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CP4-ER-0029 **FRev. 2**	**TITLE**: Ion Exchange Resin Change Out in the Northwest Plume Groundwater System	Page 1 of 19

DOCUMENT CATEGORY: ☐ Administrative ☒ Technical

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REVISION/CHANGE LOG

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FR0	Initial Release	All	09/21/2020
FR1	General Revision	All	4/22/2021
FR1A	Updated step 6.4.4 and added a note above the step.	14	5/6/2021
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1.0 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this procedure is to define the required equipment and steps necessary to perform ion exchange resin sluicing or vacuuming in the Northwest Plume Groundwater System (NWPGS), at the C-612 Facility.

1.2 Scope

This procedure applies to Paducah Gaseous Diffusion Plant (PGDP) Deactivation & Remediation (D&R) Contractor Environmental Remediation Personnel performing activities associated with ion exchange resin change out of the four ion exchange vessels (Vessel A, Vessel B, Vessel C, and Vessel D) in the NWPGS.

2.0 REFERENCES

2.1 Use References

- CP2-WM-0001, *Four Rivers Nuclear Partnership, LLC, Paducah Deactivation and Remediation Project Waste Management Plan*
- CP3-HS-2009, *Stop/Suspend Work*
- CP3-HS-2014, *Fall Prevention and Protection*
- CP3-HS-2055, *Confined Space*
- CP3-OP-0207, *Use of Procedures*
- CP3-SM-0050, *Threaded Fasteners on Pressure Boundaries, Structural Steel, and Plant Equipment*
- CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*
- CP3-WM-3015, *Waste Packaging*
- CP4-ER-0008, *Startup and Normal Operations of the C-612 Northwest Plume Groundwater System Following Long Term Shutdown*
- CP4-ER-0010, *Manual Backwash of the Ion Exchange System in the C-612 Northwest Plume Groundwater System*
- CP4-ER-0011, *Solids Dewatering in the C-612 Northwest Plume Groundwater System*
- CP4-ER-0014, *Normal Northwest Plume Groundwater System Shutdown and Restart*

2.2 Source References

- CP2-ER-0067, *Health and Safety Plan for the Paducah Plumes Operations and C-613 Sediment Basin Paducah, Kentucky*
- CP2-SM-1000, *Activity Level Work Planning and Control Program for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*
- CP3-SM-1101, *Work Package Development*
- DOE/LX/07-2469&D2 *Operations and Maintenance Plan for the Northwest Plume Groundwater Containment System Interim Remedial Action Plan at PGDP Paducah, Kentucky*

- Job Hazard Analysis-10844, *NW, NE Plumes, Water Treatment System*
- Operation and Maintenance Manual for the Ion Exchange System Trailer, *Job 3171, ProAct, June 2015*

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

4.1.1 Local Exhaust Ventilation (LEV) is recommended when feasible.

4.1.2 Safety glasses shall be worn when performing work activities listed in this procedure.

4.1.3 General building ventilation for C-612 shall be utilized when performing removal activities.

4.1.4 Cut resistant or leather gloves shall be utilized for handling items with sharp edges or corners.

4.1.5 **If** more than incidental body contact with Trichloroethylene (TCE) contaminated liquid or Ion Exchange Resin is expected, **then** single layer Tychem 5000 Apron and sleeves or Silver Shield Apron and sleeves are required.

4.1.6 Instructions provided by the Radiological Control Technicians (RCT's) shall be followed.

4.1.7 RCT shall be contacted prior to entering any Contamination Areas.

4.1.8 Radiological signs and postings shall be followed.

4.1.9 Questions regarding radiological protection should be directed to RCT Supervisor, Radiation Protection Project Manager (RPPM), or Radiological Engineer.

4.1.10 Personal Protective Equipment (PPE) and requirements of Radiological Work Permit (RWP) shall be followed.

4.1.11 Chemical Gloves (Supreno EC Microflex Nitrile, Showa 730 gloves or equivalent) shall be worn when handling the TCE contaminated Ion Exchange Resin.

