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SUBJECT

BOSS FREEZE PLAN

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PURPOSE

The purpose of this procedure is to provide the necessary steps to activate and terminate the BOSS Freeze Plan to protect exposed water systems throughout Kennedy Space Center (KSC) during freezing weather conditions.

SCOPE AND APPLICABILITY

This procedure applies to BOSS Water & HVAC Utilities and Power & Protective Systems that have exposed water based systems/equipment susceptible to freezing.

PROCESS

1. Cold Weather Preparations

Prior to each year's winter season (at the end of each fiscal year), the LCC Support Test Conductor/Duty Office (JSTC/DO) shall issue a Freeze Plan work order that shall be used for the entire season. Each shop shall charge hours related to preparing, initiating and terminating the BOSS Freeze Plan. Preparations shall be completed by each shop prior to November 1 of each calendar year. These preparations shall include:

- SE and shop's review shop freeze plan task list and update if required. Ensure all necessary tags are available.
- Any equipment/systems modified with permanent freeze protection shall be removed from the shop Freeze Plan Task List.
- When using water flow as a temporary freeze protection method, ensure water runoff does not pose a slipping hazard to personnel, especially near exterior doors and walkways

Each shop shall update the current year Freeze Plan work order with status of checks and any issues found. Shops shall notify JSTC/DO by email that all Freeze Plan preparations are complete.

2. Freeze Plan Activation

A Freeze Plan Team shall evaluate weather warnings and determine whether the BOSS Freeze Plan will be activated. The team shall consist of the following personnel:

- Utilities Branch Manager or designee
- Protective Systems Branch Manager or designee
- System Engineer (SE) Branch Manager for Mechanical Engineering or designee

Table 1: Weather Warnings

<i>Freeze Warning</i>
Temperature < 35°F (first occurrence)
Temperature ≤ 32°F for ≥ 4 hours

Weather warnings shall be communicated to the team by JSTC/DO. The weather warnings shown in Table 1 shall be used by the team along with local weather television forecasting and/or internet weather websites to determine whether the Freeze Plan shall be activated. This will be an ongoing process throughout the winter season and the team shall determine each time if the Freeze Plan should be activated and, if so, when the Freeze Plan shall be terminated.

At the first weather warning notification (Temperatures $<35^{\circ}\text{F}$), the team shall assemble and discuss weather forecasts and, in general, when/if the Freeze Plan shall be activated in the near future. After the second weather warning (Temperatures $\leq 32^{\circ}$ for ≥ 4 hours), the team shall meet to determine if the Freeze Plan should be implemented. If, after review of other weather forecast sources, the team determines that the temperatures will be less severe or of shorter duration, the Freeze Plan shall not be implemented. This shall then be communicated with the JSTC/DO. The team shall continue to assess the weather forecasts for possible activation of the Freeze Plan if weather conditions worsen.

If, after this evaluation, the team determines that the Freeze Plan should be implemented, the team shall notify the FSEU Division Manager, the NASA SI Manager and JSTC/DO. JSTC/DO shall subsequently make all the necessary notifications as required in Section 3.1 of this procedure and verify Freeze Plan work orders are in effect. The team shall continue to assess weather forecasts for termination of the Freeze Plan activities. Each time the team determines that the Freeze Plan should be activated, they shall notify the FSEU Division Manager, the NASA SI Manager and JSTC/DO and the notifications and tasking shall be repeated.

3. Notification Process

3.1. Initiation of Notifications

Based on information contained in the 7-day forecast, JSTC/DO shall coordinate with the 45th Weather Squadron to determine freeze warnings. JSTC/DO shall be contacted when each weather warning is reached. When JSTC/DO is notified by the 45th Weather Squadron that weather conditions will be 32°F for four (4) or more hours, JSTC/DO shall notify the following personnel by phone:

- FSEU Division Manager
- Protective Systems Branch Manager or designee (team member)
- Utilities Branch Manager or designee (team member)
- SE Branch Manager for Mechanical Systems or designee (team member)

Team members shall evaluate the weather warning for possible implementation of the Freeze Plan. Local television forecasts and internet weather sites may be used in this evaluation. If the team determines that the Freeze Plan should be implemented, a member of the team shall contact JSTC/DO, the FSEU Division

Manager and the NASA SI Manager stating that the Freeze Plan will be implemented.

