HVAC and Compressed Air Systems Hurricane Plan

PURPOSE

This document establishes procedures for securing and restoration of Kennedy Space Center (KSC) HVAC plants and associated facility equipment in support of hurricane conditions for:

Industrial Area Chiller Plant (IACP)
Utility Annex (UA)
Other Processing facilities

SCOPE AND APPLICABILITY

It is the policy of the Base Operations Support & Services (BOSS) contract to protect personnel, facilities, systems, equipment, and work areas falling under their responsibility are adequately covered regarding hurricane preparedness measures. This Procedure is to ensure the safeguarding and protection of the collateral equipment and personnel in the event of an approaching hurricane. The intent is to minimize permanent damage in the event of wind and water intrusion due to structural damage and facilitate rapid systems recovery.

This document supports KNPR 8715.2, Comprehensive Emergency Management Plan, EMP-P-0001 and Hurricane Preparations and Ride-Out,.

The Atlantic Hurricane season begins June 1, and runs through November 30 each year. Preparations should begin in May for the upcoming season.

PROCESS

1. HURRICANE PREPARATIONS

Refer to EMP-P-0001 for Hurricane Conditions and Categories.

Prior to hurricane season, organizational elements are required to accomplish pre-determined tasks. The BOSS Tech Ops Manager shall delegate personnel to implement and be responsible for complying with this procedure; and assure that the DAC attend Hurricane Coordinator Training as requested by the Kennedy Space Center (KSC) Emergency Operations Center (EOC).

The HVAC and Compressed Air Systems (HV/AI) Department shall accomplish items specific to their organization prior to the start of hurricane season. Pre-hurricane mitigation efforts are important to overall readiness efforts. Those efforts shall be documented as described in this document.

2. PREPARATIONS

The following preparations should be started prior to hurricane season to ensure all policies and personnel are updated for the upcoming hurricane season.

- ✓ SE to review current hurricane procedures to verify up to date versus NASA and Emergency Management policies
- ✓ The BOSS Tech Ops Manager shall appoint a Department Action Coordinator (DAC) for each Department to handle all hurricane planning activities for the Department.
- ✓ The BOSS Tech Ops Manager shall request of each department the names of those who are selected for the Damage Assessment and Recovery Team.
- ✓ Supervisors to review Hurricane supplies to verify current stock is appropriate and available for use for both Ride out crew and DART members.
- ✓ Employees will not be released from duty during evacuation at HURCON II until directed by the Management Action team (MAT) and confirmed by their immediate supervisor before departing to ensure complete accountability.

3. HURRICANE ACTIONS

3.1. Hurcon IV (50-knot/58 MPH winds within *72 hours)*

Departmental personnel will be notified and report for their normally assigned duties but will be available for duties in connection with hurricane preparations. Respond to the Hurricane Operations Plan in conjunction with this emergency plan.

Preliminary tag-up:

The Tech Ops Manager shall hold a tag up meeting with shop supervisors and SE leads to discuss the following:

- ✓ Ride-Out Team (ROT) membership.
- ✓ DART membership
- ✓ Department Action Coordinator (DAC)

Discuss implementation of Hurricane plans for the following systems:

- ✓ Facility walk downs to secure Foreign Object Debris (FOD).
- ✓ Portable Chiller placement plans.
- ✓ Backup generator needs
- ✓ Console/Plant operations.
- ✓ In-work projects that may need to be secured.
- ✓ Radio net or cell phone call in to verify completion of preparations to C-2 console for recording in System Electronic Tie-In (SETI).

Return to work discussion

- ✓ KSC “Return To Work” Access protocol
- ✓ Hotline phone #s 861-7900 (Local) or 1-866-572-4877) (NASA Toll Free)
- ✓

Actions:
Department Action Coordinator – DAC actions

3.1.1 HV/AI Shop supervisor shall start an HVAC HURCON log book and maintain it throughout the hurricane event. The document shall contain the records of all activities performed during preparation, during and after the hurricane has passed. This document is for all personnel to record items of importance. This will assist management in future hurricane planning.

