B/D, HP Drain Line, Attemp Line to HP Steam, HP SH Drain Lines		
17	Cond't Collection Line, Fogger Pump Discharge		
18	PIT-1212, PT-312, FT-303		
19	FIT-313, FT-300, FT-305, PT-305, PIT-1114, FT-304		
20	Tube Bundle to Sample Shack		
21	Tube Bundle to Sample Shack		
22	Tube Bundle to Sample Shack		
23	2 Tube Bundle to Sample Shack		
24	Tube Bundle to Sample Shack		
25	City Water		
26	Attemperation Valve Phase 2C, Cond't Line Htr #41		
27	LT-314 A/B/C, PT-314, PDT-325, LT 306 A/B/C, PT-306, PT-303, HP LT, FT-301		
28	Spare		
29	Spare		
30	CBD Line @ Drum, HP High/Low Side LT, HP Drum LT, HP Drum Ventline		
31	HP Steam PT		
32	Spare		
33	Chem Inj, Lowside Site Glass, Site Glass Drn Line, Highside Site Glass, Highside LP Drum Lvl, Lowside LP Drum		
34	LP Superheater Vents		
35	HP Lines to HRSG-3		

36	Lowside Site Glass, Chem Inj, HP Drum Lowside LT, Highside site glass, HP Drum Highside LT		
37	2 Tube Bundle to Sample Shack	-	
38	Bad Tube Bundle to Sample Shack	-	
39	Tube Bundle to Sample Shack	-	
40	Tube Bundle to Sample Shack	-	

HRSG4 Amp Readings

Breaker		Year	Year
1	Phosphate to LP Drum HRSG 4		
2	Phasphate to HRSG 4		
3	Phosphate to LP Drum HRSG 3		
4	Phosphate to HRSG 3		
5	O2 Scavenger to Hotwell		
6	Amine Tube Bundle		
7	Spare		
8	Spare Tube bundle in pipe rack.		
9	Spare		
10	Spare		
11	City Water, Continuous B/D, TBD Exchanger Changer		
12	LP Drain Header, Boiler Drain		
13	Demin Water to Fogger Pumps		
14	PDT-319, Suction to LP Recirc, Disch LP Recirc, LP B/D, LP Drain, Boiler Drains, LP SH Drain		
15	HP Coldfill, Flow Transmitters off of LP Steam Header		
16	HP B/D, HP Drain Line, Attemp Line to HP Steam, HP SH Drain Lines		
17	Cond't Collection Line, Fogger Pump Discharge		
18	PIT-1212, PT-312, FT-303		
19	FIT-313, FT-300, FT-305, PT-305, PIT-1114, FT-304		
20	Tube Bundle to Sample Shack		
21	Tube Bundle to Sample Shack		
22	Spare	-	
23	Spare	-	
24	Spare	-	
25	Spare	-	
26	Attemperation Valve Phase 2C, Cond't Line Htr #41	-	
27	LT-314 A/B/C, PT-314, PDt-325, LT 306 A/B/C, PT-306, PT-303, HP LT		
28	Spare	-	
29	Spare	-	

30	CBD Line @ Drum, HP High/Low Side LT, HP Drum LT, HP Drum Ventline		
31	HP Steam PT		
32	Spare		
33	Chem Inj, Lowside Site Glass, Site Glass Drn Line, Highside Site Glass, Highside LP Drum Lvl, Lowside LP Drum		
34	LP Superheater Vents		
35	HP Lines to HRSG-3		
36	FT-301, Lowside Site Glass, Chem Inj, HP Drum Lowside LT, Highside site glass, HP Drum Highside LT		
37	2 Tube Bundle to Sample Shack		
38	Bad Tube Bundle to Sample Shack		
39	Tube Bundle to Sample Shack		
40	Tube Bundle to Sample Shack		

ST6 Amp Readings

Breaker		Year	Year
1	Spare		
2	Spare		
3	Spare		
4	Spare		
5	Spare		
6	Spare		
7	Spare		
8	Spare		
9	Tube Bundle PT-653, PIT-106, PIT1726,PT-213A, PT213B, PT213C, PT-203-1, PT-203-2, PT203-3, PIT-531		
10	Vacuum Pumps A/B		
11	Hotwell LVL Gauge, LCV -601, PCV-686A/B, Pressure Release Valves, LCV-602		
12	Spare		
13	Tube Bundle PIT-511, PT218-1, PT218-2, PT218-3		
14	Aux Boiler Demin Water, LP Attemp Line to PCV-1733		
15	Condensate Line Ckt 37		
16	Condensate Line Ckt 38		
17	Curtain Valve, Pressure Release Valve		
18	Spare		
19	Spare		
20	Spare		
21	Spare		

22	Spare		
23	Spare		
24	Spare		
25	Spare		
26	Spare		
27	Spare		
28	Spare		
29	Spare		
30	Spare		
31	Spare		
32	Spare		
33	Spare		
34	Spare		

WT Amp Readings

Breaker		Year	Year
1	Spare		
2	Tube Bundle Raw Water Tank NE Side		
3	Demin Water to Raw Water Tank Recirc		
4	Aquatech Reject		
5	Aquatech Reject		
6	Spare		
7	Raw Water Pump recirc Line		
8	Water to Polishing Filters, Polishing Bed to Demin Tank		
9	Spare		
10	Tube Bundle Demin Water		
11	Demin Water Drop, Demin Water Recirc, Raw Water Pump Suction, Raw Water Drop, Raw Water to Aqua		
12	Second Pass Manual rinse from EDI, Waste Water Pond to FCA/Evap Ponds		
13	PIT-1624 Demin Water, Demin Makeup, Demin Pump Discharge, PI-1624		
14	Raw Water From Pump to Iron Filters, Drain to Sump Pump		
15	Backwash Water		
16	Caustic Suction, Backwash Water, Water from Multimedia to First Passs RO		
17	Raw Water to Aquatech, Reject Line, pass 1 RO to Pass 2 RO, Air from Airblower		
18	Second pass RO to Reject		
19	Ro Tank to EDI Suction, RO Water Tank, EDI to Polish Filter or Dmein Tank		
20	Demin Water To Pumps, LT-1611		
21	Demin Water to Tank, LT-1911		

22	Spare		

Cooling Tower Amp Readings

Breaker		Year	Year
1	Tube Bundle Silica Inhibitor Phase 1/2, Corrosion Inhibitor Phase 1/2		
2	Deleted		
3	Water Drop in Chem Bldg, Eye Wash Station Bleach Tank		
4	Deleted		
5	Spare		
6	PSL-1533 Ph 1, Wash Down Water for Chem Bldg, PI-1533A, PI-1533B		
7	PIT-724 PH1, Circ Water C Press Gauge, Circ Water B Press Gauge, Circ Water A Press Gauge		
8	Deleted		
9	Deleted		
10	Cooling Tower Safety Shower		
11	Deleted		
12	Deleted		
13	Cooling Tower B/D Ph 2, PSL-1534 PH2, PSL-784 PH2, PIT-724 PH1		
14	Cooling Tower Level Transmitter Ph 1		
15	Cooling Tower Blow Down Ph 1		
16	Spare		
17	Spare		
18	Spare		
19	Spare		
20	Spare		
21	Spare		
22	Spare		

