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REVISION/CHANGE LOG			
Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
FR0	Initial Bluesheeting	All	10/20/2017
FR1	Non-Intent Revision to Incorporate Bluesheeting Changes and Update to Current Form	All	11/27/2017
FR2	Clarification of work steps 6.2.4, 6.2.12, 6.3.5, 6.3.6, added new 6.3.7 and 6.3.8, and clarified 6.3.12.	6, 7, and 8	3/27/2018
FR2A	Periodic Review has been completed with no changes identified in procedure technical content. Nonintent change to correct subject matter area, subject matter expert, approver and dates has been incorporated per CP3-NS-2001. Date for review cycle has been reset.	All	9/21/2021
FR3	General revision.	All	6/21/2022

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1.0 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this procedure is to define the required equipment and action steps necessary to perform monthly, quarterly and annual maintenance at the Northwest Plume Groundwater System (NWPGS), Treatment Facility C-612.

1.2 Scope

This procedure applies to monthly, quarterly, or annual maintenance of the air compressor skid, ion exchange trailer air compressor, air dryer system, equalization (EQ) pump and air stripper skid at the C-612 Treatment Facility.

2.0 REFERENCES

2.1 Use References

- CP2-ER-0012, *Waste Management Plan for the Pump-and-Treat Operations at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*
- CP2-ER-0046, *Paducah Plume Operations Maintenance, Sampling and Analysis, and Calibration and Testing Plan*
- CP3-ES-0003, *Environmental Incident Reporting*
- CP3-HS-2010, *Instructions for Lockout/Tagout*
- CP3-OP-0207, *Use of Procedures*
- CP3-OP-0208, *Required Reading/Crew Briefing*
- CP3-SM-1101, *Work Package Development*
- CP3-TR-0102, *Conduct of Training*
- CP4-ER-0001, *Northwest Groundwater System Startup and Shutdown of the Air Compressors*
- CP4-ER-0014, *Normal Northwest Plume Groundwater Shutdown and Restart*
- CP4-ER-0017, *Northwest/Northeast Plume Daily Operational Data Collection and Maintenance*

2.2 Source References

- CP2-ER-0067, *Health and Safety Plan for the Paducah Plumes Operations and C-613 Sediment Basin Paducah, Kentucky*
- DOE/LX/07-2469&D2, *Operation and Maintenance Plan for the Northwest Plume Groundwater System Interim Remedial Action at the Paducah Gaseous Diffusion Plant Paducah, Kentucky*
- JHA-10844, *Maintenance, Operations, and Testing for the Northwest and Northeast Plume and Water Treatment Operations*

3.0 COMMITMENTS

None

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4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

4.1.1 Individuals who are assigned to the following position(s) with performance responsibilities are trained as required by the Training Position Description (TPD) for the position according to CP3-TR-0102, *Conduct of Training*, and CP3-OP-0208, *Required Reading/Crew Briefing*:

- Maintenance Mechanic
- Operator

4.1.2 Maintenance personnel must be familiar with the operation of the air compressor skid before initiation of this procedure.

4.1.3 Additional training consists of a walk down of air compressor skid operation and this procedure by the Pump and Treat Operations Manager or designee.

4.1.4 Personnel performing maintenance will have current Lockout/Tagout (LOTO) training as required by the task being performed.

4.1.5 Any environmental incident shall be reported promptly to the PSS according to C3-ES-0003, *Environmental Incident Reporting*.

4.1.6 Personnel shall wear Personnel Protective Equipment (PPE) as follows:

- Hearing protection required when posted or noise levels exceed 85 dB over an 8 hour TWA (for example, generators, impact tools, heavy equipment, etc.)
- Safety Glasses w/ Side Shields
- Steel-Toe Safety Boots
- TCE Compatible Gloves (as necessary when handling TCE contaminated pump, piping, or liquid) - Supreno EC Mircoflex Nitrile, Showa 730, or equivalent Approved Glove from IH
- Tychem 5000 Apron and Sleeves or Silver Shield Apron and sleeves are required, if more than incidental body contact with TCE contaminated liquid or material is expected
- PPE as specified by Radiologic Work Permit (RWP) and/or Industrial Hygiene/Radiological Control

