

Rocky Flats Environmental Technology Site

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REVISION 0

GROUNDWATER RECOVERY/STORAGE SYSTEM NORMAL OPERATIONS OPERABLE UNIT 1, BUILDING 891

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1. PURPOSE

This procedure provides operating instructions for the Groundwater Recovery and Storage System in the Building 891 Groundwater Treatment Facility for 881 Hillside, Operable Unit 1.

2. SCOPE

This procedure applies to all Environmental Operations Management employees and subcontractors.

This procedure addresses the following topics:

- Recovery well operation
- Collection well—french drain operation
- Self-cleaning filter operation

3. OVERVIEW

The Building 891 Groundwater Treatment Facility consists of :

- A groundwater recovery and storage system.
- An ultraviolet/hydrogen peroxide oxidation system.
- An ion exchange system with units for acid and caustic regeneration of resin.
- A spent regenerant neutralization system.
- A treated effluent storage and discharge system.

The Groundwater Recovery and Storage System collects and stores groundwater for treatment. Recovery well Pump P-100 and collection well Pumps P-101 and P-102 pump groundwater to one of two 15,000-gal groundwater equalization/storage tanks (T-201 and T-202) at the south side of Building 891. The P-100, P-101, and P-102 sump pumps contain level controls to start and stop the pumps, as required, to provide automatic on and off pump operation. A self-cleaning filter is installed between the pumps and the equalization tanks for the removal of solids. Electrical controls and alarms for the pumps, and status indicators for the tank inlet and outlet valves, are in the main control panel in the Building 891 electrical room. T-201 and T-202 are equipped with heaters, and are insulated to prevent freezing during cold weather.

Details of the water storage tanks, level controls, and heaters are discussed below. A diagram of the piping system is shown in Appendix 1, Groundwater Recovery/Storage System Diagram. A listing of valve designators, nomenclature, and type is provided in Appendix 2, Valves.

3. OVERVIEW (continued)

- T-201 is a 15,000-gal insulated influent water storage tank outdoors on the south side of Building 891. A sealed concrete berm acts as the secondary containment. T-201 has the following:
 - Level detector
 - High level alarm
 - Tank heater

Accidental overflow goes to the secondary containment.

- T-202 is a 15,000-gal insulated influent water storage tank outdoors on the south side of Building 891. A sealed concrete berm acts as the secondary containment. T-202 has the following:
 - Level detector
 - High level alarm
 - Tank heater

Accidental overflow goes to the secondary containment.

When one of the influent equalization tanks is full, the contents are pumped using P-301 or P-302 to the process units in Building 891. Between the influent equalization tanks and the suction side of P-301 and P-302 is a 2-in. Hayward Simplex plastic basket strainer to prevent bulk material from entering and damaging the pump. The collection system is equipped with a Ronan leak detection system with five standpipes with moisture detection probes. Visual and audible alarms from the leak detection system are on the south wall of the Motor Control Center.

Each subsection of the major Instructions Sections is a stand alone section that may be performed independently of other subsections.

4. RESPONSIBILITIES

4.1 Operator

Operates the recovery and collection wells.

Cleans the filter in the valve vault at the french drain.

4.2 Project Manager

Ensures that project personnel are properly trained, and that the training is documented.

Ensures that project records are handled appropriately.

5. LIMITATIONS AND PRECAUTIONS

- Operation of any pump associated with the Groundwater Recovery and Storage System in the manual mode (switch is ON) may lower the water level until the pump suction is lost. Continued operation of the pumps with the water at low levels will result in damage to the pump.
- P-101 and P-102 shall not be started simultaneously because the self-cleaning filter cannot handle the resultant surge. If both pumps are needed, the pumps shall be started sequentially.
- The tanks and collection well vault are a confined space requiring special training and entry precautions in accordance with 1-E36-HSP-6.04, Confined Space Entry Program.
- The level in T-201 and T-202 shall be monitored regularly. Manually operating the collection well pumps overrides the tank level controls and may result in the tank overflowing. Tank levels are monitored at the Allen-Bradley touch screen in the control panel in the center of the electrical room in Building 891. Tank levels may also be monitored locally from a tank-mounted level indicator with a digital readout.