QREC Pre-Winter Supply Checklist

Inspection Date_____ Inspector _____

Item	Qty	Location	Comments
Temporary Heat Trace			
Insulation Blankets			
Large Diameter & Pipe Insulation			
Extension Cords			
Light Tarps			
Heavy Duty Tarps			
Safety Wire for Securing Tarps			
Heavy Duty Zip Ties for Securing Tarps			
Properly Labeled Diesel Cans			
Properly Labeled Gas Cans			
Funnel (use with safety can N/A)			
Hand Held Torches			
Hand Held Propane Bottles			
Large Cylinder Propane Bottles			
Working Propane Heaters			
Working Salamanders			
Working Electric Heaters			
Working Heat Lamps			
Heat Lamp Bulbs			
Rolls of Duct Tape			
Rolls of Insulation			

Perform 1 checklist for warehouse
Perform 1 checklist each HRSG

QUAIL RUN ENERGY CENTER

Plant Freeze Protection Checklist (Perform With Temps Below 40F)

Perform Every 4-Hours

Date:_____ **Time:**_____ **Operators Initial:**_____

Shift: Night / Day (Circle One) **Ambient Temp** _____

	BLOCK #1
	Throughout walkdown, check instrumentation enclosures and heaters.
	Check entrances and walkways for ice accumulation, spread ice melt accordingly.
	HTPP 1 (East of HRSG 1) Check power indication, thermostat indication ON, panel in HAND <34F
	HTPP 2 (East of HRSG 2) Check power indication, thermostat indication ON, panel in HAND <34F
	HTPP STG5 (STG 5 building) Check power indication, thermostat indication ON, panel in HAND <34F
	HTTP BOP (East of demin skid) Check power indication, thermostat indication ON, panel in HAND <34F
	HTTP panel inside CT1 MCC
	Ensure STG5 building louvers are closed and pinned
	Ensure electric and diesel fire pump doors are closed, space heaters in AUTO with setpoint of 68F
	Ensure EDG1 block heater circuits are ON
	Ensure electric and diesel fire pump heater disconnects are ON
	Check ST 52-G building heater operation/doors closed
	Ensure cooling tower chemical building door is closed
	Ensure boiler chemical building door is closed and exhaust fan is OFF
	Ensure water plant overhead door is closed, BOTH heaters are operational and exhaust fans are OFF
	Ensure vaccum condensate pump building overhead door is closed
	Check STG5 builiding space heater operation (2) and exterior doors are closed
	Verify ST5 generator heater breaker is closed and in AUTO. (HRSG2 MCC)
	Check Unit 2 CEMS building heater operation and ensure door is closed. (T-Stat) stays in AUTO
	Check Unit 1 CEMS building heater operation and ensure door is closed. (T-Stat) stays in AUTO
	Ensure all GT1 PEECC heaters are in AUTO
	Ensure all GT2 PEECC heaters are in AUTO
	Ensure PEECC 1 room t-stat is in HEAT, fan in auto with setpoint of 68F
	Ensure PEECC 2 room t-stat is in HEAT, fan in auto with setpoint of 68F
	Ensure GT1 gas compartment heaters are in HAND
	Ensure GT2 gas compartment heaters are in HAND
	Prop open each safety shower to allow flow and attach hose to closest drain
	Blowdown air low point drains
	Ensure GT1-2 fogger skid/basin is drained, if not SEE FOGGER TAB
	Place all transformer fans in AUTO
	Blowdown air receiver low point drains on fuel gas skids of CT1 and CT2

QUAIL RUN ENERGY CENTER

Plant Freeze Protection Checklist (Perform With Temps Below 40F)

Perform Every 4-Hours

Date:_____ **Time:**_____ **Operators Initial:**_____

Shift: Night / Day (Circle One) **Ambient Temp** _____

	BLOCK #2
	Throughout walkdown, check instrumentation enclosures and heaters.
	Check entrances and walkways for ice accumulation, spread ice melt accordingly.
	HTPP 3 (East of HRSG 3) Check power indication, thermostat indication ON, panel in HAND <34F
	HTPP 4 (East of HRSG42) Check power indication, thermostat indication ON, panel in HAND <34F
	HTPP STG6 (STG 6 building) Check power indication, thermostat indication ON, panel in HAND <34F
	Ensure EDG2 water jacket heater is in AUTO
	Ensure STG building louvers are closed and pinned
	Ensure vaccum condensate pump building overhead door is closed
	Check STG builiding heater operation and exterior doors are closed
	Check ST 52-G building heater operation/doors closed
	Verify ST6 generator heater breaker is closed and in AUTO. (HRSG4 MCC)
	Check Unit 3 CEMS building heater operation and ensure door is closed. (T-Stat) stays in AUTO
	Check Unit 4 CEMS building heater operation and ensure door is closed. (T-Stat) stays in AUTO
	Ensure all GT3 PEECC heaters are in AUTO
	Ensure all GT4 PEECC heaters are in AUTO
	Ensure PEECC 3 room t-stat is in HEAT, fan in auto with setpoint of 68F
	Ensure PEECC 4 room t-stat is in HEAT, fan in auto with setpoint of 68F
	Ensure GT3 gas compartment heaters are in HAND
	Ensure GT4 gas compartment heaters are in HAND
	Prop open each safety shower to allow flow and attach hose to closest drain
	Ensure GT3-4 fogger skid/basin is drained, if not SEE FOGGER TAB
	Place all transformer fans in AUTO
	Blowdown air receiver low point drains on fuel gas skids of CT3 and CT4

QUAIL RUN ENERGY CENTER

Plant Freeze Protection Checklist (Perform With Temps Below 40F)

Perform Every 4-Hours

Date:_____ **Time:**_____ **Operators Initial:**_____

Shift: **Night / Day** (Circle One) **Ambient Temp** _____

	CONTROL ROOM
	Keep demin tank >23.5'
	Maintain minimum cooling tower blowdown
	Rotate main circulating water pumps
	Rotate cooling tower fans
	Rotate condensate pumps
	Rotate CCW pumps
	Rotate ACW pumps
	Both vacuum pumps in service
	Start offline boiler feed pumps, feed drum and close FCV periodically to cycle recirc valve
	Start aux boiler/feed and bleed hotwell (if possible) at 32F and decreasing

Comments:

Critical Transmitters

	Box Verified Closed/Secured to Grate Block 1	Box Verified Closed/Secured to Grate Block 2
HRSG1 Drum Level transmitters (HP & LP transmitters A&B)	❒	
HRSG2 Drum Level transmitters (HP & LP transmitters A&B)	❒	
HRSG3 Drum Level transmitters (HP & LP transmitters A,B,C)		❒
HRSG4 Drum Level transmitters (HP & LP transmitters A,B,C)		❒
BFP and Condensate disch psi transmitters (PIT-1114, 1164), PIT-684	❒	
BFP and Condensate disch psi transmitters (PIT-1114, 1164), PIT-684		❒
Circ water disch psi transmitters PIT-724	❒	
Circ water disch psi transmitters PIT-724		❒
Cooling tower level transmitters LT-726 A,B,C	❒	
Cooling tower level transmitters LT-726 A&B		❒
Air compressors and instrument air drain lines.	❒	
Bypass valve attemperation (HP & LP)	❒	
Bypass valve attemperation (HP & LP)		❒
Vacuum pump and seal water	❒	
Vacuum pump and seal water		❒
Hot well level transmitters LIT-652	❒	
Hot well level transmitters LIT-652		❒
Seal steam pressure and gland seal steam exhauster	❒	
Seal steam pressure and gland seal steam exhauster		❒
Block 2 spray curtain valve (XV-603)		❒
LCV 601 + 602 demin to hotwell (both blocks)	❒	
LCV 601 + 602 demin to hotwell (both blocks)		❒