4.1.12 Industrial Hygiene (IH) Monitoring shall take place for Ion Exchange Resin Removal Activities.

4.2 Limitations

4.2.1 The breakthrough time of Showa 730 gloves is 4 hours for TCE. Showa 730 gloves shall **NOT** be used for more than 4 hours after contact with TCE contaminated Ion Exchange Resin refer to Job Hazard Analysis-10844, *NW, N*E *Plumes, Water Treatment System,* for additional information.

4.2.2 TCE: A sustained instrument response at or above the action limit of 5 ppm in Breathing Zone (BZ) shall require a work pause with removal of personnel from the area and notification to the IS/IH supervisor and Front Line Manager (FLM).

4.2.3 **When** IH sampling results are greater than action limit of 5 ppm TCE in BZ, **then** a Mine Safety Appliance (MSA) full-face air purifying respirator with an MSA organic vapor/P100 (OV/P100) canister is required.

4.2.4 The Maximum Use Concentration (MUC) for the OV/P100 canister is 350 ppm. The canister is rated for escape from concentrations up to 5,000 ppm.

4.2.5 Occupational Exposure Limit for TCE is, 8 hour Time Weighted Average (TWA) = 10 ppm, 10 hour TWA = 7 ppm, Action Limit = 5 ppm, Short Term Exposure Limit (STEL) = 25 ppm, and Immediately Dangerous to Life or Health (IDLH) = 1000 ppm.

5.0 PREREQUISITES

5.1 All persons performing work in a confined space and their front line management shall have Confined Space Training.

5.2 All persons entering an enclosed space (entrants) shall be aware of the hazards prior to entering.

5.3 IH shall be contacted prior to Confined Space entry for monitoring requirements.

5.4 **If** necessary, **then** specific requirements shall be communicated and coordinated between support organizations (i.e., Fire Services, Radiological Control, Plant Shift Superintendent, Medical, etc.).

5.5 All applicable requirements of CP3-HS-2055, *Confined Space* shall be followed for guidance and implementation where applicable to Permit Required Confined Spaces or Non-Permit Required Confined Spaces

5.6 Prior to performing any action steps for the first time, users shall have reviewed this document based upon its level of use in accordance with CP3-OP-0207, *Use of Procedures*.

5.7 All applicable requirements of the company Lock Out/Tag Out (LOTO) Program shall be followed.

5.8 **If** activities have been determined to be a Permit Required Confined Space, **then** the specific Confined Space permit for hazards and controls shall be followed.

5.9 **If** fall hazards exist, including in **or** around a confined space, **then** requirements in procedure CP3-HS-2014, *Fall Prevention and Protection*, shall be followed.

5.10 Personnel shall Stop/Suspend work according to CP3-HS-2009, *Stop/Suspend Work* and consult with supervision or Industrial Safety (IS)/IH whenever there is believed to be a safety concern or changed condition.

5.11 Prior to entry, the Facility Manager shall be contacted for Confined Space requirements per the Confined Space process.

5.12 Engineering shall provide oversite of activities performed under this procedure.

5.13 Prior to performing the action steps identified in this procedure, the performers shall have completed the required applicable training.

5.14 Personnel shall be made familiar with the hazards associated with exposure to TCE and RAD/Tc-99 and review Safety Data Sheets.

5.15 Waste generated shall be managed according to CP2-WM-0001, *Four Rivers Nuclear Partnership, LLC, Paducah Deactivation and Remediation Project Waste Management Plan*.

5.16 Waste management shall be contacted and a CP2-WM-0011-F02, *Request for Disposal Form* and CP2-WM-0011-F03, *Request for Disposal RCRA Regulatory Codes-Attachment B* completed (if applicable).

5.17 Waste generated during this procedure shall be staged according to CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*, during the characterization period and prior to treatment/disposal.

5.18 Each container of waste shall be documented on form CP3-WM-3015 F01, *Waste Item Container Log.*

5.19 Waste containers shall be labeled according to CP3-WM-3015, *Waste Packaging*.

5.20 Waste containers shall be stored in an appropriate storage area set up by Waste Management Group according to CP3-WM-1037.

5.21 The execution of this procedure requires the use of the following equipment and supplies. Equipment quantities and sizes are detailed here only as a guide and can be changed as necessary.

