

Attachment J-C24.2

Call Henry, Inc.

FACILITIES OPERATION, REPAIR AND MAINTENANCE CONTRACT
NASA GLENN RESEARCH CENTER
Cleveland, Ohio

CHI-02-PLN-0001

Heating Plant and Boiler Systems Operation Plan

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HEATING PLANT AND BOILER SYSTEMS OPERATION PLAN

FOR

***FACILITIES MAINTENANCE, OPERATIONS AND
REPAIR (FORM)***

AT

NASA, JOHN H. GLENN RESEARCH CENTER



Approval Page

For
Revision No. : D

CHI-02-PLN-0001, Heating Plants and Boiler Systems Operations Plan, has been approved by the following personnel:

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HEATING PLANT AND BOILER SYSTEMS OPERATION PLAN

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Call Henry, Inc. Heating Plant/Boiler Systems Operation Plan

1.0 System Operations Quality Standards

CHI's Heating Plant/Boiler Systems Operation Plan assures all System Operating Requirements are performed to Contract Specified Standards.

There are 15 recurring operations requirements that apply to five distinct contract statements of work (SOW) in the contract; C8-00b, 00c, 00d, 00e; C9-00c; C14-01a, 01b, 01c; C15-32, 33, 36; C16-07 and C16-08. We discuss below our Quality Performance Plan for ensuring these operations are performed to standards.

- a. **We Implement and Maintain an Operations Program.** We initially assure contract operating requirements are performed to contract standards, by reviewing and revising current operations to incorporate any FORM contract-driven changes. As a Quality Management System document, the Plan and its related procedures are re-evaluated at a frequency no greater than every second year for continued effectiveness and accuracy. Throughout the contract period, worthy alternate or innovative approaches will be examined. Those considered efficient and effective will be submitted them to the Government for approval.
- b. **We Plan and Schedule Operations Activities and Perform to the Schedule.** We schedule all operations requirements as we do all other work, using annual, quarterly, monthly and weekly schedules. Our scheduler takes into consideration that much of our operations work is performed around-the-clock, seven days a week, and builds this requirement into our schedules and plans. We assign specific individuals to perform operations based on the schedule. Employees are required to report work progress the same as all other work activities. Work is routinely inspected by supervisors and Quality Control personnel.
- c. **Only Qualified Personnel are Assigned Operational Responsibility.** Many people who perform operations must have special training and special skills, often special certifications. Examples are watch standing Stationary Engineers, and EMCS/ALS operators and attendants. CHI currently has the best operations personnel available performing GRC operations. We will continue to assign these and the others like them to operations, and train additional employees as needed to continue the exemplary performance.
- d. **We Control Operations Activities by Specific Work Orders.** We issue work orders in advance to our operators. The work order "prompts" performance at the time scheduled. Operators use written specific step-by-step operating instructions, contained on, or referenced on, the work order to ensure complete and accurate performance. When operators complete the work order it is recorded in MP2 and in CHI work management system. Thus, CHI and NASA always have current records showing that operations have been performed accurately and on time.
- e. **We Provide Around-the-Clock Capability to Operate the EMCS, ALS Systems and Steam/Boiler Plant.** Steam plant operations and EMCS/ALS operations require around-

the-clock capability. Superbly qualified employees and subcontractors provide these services.

Call Henry Inc. operates the steam plant and related operations from Building 12. CHI maintains watchstanding capability 24/7/365. There is always at least one operator in the steam plant building, itself. And, there is an additional operator who roves to the other utilities areas and performs checks, inspections, operator maintenance and maintains logs for that equipment. CHI watchstanders use the operations plan and supporting documents to perform their duties.

Siemens performs around-the-clock monitoring of the EMCS system, including providing an EMCS operator on-site during the day shift. They report alarms to a CHI Duty Officer who dispatches persons to the alarm to diagnose and correct the problem. This occurs around-the-clock, every day of the year.

CHI and Siemens combine to provide around-the-clock capability to ensure 100% operational status of the AIS3 System. We perform daily computer and printer inspections, respond to trouble calls around-the-clock, perform PM and take all other actions needed to ensure the critical system remains 100% operational.

- f. **CHI provides water treatment to 5,000,000 gallons of water, 12 towers and 20 + closed loop systems at GRC.** We employ an on-site water treatment specialist to lead our water treatment effort. He works with water treatment vendors to ensure the highest grades of water treatment chemicals and tests, analyzes, records and reports on water quality. We take advantage of weekly on-site consulting and assistance from water treatment professionals and perform quality control on water treatment services. We strive continuously to improve our water treatment methods and equipment; and ensure our customer is kept fully informed of improvement recommendations and water condition through reports, briefings and discussions.
- g. **Our Managers Closely Monitor Operations Activities.** CHI and subcontractor managers use our operations plan and schedules to ensure the operators are assigned to the job when it is scheduled. They monitor operations using reports compiled by CHI work management system, Capella. The personal involvement of our managers and supervisors is critical to ensuring CHI operations are always performed on time.
- h. **We treat operational emergencies just as we do emergency trouble calls.** We respond to operational emergencies within 15 minutes regular work hours and two hours at other times. We continue work until the emergency has been resolved, Just as with "Emergency Trouble Calls".
- i. **We audit and Inspect Operations Activities.** Supervisors and Quality Control personnel, perform documented inspections and audits of Steam Plant operations using ISO certified quality procedures.

2.0 Purpose

To establish the work instructions necessary to operate the Heating Plant/Boiler Systems and perform operational checks on the systems and equipment. This Operating Plan (OPLN) will serve as a Task Instruction supporting CHI's ANSI/ISO Program.

3.0 Accountable Person

The CHI Manager responsible for Steam Plant activities is accountable for ensuring implementation and compliance with this OPLN. The responsible Manager may delegate responsibility for portions or all of this OPLN, but cannot relinquish accountability for implementation and compliance with the OPLN.

4.0 Locations and Organizations to which Operations Plan Applies

This OPLN applies to all Call Henry, Inc. (CHI) organizations and subcontractors assigned to CHI Facilities Operations, Repair and Maintenance (FORM) contract organizations at Glenn Research Center, Cleveland, Ohio.

Operation and maintenance of the Steam Plant and outlying Boilers is currently provided by Call Henry, Inc.

5.0 Responsibilities

All CHI organizations at the locations identified in Section 4.0 above, are responsible for:

- Fully supporting and complying with this OPLN to the degree it applies to the organization.
- Advising the Accountable Organization Manager or the Quality Management Representative of recommended changes, revisions, improvements or considerations relevant to this OPLN.
- Advising the Quality Management Representative if this OPLN applies to the organization and the organization is not included in Section 3.0 above.
- Requesting approval from the Quality Management Representative (who must obtain approval from the Project Manager) to deviate from the OPLN prior to deviating. Deviation shall be approved only when deviation is required to meet CHI contract commitments, goals or objectives.

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CHI's FORM Quality Management Representative is responsible for monitoring and reporting implementation and maintenance of this OPLN. CHI's Quality Control Office is responsible for ~~inspective~~ inspection and auditing compliance with this OPLN, reporting findings to management and the Quality Management Representative. CHI Supervision and Maintenance Personnel, including Subcontractors are responsible for being familiar and complying with the NASA GRC Safety Manual and the CHI Safety and Health Plan.

6.0 References

Contract NNC07 BA04B, Section C.14, Heating Plants

7.0 Definitions

Lay-up. When a boiler is in lay-up it is in storage. A boiler can be laid-up either wet or dry. This is usually performed during the summer, to retard corrosion and help assure trouble-free operation during the next heating season.

Stand-by. When a boiler is in stand-by, it means it is available for services at any time.

8.0 Operations Plan

8.1 General

CHI will provide 24 hr/7 day a week services.

- a. General Intention. The work under this section shall include, operating oil-fired and natural gas power boilers; water sampling, testing, analysis and treatment; fuel oil handling and sampling; boiler start-up and shut-down; operations; PM, PGM, and ROI; and minor repair of the boilers, compressed air system and associated facilities; annual boiler inspection and certification; and maintaining records and preparing reports in order to provide high/low pressure steam. This OPLN is to be considered a Task Instruction supporting CHI's ANSI/ISO/ASQ Q9001-2008 Program
- b. The Heating Plants systems and equipment to be serviced include:
 - (1) Boilers
 - (2) Compressed Air system
 - (3) Feed Water System
 - (4) Condensate Return System
 - (5) Fuel system
 - (6) Control Systems
 - (7) Water Softeners
- c. Operation of Non-certified Boilers or Unfired Pressure Vessels.
 CHI will not operate any power boiler that does not have a Valid Inspection Certificate. The COTR shall be notified if unsafe conditions are found, following repair of a pressure part, or after any major modification to boilers, control equipment or auxiliaries. The affected equipment will not be placed back in operation until written authorization is received from a certified boiler inspector.