6. MATERIALS AND EQUIPMENT

6.1 Measuring and Test Equipment

Operator

- [1] Ensure that a portable level measuring device is available.

7. PERFORMANCE DOCUMENTS

Operator

- [1] Ensure that a copy of 1-E36-HSP-6.04, Confined Space Entry Program is available prior to entry into well vault.

8. PREREQUISITES

8.1 Planning and Coordination

Project Manager

- [1] Ensure that all personnel performing this procedure have the appropriate health and safety training as specified in the Rocky Flats Plant Operable Unit 1 Groundwater Treatment Facility Health and Safety Plan.

8.1 Planning and Coordination (continued)

Project Manager (continued)

- [2] Ensure that all personnel performing this procedure are qualified for confined space entry in accordance with 1-E36-HSP-6.04.

- [3] Document personnel qualifications related to the procedure in the project files in accordance with 2-F94-ER-ADM-02.01, Personnel Training and Qualification.

9. INSTRUCTIONS—RECOVERY WELL OPERATION

There is one recovery well (CW001) located on the 881 Hillside. A Grundfos Model 5S05-13 1/2-horsepower (hp) submersible pump (P-100) installed in the recovery well pumps groundwater to the collection well at the french drain. Detailed manufacturer information on the Grundfos pump is available at the Building 891 Groundwater Treatment Facility. Automatic operation of the recovery well pump responds directly to the actual column water height in the well. Under these conditions, an increasing water level of 8 ft turns the pump ON, and a decreasing water level of 4 ft turns the pump OFF and prevents the pump from running dry, causing damage to the pump.

Project Manager and Operator

- [1] Document all activities on the Daily Log in accordance with 2-G18-ER-ADM-17.01, Records Capture and Transmittal.

Project Manager

- [2] Verify that all prerequisites in Section 8, Prerequisites have been completed, and record on Daily Log.

9.1 Recovery Well Automatic Operation

Operator

- [1] Place the P-100 Pump switch at the recovery well in AUTO.

NOTE *The breaker control for FP-100 is in the Motor Control Center on the west wall of the motor control room in Building 891.*

- [2] Place the breaker control for FP-100 in ON.
- [3] Open V-50, P100 Outlet.

NOTE 1 *The pump operating switch, P-100 with HAND-OFF-AUTO positions is beneath the Allen-Bradley touch screen in the center of the motor control room. P-100 puts the pump into operation.*

NOTE 2 *In AUTO the pump operates to maintain well level between 8ft, increasing and 4ft, decreasing.*

- [4] Place the pump operating switch P-100 in AUTO.
- [5] **IF** the pump does not start or stop at operating heights, **THEN** perform the following:
 - [A] Check status of breakers and switches.

9.1 Recovery Well Automatic Operation (continued)

Operator (continued)

- [B] Verify well level as indicated on the bubbler level indicator.

- [C] Notify Project Manager.

- [6] Record all activities in the Daily Log including:
 - Date.
 - Time.
 - Activity.

9.2 Recovery Well Manual Operation—Local

Manual operation may be established if the controls do not allow P-100 to operate in the normal mode as described in Section 9.1, Recovery Well Automatic Operation, or if it is necessary to check the pump operation at the well.

When the pump is in the Manual mode the pump operates regardless of the well water level or position of the control panel switch in Building 891. The water level is monitored by a Bubbler panel which reads pressure. A conversion factor of 2.308 is applied to the psi reading to get the depth of the water in the well.

Operator

- [1] Move the breaker control for FP-100 in ON.

The breaker control for FP-100 is on the west wall of the motor control room in Building 891.

CAUTION

With the switch in JOG, the water level in the well may be lowered until the pump suction is lost. Continued operation of the pump at low water levels damages the pump.