3.1.2 Notify all Department personnel

3.1.3 Initiate recall of essential personnel

3.1.4 Solicit volunteers for Ride-Out Team (ROT) and maintain essential personnel Forward list to DHC

3.1.5 Brief all Department personnel on return to work hotlines - 861-7900 (Local) or 1-866-572-4877 (NASA Toll Free).

3.1.6 Shop supervisors to designate Damage Assessment and Recovery Team (DART) members to be recalled for recovery and assessment efforts post HURCON conditions.

3.1.7 Systems Engineering Management to designate DART members to be recalled for recovery and assessment efforts post HURCON conditions.

Note: SE support will be assigned to shop hurricane recovery efforts first and then to Damage Assessment teams later as set up by BOSS DART Management Action Team (MAT) per EMP-P-0003. The decision as to who will support which effort will be decided by the HV/AI Management Team. Those not required for recovery effort will be assigned to Damage Assessment and report

to the Response and Recovery Team Coordinator (RTC) per EMP-P-0003 for assignment of areas to assess.

3.1.8 Ensure recovery forces have emergency supplies such as flashlights, critical tools and equipment to perform preparatory and recovery tasking.

Shop Actions:

All Building occupants through site management are responsible for securing or disposing of equipment or debris capable of become flying debris. Site Managers for the following areas to initiate walkdowns to secure loose materials or equipment that could become projectiles in hurricane strength wind in the proximity of the plants and the associated cooling towers. Conduct a general clean-up/inspection around plants and ensure trailers/portables/manufactured buildings are anchored.

Utility Annex area	K6-0947
IACP area	M7-0407
IOZ SE Mechanical Rm area	M7-0355
HVAC Utility shop building	K6-1246

3.1.9 Request sand bag as needed to secure objects or secure doors.

3.1.10 Secure loose objects and equipment located within the plants.

3.1.11 At the discretion of the Hurricane Coordinator and/or Generator Line Coordinator, all portable generators and portable fuel tanks for the generators can be fueled and set in place at the plants requiring them.

3.1.12 Supervisor prepare CCC HVAC procedure binder with following in it

EMP-P-0001	ISC Hurricane Operations Plan
UTI-P-2008	Refrigerant Plant, Utility Annex, Launch Complex 39
UTI-I-0006	KSC chiller Plant Daily Routine Duties Instructions
HV0P001N	SSPF Portable Chillers Parallel Operation
HV0P002N	SSPF Portable Chillers Stand Alone
FAM-REF-001	HVAC UA Storm Shutdown Plan
UTI-P-2013	Heat Plant, Utility Annex, LC 39, KSC
UTI-P-2017	Industrial Area Chiller Plant Operations Procedure
HURCON Log sheets	For recording hurricane activities
FAM-I-0001	HVAC and Compressed Air Systems Hurricane Plan
ROT and DART list	Current member list
FAM-REF-0001	HVAC UA Storm Shutdown Plan

Table 1: HURCON Binder contents

3.1.13 Request all necessary hurricane supplies from occupant supply areas (tarps, rope, tape, visqueen, garbage bags, batteries, etc.).

3.1.14 Prepare all vehicles for fueling, evacuation, and parking. Provide the various Recovery Teams with appropriate badging and placards.

3.1.15 Perform soft start on a UA chiller.

3.1.16 Shop supervisor shall ensure each HVAC ROT member can log in to the IOZ IEMS.

3.1.17 Shop supervisor shall ensure each HVAC ROT member can log in to the Science Annex.

3.1.18 Shop supervisor shall ensure each HVAC ROT member can log in to KDC.

3.1.19 SE / Supervisor, verify UA can be configured per UTI-P-2008. If plant conditions do not allow, generate use FAM-REF-0001 to secure operations.

3.1.20

3.1.21 SE / Supervisor, verify IACP can be configured per UTI-I-0006. If plant conditions do not allow, generate DMSO to cover.

3.1.22 Shop supervisor shall verify SSPF backup air compressor is operational.

3.1.23 Back up any crucial files.

3.1.24 Place and connect all portable chillers or other equipment requested for hurricane support.

3.1.25 Request Roads and Grounds secure all temporary chillers or other equipment installed for hurricane support.

3.1.26 Notify Division Hurricane Coordinator (DHC) via the DAC after all HURCON IV actions are completed.

SE Actions:

3.1.27 SE shall verify ROT members have proper computer workstation access

3.1.28 SE shall verify KCCS connectivity IACP

3.1.29 SE shall conduct Andover training at the CCC with HVAC ROT members. Ensure each individual can log into Andover and manipulate AHU-56 at the SSPF. Field verify equipment changed state.