8.2 Records And Reports

Contract Requirement No. C14-99, Maintenance and Production of Heating Plants Records and Reports.

Additional and maintained records and reports shall be updated after completion of the work by CHI and maintained in a history file throughout the term of the contract (see "Records and Reports" paragraph of the "MANAGEMENT" clause). Additional records and reports include:

Operating Records, Reports, and Logs. CHI shall maintain operating records, laboratory records, maintenance records, emergency condition records, fuel tank readings, and operating cost records daily. CHI shall keep copies of all records at the Central Heating Plant, Building 12.

- (1) CHI shall maintain and post current signs and instructions including, but not limited to, no smoking, electrical and chemical hazard warning signs, routine daily instructions, and routine laboratory analyses procedures required by the COTR and Federal, state and local regulations.
- (2) CHI shall maintain a log posted on each boiler in operation at the Central Steam Plant identifying the operator's name, date, time, observations

(3) Operation Procedures. CHI shall maintain complete control of the central heating plant operation by preparation and adherence to the written and posted operating procedures. The operating procedures shall be prepared by CHI per the following, in order of precedence: (1) manufacturers' instructions, (2) industry standards and national codes. As a minimum, the procedures shall include:

- (1) Plant systems and equipment operating procedures including start-up, shutdown, emergency and lay-up procedures.
- (2) Performance test records for major equipment.
- (3) Sample operator logs.
- (4) Trouble shooting procedures for major equipment and systems.
- (5) Clearly defined duties, responsibilities and qualifications for all operations and maintenance positions.

The approved procedures shall be instituted upon commencement of contract operations. CHI shall update and revise all plant operation, distribution and maintenance procedures on a continuing basis as required by physical or operational changes at no additional cost.

b. Contract Requirement No. C14-01b, Boiler Water Treatment Operation. CHI shall provide water treatment operation for the boilers as specified below, collect and test water samples; record results, and maintain water condition to the limits as specified. At least once every shift, CHI shall collect feed water, boiler water and condensate samples from the operating boiler for chemical residual testing. CHI shall develop and implement a Boiler Water Treatment Operation Plan which is included with the Water Treatment Operating Plan (WTOP). The plan shall address MSDSs of all chemicals, corrosion control, spill control, and training. CHI shall perform and record log entry results of daily on-site laboratory tests to determine or measure levels of hardness, causticity or alkalinity, phosphate, sulfite, total dissolved solids (TDS), corrosion studies, and acidity (pH). CHI shall collect monthly samples of feed water, boiler water and condensate and ship or deliver them to an independent laboratory for analysis. A copy of the analysis shall be provided to the COTR. Boiler water shall be maintained within the following chemical residual limits per the approved Boiler Water Treatment Operation Plan (BWTOP). The BWTOP details are discussed in the CHI Water Treatment Operations Plan.

Steam Boilers Operating Parameters

<u>System Type</u>	<u>Treatment Control Range</u>	<u>Sulfite Control Range</u>	<u>Neutralized Conductivity</u>
Building 12/1	20 – 30 ppm PO4	30-50 ppm SO3	2500 – 3000
Building 12/2	20 – 30 ppm PO4	30-50 ppm SO3	2500 – 3000
Building 12/3	20 – 30 ppm PO4	30-50 ppm SO3	2500 – 3000
Building 12/4	20 – 30 ppm PO4	30-50 ppm SO3	2500 – 3000
Building 12/5	20 – 30 ppm PO4	30-50 ppm SO3	2500 – 3000
Building 142*	N/A	80 –100 ppm SO3	1500 – 2000
Building 301*	2.0 – 3.0 ppm MO+3	30-50 ppm SO3	4000 – 4500
Building 302*	2.0 – 3.0 ppm MO+3	30-50 ppm SO3	4000 – 4500
Building 333/1*	2.0 – 3.0 ppm MO+3	30-50 ppm SO3	4000 – 4500
Building 333/2*	2.0 – 3.0 ppm MO+3	30-50 ppm SO3	4000 – 4500

Steam Boilers Operating Parameters

<u>System Type</u>	<u>Treatment Control Range</u>	<u>Sulfite Control Range</u>	<u>Neutralized Conductivity</u>
Building 500/8*	2.0 – 3.0 ppm MO+3	30-50 ppm SO3	4000 – 4500
Building 500/9*	2.0 – 3.0 ppm MO+3	30-50 ppm SO3	4000 – 4500
Building 500/10*	2.0 – 3.0 ppm MO+3	30-50 ppm SO3	4000 – 4500

* or equal technology

Steam Boilers Condensates Operating Parameters

<u>PH</u>	<u>Conductivity</u>
8.2 – 9.0	C-100

Hot Water Boilers Operating Parameters

<u>System</u>	<u>Type</u>	<u>Treatment Control Range</u>
Building 35	Hot Water	100 – 150 ppm MO+6
Building 35/10	Hot Water	100 – 150 ppm MO+6
Building 101 (2 blrs)	Hot Water	100 – 150 ppm MO+6
Building 142 (2 blrs)	Hot Water	100 – 150 ppm MO+6
Building 145 (2 blrs)	Hot Water	100 – 150 ppm MO+6
Building 302 (2 blrs)	Hot Water	100 – 150 ppm MO+6
Building 309/FRT	Hot Water	100 – 150 ppm MO+6
Building 309/RR	Hot Water	100 – 150 ppm MO+6
Building 322	Hot Water	100 – 150 ppm MO+6
Building 333/X	Hot Water	100 – 150 ppm MO+6
Building 340	Hot Water	100 – 150 ppm MO+6

Water Softeners

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<u>Parameter</u>	<u>ppm (total dissolved solids)</u>
SB-142 Soft T.Hard	0
WB-142 Soft T.Hard	0
SB-301 Soft T.Hard	0
SB-302 Soft T.Hard	0
SB-500/2 Soft T.Hard	0
SB-12/1 Soft T.Hard	0
SB-12/2 Soft T.Hard	0
SB-12/3 Soft T.Hard	0
SB-12/4 Soft T.Hard	0
DI-333 Carbon 1 C12	0
DI-333 Soft 1 T.Hard	0
DI-333/2 Carbon C12	0
DI-333/2 Soft T.Hard	0

Corrosion Parameters (condensate and condenser water)

<3mpy on Steel
<1 on Copper

- c. Contract Requirements No. C14-01c, Fuel Oil Handling, Tank Monitoring, and Sampling. CHI shall furnish the fuel oil for boiler operation and liquid propane used for burner ignition. The fuel oil level in any tank shall not fall below 2,500 gallons. A minimum (total of two tanks) of 5,000 gallons of fuel oil shall be maintained at Bldg. 12 and 2,500 gallons at Bldg 500. CHI shall maintain an accurate record of the amount of fuel on hand and received in each delivery and shall, when requested by the COTR, obtain and submit fuel samples for verification of type of fuel supplied. CHI shall be responsible for any fuel spill cleanup that is related to fueling operations. CHI shall maintain all fuel oil handling equipment including storage tanks, pumps, piping, and heaters and shall comply with all federal regulations pertaining to fuel operations.

- d. Contract Requirement No. C14-02b, Boiler Annual PM. Annual PM shall include the scheduled shutdown of boiler heating equipment for repair or replacement of malfunctioning equipment detected during operations, PM and inspections that are deferrable due to operational requirements and do not pose a danger to life or property. Prior to shutdown, CHI shall perform an operational test of the safety relief valves, low water alarms, flame out controls, and other safety devices. CHI shall schedule the work so a certified boiler inspector witnesses the operational test. As a minimum, CHI shall perform Annual PM as specified in the procedures in Attachment J-C14.2, Section J.

- e. Contract Requirement No. C14-02c, Boiler Annual Certification.
The boiler certification process consists of 4 phases: external inspection, internal inspection, hydrostatic pressure testing, and operational and safety testing. CHI shall notify the COTR when the boiler is ready for testing, normally simultaneously with performance of Contract Requirement C14-02b, Boiler Annual PM. CHI will schedule and perform a hydrostatic pressure test and an operational test. The Government representative and the certified Boiler Inspector shall be present during testing. (See Attachment – 1, Summary of Annual Preparation for Boiler Inspections).

8.4 “Trouble Call” Requirements

CHI shall perform trouble call work as necessary to determine the cause of system and equipment malfunctions, eliminate the cause(s), and restore the system or equipment to satisfactory working condition.

8.5 Detailed Specifications

Watch standing Personnel must be certified by the state of Ohio.