- ST-90 container (Or another appropriate container approved by Engineering)
- Container Liner
- 15 ft. x 20 ft. sheet of geotextile fabric material (not to exceed a U.S. Standard screen of 16 mesh)
- Six wood blocks (4 in. X 4in. X 6 in.)
- Metal Bar grating (2 grates cut 3 ft. X 4 ft.). A 6 in. X 6 in. corner must be cut out of one of the grates
- Polyvinyl chloride (PVC) pipe (3 ft. section of 1 ½ in.)
- Two 1 ½ in. 90-degree PVC socket fittings
- Bottom suction skimmer with 1 ½ in. PVC female pipe connector
- 1 ½ in. PVC female adapter
- 1 ½ in PVC male adapter
- Roll of 4-mil plastic sheeting

- Duct tape
- PVC extension pipe
- 2 in. ball valve
- 2 in X 8 in. pipe nipple
- HEPA Vacuum System
- Secondary containment pans (As needed)
- One piece of 12 in. X 12 in. X ¼ in. plexiglass
- Ratchet and socket or wrench
- Anticorrosion pad

Operations Personnel

6.0 INSTRUCTIONS

6.1 Preparation Activities

NOTES:

Perform steps sequentially unless otherwise noted. Ion exchange resin change out can be accomplished multiple ways. This procedure will demonstrate how either Resin Sluicing or Vacuum Extraction can be accomplished at the NWPGS facility.

Some preparation activities/steps may be omitted depending on the method of accomplishment selected (e.g. Vacuuming, Resin Sluicing) and the amount of dewatering necessary. Engineering shall be contacted for guidance on omitting steps depending on field conditions.

6.1.1 Remove the bolts securing the lid to the ST-90 container **and** pry the lid to break the seal.

6.1.2 Remove the lid and place it out of the way.

6.1.3 Line the bottom of container with an anticorrosion pad.

6.1.4 Insert the plastic liner in the ST-90 container and drape edges over the sides of the container.

6.1.5 Cut the 1 ½ in. PVC pipe into two 3 in. sections and one 30 in. section.

6.1.6 Attach one of the 3 in. sections of PVC to the 1 ½ in. male pipe adaptor connector on the bottom suction skimmer **and** attach a 90-degree PVC fitting to the other end.

6.1.7 Attach the other 3 in. section of PVC pipe to the other 90-degree PVC fitting, **and** then attach the opposite end to the 90-degree PVC fitting, previously attached to the skimmer, so that the 90-degree fitting is extending upwards.

6.1.8 Attach the 30 in. section of PVC pipe to the 90-degree fitting that is extending up from the skimmer.

6.1.9 Attach a 1 ½ in female threaded adapter to the 30 in. PVC pipe extending up.

6.1.10 Thread a 1 ½ in. quick disconnect to the female threaded adapter just installed.

6.1.11 Place a 12 in. X 12 in. X ¼ in piece of plexiglass at the corner of the ST-90 container.

6.1.12 Place the skimmer and piping on top of the plexiglass at the corner of the ST-90 container installed in previous step.

NOTE:

Care should be taken **NOT** to tear the ST-90 container liner. ST-90 container liners that are torn or punctured at any time shall be removed and replaced with a new liner.

6.1.13 Place six 4 in. X 4 in. X 6 in. blocks of wood in the bottom of the ST-90 container to support each corner and the middle of the grating that will be placed in the container.

6.1.14 Place the two sections of bar grating in the ST-90 container so that the section with the corner cut out fits around the suction piping. Make sure the wood blocks are positioned so that the grating is properly supported.

6.1.15 Place the geotextile fabric in the ST-90 container on top of the grating and push down in the corners and along the sides.

6.1.16 Drape the outer edges over the sides of the container and secure the fabric and plastic to the container.

6.1.17 Place the 4-mil plastic sheeting over the top of the ST-90 container and secure to the sides of outer walls of the ST-90, leaving a small section open for the insertion of the discharge nozzle.

6.1.18 Connect the 1 ½ in. dewatering pump hose to the quick-disconnect on the piping in the ST-90 container **and** connect the other end to the quick-disconnect on the resin dewatering pump.

6.1.19 Connect extension pipe and/or flexible hose to the resin sluice discharge valve (e.g. SLP-1, SLP-2, SLP-3, or SLP-4) of the vessel where resin is to be removed, if sluicing is the desired method.