- [2] Place the P-100 Pump switch at the recovery well in JOG.

- [3] **IF** a leak is observed,
THEN immediately place the P-100 Pump switch at the recovery well in OFF.

- [4] **WHEN** the water level indicates 4 ft,
THEN place the P-100 Pump switch at the recovery well in OFF.

- [5] **WHEN** the need to operate the pump locally no longer exists,
AND automatic operation of the level control is desired,
THEN place the P-100 Pump switch at the recovery well in AUTO.

9.2 Recovery Well Manual Operation—Local (continued)

Operator (continued)

[6] **IF** the pump does not start or stop at operating heights,
THEN perform the following:

[A] Check status of breakers and switches.

[B] Verify well level as indicated on the bubbler level indicator.

[C] Notify Project Manager.

[7] Record all activities in the Daily Log including:

- Date.
- Time.
- Activity.

9.3 Recovery Well Manual Operation—Remote

P-100 can also be operated in a manual mode from the electrical room control panel in Building 891.

Operator

[1] Place the breaker control for FP-100 in ON.

The breaker control for FP-100 is on the west wall of the motor control room in Building 891.

CAUTION

With the switch in HAND, the water level in the well may be lowered until the pump suction is lost. Continued operation of the pump at low water levels damages the pump.

[2] Place the P-100 Pump switch at the FP-100 in AUTO.

[3] Place the P-100 switch in the control room in HAND.

The P-100 switch is beneath the Allen-Bradley touch screen in the motor control room. In HAND the pump operates regardless of the well water level.

[4] **WHEN** the well water level indicates 1 ft (0.45 psi indicated on the bubbler level indicator),
THEN place the P-100 switch in AUTO.

9.3 Recovery Well Manual Operation—Remote (continued)

Operator (continued)

[5] **IF** the pump does not start or stop at operating heights,
THEN perform the following:

[A] Check status of breakers and switches.

[B] Verify well level as indicated on the bubbler level indicator.

[C] Notify Project Manager.

[6] **IF** further operation of the well is **NOT** desired,
THEN place the P-100 switch in OFF.

[7] Record all activities in the Daily Log including:

- Date.
- Time.
- Activity.

10. INSTRUCTIONS—COLLECTION WELL—FRENCH DRAIN OPERATION

The collection well collects water from three sources:

- Recovery well, as described in Section 9, Recovery Well Operation
- French drain
- Building 881 footing drain

Of the sources, only the recovery well water is pumped to the collection well. The french drain and the Building 881 footing drain flow by gravity to the collection well.

Two 1-1/2 hp pumps (P-101 and P-102) are at the collection well. P-101 and P-102 pump the collected water to influent equalization tanks (T-201 and T-202) at the Building 891 Groundwater Treatment Facility. The pumps are operated as required by level switches in the sump, such that a water level of 8 ft starts one pump, and a water level of 4 ft stops the pump. The second pump also starts if the first pump cannot pump the water as fast as the water enters the sump, or if the first pump is not operational.

Project Manager and Operator

- [1] Document all activities on the Daily Log in accordance with 2-G18-ER-ADM-17.01, Records Capture and Transmittal.

Project Manager

- [2] Verify that all prerequisites in Section 6, Prerequisites have been completed, and record on Daily Log.

10.1 Collection Well Automatic Operation

Operator

- [1] Verify the collection well water level daily on the local Bubbler panel at the well.

The Bubbler panel gives a pressure reading to which a factor of 2.308 ft/psi can be applied to get the depth of the water in feet. Detailed manufacturer information on the Bubbler panel is available at the Building 891 Groundwater Treatment Facility.

- [2] Record the collection well water level in the Daily Log.
- [3] **IF** the Bubbler panel is out of service,
THEN measure the water level using a portable level measuring instrument.

10.1 Collection Well Automatic Operation (continued)

WARNING

The collection well vault is a confined space requiring special training and entry procedures in accordance with 1-E36-HSP-6.04 to avoid death from oxygen deficiency.