Block 1 Inspection Completion Date Inspectors: _____/_____

Block 2 Inspection Completion Date Inspectors: _____/_____

Insulation

List ALL missing insulation FOCUSING on transmitters, steam drain lines and piping
Be detailed in description locations

HRSG1/GT1	HRSG2/GT2
BOP	ST5

Attach additional sheets as necessary

List ALL missing insulation FOCUSING on transmitters, steam drain lines and piping
Be detailed in description locations

HRSG3/GT3	HRSG4/GT4
BOP	ST6

Attach additional sheets as necessary

INSPECTOR(s) _____ Date_____

Air Systems

Air Compressor Wind Walls Installed	Inspector _____	Date _____
Air Dryer Yearly Maintenance PM Complete	Inspector _____	Date _____
Air Dryer "A"/"B" Dew Point Analyzer Calibrated	Inspector _____	Date _____
Air Dryer "C" Dew Point Analyzer Calibrated	Inspector _____	Date _____
Air Dryers Functioning Properly	Inspector _____	Date _____
Air Traps Functioning Properly	Inspector _____	Date _____
Air Automatic Blowdowns Functioning Properly	Inspector _____	Date _____
Air Driers Bypass Valve(s) Closed	Inspector _____	Date _____

Table Top Drill

TABLE TOP DRILL
Example Only

PROBLEM:

Date
Participants:

Reasons:

-
-
-

Corrective Actions:

-
-
-

Critical Transmitters

Verify following heat trace is working using the thermal gun.

	Block 1	Block 2
HRSG1 Drum Level transmitters (HP & LP transmitters A&B)	❒	
HRSG2 Drum Level transmitters (HP & LP transmitters A&B)	❒	
HRSG3 Drum Level transmitters (HP & LP transmitters A,B,C)		❒
HRSG4 Drum Level transmitters (HP & LP transmitters A,B,C)		❒
BFP and Condensate disch psi transmitters (PIT-1114, 1164), PIT-684	❒	
BFP and Condensate disch psi transmitters (PIT-1114, 1164), PIT-684		❒
Circ water disch psi transmitters PIT-724	❒	
Circ water disch psi transmitters PIT-724		❒
Cooling tower level transmitters LT-726 A,B,C	❒	
Cooling tower level transmitters LT-726 A&B		❒
Air compressors and instrument air drain lines.	❒	
Bypass valve attemperation (HP & LP)	❒	
Bypass valve attemperation (HP & LP)		❒
Vacuum pump and seal water	❒	
Vacuum pump and seal water		❒
Hot well level transmitters LIT-652	❒	
Hot well level transmitters LIT-652		❒
Seal steam pressure and gland seal steam exhauster	❒	
Seal steam pressure and gland seal steam exhauster		❒
Block 2 spray curtain valve (XV-603)		❒
LCV 601 + 602 demin to hotwell (both blocks)	❒	
LCV 601 + 602 demin to hotwell (both blocks)		❒
HRSG1 HP/LP temporary drum level transmitter enclosures are secured	❒	
HRSG2 HP/LP temporary drum level transmitter enclosures are secured	❒	
HRSG3 HP/LP temporary drum level transmitter enclosures are secured		❒
HRSG4 HP/LP temporary drum level transmitter enclosures are secured		❒

Block 1 Inspection Completion Date Inspectors: _____/_____

Block 2 Inspection Completion Date Inspectors: _____/_____

Lessons Learned

SEE NOTEBOOK FOR ON-GOING NOTATIONS

Appendix PEP-003-B Temporary Heater Safety

Improper use of temporary and/or portable heaters, such as Salamander heaters, can lead to serious injury or death. .

Carbon monoxide poisoning can occur if the area being heated has improper ventilation. Carbon monoxide poisoning can be identified with flu-like symptoms, such as, headaches, dizziness, and/or nausea.

Precautions when using Temporary Propane/Natural Gas/Kerosene/Diesel-fired Heaters:

- Never use the heater where flammable vapors may be present
- Never refuel the heater if it is operating and is still hot
- Keep all combustible materials away from the heater
- Maintain 8 feet of space on the outlet and 4 feet on the sides and inlet
- Never block the air inlet or outlet
- Never use duct work on the inlet or outlet
- Never handle or move the heater when it is hot
- Never transport the heater with fuel in the tank
- Heaters with thermostats may start at any time
- Locate heaters on a stable and level surface
- Only use a three-pronged grounded outlet and extension cords
- Do not expose the heater to water spray, rain, dripping water, or wind
- Unplug heaters when not in use
- The electrical components are protected by a safety fuse mounted on the PCB Board
- Never use kerosene that has been stored for a season as kerosene deteriorates over time and old kerosene will not burn properly in these heaters

Appendix PEP-003-C Cooling Tower Freeze Protection

Basics of Cooling Tower Winter Operation

A properly designed cooling tower promotes the maximum possible contact between air and water-and does so for the maximum possible time period. This design effort results in an efficiency which, although greatly appreciated in the summertime, has the capability to produce performance-degrading ice formations during winter operation. Therefore, means by which the cooling tower's efficiency can either be controlled, or can be made to work toward the management of ice formations, must be incorporated into its design, and must be properly utilized by the operator.

In addition to describing the basic concept of ice control, this appendix will describe the potential for ice formations in various types of towers and will make specific recommendations for the plant's consideration.

Types of Ice

As on any outside structure, ice can form on a cooling tower in the wintertime purely by natural effect. In addition, being both a water cooling and an air moving device, a cooling tower can promote the formation of ice by its very operation.

In either case, whether caused by nature or by the tower itself, the operator's concern for an ice formation on a cooling tower should be a reflection of both its location and its amount. Ice on exposed working platforms can be a personnel hazard, and should be corrected manually. Light random ice on the louvers, structure, and the leading edges of fill, is usually of minor concern. Ice allowed to form on fans and other mechanical equipment, not to mention the shrouds and control devices associated with that mechanical equipment, can lead to catastrophe.

Generally speaking, acceptable ice is of relatively thin cross-section which may have formed on the louvers or air intake structure of an induced draft tower. Figure 1 shows what might be considered an acceptable amount of ice having formed inside the air intake structure of a counterflow cooling tower.