4. HURCON III ACTIONS (50-KNOT/58 MPH WINDS WITHIN *48 HOURS)*

HURCON III is the phase when most preparation activities shall be completed and evacuation of non-essential personnel may be directed. KSC shall initiate hurricane securing (i.e., safeguarding) of facilities, property, and equipment when HURCON III is announced. The HVAC Shop supervisor or DAC shall provide updated lists of their ROT to the DHC including name, functional area, work phone, and home phone number of each member. ROT members will assemble and be briefed at the KSC Auditorium. Any equipment, vehicle, or manpower shortages will be reported immediately to the DHC.

4.1 Actions:

4.1.1. Continue work on any HURCON IV work not yet completed

4.1.2. The DAC provides status reports as required to the DHC.

4.1.3. Validate ROT member names and send update to DHC.

4.1.4. Relocate pre-designated vehicles as directed.

4.1.5. Issue hurricane supplies (plastic bags, sheeting, tape, etc.) to employees. Obtain batteries for flashlights and ensure that an adequate number of flashlights are available in case of power outages.

4.1.6. Back up computer hard drives as necessary.

4.1.7. Power down computers and electronic equipment.

4.1.8. Cover electronic equipment with plastic.

4.1.9. Where practical, raise equipment at least sixteen (16) inches off the ground.

4.1.10. Disconnect all unnecessary electrical equipment and turn off unnecessary lighting.

4.1.11. Secure facility doors prior to HURCON II with sandbags as needed.

4.1.12. Start and place on-line portable chillers per FAM-REF-0001.

4.1.13. Keep the DAC and/or the DHC informed every 2 hours.

4.1.14. IACP--- If approved by SSPF site manager, initiate the starting of the SSPF (Space Station Processing Facility) Back up chillers operating in Parallel per Job Plan HVOP001N and WON.

4.1.15. UA--- Configure Plant for possibility of operation off the Emergency Power Plant during a total FPL power loss as per UTI-P-2008, Appendix B.

4.1.16. Conduct training at the CCC with any HVAC ROT members that were not on the May ROT list.

4.1.17. Ensure each HVAC ROT member can log in to Andover.

4.1.18. Ensure each HVAC ROT member can log in to the IOZ Johnson Metasys.

4.1.19. Ensure each HVAC ROT member can log in to the Science Annex.

4.1.20. Ensure each HVAC ROT member can log in to KDC.

4.1.21. Notify DHC via DAC after all HURCON III and IV actions are completed.

5. HURCON II (50-KNOT/58 MPH WINDS WITHIN *24 HOURS)*

HURCON II is the phase when all securing actions shall be completed or terminated. The remainder of KSC and contractor personnel shall be released effective at HURCON II when directed by the CD through the NASA Emergency Management Officer (NEMO).
Ensure all for HURCON IV and III actions are complete.

Actions:

5.1.1. Ensure all for HURCON IV and III actions are complete.

5.1.2. Configure back up chillers at the SSPF for standalone operations per Job Plan HVOP002A and WON.

5.1.3. If securing UA due to hurricane then, Secure Utility Annex per FAM-REF-0001.

5.1.4. Station two HVAC GSA vehicles at the LCC or other as directed by management.

5.1.5. Secure Utility Annex gas-fired Boilers per UTI-P-2013

5.1.6. If evacuating the IACP then configure plant per UTI-P-2017 and perform remote operations from the CCC.

5.1.7. If evacuating the UA then configure plant per UTI-P-2008 Appendix B and perform remote operations from the CCC.

5.1.8. Notify the KSC Hurricane Center of the status of the plants (NET 205, TEL: 79200 / 9201) and proceed with the evacuation as instructed.

5.1.9. All available resources will be concentrated on final hurricane preparations, checks, emergency situations, and the release of unneeded manpower. The BOSS MAT shall make a real time call to release or stage any ride out team members.

6. HURCON I (50-KNOT/58 MPH WINDS WITHIN *12 HOURS)*

HURCON I is the phase when KSC shall remain secured and the ROT shall be sheltered or evacuated. ROT personnel shall be directed to shelter prior to the arrival of 50 knot/58 MPH winds.