NOTE:

Resin may be either vacuumed directly out of the vessels or at locations where it may be spilled during sluicing operations.

6.1.20 Setup vacuum system (e.g. Drum vacuum, Hurricane Vacuum, Vacuum Truck, or other engineering approved vacuum system) as necessary to support resin removal.

6.2 Resin Sluicing

6.2.1 **If** resin sluicing is the desired method, **then** verify the backwash/sluice tank (F-002) level is at least 80% as indicated by the level indicator on the K-100 panel.

6.2.2 **If** the backwash/sluice tank level is below 80%, **then** notify the Pump & Treat Operations Manager (or designee) to correct.

6.2.3 Verify that the settling tank (F-008) is less than 50% full.

6.2.4 **If** the settling tank is greater than 50% full, **then** perform the following:

A. Delay resin sluicing until the tank drains to below 50% full.

B. Perform solids dewatering in accordance with CP4-ER-0011, *Solids Dewatering in the C-612 Northwest Plume Groundwater System* until the tank drains to below 50% full.

6.2.5 **If** outside, **then** tape a 10 ft. X 15 ft. piece of 4 mil plastic sheeting on the ground **or** use secondary containment dykes.

6.2.6 **If** using plastic sheeting or secondary containment dykes, **then** center the ST-90 over the plastic sheeting or secondary containment dykes.

6.2.7 Position the ST-90 so that the corner with the skimmer is at the low point.

6.2.8 **If** necessary remove the bolts securing the lid to the ST-90 container **and if** necessary, **then** pry the lid to break the seal.

6.2.9 Shutdown the Northwest Plume system using procedure CP4-ER-0014, *Normal Northwest Plume Groundwater Shutdown and Restart*.

6.2.10 Align valves in accordance with Appendix B, *Valve Alignment for Ion Exchange Trailer Vessel Resin Change*, for the vessel being changed.

6.2.11 Verify that the UV-107 valve is in the CLOSED position at the K-100 panel and check the oil level in the backwash pump site glass.

NOTE:

The following step will energize the backwash pump (J-008), as indicated by the illumination of the green light on the master disconnect switch.

6.2.12 Press the “ON” button for the backwash/sluice pump on the main NWPGS control panel, K-100.

6.2.13 Slowly open the primary effluent block valve (e.g. PV-4, PV-5, PV-15, or PV-16) on the vessel where the resin is to be changed until the resin is floating more than three-fourths the way up the upper sight glass.

6.2.14 **When** the resin is suspended, **then** station an operator at the discharge nozzle placed into the ST-90.

6.2.15 Slowly open the corresponding resin sluice discharge valve (e.g. SLP-1, SLP-2, SLP-3, or SLP-4).

NOTES:

Additional back feeding may be required, as determined by Engineering or the Pump & Treat Operations Manager, if there is no movement of resin through the pipe.

6.2.16 Start the dewatering pump.

NOTE:

The dewatering pump may remain on through the entire operation to control the water level in the ST-90 container. During sluicing and dewatering operations, the dewatering process does **NOT** always keep pace with sluicing into the ST-90 container. Operations personnel may reduce or even temporarily suspend sluicing in order for dewatering operations to catch up.

6.2.17 Allow sluicing and dewatering to take place until there is no resin entering the ST-90 .

6.2.18 Continue to allow sluicing and dewatering for another 3-5 minutes to ensure residual resin has been removed from the piping.

6.2.19 **If** an additional ST-90 container is needed, **then** perform the following:

A. Close the primary sluicing block valve (e.g. SLP-1, SLP-2, SLP-3, or SLP-4) on the vessel where the resin is being changed.

B. Manage resin filled ST-90 container in accordance with CP3-WM-1037 and/or Waste Management direction.

C. Prepare a container per Section **6.1**.

D. **When** container is prepared, **then** resume sluicing operations by opening the primary effluent block valve on the vessel where the resin is being changed.

E. **If** an additional ST-90 container is needed, **then** repeat Step **6.2.19**.

NOTE:

Engineering or the Pump & Treat Operations Manager will inspect the vessel when sluicing is complete to determine if excessive residual resin remains in the vessel. If so, then vacuuming, as described in Section **6.3**, will be required.