8.6 Attachments

- Attachment – 1 Summary of Annual Preparation for Boiler Inspection
- Attachment – 2 Area Clearance and Valve Tag Out Procedures for Steam Systems Shutdown
- Attachment – 3 Boiler, Steam Turbine, Feed Water System, and Water Softener Procedures
- Attachment – 4 Confined Space, Lock Out/Tag Out Procedure Steam Drum and Mud Drum
- Attachment – 5 Personnel Schedule for Boiler Operations
- Attachment – 6 Steam Plant Work Assignment Report
- Attachment – 7 Bldg. 500, Boiler Conversion - from Natural Gas Pilot to Propane Pilot
- Attachment – 8 Bldg. 12, Boilers #1-5; Propane Connection Procedure
- Attachment – 9A Bldg. 12, Starting Boiler #5; on #2 Fuel Oil with Gas Pilot Startup
- Attachment – 9B Bldg. 12, Starting Boiler #5; with Propane Pilot Startup
- Attachment – 10 Bldg. 12, Starting Boilers #1, #2, #4; on #2 Fuel Oil with Gas Pilot Startup
- Attachment – 11 Bldg. 12, Starting Boilers #1 and #2; with Propane Pilot
- Attachment – 12 Emergency Generator Power *Revised by "D"*
- Attachment – 13 Emergency Call Procedures *Revised by "D"*
- Attachment – 14 Building 500 Boiler Room Evacuation Procedures

ATTACHMENTS

Call Henry Inc. – Heating Plant/Boiler Systems Operation Plan

Attachment – 1 Summary of Annual Preparation for Boiler Inspection

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MAIN STEAM PLANT
BLDG-12, 500 ||
AND
OUTLYING BOILERS

BOILERS #1 & #2

Remove the manhole covers, separators, baffles, cross members, feedwater lines and surface blowdown lines. Flush out the steam drum, mud drum and the tubes. If required remove the separator bracket and clean each tube with turbine or high pressure water. Remove a few handhole covers, flush out and inspect the tube headers. Remove all inspection plugs from the water column cross tees. Repack the gauge glass shut off valves and replace glass if needed. Replace as needed the water column blowdown valves. Inspect and repack the bottom blowdown valves. Inspect the combustion chamber and have the brickwork repaired as needed. Have the steam pressure gauge calibrated. Once the boiler has been inspected, reinstall all of the above equipment. A hydrostatic test at one and a half times working pressure and an accumulation test must be performed before the boiler can be put back in service.

BOILER #3

Remove the manhole covers, the feedwater trough, baffles, and steam separator. Flush out the steam, water, and mud drum and each tube. If required clean each tube with turbine or high pressure water. Remove all inspection plugs from the water column cross tees. Repack the gauge glass shut off valves and replace the glass if needed. Replace as needed the water column blowdown valves. Inspect and repack the bottom blowdown valves. Inspect the combustion chamber and have the brickwork repaired as needed. Have the steam pressure gauge calibrated. Once the boiler has been inspected, reinstall all of the above equipment. A hydrostatic test at one and a half times working pressure and an accumulation test must be performed before the boiler can be put back in service.

BOILER #4

Remove the manhole covers and steam separator. Flush out the steam drum, mud drum and tubes. Clean the steam separator. If required clean each tube with turbine or high pressure water. Remove the two handhole covers, flush out and inspect the tube headers. Remove all inspection plugs from the water column cross tees. Repack the gauge glass shut off valves and replace glass if needed. Replace as needed the water column blowdown valves. Inspect and repack the bottom blowdown valves. Inspect the combustion chamber and have the brickwork repaired as needed. Have the steam pressure gauge calibrated. Once the boiler has been inspected, reinstall all of the above equipment. A hydrostatic test at one and a half times working pressure and an accumulation test must be performed before the boiler can be put back in service.

BOILER #5

Remove the manhole covers, baffles and steam separator. Flush out the steam drum, mud drum and tubes. Clean the steam separator. If required clean each tube with turbine or high pressure water. Remove all inspection plugs from the water column cross tees. Repack the gauge glass shut off valves

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and replace glass if required. Replace as needed the water column blowdown valves. Inspect and repack the bottom blowdown valves. Inspect the combustion chamber and have the brickwork repaired as needed. Have the steam pressure gauge calibrated. Once the boiler has been inspected reinstall all of the above equipment. A hydrostatic test at one and a half times working pressure and an accumulation test must be performed before the boiler can be put back in service.

BOILERS BLDG 301 AND 302

Drain the waterside, remove the manhole and top handholes, with a waterhose flush out all loose mud and scale from the waterside. Open the rest of the handholes. Remove all inspection plugs from the water column cross tees. Remove the McDonnell/Miller float assembly from the body and clean and flush. Open all access covers to fireside. Punch all firetubes with wire brush. Scrape and wirebrush the rust and soot from the tube sheets and combustion chamber. Clean all flanges and mating surfaces on the water and firesides. Repack or replace as needed the gauge glass shutoff valves, water column blowdown valves and the two bottom blowdown valves. Once the boiler has been inspected, reinstall all of the above equipment. A hydrostatic test at one and a half times working pressure and an accumulation test must be performed before the boiler can be put back in service. With a load on the boiler check and adjust with instruments the burner operation for maximum efficiency.

BLDG #333
Boilers #1 & #2

Open the steam and mud drums. Flush out loose mud and scale with a water hose. Flush out the tubes. Remove all inspection plugs from the water column cross tees. Remove the McDonnell/Miller floats from their body and clean and flush. Clean the flange and mating surfaces. Repack the gauge glass shutoff valves. Repack the steam valve as needed (1 per boiler). Replace the vent valve. Clean all mating surfaces on the water side. After the boiler has been inspected, reinstall all of the above equipment. A hydrostatic test at one and a half times working pressure and an accumulation test must be performed before the boiler can be put back in service. With a load on the boiler check and adjust with instruments the burner operation for maximum efficiency.

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BLDG #500
Boilers #8, #9 and #10

Close main stop (*steam out*) valve(s) on boiler(s) being prepared for service. Use chain(s) to apply lock-out / tag-out to main gas valves serving boiler(s):

- Boiler 8 - FN0701, FN0702 and FN0703
- Boiler 9 - FN0719, FN0720 and FN0721
- Boiler 10 - FN0737, FN0738 and FN0739

Use lock-out / tag-out procedures on electrical power and water supplying boiler(s) being prepared. Drain water-side of boiler(s), remove manhole and two side hand-holes. Using water hose flush all loose mud and scale from waterside. Open remaining hand-holes and remove inspection plugs from water column cross tees. Remove *McDonnell / Miller* float assembly from body. Clean and flush and proceed as described for building 302 boilers.

Attachment – 2 Area Clearance and Valve Tag Out Procedures for Steam Systems Shut Down

STEAM PLANT AND OUTLYING BOILERS

An area clearance will be provided by CHI to the steam plant QAE (Building #12), and a copy will be posted at the Main Steam Plant, and contain the following information:

- 1. Required Building Manager’s signature.
- 2. Responsible NASA COTR’s / QAE’s signature, Research Facility Schedule Office signature, and Facilities Operations Division Chief signature.
- 3. A listing of utilities, services, and /or equipment to be shutdown.
- 4. The type of work to be performed and work location.
- 5. Date and time of requested shutdown.
- 6. Date and time work will be completed and services can be restored.

A valve lock out tag or tags issued from Central Control Building (#143) will be provided to the steam plant QAE by the inspector requesting the system shutdown and shall contain the following information:

- 1. Tag number issued by CCB.
- 2. Valve number and / or equipment to be operated and building number.
- 3. Date and time.
- 4. Person in charge, phone number, and alternate person and phone number, if required.

This lock out tag or tags will be given to the steam plant foreman and each individual valve tag will be placed on each valve or piece of equipment that is to be shutdown, per the area clearance.

Upon Completion of Work Described on Area Clearance

- 1. The NASA QAE or CHI inspector requesting shutdown of systems will sign and date the area clearance that states the work is complete and the job site is in a safe condition to restore services.
- 2. The CHI inspector or QAE who is the responsible person on the area clearance and CCB tag will notify the steam plant QAE to restore services. QAE will then notify the steam plant foreman (CHI).
- 3. The steam plant operator can then remove all CCB tags and return all equipment and / or valves to their normal operational position.
- 4. The QAE or CHI inspector who is the responsible person on the area clearance and CCB tag will then receive the tag from the steam plant QAE and return them to Central Control Building (C#143) for cancellation.

Situations and problems with the processed steam system that are considered EMERGENCIES, will not require the area clearance procedure. CHI’s Duty Officer must be notified immediately upon knowledge of the emergency condition. (See CHI’s Emergency Management Plan).