Actions:

6.1.1. Release all personnel not required for Ride-Out team.

6.1.2. Communications – ensure Ride-Out Team has mobile phones and radios.

6.1.3. Ensure all portable chillers and other HVAC equipment have been configured per direction from Facility Managers.

6.1.4. Ensure UA and IACP configured to support for ride through.

6.1.5. Ride-Out Team if required shall remain on site at the Utility shop and/or the Launch Control Center (LCC).

7. POST HURRICANE OPERATIONS – RETURN TO NORMAL OPERATIONS

7.1. REENTRY FOLLOWING EVACUATION

7.1.1. Post hurricane damage assessment and recovery shall be per EMP-P-0003, Damage Assessment and Recovery. Personnel shall start restoring systems to pre-hurricane configuration and normal operation as directed by the HVAC management team.

7.1.2. After the storm passes the notification to report to work will be broadcast over the local media stations. Depending upon the post-storm conditions, the broadcast will direct:

7.1.2.1. The Ride-Out/DART Teams reporting instructions (emergency work crews)

7.1.2.2. Report to work at a certain hour (general populace)

7.1.2.3. Not report to work until further notice (general populace)

7.1.3. If we encounter a severe storm and communications are totally destroyed to the point broadcasts can't be made over local media, DART Team members should report to their workstation to augment the Ride-Out Team when roadways are safe. The general populace should stay at home until either contacted by phone, or receive notification over the local media stations.

7.1.4. If the Center was evacuated under Category 2 or higher storm, listen to radio and television announcements or call the Hurricane Center for status. Reentry may require the issuance of County Road Block Passes.

7.1.5. The first to be recalled and report during daylight hours following the ALL CLEAR will be the Recovery Teams, consisting of the DACs for their respective areas, engineering representative for their respective areas, engineering representative for each team, and first shift hourly employees as deemed necessary by management.

7.1.6. The HVAC management team shall establish a base of communications at the Utility shop (K6-1246), or an alternate designated location if the Utility shop is unavailable for coordinating all DART activities.

7.1.7. HVAC management team to form up the DART for recovery effort first to address restoration activities and then to assess damage to areas prior to general occupancy.

7.1.8. Distribute a Hurricane Damage Assessment Form EMR-F-0015 (Or an equivalent form) to each DART to record all damage found and safeing activities performed for use by the MAT and RTC later.

7.1.9. Communications from the field shall be to the HVAC management team for all activities except emergency securing operations that should be directed to the LCC HVAC console and then PPSMT.

7.1.10. The HVAC management team will keep a the HURCON log up to date with all activities and record/receive all Damage Assessment reported on the Hurricane Damage Assessment Form EMR-F-0015 (Or an equivalent form). These forms will be forwarded to the MAT or RTC as time permits to complete the damage assessment as required by EMP-P-0003.

7.1.11. The HVAC Recovery Team will conduct a quick look inspection of possible hurricane damage to facilities and equipment in their plants and report results.

7.1.12. Once the quick look damage assessment reports have been made, the HVAC Recovery Team will be expected to conduct a detailed damage assessment and concentrate on restoring systems and equipment to normal support configuration.

7.1.13. Remove all protective covering upon arrival at each plant following the All Clear Instructions.

7.1.14. Any evidence of electrical equipment having been subject to water intrusion will require insulation testing prior to re-energizing.

7.1.15. Verify that the oil sump heaters on all chiller units have been activated and are functioning.

7.1.16. Verify communication with the connected facilities.

7.1.17. Verify that the connected facilities are serviceable via input from rover teams.

7.1.18. Review all work station alarm pages and take corrective actions

7.2. Return Equipment to original locations

7.2.1. Restart Utility Annex per FAM-REF-0001.

7.2.2. Restart boilers at the UA per UIT-P-2013.

7.2.3. Secure SSPF portable chillers per Job Plan HVOP002A and WON.

7.2.4. If secured, restart IACP and charge storage tank.

7.2.5. Notify line coordinator of plant status

7.2.6. Estimate hours required to repair/replace any systems damaged during the hurricane.

7.2.7. Relocate Sandbags to pallets for Roads and Grounds pickup.

7.2.8. Notify Roads and Grounds to pick up pallets of sandbags.

7.2.9. Notify Roads and Grounds to remove equipment securing anchors to avoid trip hazards.

RECORDS

The following records are retained by the organizations listed below:

Record	Responsible Organization
Hurricane Log Book	BOSS HVAC Department

AFFECTED DIVISIONS/OFFICES

Engineering Services
FSEU OM&E

ROLES AND RESPONSIBILITIES

FSEU Technical Operations:

- Ensures compliance within the Department to the requirements stated in this procedure.
- Ensure employees are briefed on the requirements of this procedure

FSEU Supervisor:

- Ensures compliance within the department to the requirements stated in this procedure.