Operator (continued)

[4] Drop the sensor through the drain in the valve vault.

[5] Lower the sensor until the sensor reaches the water surface.

NOTE 1 *The maximum allowed reading is 2 ft above the bottom of the vault.*

NOTE 2 *Overflow from the french drain cleanouts occurs when the level reaches 2.4 ft above the bottom of the vault.*

[6] Record the distance from the valve vault to the water surface in the daily log.

[7] **IF** the water level is greater than 2 ft,
THEN notify the Project Manager.

[8] Open the appropriate manual inlet valve at the Influent Storage Tank:

[A] For T-201, open HVA-201, Influent From French Drain to T-201.

[B] For T-202, open HVA-202, Influent From French Drain to T-202.

[9] **IF** the self-cleaning filter is to be used,
THEN open V-53, Collection Gallery Filter Inlet and V-55, Collection Gallery Filter Outlet at the self-cleaning filter in the valve vault at the collection well.

[10] **IF** the self-cleaning filter is being serviced,
THEN open V-54, Collection Gallery Filter Bypass.

[11] Place the local pump controls at the collection well in AUTO.

[12] Place the breaker control FP-101 in ON.

The breaker control FP-101 is in the Motor Control Center on the west wall of the Motor control room in Building 891.

10.1 Collection Well Automatic Operation (continued)

CAUTION

The self-cleaning filter cannot handle the surge produced when both pumps are started simultaneously and the filter will break.

Operator (continued)

- [13] **IF** both pumps are needed,
THEN start one first and then the other.
- [14] Place switches P-101 or P-102 for operating the pumps in AUTO for automatic operation.
- Switches P-101 and P-102 are on the control panel directly below the Allen-Bradley touch screen in the center of the motor control room. In this mode, the pumps stop automatically when the T-201 or T-202 water level reaches the high level switch.
- [15] **IF** the leak detection monitor alarms,
THEN immediately turn OFF P101 and P102 and notify the Project Manager.
- [16] Record all activities in the Daily Log including:
- Date.
 - Time.
 - Activity.

10.2 Collection Well Manual Operation—Local

Manual operation of P-101 and P-102 may be established if necessary to verify the operation of either or both pumps.

Operator

- [1] Ensure that there is 8 ft of water for pumping by observing the local Bubbler panel at the well.
- The Bubbler panel gives a pressure reading to which a factor of 2.308 can be applied to get the depth of water in feet. Detailed manufacturer information on the Bubbler panel is available at the Building 891 Groundwater Treatment Facility.
- [2] **IF** the Bubbler panel is out of service,
THEN measure the collection well water level using the portable level measuring instrument.

10.2 Collection Well Manual Operation—Local (continued)

WARNING

The collection well vault is a confined space requiring special training and entry procedures in accordance with 1-E36-HSP-6.04 to avoid death from oxygen deficiency.

Operator (continued)

[3] Drop the sensor through the valve vault drain.

NOTE 1 *The maximum allowed reading is 2 ft above the bottom of the vault.*

NOTE 2 *Overflow from the french drain cleanouts occurs when the level reaches 2.4 feet.*

[4] Record the distance from the valve vault to the water surface in the Daily Log.

[5] Open the appropriate manual inlet valve at the Influent Storage Tank:

[A] For T-201, open HVA-201, Influent From French Drain to T-201.

[B] For T-202, open HVA-202, Influent From French Drain to T-202.

[6] **IF** the self-cleaning filter is to be used,

THEN open the following valves:

- V-51, P-101 Outlet
- V-52, P-102 Outlet
- V-56, P-101, P-102 Effluent.

[7] Place the breaker control FP-101 in ON.

The breaker control FP-101 is in the Motor Control Center on the west wall of the motor control room in Building 891.

[8] Place the P-101 Pump or P-102 Pump switch for the pump to be operated in HAND.

The HAND position allows the pump to run continuously until the pump is turned off. The pump operates regardless of the well water level, or position of the control panel switch in Building 891.