Attachment – 3 START UP PROCEDURES

BOILER 1 START-UP

(THIS PROCEDURE CAN BE USED WITH BOILER 1 FLOW SCHEMATIC CE-180225)

STEP #	INITIAL	PROCEDURE
1		Verify that all power to boiler is on
2		Ensure that the power is on to recorders Penny & Giles
3		Check induced draft fan (third floor). Open water flow through bearings, and oil in sight should be 2/3 full.
4		Set selector switch on boiler panel to gas or oil
4A		Gas
4A1		Open gas valves FN1744, FN1735, FN1734, and FN1726 on #1 burner
4A2		Open gas valves FN1714, FN1713, FN1706 on #2 burner
4A3		Close oil valves F02617 and F02601 located at F.O. pumping station to burners #1 and #2
4B		Oil
4B1		Close gas valves FN1734 and FN1726 on #1 burner
4B2		Close gas valves FN1713 and FN1706 on #2 burner
4B3		Open gas valves FN1744, FN1735, and FN1714 (to pilot)
4B4		Open oil valves F02617 and F02601 located at F.O. pumping station
4B5		Open air valves AT2618 and AT2607
5		Check water level in boiler (three nuts from bottom of sight glass). If water level in boiler is low, open by-pass valve WF1722 until proper level is achieved.
6		Verify valves SH1001 (Main stop) and SH1000 (Non-return) are closed
7		Open valves SH1742 (Main stop drain), SH1853 (Non-return drain) and SH1864 and SH1865 (Steam drum vents)
8		Start induced draft fan and put on auto. Set point furnace draft to -.08" w.c.
9		Set boiler master and burner master controls on manual and start burners
10		Warm up boiler slowly, low fire until steam comes out of vents
11		When dry steam comes from vents (five to seven psig), close vent valves SH1864 and SH1865
12		Gradually increase burner setting until boiler is at 80% of operating pressure (approx. 4 hrs. from cold start)
13		Maintain water level in boiler with valve WF1722
14		At 80% of header pressure, open valve SH1001 (Main stop). Throttle drain valves SH1742 and SH1853 and allow steam to flow until dry steam exists.
15		At 85% to 90% of header pressure, open non-return valve SH1000 and close valves SH1853 and SH1742.
16		When boiler pressure reaches main header pressure, non-return valve will open
17		At any sign of water hammer, shut valve SH1001 (main stop) and start over again with drains fully open
18		Match up boiler master with burner master and put in automatic
19		Put "copes" valve WF1724 in service including opening valves WF1723, WF1725 and closing by-pass valve WF1722
20		Assure proper level in boiler (-1 to +1) zero mid-scale on boiler control water level indicator

Name: _____ Date: _____ Time: _____

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BOILER 2 START-UP

(THIS PROCEDURE CAN BE USED WITH BOILER 2 FLOW SCHEMATIC CE-180226)

STEP #	INITIAL	PROCEDURE
1		Verify that all power to boiler is on
2		Ensure that the power is on to recorders Penny & Giles
3		Check induced draft fan (third floor). Open water flow through bearings, and oil in sight should be 2/3 full.
4		Set selector switch on boiler panel to gas or oil
4A		Gas
4A1		Open gas valves FN1788, FN1779, FN1778, and FN1771 on #1 burner
4A2		Open gas valves FN1759, FN1758, FN1751 on #2 burner
4A3		Close oil valves F02653 and F02637 to burners #1 and #2
4B		Oil
4B1		Close gas valves FN1778 and FN1771 on #1 burner
4B2		Close gas valves FN1758 and FN1751 on #2 burner
4B3		Open gas valves FN1788, FN1779, and FN1759 (to pilot)
4B4		Open oil valves F02653 and F02637 located at F.O. pumping station
4B5		Open air valves AT2640 and AT2629
5		Check water level in boiler (three nuts from bottom of sight glass). If water level in boiler is low, open by-pass valve WF1716 until proper level is achieved.
6		Verify valves SH1003 (Main stop) and SH1002 (Non-return) are closed
7		Open valves SH1743 (Main stop drain), SH1898 (Non-return drain) and SH1914 and SH2007 (Steam drum vents)
8		Start induced draft fan and put on auto. Set point furnace draft to -.08" w.c.
9		Set boiler master and burner master controls on manual and start burners
10		Warm up boiler slowly, low fire until steam comes out of vents
11		When dry steam comes from vents (five to seven psig), close vent valves SH1914 and SH2007
12		Gradually increase burner setting until boiler is at 80% of operating pressure (approx. 4 hrs. from cold start)
13		Maintain water level in boiler with WF1716
14		At 80% of header pressure, open valve SH1003 (Main stop). Throttle drain valves SH1743 and SH1898 and allow steam to flow until dry steam exists.
15		At 85% to 90% of header pressure, open non-return valve SH1002 and close valves SH1713 and SH1898.
16		At any sign of water hammer, shut valve SH1003 (main stop) and start over again with drains fully open
17		When boiler pressure reaches main header pressure, non-return valve will open
18		Match up boiler master with burner master and put in automatic
19		Put "copes" valve WF1718 in service including opening valves WF1717 and WF1719 and closing by-pass valve WF1716.
20		Assure proper level in boiler (-1 to +1) zero mid-scale on boiler control water level indicator

Name: _____ Date: _____ Time: _____

BOILER 3 START-UP

(THIS PROCEDURE CAN BE USED WITH BOILER 3 FLOW SCHEMATIC CE-103566)

STEP #	INITIAL	PROCEDURE
1		Verify that all power to boiler is on
2		Ensure that the power is on to recorders Penny & Giles
3		Check induced draft fan (third floor). Open water flow through bearings, and oil in sight should be 2/3 full.
4		Set selector switch on boiler panel to gas or oil
4A		Gas
4A1		Open gas valves FN1178, FN1194, FN1203, FN1189 and FN1188 on burner
4A2		Close oil valve F02689
4B		Oil
4B1		Close gas valves FN1194
4B2		Open gas valves FN1178, FN1188, and FN1189 (to pilot)
5		Check water level in boiler (three nuts from bottom of sight glass). If water level in boiler is low, open by-pass valve WF1714 until proper level is achieved.
6		Verify valves SH1005 (Main stop) and SH1004 (Non-return) are closed
7		Open valves SH2640, SH2636 and SH1033 (Main stop drains) and SH1949 (Steam drum vent)
8		Start induced draft fan and put on auto. Match up pointers on control
9		Set boiler master to 0% and in manual and start burners
10		Warm up boiler slowly, low fire until steam comes out of vents
11		When dry steam comes from vents (five to seven psig), close vent valves
12		Gradually increase burner setting until boiler is at operating pressure (approx. 4 hrs. from cold start)
13		Maintain water level in boiler with valve WF1714
14		At 80% of header pressure, open valve SH1005 (Main stop). Throttle drain valves SH2640 and SH2636 and allow steam to flow until dry steam exists.
15		At 85% to 90% of header pressure, open non-return valve SH1004. Close drain valves SH2640, SH2636 and SH1033.
16		When boiler pressure reaches main header pressure (non-return valve will open)
17		At any sign of water hammer, shut valve SH1005 (main stop) and start over again with drains fully open
18		Match up boiler master with plant master and put in automatic
19		Put "copes" valve WF1710 in service including opening valves WF1709 and WF1712 and closing by-pass valve WF1714
20		Assure proper level in boiler (-1 to +1) zero mid-scale on boiler control water level indicator

Name: _____ Date: _____ Time: _____

BOILER 4 START-UP

(THIS PROCEDURE CAN BE USED WITH BOILER 4 FLOW SCHEMATIC CE-103567)

STEP #	INITIAL	PROCEDURE
1		Verify that all power to boiler is on
2		Ensure that the power is on to recorders Penny & Giles
3		Check induced draft fan (third floor). Open water flow through bearings, and oil in sight should be 2/3 full.
4		Set selector switch on boiler panel to gas or oil
4A		Gas
4A1		Open gas valves FN1177, FN1228, FN1236, FN1242 on #1 burner
4A2		Open gas valves FN1209, FN1217, and FN1223 on #2 burner
4A3		Close oil valves F01001 and F01013 to burners #1 and #2
4B		Oil
4B1		Close gas valves FN1236 and FN1242 on #1 burner
4B2		Close gas valves FN1217 and FN1223 on #2 burner
4B3		Open gas valves FN1177, FN1209, and FN1228 (to pilot)
4B4		Open oil valves F01001 and F01013 located at F.O. pumping station
5		Check water level in boiler (three nuts from bottom of sight glass). If water level in boiler is low, open by-pass valve WF1705 until proper level is achieved.
6		Verify valves SH1008 (Main stop) and SH1007 (Non-return) are closed
7		Open valves SH2629 (Main stop drain) and SH2632 (Steam drum vent)
8		Start induced draft fan and put on auto. Match up pointer on control
9		Set boiler master to 0% and in manual and start burners
10		Warm up boiler slowly, low fire until steam comes out of vent
11		When dry steam comes from vent (five to seven psig), close vent valve
12		Gradually increase burner setting until boiler is at operating pressure (approx. 4 hrs. from cold start)
13		Maintain water level in boiler with WF1705
14		At 80% of header pressure, open valve SH1008 (Main stop). Throttle drain valves SH2629 and SH2632 and allow steam to flow until dry steam exists.
15		At 85% to 90% of header pressure, open non-return valve SH1007 and close drain valves SH2629 and SH2632.
16		When boiler pressure reaches main header pressure, non-return valve will open
17		At any sign of water hammer, shut valve SH1008 (main stop) and start over again with drains fully open
18		Match up boiler master with plant master and put in automatic
19		Put "copes" valve WF1701 in service including opening valves WF1700 and WF1703 and closing by-pass valve WF1705
20		Assure proper level in boiler (-1 to +1) zero mid-scale on boiler control water level indicator