4.2 Limitations

None

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5.0 PREREQUISITES

- 5.1 Prior to performing any action steps identified in this procedure for the first time, review this document based upon its level of use according to CP3-OP-0207, *Use of Procedures*.
- 5.2 Prior to using this procedure as a work control document, follow the requirements as defined in CP3-SM-1101, *Work Package Development*, for the activities being performed.
- 5.3 Ensure the following special equipment and supplies are available:
- Gardner Denver Oil Filter Part #2116128 (or equivalent)
 - Gardner Denver Oil Separator Part #2116717 (or equivalent)
 - Gardner Denver Air Filter Part #2116150 (or equivalent)
 - Summit SH46 Synthetic Oil (or equivalent)
 - Hankison Oil Removal Filter Part #E3-36-13 (or equivalent)
 - Hankison Air Line Particulate Filter Part #E7-32-10 (or equivalent)
 - Hankison T-Series Air Line Filter Part #07-31-3 (or equivalent)
 - Ingersoll Rand All Season Select Lubricant Part #38436721 (or equivalent)
 - Ingersoll Rand Single Stage Air Compressor Filter Part #32170979 (or equivalent)
 - Strap Wrench
 - Oil Absorbent Pads
 - Oil Containment Pan
 - Oil Containment Bucket

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6.0 INSTRUCTIONS

6.1 Preparation Activities

Maintenance Mechanic and Technician

- 6.1.1 Don required PPE as outlined in Step 4.1.6.
- 6.1.2 Ensure all tools and supplies are available before executing this procedure.

6.2 Monthly Air Filter Maintenance for Air Compressor Skid (J-012)

NOTE:

Good housekeeping and proper disposal should be practiced at all times to clean any trash/debris.

Technician

- 6.2.1 Shut down the NWPGS according to CP4-ER-0014, *Normal Northwest Plume Groundwater Shutdown and Restart*.
- 6.2.2 Shut down the air compressors according to CP4-ER-0001, *Northwest Groundwater System Startup and Shutdown of the Air Compressors*.
- 6.2.3 Switch breaker #5 in power panel PP-1 to the OFF position.

Maintenance Mechanic

- 6.2.4 Place single source LOTO on breaker #5 in power panel PP-1 according to CP3-HS-2010, *Instructions for Lockout/Tagout*.
- 6.2.5 Attempt to start each air compressor to confirm the air compressors will **NOT** start.
- 6.2.6 **If** an air compressor does start, **then STOP and** contact the Front Line Manager (FLM) or Facility Manager prior to performing work.
- 6.2.7 Remove air compressor panels as necessary to expose aftercooler and air filter housing.
- 6.2.8 Check for buildup of debris on the aftercooler **and if** necessary, **then** clean.
- 6.2.9 Inspect **and** replace air filter as necessary.
- 6.2.10 Reinstall air compressor panels.
- 6.2.11 Repeat Steps 6.2.7 through 6.2.10 for each air compressor.
- 6.2.12 Remove single-source LOTO lock from breaker #5 in power panel PP-1.

Technician

- 6.2.13 Switch breaker #5 in power panel PP-1 to the ON position.

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Technician

6.2.14 Restart the air compressors according to CP4-ER-0001.

6.2.15 Restart the NWPGS according to CP4-ER-0014.

6.3 Quarterly Oil System Maintenance for Air Compressor Skid

Technician

6.3.1 Shut down the NWPGS according to CP4-ER-0014.

6.3.2 Shut down the air compressors according to CP4-ER-0001.

6.3.3 Switch breaker #5 in power panel PP-1 to the OFF position.

Maintenance Mechanic

6.3.4 Place single source LOTO on breaker #5 in power panel PP-1.

6.3.5 Attempt to start each air compressor to confirm the air compressors will **NOT** start.

6.3.6 **If** an air compressor does start, **then** STOP and contact the FLM or Facility Manager prior to performing work.

6.3.7 Remove panels to expose oil filter, oil separator, and aftercooler.

6.3.8 Bleed pressure off the oil system through the air relief valve located above the oil separator located on the compressor.