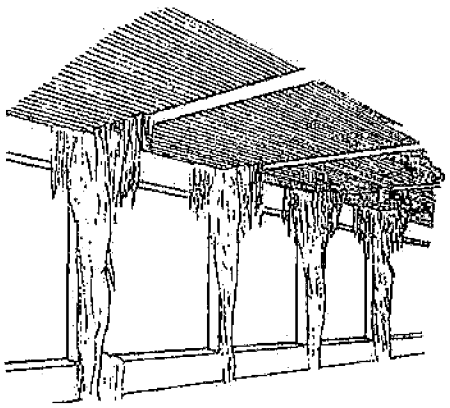


Figure 1

Figure 2 indicates a relatively light curtain of ice on the louvers of a cross flow tower. Since this amount of ice would normally have been anticipated in a cooling tower's design loading, it is customarily of little structural concern and, in some cases; its retardation of air flow through the tower achieves a result similar to the airside control procedures about to be discussed. However, although this ice may still be considered acceptable, it has proceeded to a point where measures for its limitation or removal should be undertaken.

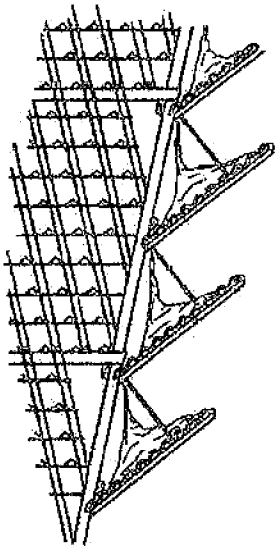


Figure 2

If allowed to grow unchecked, ice can achieve massive cross-section, encroaching upon the fill (Fig. 3) or totally blocking air flow (Fig. 4). Its weight alone can overload affected members and, when ice of such mass dislodges, it is obviously capable of doing significant damage.

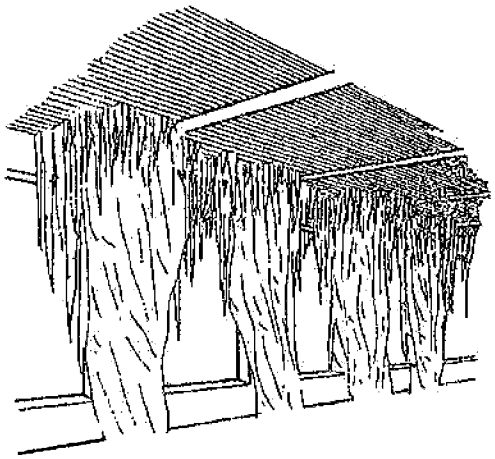


Figure 3

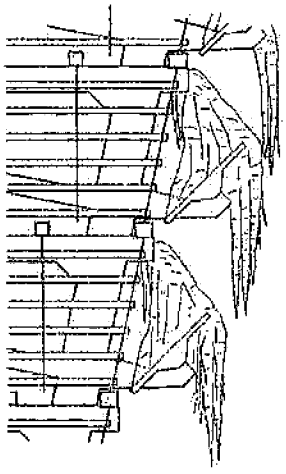


Figure 4

Potential for Ice

Although the methods of ice control vary somewhat with type of tower, and the type of fill with which it is equipped, as well as the water distribution system and mechanical equipment arrangements, they are all based upon the following points of logic:

- The potential for ice varies inversely with outside air temperatures. Once the ambient depresses to 32 °F, further reductions increase the probability of ice.

- Within design limits, the potential for ice varies inversely with the amount of water flowing over the fill. A reduced water flow rate increases the probability of ice. The potential for ice varies directly with the quantity of air flowing through the tower. Reducing the air flow retards the formation of ice.

- Where air flow is uncontrolled (as in the case of natural draft towers), the potential for ice formation varies inversely with the heat load imposed on the tower. In that case, a reduced heat load will increase the probability of ice.

- Where air flow is controlled to maintain a specific cold water temperature, the potential for ice varies directly with head load, and inversely with the selected cold water temperature. Increasing the heat load, or lowering the required cold water temperature, will increase the probability of ice.

All mechanical draft towers permit some degree of air flow manipulation for controlling ice, the extent of which depends primarily upon the number of cooling tower cells, and the speed-change characteristics of the motors. Larger towers designed to be operated in cold climates usually also include means by which to control placement of water over the fill. In mechanical draft towers, airside and waterside control arrangements can be mutually supportive. However, natural draft towers offer no reasonable opportunity for airside control and. for that reason; the methods will be discussed separately.

Airside Control of the Formation of Ice

Manipulation of the air flow is an invaluable tool, not only in the retardation of ice formation, but in the reduction or elimination of ice already formed. In addition to bringing less cold air into contact with the circulating water, reducing the entering air flow velocity alters the path of the falling water, allowing it to impinge upon-and melt-ice previously formed by random droplets which wind gusts or normal splashing may have caused to escape the protection of the relatively warm mainstream of water.

On multi-cell towers (in-line configuration) equipped with a separate plenum for each fan, individual fans may be cycled as necessary to control ice. However, it must be understood that cycling the fan on a particular cell accomplishes nothing with respect to deicing of adjacent cells. Individual cell ice control must be accomplished independently. This is because of the temperature gradients about to be discussed.

Temperature Gradients in Respect to the Formation of Ice

Understanding how to anticipate and control ice requires some knowledge of the water temperature gradients that occur in an operating cooling tower. Without such knowledge, operators often assume that controls which will automatically cycle fans to maintain a leaving cold water temperature well above freezing are sufficient insurance against the formation of ice. Occasionally, they are bewildered to find ice beginning to form even before the cold water basin temperature has depressed to that presumably "safe" level.

The reason, of course, is the aforementioned temperature gradients that occur transversely in all towers, and longitudinally in multi-cell towers where fans are cycled progressively. Figure 6 indicates the typical transverse temperature gradients in a bank of cross flow fill. In this particular case, water is entering the tower at 64.5 °F and leaving at 44.5 °F; temperatures which would seem to indicate to an operator that a 12.5 °F "safe" zone (44.5-32) exists between his operating point and freezing.

Obviously, such is not the case. As can be seen in Figure 6, the net outlet temperature of 44.5 °F results from a mixture of water temperatures varying from about 53 °F at the inboard edge of the fill to about 33 °F at the outboard edge. Consequently, the real margin of safety is only about 1 °F in this case.