6.2.20 **When** sluicing is complete, **then** close the primary sluicing block valve (e.g. SLP-1, SLP-2, SLP-3, or SLP-4) on the vessel where the resin is being changed.

6.2.21 Close the primary effluent block valve (e.g. PV-4, PV-5, PV-15, or PV-16) on the vessel where the resin is being changed.

6.2.22 Close valve PV-24.

NOTE:

The following step will de-energize the backwash pump (J-008), as indicated by the illumination of the red light on the master disconnect switch.

6.2.23 Press the “OFF” button for the backwash/sluice pump on the main NWPGS control panel, K-100 to turn off the pump.

6.2.24 Close Backwash/Sluice Pump Suction Valve Hand Valve (HV)-057.

6.2.25 Close Backwash/Sluice Pump Discharge Valve HV-060.

6.2.26 Close the Vessel A/B Backwash Influent Block Valve PV-25.

6.2.27 Close Auto Valve (AV) for the vessel being sluiced (e.g. AV1, AV2, AV3, or AV4) using the corresponding Air Supply Block Valve (e.g. PV-28, PV-29, PV-20, or PV-31).

6.2.28 Close the ion exchange trailer backwash effluent valve PV-24.

6.2.29 Open primary effluent sluicing block valve (e.g. SLP-1, SLP-2, SLP-3, or SLP-4) on the vessel where the resin is being changed.

6.2.30 Open the vent valve (e.g. ABV-1, ABV-2, ABV-3, or ABV-4) for the vessel being drained and drain all remaining water from the vessel to the C-612 system sump.

NOTE:

Dewatering of the ST-90 may last for several days. When waste (including waste water) is not being actively removed from, added to, or inspected in, the ST-90, then the ST-90 must be closed per Section **6.3.6** of CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*. If the ST-90 is located inside of the C-612 building, then closure can be achieved during the dewatering process by covering the ST-90 and extension pipe with a tarp and securing the tarp.

6.2.31 **When** all water has been sufficiently drained, **then** turn off resin dewatering pump.

6.2.32 Allow all water to drain and remove the extension pipe and/or flexible hose from the ST-90 and route to the C-612 sump for discharge.

6.2.33 Detach the geotextile fabric, which is folded over the edges, of the ST-90 container and fold the material in on top of the plastic.

6.2.34 Fold the container liner in and prepare to close the container.

6.2.35 Use the forklift to replace the lid.

6.2.36 Replace lid bolts and tighten.

6.2.37 Close the primary effluent sluicing block valve (e.g. SLP-1, SLP-2, SLP-3, or SLP-4) for the vessel being drained.

6.2.38 Close the vent valve (e.g. ABV-1, ABV-2, ABV-3, or ABV-4) for the vessel being drained.

6.2.39 Isolate the ion exchange vessel being changed in preparation of loading the new resin.

6.2.40 Open upper manway on the vessel being serviced.

6.2.41 **If** desired **and** resin level is below the lower manway, **then** open lower manway on vessel being serviced.

WARNING:

Confined space requirements shall be followed, as mentioned in Steps **5.1-5.11,** if necessary to vacuum out remaining resin or bedding residuals in the bottom of the vessel.

6.2.42 **If** necessary, **then** vacuum out any resin or bedding residuals in the bottom of the vessels per Section **6.3.**

6.2.43 **If** complete, **then** move to Section **6.4** to load the resin into the vessel.

6.3 Vacuuming Resin from Vessels

NOTES:

Different vacuum systems may be setup and used at the discretion of Engineering or the Pump & Treat Operations Manager.

Vacuum systems may be routed directly into the ST-90 or another approved container or may be routed into a drum and then repacked into the ST-90 or other approved container for dewatering operations.

6.3.1 Setup vacuum system per manufacturer instructions and engineering direction.

6.3.2 **If** outside, **then** tape a 10 ft. X 15 ft. piece of 4 mil plastic sheeting on the ground **or** use secondary containment dykes.

6.3.3 **If** using plastic sheeting or secondary containment dykes, **then** center the ST-90 over the plastic sheeting or secondary containment dykes.

6.3.4 Position the ST-90 so that the corner with the skimmer is at the low point.

6.3.5 Remove the bolts securing the lid to the ST-90 container and **if** necessary, **then** pry the lid to break the seal.