6.3.9 Place oil drain pan or bucket under the oil filter **and** remove the oil filter.

6.3.10 Fill the new oil filter with new Summit SH46 (or equivalent) oil **and** reinstall it on the air compressor.

6.3.11 Check for correct oil level in the oil tank **and** add oil as necessary.

6.3.12 Repeat Steps **6.3.7** through **6.3.11** for the second air compressor.

6.3.13 Remove single-source LOTO lock from breaker #5 in power panel PP-1.

Technician

6.3.14 Switch breaker #5 in power panel PP-1 to the ON position.

6.3.15 Restart the air compressors according to CP4-ER-0001.

6.3.16 Check for oil leaks.

6.3.17 Restart the NWPGS according to CP4-ER-0014.

6.3.18 Dispose of all waste according to CP2-ER-0012, *Waste Management Plan for the Pump-and-Treat Operations at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky.*

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NOTE:

The oil in the air compressors is changed annually or sooner depending on operational conditions.

6.4 Annual Oil System Maintenance for Air Compressor Skid

Technician

- 6.4.1 Shut down the NWPGS according to CP4-ER-0014.
- 6.4.2 Shut down the air compressors according to CP4-ER-0001.
- 6.4.3 Switch breaker #5 in power panel PP-1 to the OFF position.

Maintenance Mechanic

- 6.4.4 Place single source LOTO on breaker #5 in power panel PP-1.
- 6.4.5 Attempt to start each air compressor to confirm the air compressors will **NOT** start.
- 6.4.6 **If** an air compressor does start, **then** STOP and contact the FLM or Facility Manager prior to performing work.
- 6.4.7 Remove air compressor side panel to expose oil filter, oil separator, and aftercooler.
- 6.4.8 Bleed pressure off the oil system through the air relief valve located above the oil separator.
- 6.4.9 Place oil drain pan or bucket under the oil filter **and** remove the oil filter.
- 6.4.10 Connect a drain line to the drain valve located at the bottom of the air compressor.
- 6.4.11 Drain the oil from air compressor into a collection pan or bucket.
- 6.4.12 Fill the new oil filter with new Summit SH46 (or equivalent) oil **and** reinstall it on the air compressor.
- 6.4.13 Remove the drain line from the bottom of the oil separator **and** remove the oil separator.
- 6.4.14 Install the new oil separator **and** reattach the drain line.
- 6.4.15 Close the compressor oil drain valve **and** refill the tank with new Summit SH46 (or equivalent) oil according to capacities listed below:
 - Reservoir capacity to FULL level – 2.5 U.S. Gallons
 - System capacity (reservoir plus oil cooler and piping) – 3.5 U.S. Gallons
 - Add range to FULL level – 3.0 U.S. Quarts
- 6.4.16 Remove single-source LOTO lock from breaker #5 in power panel PP-1.

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Technician

- 6.4.17 Switch breaker #5 in power panel PP-1 to the ON position.
- 6.4.18 Restart the air compressors according to CP4-ER-0001.
- 6.4.19 Check for oil leaks once each compressor has started.
- 6.4.20 Restart the NWPGS according to CP4-ER-0014.
- 6.4.21 Dispose of all waste according to CP2-ER-0012.

6.5 Annual Maintenance for the Ion Exchange Trailer Air Compressor

Technician

- 6.5.1 Confirm backwash of the Ion Exchange vessel(s) is **NOT** taking place.
- 6.5.2 Set the air compressor power switch lever to the OFF position.
- 6.5.3 Disconnect the air compressor power cord from the receptacle.
- 6.5.4 Bleed air pressure from the air compressor receiver using the Main Air Supply Bleed Valve PV-32.

Maintenance Mechanic

- 6.5.5 Place an oil containment pan under the oil drain plug.
- 6.5.6 Remove oil drain plug **and** drain oil from the air compressor.
- 6.5.7 Replace the oil drain plug **and** fill the crankcase with Ingersoll Rand All Season Select (or equivalent) lubricant.
- 6.5.8 Unscrew **and** remove air filter assembly wing nut.
- 6.5.9 Remove air filter cover, baffle, **and** element from the base.
- 6.5.10 Install new air filter assembly.
- 6.5.11 Reinstall **and** tighten air filter assembly wing nut.

Technician

- 6.5.12 Plug in the air compressor power cord to the receptacle.
- 6.5.13 Set the air compressor power switch lever to the AUTO/ON position.
- 6.5.14 Dispose of all waste according to CP2-ER-0012.

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6.6 Annual Maintenance for Air Dryer System

Technician

- 6.6.1 Shut down the NWPGS according to CP4-ER-0014.
- 6.6.2 Shut down the air compressor skid according to CP4-ER-0001.
- 6.6.3 Switch breaker #5 in power panel PP-1 to the OFF position.