Name: _____ Date: _____ Time: _____



BOILER 5 START-UP

(THIS PROCEDURE CAN BE USED WITH BOILER 5 FLOW SCHEMATIC CE-103595)

STEP #	INITIAL	PROCEDURE
1		Verify that all power to boiler is on.
2		Ensure that the power is on to recorders, Penny & Giles
3		Set selector switch on boiler panel to gas or oil
3A		Gas
3A1		Open valves on fire FN1129 thru FN1136
3A2		Connect regulator valve linkage to gas valve FN1128
3A3		Disconnect oil linkage to regulator valve F01054
3A4		Open gas valves FN1117, FN1110 and FN1127
3B		Oil
3B1		Disconnect gas linkage to regulator valve FN1128
3B2		Connect oil linkage to regulator valve F01054
3B3		Place oil burner in position
3B4		Close gas valves FN1117 and FN1127
3B5		Open gas valve FN1110 to pilot
3B6		Open steam atomization drains SH2656, SH2657 and SH2658
3B7		Open steam atomization valves SH1471, SH1501 and SH2653
3B8		Close valves F01028 and F01033 for #1 oil pump or valves F01029 and F01039 for #2 oil pump (located behind boiler). Start either pump.
3B9		Open steam valve SH0753 and oil valve F01058
4		Check water level in boiler (two to three nuts from bottom of sight glass).
5		Open feedwater valves WF2668, WF2678 and WF2672
6		Verify valves SH1010 (Main stop) and SH1009 (Non-return) are closed.
7		Open drain valves SH2615 and SH2624
8		Open steam drum vents SH0716, SH0763 and SH2625
9		Set boiler master on manual and start burner: zero setting on controls
10		Warm up boiler slowly, low fire until steam comes out of vents
11		When dry steam comes out of vents (five to seven psig), close vent valves
12		Gradually increase burner setting until boiler is at operating pressure (approx. 2 hrs.)
13		Maintain water level in boiler with valve WF2672
14		At 80% to 90% of header pressure, open valve SH1010 (Main stop). Throttle drain valve SH0760 and allow steam to flow until dry steam exists.
15		At 85% to 90% of header pressure, open non-return valve SH1009 (Non-return)
16		When boiler pressure reaches main header pressure (Non-return valve will open), close drain valves SH2615, SH2624 and SH0760 and vent valves SH0716, SH0763 and SH2625
17		At any sign of water hammer, shut valve SH1010 (main stop) and start over again with drains fully open
18		Match up boiler master and put in automatic
19		Put "copes" valve in service WF2670, including opening isolation valves WF2671 and WF2669
20		Close by-pass valve WF2672
21		Assure proper level in boiler (-1 to +1) zero mid-scale on boiler control water level indicator
22		Start oxygen-trim when boiler is on line

Name: _____ Date: _____ Time: _____



301 BOILER START-UP

Note: 301 Boiler replaced by 3 new boilers. Operating information not yet provided to CHI.

STEP #	INITIAL	PROCEDURE
1		Verify that all power to boiler is on
2		Set selector switch on boiler panel to gas or oil
2A		Gas
2A1		Open valves #G-1, #G-23 (2), #121
3		Check water level (middle of gauge-glass)
4		Open feed water valve #4, #8, #5, #6 on feed water pumps.
5		Open vent valve #26
6		Close main stop valve #1
7		Start boiler on low fire & warm up slowly.
8		When dry steam comes from vent, close valve.
9		When pressure reaches 12 lbs, boiler will automatically shut off.
10		Set rheostat for 50% and slowly open main stop valve.

Name: _____ Date: _____ Time: _____



Revised by "D"

Attachment – 3-G

302 BOILER START-UP

STEP #	INITIAL	PROCEDURE
1		Verify that all power to boiler is on
2		Turn on stack fan
3		Set selector switch to GAS
3A		Gas:
3A1		Open gas valve #FN9055
4		Check water level in 1/2 gauge glass
5		Put feed water pumps on AUTOMATIC
6		Open vent valve #28
7		Turn selector switch to MANUAL
8		Set rheostat to CLOSED position
9		Start boiler on low fire & warm up slowly
10		When dry steam comes from vent, close valve #28
11		When boiler reaches set pressure it will automatically shut off.
12		Put selector switch in AUTOMATIC
13		Slowly open main stop valve #1 (SL-9126)
14		When valve is all-the-way open, the boiler is on line

Name: _____ Date: _____ Time: _____



Revised by "D"

Attachment - 3-H

STEAM TURBINE #1 (SOUTH) START-UP

Table with 3 columns: STEP #, INITIAL, PROCEDURE. Contains 27 rows of start-up instructions for a steam turbine.

Name: _____ Date: _____ Time: _____



Revised by "D"

Attachment - 3-I

STEAM TURBINE #2 START-UP

STEP #	INITIAL	PROCEDURE
1		Check governor oil level (2/3 full sight glass – left side)
2		Check front bearing oil cup (2/3 to full)
3		Turn on bearing water D.W. 068, 065, 058 (above #1 turbine – next to D.W. V070)
4		Check back bearing oil cup (2/3 full)
5		Turn on bearing water D.W. V067 & 064.
6		Check water pump oil cup (2/3 to full)
7		Open valves for start up:
7A		BFW V028 (pump suction)
7B		BFW V016 (pump discharge)
7C		V289 (under throttle valve)
7D		V288 (Rotor drain)
7E		V287 (Exhaust drain)
7F		V286 (under exhaust line)
7G		Equalizing line valve BFW0161
8		Valves closed:
8A		LPS V032 (Turbine exhaust-above #1 turbine)
8B		HPS V286 (High pressure to throttle valve)
		START UP:
1		Open suction valve BFW V02B (Westend of pump)
2		Open discharge valve BFW V016 (Westend of pump). If the seals leak, do not use this turbine.
3		Engage resting lever with hand trip level (latch) (right side of pump)
4		Crack open slowly – valve HPS V286 (right side of pump next to post)
5		Make sure all water is removed by draining from turbine housing.
6		Close valve HPS V286 (Inlet side)
7		Crack open valve LPS V032 (located above #1 turbine)
8		Remove all water through drains (Exhaust side)
9		Close all drains - #289, #288, #286 and #287.
10		Open LPS V032 fully.
11		Open slowly IIPS V286.
12		Gently let turbine spin to warm up (forty-five minutes to one hour)
13		Open fully LPS V032 and HPS V286 – <u>in that order.</u>
14		Open and close all drains to make sure no water is in turbine.
15		Maintain 150 degrees bearing temperature.

Name: _____ Date: _____ Time: _____



Revised by "D"

Attachment - 3-J

FEED WATER TANK START-UP

STEP #	INITIAL	PROCEDURE
1		OPEN VALVES:
1A		WA2617 CW-V002 Soft Water into meter (basement)
1B		WA2615 CW-V003 Soft Water out of meter (basement)
1C		WA2619 BFW-V128 Soft Water feed to plant (behind #1 boiler-right side)
1D		SP2010 SP-V167 Condensate Returns (West end above tank)
1E		SP2009 SP-V166 Condensate Pump Returns (West end above tank)
1F		WN2663 W.D. V0137 Domestic water (West end above tank)
1G		WA2622 BFW-V0131 Shut off to feed water regulator (side of tank)
1H		WA2624 BFW-V0129 Shut off after feed water regulator (side of tank)
1I		SG2602 BFW-V0158 Condensate Gravity Returns (East end-top of boiler)
1J		SP2003 CPR-V003 Condensate Returns (on catwalk-front of tank)
1K		SP2001 CPR-V005 Condensate Returns (on catwalk-front of tank)
1L		WF2600 BFW-V0169 Gravity feed to pumps (above computer room door)
1M		No tag Overflow valve (West end of tank)
2		CLOSE VALVES:
2A		WA2620 WD-V0133 Soft water bypass (south wall-first floor)
2B		WA2658 WD-V0135 Domestic water bypass (south wall-first floor)
2C		WA2621 BFW-V0132 Bypass valve (second floor-front of tank)
2D		WN2864 SP-V0168 Bypass valve to pump suction (West end of tank-top line)
2E		WA2621 BFW-V0132 Bypass valve around regulator (side of tank)
2F		WF1832 BFW-V0127 Feed water tank drain (West end-under tank)
3		Open steam side of feed water system:
3A		SH1515 S.H. V0144 High pressure steam to system (left side of tank)
3B		SH1513 SH-V0143 High pressure steam shut off to regular (left side)
3C		SL2636 SL-V0148 Low pressure shut off to system (left side of tank)
3D		SL2635 SL-V0139 Low pressure shut off from turbine exhaust
4		Proper water level 2/3 of second glass (side of tank-second floor)
5		8 7 9 pounds on gauge above regulator in order to work (second floor-left side)

Name: _____ Date: _____ Time: _____



Revised by "D"

Attachment - 3-K

EMERGENCY PROCEDURES FOR FAILED WATER-SOFTENER OR FEED-WATER FLOAT/PUMP

Table with columns: STEP #, INITIAL, PROCEDURE. Contains sections for Water-Softener #1-4 failures, Feed-Water Float failure, and Feed-Water Pump #1-2 failures. Includes a NOTE box: 'NOTE: If the softener currently in use is the softener that fails, PUSH RESET BUTTON to manually place a different softener on-line.'