6.3.6 **If** the Northwest Plume system is **NOT** shutdown, **then** shutdown the Northwest Plume system using procedure CP4-ER-0014.

6.3.7 Close the Process Influent Block Valve for the vessel (e.g. PV-1, or PV-12) where the resin change is to be drained.

NOTE:

Resin may be vacuumed from the vessels while the media is either wet or dry. The vessels will have to be drained sufficiently to open the upper manway. After that, additional draining may be optional. An air source may also be connected to the vessel to push excess water out of the system but care should be taken to bleed any excess air pressure from the system prior to opening the vessel.

6.3.8 Open valve UV-107 or UV-110 to allow for the water in the system to be pushed out of the vessel.

NOTE:

Alternatively, you can disconnect the line after the vessel by closing the corresponding effluent block valve for the vessel (e.g. PV-4, PV-5, PV-15, or PV-16) and the corresponding lead and lag valves (PV-8, PV-9, PV-10, PV-11, PV-19, PV-20, PV-21, or PV-22) for the vessel being changed.

6.3.9 **If** desired, **then** connect an air supply to the vessel Air Bleed Valve and slowly open the valve to push water from the vessel into the system.

6.3.10 Once the vessel has been drained sufficiently to uncover the top manway the pressure or gravity drain may be removed **and if** necessary, **then** open the air bleed valve for the vessel being drained to atmosphere to vent excess pressure.

6.3.11 Close valve UV-107 or UV-110 to allow for the water in the system to be pushed out of the vessel.

NOTE:

Care should be taken to ensure the vessel has been depressurized by opening the Air Bleed Valve on the vessel being drained.

6.3.12 Open the upper manway on the vessel being drained.

NOTE:

Vacuum system discharge can be routed into the ST-90 or into a temporary holding drum.

6.3.13 Route vacuum hose to vacuum system from the upper manway and ensure hoses reach easily around working area.

6.3.14 Start the resin dewatering pump.

NOTE:

The resin dewatering pump may remain on through the entire operation to control the water level in the ST-90 container.

6.3.15 **When** the lower manway is accessible, **then** open it and relocate there for safer access.

NOTE:

During this time, vacuum extraction may have to cease to allow for resin dewatering or change out of containers.

6.3.16 **If** an additional ST-90 container is needed, **then** perform the following:

A. Turn off vacuum system operation.

B. Manage used ST-90 container in accordance with CP3-WM-1037 and/or Waste Management direction.

C. Prepare a container per Section **6.1**.

D. **When** container is prepared, **then** turn on vacuum system to resume vacuum operations.

E. **If** an additional ST-90 container is needed, **then** repeat Step **6.3.16**.

6.3.17 **When** resin extraction is complete, **then** turn off vacuum system operation.

NOTE:

Resin extraction is complete when the resin has been removed from the vessel to the extent practicable. The amount of residual resin must be approved by Engineering or the Pump & Treat Operations Manager.

6.3.18 **If** all water has been sufficiently drained, **then** turn off resin dewatering pump.

NOTE:

Dewatering of the ST-90 is a continuous process that may last for several days. When waste (including waste water) is not being actively removed from, added to, or inspected in the ST-90, then the ST-90 must be closed, per Section **6.3.6** of CP3-WM-1037, *Generation and Temporary Storage of Waste Materials*. If the ST-90 is located inside of the C-612 building, then closure can be achieved during the dewatering process by covering the ST-90 and extension pipe with a tarp and securing the tarp.

6.3.19 Allow all water to drain and remove the extension pipe and/or flexible hose from the ST-90 and route to the C-612 sump for discharge.

6.3.20 Detach geotextile fabric from the outer walls of the ST-90 and fold the material in on top of the plastic.

6.3.21 Fold the container liner in and prepare to close the container.

6.3.22 Use the forklift to replace the lid.

6.3.23 Replace lid bolts and tighten.

6.3.24 Manage ST-90 container in accordance with CP3-WM-1037 and/or Waste Management direction.

6.3.25 **If** complete, **then** move to Section **6.4** to load the resin into the vessel.