Maintenance Mechanic

- 6.6.4 Place single-source LOTO lock on breaker #5 in power panel PP-1.

Technician

- 6.6.5 Relieve pressure from the system by opening Auxiliary Compressed Air Supply Valves HV-031, HV-031A, **and** Air Pressure Safety Valves PSV-A4-1 and PSV-A4-2.

Maintenance Mechanic

- 6.6.6 Confirm the pressure of the air dryer system has been relieved by checking pressure indicating gauge PI-J012C.
- 6.6.7 Remove Oil Removal Filters A3-A and A3-B.
- 6.6.8 Apply anti-seize compound to the threads **and** install new oil removal filters.
- 6.6.9 Remove airline particulate filter A5-A and airline particulate filter A5-B.
- 6.6.10 Apply anti-seize compound to the threads **and** install new airline particulate filters.
- 6.6.11 Remove the T-Series airline filter at the discharge of the air dryer.
- 6.6.12 Apply anti-seize compound to the threads **and** replace the T-Series airline filter.
- 6.6.13 Check the purge muffler filter cartridges **and** replace if required.
- 6.6.14 Remove the single-source LOTO lock from breaker #5 in power panel PP-1.

Technician

- 6.6.15 Switch breaker #5 in power panel PP-1 to the ON position.
- 6.6.16 Restart air compressor system according to CP4-ER-0001.
- 6.6.17 Restart the NWPGS according to CP4-ER-0014.
- 6.6.18 Dispose of all waste according to CP2-ER-0012.

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6.7 Quarterly Maintenance of Equalization (EQ) Pump (J-005)

Technician

6.7.1 Shut down the NWPGS according to CP4-ER-0014.

Maintenance Mechanic

- 6.7.2** Place the EQ pump disconnect in the OFF position.
- 6.7.3** Drain the oil from the bearing housing into an appropriate container.
- 6.7.4** Refill the bearing housing with Pacemaker 100 oil (or equivalent).
- 6.7.5** Place the EQ pump disconnect in the ON position.

Technician

- 6.7.6** Restart the NWPGS according to CP4-ER-0014.
- 6.7.7** Dispose of all waste according to CP2-ER-0012.

6.8 Quarterly Maintenance on the Air Stripper Skid (J-006)

Technician

6.8.1 Shut down the NWPGS according to CP4-ER-0014.

Maintenance Mechanic

WARNINGS:

Non-Essential personnel shall stay clear while disconnect is being opened.

Personnel operating disconnect must **NOT** stand in front of or directly face the disconnect when operating.

- 6.8.2** Place the Air Stripper SKID disconnect in the OFF position.
- 6.8.3** Drain the oil from the Air Stripper pump into an appropriate container.
- 6.8.4** Refill the Air Stripper pump with Pacemaker 100 oil (or equivalent).
- 6.8.5** Place the Air Stripper SKID disconnect in the ON position.

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Technician

6.8.6 Restart the NWPGS according to CP4-ER-0014.

6.8.7 Dispose of all waste in according to CP2-ER-0012.

7.0 ACCEPTANCE CRITERIA

None

8.0 POST PERFORMANCE WORK ACTIVITIES

Technician/FLM/Facility Manager

Record all operational activities and maintenance according to CP4-ER-0017, *Northwest/Northeast Plume Daily Operational Data Collection and Maintenance* and CP2-ER-0046, *Paducah Plume Operations Maintenance, Sampling and Analysis, and Calibration and Testing Plan*.

9.0 RECORDS

9.1 Records Generated

The following records may be generated by this procedure:

None

Forms are to be completed according to CP3-OP-0024, *Forms Control*.

9.2 Records Disposition

The records are to be maintained according to CP3-RD-0010, *Records Management Process*.

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Appendix A – Acronyms/Definitions

ACRONYMS

EQ – Equalization

FLM – Front Line Manager

LOTO – Lockout/Tagout

NWPGS – Northwest Plume Groundwater System

PPE – Personal Protective Equipment

RWP – Radiologic Work Permit

TPD – Training Position Description

DEFINITIONS

TECHNICIAN - The person performing the steps of this procedure. The person performing this work could have job functions including the Operator, or Maintenance Mechanic.