Revised by "D"

GAS OR OIL START UP PROCEDURE FOR #8 BOILER

Attachment - 3-L

Name: _____ Date: _____ Time: _____

WARNING: NO SMOKING DURING THE FOLLOWING PROCEDURES

STEP	PROCEDURE	VALVE
1	Open vent on top of water column	
2	Close main steam crown valve	SL-0706
3	Close Blowdown valves	
3a	Observe Sight Glass and Check for Water	
3b	Check Operation of Water Column Tri-cocks	WF-0720
3c	Surface Blowdown Right & Left	
4	Open sight glass quick valves	
5	Close Tri-cocks on water column	
6	Open boiler makeup valve	WF-0700
7	Open Feedwater Pump Suction valve on feedwater pump from make up tank	WF-0787
8	Open Feedwater Pump Discharge valve on feedwater pump from make up tank	WF-0795
9	Start Feedwater Pump #22 on motor control center or open valve to fill boiler from softwater tank	WA-0700
10	Fill boiler to operating level	
10a	Feedwater pump will stop pumping when operating level is reached	
10b	If filling from softener, manually close valve when operating level is reached	WA-0700
11	Open main gas valve in gas room	FNV-143
11a	GAS	
11a1	Open gas shut off valves	FN-0701, 0702, 0705, 0711
11b	OIL	
11b1	Close gas shut off valves	FN-0701, 0702



11b2	Close gas shut off valves	FN-0705, 0711
11b3	Open fuel oil valves to & from fuel oil pump (located North East wall behind #1 chiller)	
11b4	Engage main breaker for power to fuel oil pump #1 & #2. Turn control switch to auto on #1 & #2 fuel oil pump	
12	Engage power to #8 boiler-main breaker located in electrical inside first panel door	
13	Engage power on switch box-located in front of boiler lower left side	
14	Set firing rate rheostat switch on #1 on scale side of control panel lower right side	
15	Turn fuel selector switch to proper fuel (gas or oil). Located on right side of control panel	
16	When boiler starts producing steam close vent #1 and increase firing rate	
17	Open crown valve at 7-8 psi on boiler. Boiler is in service and on line	S-1
18	Make visual check of boiler and valves for leaks or any unwanted conditions.	
19	When boiler reaches operating pressure, blowdown, water column, sight glass, surface blowdown, bottom blowdown & steam header	



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GAS OR OIL START UP PROCEDURE FOR #9 BOILER

Attachment – 3-M

Name: _____ Date: _____ Time: _____

WARNING: NO SMOKING DURING THE FOLLOWING PROCEDURES

STEP	PROCEDURE	VALVE
1	Open vent on top of water column-2 valves	
2	Close main steam crown valve	WF-0779
3	Close Blowdown valves	#2,3
3a	Observe Sight Glass and Check for Water	
3b	Check Operation of Water Column Tri-cocks	
3c	Surface Blowdown Right	
4	Open sight glass quick valves	
5	Close Tri-cocks on water column	#9a, b, c
6	Open boiler makeup valve	
7	Open Feedwater Pump Suction valve on feedwater pump #9 from make up tank	WF-0798
8	Open Feedwater Pump Discharge valve on feedwater pump #9 from make up tank	WF-0807
9	Start Feedwater Pump #9 on motor control center or open valve to fill boiler from softwater tank	
10	Fill boiler to operating level	
10a	Feedwater pump will stop pumping when operating level is reached	
10b	If filling from softener, manually close valve #12 when operating level is reached	WA-0700
11	Open main gas valve in gas room	FNV-1
11a	GAS	
11a1	Open gas shut off valves	FN-0720, 0721
11b	OIL	
11b1	Open gas shut off valves	FN-0720, 0721
11b2	Close gas shut off valves	FN-0723, 0729
11b3	Open fuel oil valves on Reservoir	



11b4	Open fuel oil valves to & from fuel oil pump (located North East Wall behind #1 chiller)	
11b5	Engage main breaker for power to fuel oil pump #1 & #2. Turn control switch to auto on #1 & #2 fuel oil pump (located on North wall behind #1 chiller)	
12	Engage power to #9 boiler-main breaker located in electrical inside first panel door	
13	Engage power on switch box-located on left side of boiler	
14	Set firing rate rheostat switch on #1 on scale front of control panel lower left side	
15	Turn fuel selector switch to proper fuel (gas or oil). Located on right side of control panel. Boiler programmer should start its cycle	
16	When boiler starts producing steam close vent #1 and increase firing rate	
17	Open crown valve at 7-8 psi on boiler. Boiler is in service and on line	S-2
18	Make visual check of boiler and valves for leaks or any unwanted conditions.	
19	When boiler reaches operating pressure, blowdown, water column, sight glass, surface blowdown, bottom blowdown & steam header	
12	Engage power to #9 boiler-main breaker located in electrical inside first panel door	



Revised by "D"

GAS OR OIL START UP PROCEDURE FOR #10 BOILER

Attachment – 3-N

Name: _____ Date: _____ Time: _____

WARNING: NO SMOKING DURING THE FOLLOWING PROCEDURES

STEP	PROCEDURE	VALVE
1	Open vent on top of water column-2 valves	
2	Close main steam crown valve	SL-0708
3	Close Blowdown valves	
3a	Observe Sight Glass and Check for Water	
3b	Check Operation of Water Column Tri-cocks	
3c	Surface Blowdown Right & Left	
4	Open sight glass quick valves	
5	Close Tri-cocks on water column	
6	Open boiler makeup valve	
7	Open Feedwater Pump Suction valve on feedwater pump #10 from make up tank	WF-0812
8	Open Feedwater Pump Discharge valve on feedwater pump #10 from make up tank	WF-0820
9	Start Feedwater Pump #24 on motor control center or open valve to fill boiler from softwater tank	WA-0711
10	Fill boiler to operating level	
10a	Feedwater pump will stop pumping when operating level is reached	
10b	If filling from softener, manually close valve when operating level is reached	WA-0711
11	Open main gas valve in gas room	FNV-143
11a	GAS	
11a1	Open gas shut off valves	FN-0703, 0738, 0741, 0746
11b	OIL	
11b1	Open gas shut off valves	FN-0703, 0738
11b2	Close gas shut off valves	FN-0741, 0746

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11b3	Open fuel oil valves on Reservoir	
11b4	Open fuel oil valves to & from fuel oil pump (located North East Wall behind #1 chiller)	
11b5	Engage main breaker for power to fuel oil pump #1 & #2. Turn control switch to auto on #1 & #2 fuel oil pump (located on North wall behind #1 chiller)	
12	Engage power to #10 boiler-main breaker located in electrical inside first panel door	
13	Engage power on switch box-located in front of boiler lower left side	
14	Set firing rate rheostat switch on #1 on scale side of control panel lower right side	
15	Turn fuel selector switch to proper fuel (gas or oil). Located on right side of control panel. Boiler programmer should start its cycle	
16	When boiler starts producing steam close vent #1 and increase firing rate	
17	Open crown valve at 7-8 psi on boiler. Boiler is in service and on line	SL-0708
18	Make visual check of boiler and valves for leaks or any unwanted conditions.	
19	When boiler reaches operating pressure, blowdown, water column, sight glass, surface blowdown, bottom blowdown & steam header	
11b5	Engage main breaker for power to fuel oil pump #1 & #2. Turn control switch to auto on #1 & #2 fuel oil pump (located on North wall behind #1 chiller)	
12	Engage power to #10 boiler-main breaker located in electrical inside first panel door	

Boiler 10 page 2



Boiler #1

Check

Initial

Main Steam Header:

_____	_____
_____	_____
_____	_____

1. Close steam main header valve #SH 1001.
Chain and lock. Install lockout tag.
2. Close steam non-return valve #SH 1000.
Chain and lock. Install lockout tag.
3. Open drain valves #SH 1853 and #SH 1742.
Install lockout tags.