Systems Engineering:

- Responsible for the update of this procedure and compliance within the department to the requirements stated in this procedure

Employees

- Be familiar with the contents of this procedure and comply with stated requirements.

Ride-Out Team personnel
These employees function and operate under the command and control of the KSC Team Coordinator. Normally, the NASA Emergency Preparedness Planning Officer will be the focal point and will provide specific direction to contractors before, during, and immediately after a hurricane.

DART Teams
After the Ride-Out Team begins reopening KSC, it will be necessary to call in other essential personnel to continue the recovery effort, restore infrastructure, and establish operations.

REFERENCE DOCUMENTS

The following documents are referenced in this procedure:

Document Number	Title
EMP-P-0001	ISC Hurricane Operations Plan
UTI-P-2008	Refrigerant Plant, Utility Annex, Launch Complex 39
UTI-I-0006	KSC chiller Plant Daily Routine Duties Instructions
HV0P001N	SSPF Portable Chillers Parallel Operation
HV0P002N	SSPF Portable Chillers Stand Alone
FAM-I-2004	Hurricane Plan for Payload Facilities
UTI-P-2013	Heat Plant, Utility Annex, LC 39, KSC
FAM-REF-0001	HVAC UA Storm Shutdown Plan

ACRONYMS

AC	Action Coordinator
DAC	Department Action Coordinator
CAT	Category
CCEMP	Consolidated Comprehensive Emergency Management Plan
CD	KSC Center Director
CCAFS	Cape Canaveral Air Force Station
CIF	Central Instrumentation Facility
DAC	Damage Assessment Coordinator
DART	Damage Assessment and Recovery Team
DAT	Damage Assessment Team
DHC	Department Hurricane Coordinator
EOC	Emergency Operations Center
HMT	Hurricane Management Team
HQ	Headquarter Facility
HURCON	Hurricane Condition
HVAC	Heating, Ventilation and Air Conditioning
IACP	Industrial Area Chiller Plant
IH	Industrial Hygiene
ISC	Institutional Services Contract
KSC	Kennedy Space Center
MAT	Management Action Team
MEE	Mission Essential Evaluation
MESC	Medical Environmental Support Contract
MPPF	Multi-Purpose Processing Facility
NEMO	NASA Emergency Management Officer
NLT	No Later Than
O&C	Operations & Checkout Facility
OHF	Occupational Health Facility

OMI	Operations and Maintenance Instructions
PAFB	Patrick Air Force Base
PHSF	Payload Hazardous Processing Facility
PM ISC	Program Manager
RTC	Response and Recovery Team Chief
SCADA	Supervisory Control and Data Acquisition
SHT	Safety, Health, and Training
SPCC	Spill Prevention, Control, and Countermeasures
SSPF	Space Station Processing Facility
TAC	Training Applications Center
UA	Utility Annex
VAB	Vehicle Assembly Building
VCF	Vapor Containment Facility

REVISION RECORD

The following revisions have been applied to this document:

Revision Number	Change Description	Date
Basic	Initial Release	8/4/2000
1	Updated	12/21/2001
2	Updated	2/3/2004
3	Updated	12/20/2005
4	This revision removes the statement “SGS Company Proprietary – JBOSC Competition Sensitive” from this document	5/28/2007
5	This revision included the Hurricane plan for Payload Facilities	6/1/2010
6	Major Revision	12/20/2016
7	Added temporary reference to DMSO-17-004 to secure Utility Annex due in the event of a hurricane. Also corrected minor typos.	8/1/2017
8	Updated for BOSS, added new docs, added updates per EMP-P-0001.	9/06/19

DOCUMENT APPROVALS

6/2/2020

X Melquiades Lopez

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