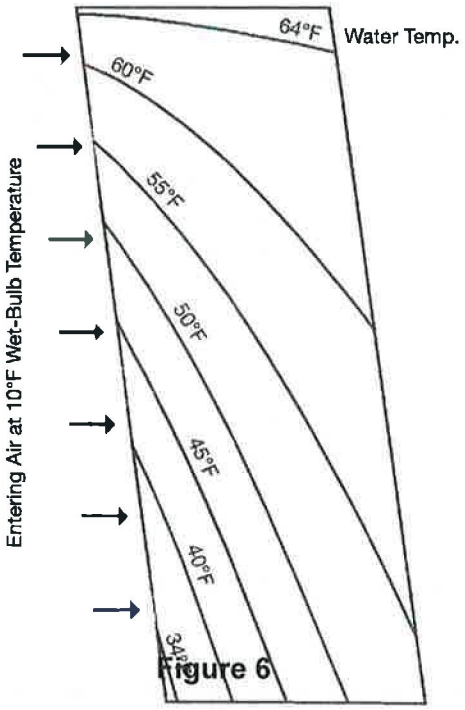


Figure 6

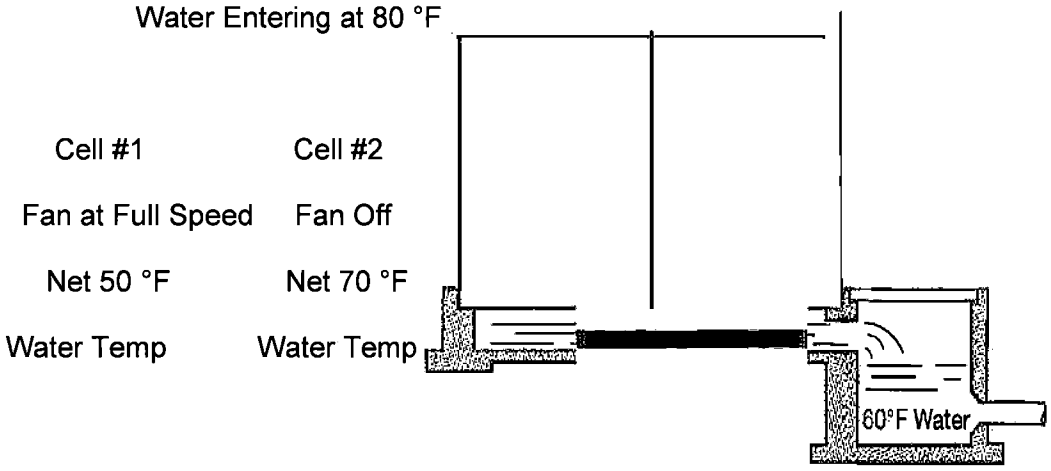
The operator must not assume from this that 44.5 °F cold water temperature is the "magic" point of control for all operating situations. Water temperatures at the coldest point of the fill are very sensitive to the range (difference between entering hot and leaving cold water temperatures through which the tower is cooling). At a given cold water temperature control point, reduced ranges (i.e. reductions in heat load at a constant water flow rate) will cause the water temperature at the coldest point of the fill to rise.

Conversely, increased ranges (i.e. reductions in water flow at a fixed heat load) will cause water temperature at the coldest point of the fill to depress.

For example, if the tower in which the (Fig. 6) fill is installed were operating at a 10 °F range (cooling the water from 54.5 °F to 44.5 °F), the entering wet-bulb temperature would be 29 °F and the water temperature at the coldest point of the fill would be about 38.5 °F. As wet-bulb temperature further reduces, measures would be taken to diminish air flow through the fill (by fan manipulation) and the coldest water in the fill would reduce only negligibly below that level.

There is also a longitudinal temperature gradient (actually, steps rather than a gradient as individual fans are manipulated) in a multi-cell tower. This is because cells with fans operating at full speed contribute much more to the tower's overall cooling effect than do cells with fans either operating at reduced speed-or off. For example, if water were entering the tower in Figure 7 at 80°F and leaving at a net 60 °F (one fan running-one off), the actual water temperature produced by cell #1 would be 50 °F and water at the coldest point of its fill would be at or near freezing.

Figure 7



Based on the premise that the operator will manipulate fans to prevent the net cold water temperature from going below 60 °F, and the winter wet bulb temperature can routinely depress to 0 °F. The solid line indicates the net water temperature sensed by the operator's thermometers or control devices; the dashed line indicates the net water temperature from the cell operating at the greatest fan speed; and the dotted line indicates the coldest water temperature in the fill.

Icing Characteristics vs. Types of Fills and Towers

The falling water pattern associated with various types of towers has much to do with both the type of ice formed and its location. Cross flow towers equipped with splash fill tend to form the louver ice depicted in Figures 2 and 4, wherein random water droplets generated by the splashing action may impinge upon the louvers and be frozen almost

instantaneously. Ice typical of Figure 2 can usually be controlled merely by reducing the fan's speed-or turning it off for a short period. The reduction in air velocity entering the louvers causes the water's pattern of fall to become vertical, and the louvers are subjected to a cascade of relatively warm water for deicing.

To the degree that such ice blocks air flow, it can oftentimes be self-limiting. Water behind a series of blocked louvers will fall vertically, and will effect a certain amount of deicing. Many wintertime operators of cross flow towers will have observed the kaleidoscopic effect of this alternate freezing and thawing.

Left to progress to the magnitude indicated in Figure 4, such ice would require that the fans be reversed (on a mechanical draft tower) for an interim of time, the extent of which must depend upon the tendency for ice to form on the fan cylinder and mechanical equipment. This reversal of air flow not only tends to inundate the louvers with warm water, but also bathes the louvers with warm exit air. In a natural draft tower, where air flow reversal is impossible, removal of such ice would require a special distribution system whereby water could be periodically diverted to deluge the louvers.

Because of a typically "contained" flow pattern, random water droplets rarely escape film-type fill, and cross flow towers so equipped tend toward little or no self-produced louver ice. In those cases, louver ice is usually the product of high winds, snow, sleet, and other natural forces.

Used in cross flow configuration, PVC film fill also tends to limit the amount of ice that it will permit to form on the fill itself. In extended tests, conducted at zero heat load in freezing weather, attempts at forming significant fill ice have met with almost no success. In these tests, thin ice would form at the leading edge of the fill, turn to slush as air flow became blocked; and shortly disappear. This was particularly true of the configurations having louvers molded integrally with the fill. Therefore, given normal control measures, these towers have proved to be quite civilized in their wintertime operation. This is especially true in the low-load, low-temperature situations encountered in "free cooling". Such towers routinely deliver 40 °F cold water at imposed ranges varying from 10 °F to less than 2 °F.

Since the fill of a counter flow tower is elevated appreciably above the cold water basin level, the generation of random water droplets produced by this free fall tends to be irrespective of the type of fill utilized. Droplets which splash in an outboard direction will freeze on the basin curb and lower structure. Wind gusts cause falling water to momentarily encounter, and freeze upon, the intermediate structure (or louvers, if so equipped). Also, water which normally encounters the inside of the casing can continue down the inboard side of the exposed structure, where it becomes subject to freezing. The combination of these effects initially results in the formations typified by Figure 1.

Given no concern (and a sufficiently low ambient), the formations will tend to grow toward that depicted in Figure 3, particularly where the normal fill temperature gradient results in water near freezing at the fill's coldest point.

Deicing measures for counter flow towers are similar to those utilized for cross flow towers, but tend to be somewhat less effective. The normally vertical sides of a counter flow tower place air inlet areas beyond the reach of the falling water pattern with fans off. That operating mode, therefore, usually removes only that ice which has begun to encroach inward from the air inlets. Because of a counter flow tower's structural nature, however, this limited deicing capability may prove to be enough in most cases. Peripheral ice of concern can be removed by fan reversal, but acceptable results may require several attempts. This is because air flow reversal can bring only a relatively minimal amount of warm water to bear on the ice. Therefore, warm air must accomplish most of the work, which slows down the process considerably. The number of attempts necessary, of course, depends on the tendency for icing of the mechanical equipment during backward air flow.

Many operators are reluctant to reverse fans on a counter flow tower because of the small amount of water caused to escape the air inlets by the outward flow of air. This may produce sufficient ice in the immediate region of the tower to be considered hazardous, requiring separate measures for its control.

Although fewer icing tests have been run on film fill for counter flow towers, there is every reason to believe its response will be similar to that encountered in cross flow towers. Fill icing is expected to be relatively little, with a tendency toward self-limitation.