3.2. Freeze Plan Activation Notification Process

JSTC/DO shall make the following public address in the event of Freeze Plan activation:

“YOUR ATTENTION PLEASE. A TEMPERATURE OF _____ DEGREES OR LESS IS EXPECTED FROM _____ UNTIL _____. ALL AREAS SHOULD TAKE APPROPRIATE ACTIONS AT THIS TIME TO AVOID FREEZE DAMAGE TO FACILITIES AND EQUIPMENT.” (REPEAT)

JSTC/DO shall make notifications via the (2) Weather Page Groups (i.e.: ksc-ml-weather@nasa.gov and ksc-ml-weather2@nasa.gov) to implement the Freeze Plan actions. Additionally, a message shall be sent via e-mail to the Freeze Plan Contact Group, identified and maintained by the Mission Support Office, MSO. An example email is shown below:

“BOSS has directed all agencies to implement Freeze Plan actions effective @ _____ and to remain in that status until further direction. Report completed status back to JSTC/DO @ 861-5050 OR 861-5464.”

When personnel on the Freeze Plan Notification Contact list, Form MSO-F-0017, have been notified to implement the Freeze Plan, JSTC/DO shall contact the following personnel and advise them that BOSS has implemented the Freeze Plan:

- TOSC & NASA NTD
- BOSS Facility Managers

4. Freeze Plan Implementation

BOSS Shops shall hold Pre-Operational briefings with crews prior to implementation of the Freeze Plan. During the briefings, this procedure, along with any referenced by this procedure, shall be reviewed specific to the shop conducting the meeting. The proper work order number for implementing the Freeze Plan shall be discussed in the briefing. SE's associated with the shop conducting the briefing shall be notified of the meeting in advance.

4.1. Water & Wastewater/Plumbing

When notified by JSTC/DO, the Shop Supervisors (Water and Plumbing) shall implement their shop's task list. Perform all required tasks to prevent freeze damage as detailed in the task lists referenced below. Ensure water runoff does not pose a slipping hazard to personnel, especially near exterior doors and walkways, by diverting the water flow away from these areas. Once complete with all tasking, notify JSTC/DO that all Water/Wastewater/Plumbing tasks are complete. Use KSC Form 28-288 NS, Water & Waste Freeze Plan Tag, on system components changed by performing this procedure. Report any system anomaly to JSTC/DO.

Refer to Form UTI-F-2007, Freeze Plan Task List – Water & Wastewater Shop, for tasks to be performed. Initial and date each task.

4.2. Protective Systems

When notified by JSTC/DO, the Shop Supervisor shall implement their shop's task list. For any fire suppression system which is "impaired" during the performance of the Freeze Plan, the performing crew and/or the Supervisor shall ensure compliance with Procedure PPS-P-0001, Protective Systems Impairment Notification Process. The impairment type shall be classified as "unscheduled".

When implementing the task list, tagging of equipment/valves shall be required. The following tagging requirements exist:

- Main control valve: tagged with KSC Form 4-622, DO NOT USE OR OPERATE tag when closed.
- Inspector Test Valves: tagged with KSC Form 28-580, Out-of Service tags when left partially open to cause a minor flow or when fully open for drain.
- Fire Alarm Control Panels: tagged with KSC Form 28-580 when any impairment exists.
- Write "FREEZE PLAN" across all tags and date each tag.