6.4 Loading Vessel with Resin

6.4.1 Prior to loading, request engineering to inspect vessel interior, vessel headers, and liner for defects.

6.4.2 Repair or mitigate defects if directed by engineering.

NOTES:

The lower manway will need to be closed as the height of the resin increases and the resin will be loaded from the upper manway.

A resin loader is located in the ion exchange trailer and is available for use.

6.4.3 As directed by engineering, load resin bedding into the vessel being changed to the desired height as determined by engineering.

NOTE:

A couple of examples of acceptable containers or methods are as follows: dumping the resin directly out of the bags into the vessel or using a 2-gallon bucket to dump the resin into the vessel.

6.4.4 Load new resin using an acceptable container or method that facilitates the loading **and** fill to the desired height as determined by engineering.

6.4.5 Clean up any spilled material using the designated vacuum and pick up equipment.

6.4.6 Ensure a suitable hatch gasket is in place, then close hatch and torque bolts according to CP3-SM-0050, *Threaded Fasteners on Pressure Boundaries, Structural Steel, and Plant Equipment* values in Appendix D or per Engineering direction using a torque wrench.

6.5 System Restart

6.5.1 Align valves to backwash the vessel that was changed per CP4-ER-0010, *Manual Backwash of the Ion Exchange System for the C-612 Northwest Plume Groundwater System.*

6.5.2 Backwash per engineering direction.

NOTE:

The vessel that has been changed should now be the lag vessel and the vessel that has **NOT** been changed should now be the lead vessel.

6.5.3 Once backwash is complete, align valves per CP4-ER-0008, *Startup and Normal Operation of the C-612 NW Plume Groundwater System Following Long Term Shutdown*.

6.5.4 Restart system per CP4-ER-0008.

6.5.5 As system is starting open, vent valve (e.g. ABV-1, ABV-2, ABV-3, or ABV-4) for the vessel that was changed and bleed excess air from the vessel.

6.5.6 **When** all air has been drained, **then** close valve.

6.5.7 Remove excess air from other vessels as necessary.

6.5.8 At engineering direction, allow system to stabilize and collect initial sampling per engineering request.

6.5.9 Check for leaks once the vessels are pressurized.

6.5.10 **If** leaks are found, **then** attempt to correct leak **and** notify engineering.

7.0 RECORDS

7.1 Records Generated

The following records may be generated by this procedure:

None.

Forms are to be completed in accordance with CP3-OP-0024, *Forms Control*.

7.2 Records Disposition

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

Appendix A – Acronyms/Definitions

ACRONYMS

AV – Auto Valve

BZ – Breathing Zone

D&R – Deactivation & Remediation

FLM – Front Line Manager

HV – Hand Valve

IDLH – Immediately Dangerous to Life or Health

IH – Industrial Hygiene

LEV – Local Exhaust Ventilation

LOTO – Lock Out/Tag Out

MSA – Mine Safety Appliance

MUC – Maximum Use Concentration

NWPGS – Northwest Plume Groundwater System

PGDP – Paducah Gaseous Diffusion Plant

PPE – Personal Protective Equipment

RCT – Radiological Control Technician

RPPM – Radiation Protection Project Manager

RWP – Radiological Work Permit

STEL – Short Term Exposure Limit

TCE – Trichloroethylene

TWA – Time Weighted Average

DEFINITIONS

Operations Personnel - The person performing the steps in this procedure. The person performing this work could have job functions including, but **NOT** limited to, Facility Manager for C-612, the Frontline Supervisor, the Project Manager of Pump and Treat Operations, or an Operator or Maintenance Mechanic.