Waterside Control

Larger towers designed for operation in freezing weather should be equipped with a water distribution system which can be manipulated to place the greatest concentration of flowing water nearest the air intakes of the tower. This applies particularly to natural draft towers, where no means of airside control is available. Not only does this give the most difficult cooling job to the coldest air, but it also assures a rapid rise in air temperature to preclude freezing on the fill. Most importantly, it places the maximum amount of relatively warm flowing water in close proximity to the areas of greatest ice concern.

To provide for start-up and operating flexibility, provision for total water bypass directly into the cold water basin is advisable on mechanical draft towers, and should be considered mandatory on natural draft towers. During cold weather start-up, the basin water inventory may be at a temperature very near freezing, at which time the total water flow should be directed back into the cold water basin upon return from the process load, without going over the fill. This bypass mode should be continued until the total water inventory reaches an acceptable temperature level (usually about 80 °F), at which time the bypass may be closed to cause total flow over the fill.

Even during operation, combinations of low load, low ambient, and high winds can promote ice formations despite normal! Airside and waterside control procedures. In those cases, it may intermittently become necessary to divert to total bypass flow to build heat content in the circulating water. Modulation of the bypass whereby a portion of the water flow is allowed to continue over the fill, must not be permitted on a natural draft tower, and its utilization on mechanical draft towers should be discouraged.

Where reduced flow rates cannot be avoided, either by pump manipulation or through bypass modulation, cross flow towers can be provided with a longitudinal dam in the hot water basins to concentrate water outboard on the fill. The height and location of this dam would be based upon a predetermined minimum allowable water flow rate. At increased flow rates, the dam would become submerged, allowing water access to the inboard areas of the fill.

Note, that the space occupied by fill angles inward on the tower from top to bottom. During full fan operat1on, water passing over the fill will tend to fall at that angle due to the velocity of the horizontal flow of air with which it is in contact. When the fan is slowed, or brought to a stop, the incoming air velocity reduces significantly and the water attempts to fall vertically. In doing so, the water impinges upon the louvers, cascading successively downward to the cooling tower basin. Except in the most severe situations, this cascade of warm water is usually sufficient to accomplish deicing.

In situations of extreme cold weather and/or a very light heat load, it, may become necessary to reverse the direction of fan rotation. {This is easily accomplished on a three-phase motor by switching two of the three leads.) In this mode of operation, air flows downward through the fan- picks up heat passing through the fill-and exits through the louvers. This reverse passage of air shifts the falling water pattern outward causing an increased cascade down the louvers. The combination of warm water and warm air, of course, effects complete deicing.

Fan reversal should be limited to a time period of no more than 1 or 2 minutes to preclude excessive icing of the fan. Unless an inordinate buildup of ice has been allowed to accumulate, this is usually more than sufficient time to accomplish louver deicing. Monitoring is required to determine the time required to melt accumulated ice. Also, to prevent possible damage to the fan, drive train, and electrical system, an interval of no less than two minutes should exist between the instant that the motor is de-energized and the time it is restarted in the opposite direction. This allows the fan time to lose rotational momentum.

To those of you who may be unfamiliar with "recirculation; it is the reintroduction of a portion of the saturated leaving air stream back into the relatively dry entering air stream. In summertime, such a situation causes an undesirable elevation in cold water temperature by increasing the wet- bulb temperature of the air entering the tower. In wintertime, the artificially- increased moisture content of the entering air quickly condenses and freezes on the tower's coldest point-the air intake (fan} area.

Obviously, in any given wind condition, recirculation is a function of the relative velocities of the air entering and leaving the tower. Where the exiting air velocity exceeds entering velocity, the tower's tendency to recirculate is reduced. Conversely, higher entering velocities produce a localized zone of low pressure into which recirculation is induced.

In the typical induced draft, propeller fan tower, the average exit velocity is approximately 1900 ft/min, compared to an entering velocity of 685 ft/min. This positive ratio exceeding 2.5/1 minimizes the potential for recirculation. This negative ratio

exceeding 3/1 virtually assures some recirculation of saturated air back into the fan intakes.

An adverse wind condition compounds the problem. A wind velocity as little as 7.5 mph (660 ft/min} will deflect the exit plume an amount sufficient to insure entrapment within the negative pressure zone created by the fan's high entering velocity.

NAES	PLANT EMERGENCY PLANS	
Number: **PEP-004**	Subject: **Hot Weather Plan**	
Approved for use by:	Current Issue: **Rev 4**	Issue Date: **30 November 2022**

TABLE OF CONTENTS

APPENDICES

Latest Revision Approval:

Written By: NAES Corp Date: December 19, 2014

Approved By: Andy Duncan Date: August 18, 2022

REVISION HISTORY LOG				
Rev.	**Date**	**Description**	**By Initials**	**Approval Initials**
-	12/19/14	Initial Release		
1	03/09/15	Quail Run Addition		
2	03/31/22	Review vs updated TAC 25.53 requirements	ECN	AD
3	08/18/22	Revision to add section 10 for Hot Weather Emergency Response in the ERCOT region	ECN	AD
4	11/30/2022	Moved Hot Weather Emergency Response section to PEP-007 Severe Weather Events to align with location of Cold Weather Emergency Response.	ECN	AD

1. INTRODUCTION

This Plant Emergency Plan shall be followed by NAES Plant personnel to prepare for and respond to high ambient temperatures – Summer Readiness and Hot Weather Emergency Response. Only the most recently approved revision of this document shall be used and previous versions shall be destroyed to prevent confusion.

Recognizing that proper preparation and planning are essential to ensure reliability during extreme weather conditions, NAES has established the following Hot Weather Plan to address Power Plant Weatherization and Emergency Response

Note: Following items apply only to facilities in Texas:

The facility has received advanced notification that Texas Administrative Code (TAC), Substantive Rules Chapter 25, Subchapter C, Article 25.55 is being modified to include summer readiness requirements.

ERCOT Nodal Protocol 3.21(2) requires each Resource Entity to provide a current weatherization plan for each Generation Resource. The weatherization plan must include a description of the Generation Resource's ability to withstand extreme heat or cold weather, a description of materials and devices used to ensure operation during extreme weather, and practices and procedures undertaken in preparation for winter and summer.

The Texas Administrative Code (TAC), Substantive Rules Chapter 25, Subchapter , Article 25.53 requires electric utilities and power generation companies to prepare and file an emergency operations plan. As part of the Emergency Operating Plan, TAC 25.53 (e)(2)(A) requires that there is a weather emergency annex that includes: operational plans for responding to a cold or hot weather emergency distinct from the weather preparations required under TAC 25.55.

2. PURPOSE

The Hot Weather Plan is a plan to guide activities required to prepare for summer weather conditions and also satisfies the requirements of several outside agencies. The focus is on maintaining facility reliability and preventing hot weather related outages.

Additionally, Section 10 of this procedure is utilized to respond to Hot Weather Emergencies as required by TAC 25.53 (e)(2)(A)

3. OBJECTIVE

It is the responsibility and policy of NAES personnel to develop and implement a robust Hot Weather Plan to maintain the readiness and reliability of each facility during extreme hot weather and hot weather emergencies. This plan should be reviewed periodically to incorporate industry best practices and lessons learned for continuous improvement.