Steam and Mud Drum Entry:

Revised by "D"

1. Glenn Safety Office issues a confined space entry permit.
2. Notify ~~Fire Department~~ for CHI Protective Systems Office to schedule atmospheric testing.
3. ~~Fire station~~ Authorized CHI employee will conduct an atmospheric testing of the confined space and log the results on the posted permit.
4. Forced air ventilation system must be in place and operating properly.
5. Operator and person who enters confined space must verify that all of the above valves are in their required positions, locks and/or tags are in place, and all energy sources have been effectively de-energized and isolated.
6. A confined space entry permit shall be posted at the entry site and all provisions listed on the permit will be completed.
7. Personnel entering steam or mud drum must have an attendant person positioned outside entry to assist during operation or emergency.
8. All entrants, attendants and confined space supervisors must be up-to-date on their Confined Space training
9. Comply with all requirements of the Confined Space chapter of the Lewis Glenn Safety Manual.



Boiler #2

<u>Check</u>	<u>Initial</u>
_____	_____
_____	_____
_____	_____

Main Steam Header:

1. Close steam main header valve #SH 1002. Chain and lock. Install lockout tag.
2. Close steam non-return valve #SH 1003. Chain and lock. Install lockout tag.
3. Open drain valves #SH 1898 and #SH 1743. Install lockout tags.

Steam and Mud Drum Entry:

Revised by "D"

10. Glenn Safety Office issues a confined space entry permit.
11. Notify ~~Fire Department~~ for CHI Protective Systems Office to schedule atmospheric testing.
12. ~~Fire station~~ Authorized CHI employee will conduct an atmospheric testing of the confined space and log the results on the posted permit.
13. Forced air ventilation system must be in place and operating properly.
14. Operator and person who enters confined space must verify that all of the above valves are in their required positions, locks and/or tags are in place, and all energy sources have been effectively de-energized and isolated.
15. A confined space entry permit shall be posted at the entry site and all provisions listed on the permit will be completed.
16. Personnel entering steam or mud drum must have an attendant person positioned outside entry to assist during operation or emergency.
17. All entrants, attendants and confined space supervisors must be up-to-date on their Confined Space training
18. Comply with all requirements of the Confined Space chapter of the Lewis Glenn Safety Manual.



Boiler #3

Steam and Mud Drum Entry:

Revised by "D"

- 19. Glenn Safety Office issues a confined space entry permit.
- 20. Notify ~~Fire Department~~ for CHI Protective Systems Office to schedule atmospheric testing.
- 21. ~~Fire station~~ Authorized CHI employee will conduct an atmospheric testing of the confined space and log the results on the posted permit.
- 22. Forced air ventilation system must be in place and operating properly.
- 23. Operator and person who enters confined space must verify that all of the above valves are in their required positions, locks and/or tags are in place, and all energy sources have been effectively de-energized and isolated.
- 24. A confined space entry permit shall be posted at the entry site and all provisions listed on the permit will be completed.
- 25. Personnel entering steam or mud drum must have an attendant person positioned outside entry to assist during operation or emergency.
- 26. All entrants, attendants and confined space supervisors must be up-to-date on their Confined Space training
- 27. Comply with all requirements of the Confined Space chapter of the Lewis Glenn Safety Manual.



Boiler #4

<u>Check</u>	<u>Initial</u>
_____	_____
_____	_____
_____	_____

Main Steam Header:

1. Close steam supply valves #SH 1008 (Header) and #SH 1007 (non-return). Install chains, locks, and lockout tags.
2. Open drain valves #SH 2629. Install lockout tag.
3. Verify closed steam supply to injector for feed water system. Valve #SH 1466 and #SH 1470.

Steam and Mud Drum Entry:

Revised by "D"

28. Glenn Safety Office issues a confined space entry permit.
29. Notify ~~Fire Department~~ for CHI Protective Systems Office to schedule atmospheric testing.
30. ~~Fire station~~ Authorized CHI employee will conduct an atmospheric testing of the confined space and log the results on the posted permit.
31. Forced air ventilation system must be in place and operating properly.
32. Operator and person who enters confined space must verify that all of the above valves are in their required positions, locks and/or tags are in place, and all energy sources have been effectively de-energized and isolated.
33. A confined space entry permit shall be posted at the entry site and all provisions listed on the permit will be completed.
34. Personnel entering steam or mud drum must have an attendant person positioned outside entry to assist during operation or emergency.
35. All entrants, attendants and confined space supervisors must be up-to-date on their Confined Space training
36. Comply with all requirements of the Confined Space chapter of the Lewis Glenn Safety Manual.



Boiler #5

<u>Check</u>	<u>Initial</u>	<u>Main Steam Header:</u>
_____	_____	1. <u>Close</u> main steam valve #SH 1010 (Header) and #SH 1009 (non-return). Install chains, locks, and lockout tags.
_____	_____	2. <u>Open</u> drain valves #SH 2615 and #SH 2624. Install locks and tags.
_____	_____	3. <u>Close</u> steam supply valves to fuel atomization system. Valves #SH 0753 and #SH 1501. Install locks and tags.

Steam and Mud Drum Entry:

Revised by "D"

- 37. Glenn Safety Office issues a confined space entry permit.
- 38. Notify ~~Fire Department~~ for CHI Protective Systems Office to schedule atmospheric testing.
- 39. ~~Fire station~~ Authorized CHI employee will conduct an atmospheric testing of the confined space and log the results on the posted permit.
- 40. Forced air ventilation system must be in place and operating properly.
- 41. Operator and person who enters confined space must verify that all of the above valves are in their required positions, locks and/or tags are in place, and all energy sources have been effectively de-energized and isolated.
- 42. A confined space entry permit shall be posted at the entry site and all provisions listed on the permit will be completed.
- 43. Personnel entering steam or mud drum must have an attendant person positioned outside entry to assist during operation or emergency.
- 44. All entrants, attendants and confined space supervisors must be up-to-date on their Confined Space training
- 45. Comply with all requirements of the Confined Space chapter of the Lewis Glenn Safety Manual.



Personnel Schedule for Boiler Operations (Sample)

Steam Plant (Building 12)

Shift	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Date							
10:30pm	Walker	Walker	Walker	Pavell	Pavell	Walker	Walker
6:30am	Krepps	Krepps	Krepps	Hardy	Hardy	Krepps	Krepps
6:30am	Sharp	Sharp	Sharp	Sharp	Sharp	Pavell	Hardy
2:30pm	Marquette	Marquette	Marquette	Marquette	Marquette	PT	PT
2:30pm	Pavell	Pavell	Gallik	Gallik	Gallik	Gallik	Gallik
10:30pm	Hardy	Hardy	Edgerton	Edgerton	Edgerton	Edgerton	Edgerton



Attachment 7

PROCEDURE TO CONVERT BLDG 500 BOILERS FROM NATURAL GAS PILOT TO PROPANE PILOT (Use schematic file drawing to follow procedure)

- WARNINGS:** — **1. CHANGE OVER TO FUEL OIL FROM OTHER FUEL SOURCES SHALL NOT BE CONDUCTED WHILE BOILERS ARE HOT. A 2-HOUR WAITING PERIOD SHALL BE PART OF THE SWITCH-OVER PROCESS**
- **2. NO SMOKING DURING THE FOLLOWING PROCEDURES**

STEP PROCEDURE

	Note: Items 1, 2 and 4 are for initial boiler only
1	Verify valves #3a, b, c are closed and valve #7 is closed, propane tanks are not connected
2	Verify propane bottles are detached from regulator hookups
3a	Start converting pilots one boiler at a time
3b	Close main natural gas valve "a" for boiler being converted (8, 9,10)
3c	Let boiler burn off natural gas
3d	Close natural gas valves b, c and d for boiler being converted and close valve #6
4a	Hook up propane bottles and open valve #7
4b	Check if regulator is operating properly pilot pressure column. See note below for instructions for regulator.*
5a	Open valve #3
5b	See if propane pilot lights off
	For Fuel Oil
6a	Follow Boiler Startup Procedure for using fuel oil except operating any natural gas valves as indicated in items 1-13b2
6b	See if pilot and main fuel lights off
	For Natural Gas
7a	Follow Boiler Startup Procedure for using natural gas except do not open valve d as indicated in item 13a1
7b	See if pilot and main fuel light off
	To convert back to a natural gas pilot
8a	Close valve #3 for the first boiler to be converted and allow pilot to burn out. Verify valve #6 is closed.
8b	Open valve #6 and vent system
9	Follow procedure for starting boiler
10	Repeat procedure for each boiler
11	After each boiler is converted disconnect propane bottles and vent system

NOTE: Building 500 boilers are no longer connectable to fuel types other than natural gas.