Appendix B – Valve Alignment for Ion Exchange Trailer Vessel Resin Change

VALVE ID	DESCRIPTION	VESSEL BEING CHANGED			
		A	B	C	D
PV-1	Vessels A/B Process Influent Block Valve	CLOSED	CLOSED		
PV-2	Vessel A Primary Influent Block Valve	OPEN	CLOSED		
PV-3	Vessel B Primary Influent Block Valve	CLOSED	OPEN		
PV-4	Vessel A Primary Effluent Block Valve	CLOSED	CLOSED		
PV-5	Vessel B Primary Effluent Block Valve	CLOSED	CLOSED		
PV-6	Vessel A (Lag) Influent Block Valve	OPEN	CLOSED		
PV-7	Vessel B (Lag) Influent Block Valve	CLOSED	OPEN		
PV-8	Vessel A (Lead) Effluent Block Valve	OPEN	CLOSED		
PV-9	Vessel A (Lag) Effluent Block Valve	CLOSED	CLOSED		
PV-10	Vessel B (Lag) Effluent Block Valve	CLOSED	CLOSED		
PV-11	Vessel B (Lead) Effluent Block Valve	CLOSED	OPEN		
PV-12	Vessels C/D Process Influent Block Valve			CLOSED	CLOSED
PV-13	Vessel C Primary Influent Block Valve			OPEN	CLOSED
PV-14	Vessel D Primary Influent Block Valve			CLOSED	OPEN
PV-15	Vessel C Primary Effluent Block Valve			CLOSED	CLOSED
PV-16	Vessel D Primary Effluent Block Valve			CLOSED	CLOSED
PV-17	Vessel C (Lag) Influent Block Valve			OPEN	CLOSED
PV-18	Vessel D (Lag) Influent Block Valve			CLOSED	OPEN
PV-19	Vessel C (Lead) Effluent Block Valve			OPEN	CLOSED
PV-20	Vessel C (Lag) Effluent Block Valve			CLOSED	CLOSED
PV-21	Vessel D (Lag) Effluent Block Valve			CLOSED	CLOSED
PV-22	Vessel D (Lead) Effluent Block Valve			CLOSED	OPEN
PV-23	Ion Exchange System Effluent Block Valve	OPEN	OPEN	OPEN	OPEN
PV-24	Ion Exchange System Backwash Effluent Block Valve	½ OPEN	½ OPEN	½ OPEN	½ OPEN
PV-25	Vessels A/B Backwash Influent Block Valve	OPEN	OPEN	CLOSED	CLOSED
PV-26	Vessels C/D Backwash Influent Block Valve	CLOSED	CLOSED	OPEN	OPEN
PV-27	Main Air Supply Block Valve	OPEN	OPEN	OPEN	OPEN
PV-28	Auto Valve 1 (AV1) Air Supply Block Valve	OPEN	CLOSED	CLOSED	CLOSED
PV-29	Auto Valve 2 (AV2) Air Supply Block Valve	CLOSED	OPEN	CLOSED	CLOSED
PV-30	Auto Valve 3 (AV3) Air Supply Block Valve	CLOSED	CLOSED	OPEN	CLOSED
PV-31	Auto Valve 4 (AV4) Air Supply Block Valve	CLOSED	CLOSED	CLOSED	OPEN
PV-32	Main Air Supply Bleed Valve	CLOSED	CLOSED	CLOSED	CLOSED
PV-33	Main Air Supply Secondary Block Valve	OPEN	OPEN	OPEN	OPEN

- Indicates Valve to Remain in Current Position
- Indicates Valve to be in the Open Position
- Indicates Valve to be in Closed Position

Appendix B – Valve Alignment for Ion Exchange Trailer Vessel Resin Change (Continued)

VALVE ID	DESCRIPTION	VESSEL BEING CHANGED			
		A	B	C	D
HV-056	Backwash/Sluice Tank Drain Valve	CLOSED	CLOSED	CLOSED	CLOSED
HV-057	Backwash/Sluice Pump Suction Valve	OPEN	OPEN	OPEN	OPEN
HV-058	Backwash/Pump Discharge Pressure Gauge Valve	OPEN	OPEN	OPEN	OPEN
HV-059	Backwash/Sluice Pump Recycle Valve	½ OPEN	½ OPEN	½ OPEN	½ OPEN
HV-060	Backwash/Sluice Pump Discharge Valve	OPEN	OPEN	OPEN	OPEN
HV-095	Effluent Backwash Water Header Valve	OPEN	OPEN	OPEN	OPEN
HV-144	Backwash System Tank Influent Control Air Supply Valve	OPEN	OPEN	OPEN	OPEN
HV-168	Backwash Water Sample Supply Valve	CLOSED	CLOSED	CLOSED	CLOSED
HV-169	Backwash Water Sample Valve	CLOSED	CLOSED	CLOSED	CLOSED

- Indicates Valve to Remain in Current Position
- Indicates Valve to be in the Open Position
- Indicates Valve to be in Closed Position