4. REFERENCE POLICIES

Texas Administrative Code §25.53 Electric Service Emergency Operating Plans

Texas Administrative Code §25.55 Weather Emergency Preparedness

ERCOT Nodal Protocols Section 3: Management of Activities for the ERCOT System 3.21

5. SUMMER READINESS POLICIES

The purpose of this plan is to provide guidelines on how to prepare for, and prevent, summer season operating problems caused by extreme hot weather. Summer Readiness procedures will be executed annually. Plant personnel shall prepare equipment to reduce the possibility of operating restriction or damage and to minimize the risk of forced outages or forced curtailment.

Operation and maintenance personnel will use checklist forms, maintained in Appendixes of this procedure, to ensure the plant is ready for summer operations. Some of the major areas include:

- Inspect and verify building HVAC and ventilation fans are functioning properly. This includes CEMS shacks, electrical buildings, Steam Turbine Buildings, CT enclosures, and the admin building.
- Inspect DCS control cabinets cooling / ventilation fans for proper operation.
- Verify plant heat exchangers operating properly and any required cleaning / maintenance is performed prior to Summer Readiness Declaration.
- Identify any temporary cooling requirements that may be required
- Monitor oil coolers for proper operation.
- Identify and obtain any supplies needed to maintain summer readiness
- Identify and track to completion any maintenance activities required to maintain summer readiness

6. ANNUAL REVIEW

An annual review should be scheduled prior to March 15th of each year to coincide with the EOP reporting requirements by the PUC and ERCOT. During the annual review the Hot Weather Plan will be reviewed and updated as necessary this will kick off the preparedness planning for summer weather. The annual review meeting should include the following activities:

1. Review lessons learned from previous summer operation.

2. Review best practices available from NERC, ERCOT and other resources.

3. Review HVAC and cooling protection systems (HVAC PMs in place, contractor scheduled, WOs complete prior to summer)

4. Identify additional summer weather supplies that may be needed along with any changes to staffing requirements.

5. Review and update equipment/system checklists and/or operating procedures.

6. Identify action items, work orders, and responsibility for preparing for and updating the Hot Weather Plan.

7. Annually update and distribute copies of the Hot Weather Plan to plant Operations personnel.

7. HOT WEATHER PLAN MANAGEMENT STAFFING PROCEDURES

During periods of severe weather, attempts should be made to minimize personnel risk. Additionally, we want to ensure the appropriate personnel are on hand to help the facility survive the severe weather event.

- The operations call-out list will be utilized as necessary during severe weather events. This consists of the personnel that are not actively on-shift and not scheduled to relieve on the following shift.

- Maintenance department assigns 1 mechanical-maintenance technician and 1 instrumentation-control-electrical (IC&E) technician on call at all times on a weekly rotational basis. A secondary person is assigned as backup in the event the primary person for that week cannot be reached.

8. SUMMER READINESS ANNUAL IMPLEMENTATION

ERCOT Nodal protocols required that Summer Readiness be declared no earlier than May 1 and no later than June 1 of each year. Summer readiness preparations typically begin during the Spring Outage to ensure all required preventative and correct maintenance activities are complete prior to the summer readiness deadline.

NOTE: The Hot Weather checklists, prepared prior to the facility's first summer, and maintained as Appendixes of this plan, will be used to verify readiness of equipment and systems that may cause generation outage or curtailment resulting from extreme hot weather. The Hot Weather checklists will verify operation of equipment and systems when extreme hot weather advisories are issued.

Activities that should be conducted during this annual implementation are:

1. PEP-004-APPENDIX-A Summer Readiness Checklist should be implemented during the Spring Outage and completed no later than May 1 of each year.

2. Communicate Hot Weather Plan responsibilities to appropriate personnel by May 1st.

3. Provide training to staff responsible for implementation of the Hot Weather Plan by the end of May.

4. Establish staff responsibilities to monitor weather and weather alerts.

5. Control Room Operator will discuss the weather forecast at the beginning of each shift during shift turnover to keep all personnel alerted to possible adverse weather conditions.

6. Communicate and implement summer weather advisories and any OCNs communicated by ERCOT.

    a. Note in shift logs that a summer weather advisory or OCN has been implemented

    b. Note in shift logs when the summer weather advisory is released.

7. Update the emergency call out List.

The Operations manager shall coordinate all activities within this procedure, and determine the actions needed to bring the site to summer readiness by performing the actions listed below:

1. Schedule/Track to completion the actions of PEP-004-APPENDIX A Summer Readiness Checklist

2. Ensure system reviews have been completed and identified deficiencies are incorporated into the Maximo work management system.

3. Coordinate with the site EH&S Manager to verify the site environmental discharge equipment is ready for summer operation.

4. Conduct a summer post run critique meeting by October 31st. Provide lessons learned to be incorporated into future summer operational periods.

5. Monitor critical equipment performance during the summer readiness period. Implement a corrective action plan for any identified issues.

6. Report known critical equipment deficiencies to the Plant Manager for risk assessment.

9. SEASONAL END OF HOT WEATHER PLAN

A. Communicate end of Hot Weather Plan implementation to facility personnel.

B. Document lessons learned/best practices and close out PEP-APP-A Summer Readiness Checklist

PEP- 004-APPENDIX-A Summer Readiness Checklist			
Item No.	**Responsibility**	**Item Description**	**Complete / Date / Notes**
1	OPS Manager / Maintenance Manager	Evaluate lessons learned from previous summer runs to determine any conditions that need to be fixed/improved prior to summer readiness declaration. Enter in APPENDIX PEP- 004-D Seasonal Readiness Work Order Tracking	
2	OPS Manager / Maintenance Manager	Review Maximo and identify all work orders that must be complete prior to summer readiness declaration. Verify all work identified as a prerequisite to Summer Readiness has been properly coded and incorporated into the site work schedule for completion prior to June 1 or intended summer readiness declaration deadline. Enter any required WOs to be complete by Summer Readiness Declaration into APPENDIX PEP- 004-D Seasonal Readiness Work Order Tracking	
3	OPS Manager / Maintenance Manager	Ensure combined cycle unit tuning is completed for summer operation	
5	OPS Manager / Maintenance Manager	Complete PEP- 004-APPENDIX-E – Hot Weather Preparedness Supplies checklist prior to summer declaration. Enter any additional identified required spares on APP-E.	
6	Engineering / Environmental	Complete CEMS Readiness Review for Summer. (RATA testing typically scheduled post outage prior to Summer Readiness Declaration)	
7	Maintenance Manager	Evaluate maintenance schedules for protective relays should be evaluated to ensure calibrations due before September 1st is performed prior to the summer readiness period begins.	
8	Maintenance Manager	Evaluate site preventive maintenance tasks and any scheduled special tests. Move any risks to reliability out of the summer operational period	
9	Environmental	Validate if any environmental testing is required during the summer months and is scheduled. Notify OPS and Maintenance Manager and evaluate if testing could be rescheduled.	
11	OPS Manager / Maintenance Manager	Assign and complete PEP-004-APPENDIX B - SUMMER READINESS EQUIPMENT-CHECKLIST	
12	Maintenance Manager	Complete / verify up to date all applicable PMs listed in PEP-004-APPENDIX C – Hot Weather PM list	

PEP- 004-APPENDIX-A Summer Readiness Checklist			
Item No.	**Responsibility**	**Item Description**	**Complete / Date / Notes**
13	OPS Manager	Review forced outage history and the previous summer's operations lessons learned and incorporated into procedures / planning as necessary	
14	OPS Manager / Maintenance Manager	Ensure all actions required from the previous steps complete. Track all contingency actions in Action Tracking or CMMS. Verify Required WOs in APPENDIX PEP- 004-D Seasonal Readiness Work Order Tracking complete	
15	**OPS Manager**	**Complete the Summer Declaration readiness and submit to Asset management prior to June 1st.**	
16	All	Track all Summer Readiness issues and have Lessons Learned for end of the season	
17	OPS Manager	When seasonal conditions warrant, then secure the site from the summer operational line-ups and configuration using site specific procedures and/or checklists	
18	OPS Manager	Hold Summer Readiness Critique	
19	OPS Manager / Maintenance Manager	Identify and budget items needed for next year's seasonal readiness in the site budget.	