Notify the Fire Console (867-7627) upon arrival at each facility, when the status of any system changes and when off-site. Alarm technicians shall silence all audible signals at the Fire Alarm Control Panel (FACP) and shall reset all alarm signals generated during performance of this procedure, as required. Constant alarm signals due to implementation of the Freeze Plan are not authorized.

When the task list is completed, the Supervisor shall send an email to KSC-ML-PSIN (ksc-ml-psin@lists.nasa.gov) which indicates the following:

"Freeze Plan completed for KSC fire systems."

If use of the ML system results in an undeliverable email, the following organizations/personnel shall be notified via email stating that KSC fire systems task list is complete:

- Protective Systems SE
- Protective Systems Supervisor
- Plumbing Supervisor
- Fire Marshall
- JSTC/DO

Refer to Form PPS-F-2126, Freeze Plan Task List, for tasks to be performed. Initial and date each task. Notify JSTC/DO when the task list is complete.

4.3. HVAC

When notified by JSTC/DO, the Shop Supervisor shall implement their shop's task list. Perform all required tasks to prevent freeze damage as detailed in the task lists referenced below. Once complete with all tasking, notify JSTC/DO that all HVAC tasks are complete. Use KSC Form 28-288 NS on system components changed by performing this procedure. Report any system anomaly to JSTC/DO.

Refer to Form UTI-F-2008, Freeze Plan Task List – HVAC Shop, for tasks to be performed. Initial and date each task.

5. Freeze Plan Termination

5.1. JSTC/DO Termination Actions

JSTC/DO shall periodically contact the 45th Weather Squadron to obtain weather forecasts and shall relay these forecasts to the Freeze Plan Team. When temperatures are no longer projected to remain below 32°F and the Freeze Plan Team has determined that Freeze Plan activities can be ceased, JSTC/DO shall contact agencies listed on MSO-F-0017 and advise them to terminate from their Freeze Plan activities and return systems to normal operations.

JSTC/DO shall make the following public service address terminating the Freeze Plan:

*"Your attention please. The previously issued Freeze Plan has been terminated. Please return all systems back to normal configuration."
(REPEAT)*

JSTC/DO shall make notifications via the (2) Weather Page Groups (i.e.: ksc-ml-weather@nasa.gov and ksc-ml-weather2@nasa.gov) to terminate the Freeze Plan actions. Also an email shall be sent to the Freeze Plan Contact Group. The following is an example for the email message:

The previously issued Freeze Plan has been terminated. Agencies shall report completed terminated status back to JSTC/DO @ 861-5050 or 861-5464 when systems are returned to normal configuration.

When all systems have returned to normal configuration, JSTC/DO shall contact the following organizations/personnel and advise them that BOSS has terminated the BOSS Freeze Plan activities and systems have been returned to normal configuration:

- TOSC & NASA NTD
- BOSS Facility Managers

The BOSS Test Conductor or Duty Officer shall make an entry in the BOSS Duty Office E-Log and check entry to be included in the Highlights Report. The completed Form MSO-F-0017 shall be maintained IAW record retention guidelines.

The above steps shall be repeated as the weather conditions change.

5.2. BOSS Shop Termination Actions

Once notice has been given to terminate activities related to the Freeze Plan, shop personnel shall restore all systems to normal configuration. All Freeze Plan tags shall be removed. Note any problems, suggestions or corrective actions required. All shops, when complete with restoring systems/equipment, shall report such to JSTC/DO. Additionally, Protective Systems Supervisor shall send out an ML notification stating that the Freeze Plan has been terminated.

5.3. Follow Up Actions

Each shop shall update their respective freeze plan task lists with any changes at the end of each winter season or as changes occur during the season. If, during a freeze plan activation, a system/equipment is found damaged from the freezing temperatures, a repair work order with a Technical Anomaly Level (TAL) 2 shall be issued, in accordance with Technical Anomaly Event Disposition Process (ENG-P-0027). This will require the SE for the system impacted to evaluate what additional measures need to be taken to prevent future occurrences of this nature. The problem-cause-remedy codes shall be completed on the work order by the Shop Supervisor and the SE shall ensure that the appropriate codes have been chosen. Any additional measures to prevent this from reoccurring shall be added to the work order long description. The SE and Shop Supervisor shall update the shop Freeze Plan Task List with these new measures. Additionally, the failure shall be reported to the duty office in accordance with SMA-P-0016, Event and Near Miss Reporting.