~~**NOTE - The high pressure regulator on the "service" side will deliver gas from the service cylinder until the pressure within the cylinder drops to approximately 6 pounds per square inch. The regulator on the "reverse" side will then automatically begin drawing gas from the reserve cylinder.~~

~~When the indicator on the Certimatic shows red, the spent cylinder should be replaced. The arrow on the handle indicated which is to be removed.~~

~~The Cerimatic permits easy cylinder replacement. First the handle is rotated to show which cylinder is now being used (it becomes the new "service" cylinder) and to change the indicator back to white. The cylinder valve on the exhausted cylinder is then closed. Its POL pigtail connection is broken and the cylinder is removed.~~

~~The replacement cylinder is now located in position. Its POL connection is make leak-tight and its cylinder valve is opened.~~

~~For more information see instruction sheet.~~

OPS-500-NG _____ Revised 8/16/05



PROPANE CONNECTION PROCEDURE FOR BUILDING 12

Boiler #1

1. Close valves FN 1717 and FN 1838
2. Install plugs
3. Connect propane tank to valve FN1839 for burner #1 & FN 1718 for burner #2

Boiler #2

1. Close valves FN 1841 and FN1783
2. Install plugs
3. Connect propane tank to valve FN 1845 for burner #1 and FN 1842 for burner #2

Boiler #3

Revised by "D"

Boiler #3 has no connection for propane pilot hook up. ||

Boiler #4

No tag numbers for burner #1

1. Close valve FN 1832
2. Install plug
3. Connect propane tank to valve FN 1833 for burner #2

Boiler #5

1. Close valve 1835
2. Install plug
3. Connect propane tank (no tag)

OPS-12-PC

Document added 04/01/11

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**TO START #5 BOILER ON #2 FUEL OIL WITH
A GAS PILOT START UP**

Revised by "D"

NOTE: CHANGE-OVER TO FUEL OIL OPERATIONS SHALL NOT BE CONDUCTED WHILE BOILERS ARE HOT. A 2-HOUR WAITING PERIOD SHALL BE PART OF THE SWITCH-OVER PROCESS.

1. Adjust forced draft fan damper to oil position
2. Close steam and fuel oil valves at main burner assembly
3. Start fuel oil transfer pumps
4. Start both main fuel oil pumps at rear of boiler
5. Remove nut from gas linkage and remove linkage
6. Close both main gas valves leaving gas pilot valve open
7. Take nut from gas linkage and hook up oil linkage arm and install nut and tighten
8. Insert oil nozzle into burner assembly, line up steam and fuel oil ports and swing up clamp support and tighten
9. Loosen square headed bolt at 12:00 position and push burner nozzle in till you have a $\frac{3}{4}$ " between the purple peeper and the steam line. Tighten bolt at 12:00 and secure
10. Open the 3 condensate drains off atomizer station (labeled)
11. Crack open main steam to station atomizer and remove condensate
12. Close drains (3) after condensate removal
13. Open main steam to atomizer station
14. Open main steam valve to burner (where braided lines & gauges are)
15. Open main fuel oil to burner (where braided lines & gauges are)
16. Switch gas/oil selector switch to oil operation
17. Proceed to start boiler

OPS-12-GO

Document added 04/01/11

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**TO START #5 BOILER USING PROPANE
FOR PILOT START UP**

Revised by "D"

1. ~~You have to physically~~ Remove both unions and nipple and cap off the gas pilot line (close pilot gas valve).
2. Thread male adapter onto propane pilot line and hook up the female fitting off propane tank to the adapter
3. Open propane tank valve
4. Open ball valve to the pilot gas train
5. Proceed to start the boiler

OPS-12-GO

Document added 04/01/11

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TO START BOILERS #1, #2, #4 ON #2 FUEL OIL
WITH GAS PILOT

Revised by "D"

NOTE: CHANGE-OVER TO FUEL OIL OPERATIONS SHALL NOT BE CONDUCTED WHILE BOILERS ARE HOT. A 2-HOUR WAITING PERIOD SHALL BE PART OF THE SWITCH-OVER PROCESS.

1. Place gas/oil selector switch to oil on both burners
2. Close both main gas valves going to the burner
3. Leave pilot gas valve open for gas pilot start up
4. Open air atomizer valves to both burners
5. Open fuel oil valves to burner
6. Check oil level in air compressors
7. Start induced draft fan and place in automatic
8. Then proceed to start the boiler
9. Start fuel oil transfer pumps and place switch to auto

OPS-12-GO

Document added 04/01/11

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**TO START BOILERS #1 & #2 ON
A PROPANE PILOT**

1. You have to physically remove both unions and nipple and cap off gas line (pilot) with the gas pilot valve closed
2. Thread male adapter onto propane pilot line and hook up female fitting off propane tank to the male connection
3. Open propane tank valve
4. Open ball valve to pilot gas train
5. Proceed to start the boiler

Document added 04/01/11

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SWITCHING ORDER: S-112

Revised by "D"

SWITCHING TO EMERGENCY GENERATOR POWER IN BUILDING 12

Note: CHI-LV personnel **must** contact the GRC EPD prior to performing this switching order.

CHI-LV @ Bldg 12

1. **Verify Open** both the 480v and 208v "Emergency Tie Discs." located outside.
2. **Verify Open** both the FMCC01 Tie GEN Brk.(FMCC01 Brk. 7) and P0106TieGEN Brk.(P0106 Brk. 7).
3. **Plug in** both 480v and 208v umbilicals from generator (Yellow is 208v, Red is 480v).
4. **Start Generator** and **Verify proper Voltages & Frequency** at the generator.
5. **Contact** Steam Plant Operator to shut down plant.

When Notified that Steam Plant is down:

6. **Open** the B4H1BSM Brk.(FMCC01M), **Tag** E-xx,xxx (*PD assigned*), and perform **LO/TO**.
7. **Open** the P01M Brk., **Tag** E-xx-xxx (*PD assigned*), and **LO/TO**.
8. **Open** the P02M Brk., **Tag** E-xx-xxx (*PD assigned*), and **LO/TO**.
9. **Close** the P02Tie 01 (P02 Brk. 9) and **Notify** the EPD; PT-125 remains.
10. **Close** both the 480v and 208v main brks. feeding transformer located on the generator.
11. **Verify the Voltages and Phase Rotation** at the discs. outside.
12. **Close** both the 480v and 208v "Emergency Tie Discs."
13. **Notify** the EPD and Steam Plant Operator of tying Emergency Generator Power to Bldg.12.
14. **Close** the FMCC01 Tie GEN (FMCC01 Brk. 7).
15. **Close** the P0106TieGEN (P0106 Brk. 7)
16. **Notify** the Steam Plant Operator and EPD that the Generator Tie to Bldg. 12 is completed, and the boilers can be brought on line (one at a time).

EMER GEN

Document added 04/01/11



This Switching will continue when Tag Exx-xxx is released.

CHI-LV @ B.12

17. **Contact** Steam Plant Operator to shut down plant.

When Notified that Steam Plant is down:

- 18. **Open** the FMCC01 Tie GEN (FMCC01 Brk. 7).
- 19. **Open** the P0106TieGEN (P0106 Brk. 7).
- 20. **Open** both the 480v and 208v "Emergency Tie Discs."
- 21. **Open** both the 480v and 208v main brks. feeding transformer located on the generator.
- 22. **Open** the P02Tie01 (P02 Brk. 9); PT-125 remains.
- 23. **Remove** LO/TO & Tag E-xx,xxx (*PD assigned*) and **Close** the P02M Brk.
- 24. **Remove** LO/TO & Tag E-xx,xxx (*PD assigned*) and **Close** the P01M Brk.
- 25. **Remove** LO/TO & Tag E-xx,xxx (*PD assigned*), **Close** the B4H1BSM Brk.(FMCC01M), and **Notify** the EPD.
- 26. **Contact** Steam Plant Operator to start up plant.
- 27. Shut down Generator.
- 28 Unplug both 480v and 208v umbilicals from generator.

This completes S-112

EMER GEN

Document added 04/01/11



EMERGENCY CALL PROCEDURE

MAIN STEAM PLANT, DEB, AND OUTLYING BOILER OPERATIONS:

Notify dispatch (911) of fire, or other hazardous conditions that would require their support or building evacuation.

Notify steam plant foreman/CHI of any emergency:

- Billy Sharp 216-961-1277
- Don Musick 216-533-6866
- Scott Marabito 216-534-8360

Steam Plant Foremen will determine which trade group supervisor should be called by the fire station.

Boiler operator will then call the fire station if CHI is needed and explain the emergency to them. CHI will notify their appropriate supervisor.

CALL GOVERNMENT COTR IF NECESSARY:

- Bob Vanek 216-704-9367

EMER CALL

Document added 04/01/11

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BUILDING 500 BOILER ROOM EVACUATION PROCEDURE

1. If a fire alarm sounds, evacuate through the nearest safe exit available
2. Wait outside at designated building assembly area so all personnel can be accounted for
3. Upon Fire Department arrival, the supervisor shall be the liaison between the Boiler Operators and the Fire Department
4. No re-entry into the building shall be permitted without approval from the on-site Fire Department official in charge
5. If it becomes necessary for a qualified boiler operator to re-enter the building to shut down certain systems, this will be accomplished ONLY under the direction and supervision of the on-site Fire Department official in charge

Document added 04/01/11

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