PEP- 004-APPENDIX-B -SUMMER READINESS EQUIPMENT-CHECKLIST

NOTE : For any exceptions to any step below, document the details in Action Tracking or create a Service Request to track any open items

___ Verify the CT Fogger systems are available for summer operation. Inspect pumps, controls, filters, belts, and motors. Verify any needed spare parts and oil are available as needed.

___ Verify the Water Treatment system is available for service. Check the status of RO membranes to ensure new membranes are not expected to be needed during the summer months. Verify Water Treatment plant equipment including MMF's , RO's, cartridge filters, pumps, & chemical systems are available for use with sufficient spares to support the summer operational period.

___ Verify Switchyard & all electrical building ventilation checks have been completed and known deficiencies have been corrected prior to the start of the summer season. (Switchyard PDCs 1 &2, Primary Buildings 1&2, CT 1-4 PEECCs, Common Services Building, Cooling Tower PDCs 1&2, CEMS Shacks 1-4, Admin Building)

___ Switchyard and electrical area rodent & weed control measures have been recently performed.

___ Thermography has been completed within the last 12 months on critical plant equipment prior to the start of the summer season.

___ CEMS RATA testing has been completed/scheduled prior to the summer operational period.

___ CEMS equipment is ready for summer operations.

___ A review of active temporary alterations or Operator workarounds affecting critical equipment has been performed.

___ A review of work orders has been completed identifying electrical building areas & breaker enclosures that exhibit signs of environment exposure and track these to completion.

___ HRSG Duct Burners have been tested for operation. Sufficient spare parts exist to support expedient repairs if needed.

___ Closed Cooling Water Heat Exchangers for both Power Blocks have been cleaned prior to the start of the summer period.

___ Verify Wall Panels around Plant Air Compressors removed

___ Identify and budget items needed for next year's seasonal readiness in the site budget.

___ Conduct a least one Summer Readiness review with plant personnel at their monthly safety meeting to discuss the importance of maintaining equipment availability and severe weather actions needed to safeguard equipment.

APPENDIX PEP- 004-C Summer Readiness PM List

Summer Seasonal Readiness PM List

PM Work	Description
Transformer PM	Take transformer oil samples
Switchyard Insulator PM	Perform inspection of switchyard insulators for evidence of tracking and grounding
Battery Chargers PM	Check OEM recommended maintenance schedule
Inverters PM	Check OEM recommended maintenance schedule
CTs PM	Inspection for burnt wiring and insulation breakdown
PTs PM	Inspection for burnt wiring and insulation breakdown
HVAC Systems	Anthony Mechanical performing quarterly inspections/PMs and repair as needed
Inspect fogger spray patterns	Inspect spray pattern, identify and replace necessary nozzles
Verify proper operation of inlet fogging systems	Check belts, change oil, etc.
Condensate Pumps/Motors	Lubrication PM
Boiler Feed Pumps/Motors	Lubrication PM
Circ Pumps/Motors	Lubrication PM
ACW Pumps/Motors	Lubrication PM
CCW Pumps/Motors	Lubrication PM
GT starting Motors	Lubrication PM
Demin Pumps/Motors	Lubrication PM
RO1 1st pass booster pump/Motors	Lubrication PM
RO1 2nd pass booster pump/Motors	Lubrication PM
RO2 1st pass booster pump/Motors	Lubrication PM
RO2 2nd pass booster pump/Motors	Lubrication PM
Multi-media Filer Feed Pumps/Motors	Lubrication PM
ACW/CCW plate and frame exchangers	Pull and clean basket strainers prior to summer season. Clean plates during outage.
Vacuum pump plate and frame exchangers	Back flush prior to summer season and clean plates during outage
O&M Tech round evaluation	Evaluate and add additional support for summer periods if needed
Winterizing supplies and structures	Tear down winterizing buildings and store supplies. Conduct inventory on response kit
Building exhaust fans	Visual and lubrication PM on building exhaust fans
Turbine fuel gas flow meters	Yearly calibration and inspection
Duct burner fuel gas flow meters	Yearly calibration and inspection
Evaporation ponds "A" and "B"	Monthly visual liner inspection PM
Retention pond "C"	Monthly visual liner inspection PM
Retention pond "C" transfer pumps	Lubrication and visual Inspection PM
Forced evaporators	Yearly lubrication and cleaning PM
Thermostats and heat tracing	Summer preparedness thermostat inspection and temperature setting (heat to cool)
Turbine compartment vent fans	Lubrication PM
Exhaust frame blowers	Lubrication PM
Scanner air blowers	Lubrication PM
Block 1 cooling tower fan motors A-F	Lubrication PM
Block 2 cooling tower fan motors A-F	Lubrication PM
Bulk chemical supplier	Touch base with supplier representative prior to summer season to ensure reliability

APPENDIX PEP- 004-C Summer Readiness PM List	
Summer Seasonal Readiness PM List	
PM Work	**Description**
CEMS PM	Weekly/Monthly/Quarterly PMs
Seasonal tuning	Evaluate and tune combustion turbines for summer parameters
Battery capacity test	Complete battery capacity tests
Dilution air blowers	Lubrication PM

APPENDIX PEP-004-D Seasonal Readiness Work Order Tracking								
Seasonal Readiness Work Orders								
Work Order	**Description**	**Location**	**Status**	**Crew**	**Outage Code**	**Priority**	**Parts Available**	**Site**

PEP- 004-APPENDIX-E – Hot Weather Preparedness Supplies

APPENDIX PEP- 004-E Hot Weather Preparedness Supplies				
Item	**Min Quantity**	**Quantity Available**	**Quantity on Order**	**Notes/Location:**
Spare Wall AC Units	2			
Spare floor portable AC Units*	1			
Large Portable Fans (36 in)**	2			
Spare Extension Cords (50+ ft)	4			warehouse
Spare RO membranes	1 set or on order			
Spare demin bottles	2 or on order			
Other spares needed : (list below)				

Notes:
* staged in switchyard building
** 1 staged in field near air compressors during summer months
For other spares, evaluate current plant and weather conditions and add to the list as needed.

NAES	PLANT EMERGENCY PLANS	
Number: **PEP-006**	Subject: **Emergency Water Shortage**	
Approved for use by:	Current Issue: **Rev 2**	Issue Date: **March 31, 2022**
Prepared by NAES Corporation		

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