RECORDS

The following records are retained by the organizations listed below:

Record	Responsible Organization
KSC Form 28-288, Water & Waste Freeze Plan Tag	Water & Wastewater Shop
KSC Form 28-580, Out of Service Tag	Protective Services and Plumbing Shops
KSC Form 4-622, Do Not Use or Operate Tag	Protective Services & Plumbing Shops
MSO-F-0017, Freeze Plan Notification Contact list	Duty Office
PPS-F-2126, Freeze Plan Task List	Protective Services Shop
UTI-F-2007, Freeze Plan Task List – Water & Wastewater Shop	Water & Wastewater Shop
UTI-F-2008, Freeze Plan Task List – HVAC Shop	HVAC Shop

AFFECTED DIVISIONS/ OFFICES

FSEU
Engineering
WCC

MANAGEMENT ROLES AND RESPONSIBILITIES

FSEU Division Manager: Ensures compliance within the division level to the requirements stated in this procedure.

FSEU Branch Managers: Ensures compliance within the branch level to the requirements stated in this procedure.

FSEU Supervisors: Ensures compliance at the shop level to the requirements stated in this procedure.

WCC Division Manager: Ensures Notifications are made in accordance with this procedure and Freeze Plan work orders are generated and updated accordingly.

FUNCTIONAL ROLES AND RESPONSIBILITIES

FSEU Shop Supervisors: Ensures completion of all tasks associated with this procedure

FSEU Shop Personnel: Complies with all requirements stated in this procedure.

Mission Support Office Personnel: Complies with all requirements stated in this procedure.

REFERENCE DOCUMENTS

The following documents are referenced in this procedure:

Document Number	Title
ENG-P-0027	Technical Anomaly Event Disposition Process
KSC Form 28-288	Water & Waste Freeze Plan Tag
KSC Form 28-580	Out of Service Tag
KSC Form 4-622	Do Not Use or Operate Tag
MSO-F-0017	Freeze Plan Notification Contact List
PPS-F-2126	Freeze Plan Task List
PPS-P-0001	Protective Systems Impairment Notification Process
SMA-P-0016	Event and Near Miss Reporting
UTI-F-2007	Freeze Plan Task List – Water & Wastewater Shop
UTI-F-2008	Freeze Plan Task List – HVAC Shop

ACRONYMS

FACP – Fire Alarm Control Panel
FSEU – Facilities, Systems, Equipment, Utilities Operation Maintenance
HVAC – Heating, Ventilating and Air Conditioning
BOSS – Base Operations and Spaceport Services
JSTC/DO – LCC Support Test Conductor/Duty Office
KSC – Kennedy Space Center
MSO – Mission Support Office
NASA NTD – NASA Test Director
SE – System Engineer
TAL – Technical Anomaly Level
TOSC – Test and Operations Support Contract

DEFINITIONS

Impaired – A status of a fire suppression system, which is less than normal and indicates that the complete system or portions of it are out-of-service.

JSTC – JSTC is a 24-hour, seven days a week, and central point of contact for numerous BOSS and non-BOSS contractors as well as KSC assets.

REVISION RECORD

The following revisions have been applied to this document:

Revision Number	Change Description	Date
7	Updated procedure based on organizational changes and minor changes made throughout.	2/15/2017
8	Deleted references to verifying humidifiers are operational and reference to electrical heating devices.	12/18/2017
9	Administrative change only. Document updated to remove branding of previous contract.	04/01/2019

DOCUMENT APPROVALS

X

Manager, FSEU

Signature on file