[9] **IF** the leak detection monitor alarms,

THEN immediately turn OFF P101 and P102 and notify the Project Manager.

10.2 Collection Well Manual Operation—Local (continued)

CAUTION

Operation of the collection well pumps in **HAND** overrides the influent equalization tank level controls. Monitoring collection well level will prevent water level damage to the pumps.

Operator (continued)

- [10] Monitor the influent equalization tank level regularly to prevent overfilling.
- [11] Place local control for operating pump in OFF.
- [12] Record all activities in the Daily Log including:
 - Date.
 - Time.
 - Activity.

10.3 Collection Well Manual Operation—Remote

Manual operation of P-101 and P-102 may also be established remotely using the controls at the control panel in Building 891.

Operator

- [1] Ensure that there is 8 ft of water for pumping by checking the local Bubbler panel at the well.

The Bubbler panel gives a pressure reading to which a factor of 2.308 can be applied to get the depth of water in feet.

WARNING

The collection well vault is a confined space requiring special training and entry procedures in accordance with 1-E36-HSP-6.04 to avoid death from oxygen deficiency.

- [2] **IF** the Bubbler panel is out of service,
THEN measure the collection well water level using the portable level measuring instrument.
- [3] Drop the sensor through the valve vault drain.

NOTE 1 *The maximum allowed reading is 2 ft above the bottom of the vault.*

NOTE 2 *Overflow from the french drain cleanouts occurs when the level reaches 2.4 feet.*

10.3 Collection Well Manual Operation—Remote (continued)

Operator (continued)

- [4] Record the distance from the valve vault to the water surface in the Daily Log.
- [5] Open the appropriate manual inlet valve at the influent storage tank:
- [A] For T-201, open HVA-201, Influent From French Drain to T-201.
- [B] For T-202, open HVA-202, Influent From French Drain to T-202.
- [6] **IF** the self-cleaning filter is to be used,
THEN open the following valves:
- V-51, P-101 Outlet
 - V-52, P-102 Outlet
 - V-56, P-101, P-102 Effluent
- [7] Place the breaker control FP-101 in ON.

The breaker control FP-101 is in the Motor Control Center on the west wall of the motor control room in Building 891.

- [8] Place the P-101 Pump switch at the collection well in AUTO.

CAUTION

Manually operating the collection well pumps overrides the tank level controls and may cause the tank to overflow. Monitoring the collection well level prevents water level damage to the pumps.

- [9] Place the P-101 switch on the control panel in Building 891 in HAND.
- [10] Monitor the level in T-201 or T-202 regularly to prevent overflowing.

Tank levels are monitored at the Allen-Bradley touch screen in the control panel in the center of the motor control room in Building 891. Tank levels can also be monitored locally from a tank-mounted level indicator with a digital readout.

- [11] **IF** the leak detection monitor alarms,
THEN immediately turn OFF P101 and P102 and notify the Project Manager.

NOTE: P-101 or P-102 or both may be used in the following Step [12].

- [12] Place switches P-101 and P-102 on the control panel in Building 891 in AUTO, depending on system needs.

10.3 Collection Well Manual Operation—Remote (continued)

Operator (continued)

[13] Record all activities in the Daily Log including:

- Date.
- Time.
- Activity.

11. INSTRUCTIONS—SELF-CLEANING FILTER OPERATION

When P-101 and P-102 are operating, the self-cleaning Filtomat Model M302L 25 micron filter in the valve vault at the french drain operates automatically. When backwashing is necessary, the filter proceeds through a backwash cycle that is automatically initiated and controlled.

Project Manager and Operator

- [1] Document all activities on the Daily Log in accordance with 2-G18-ER-ADM-17.01, Records Capture and Transmittal.

Project Manager

- [2] Verify that all prerequisites in Section 6, Prerequisites have been completed, and record on Daily Log.

11.1 Self-Cleaning Filter Manual Cleaning

When the filter backwashes too frequently (at less than 2-min. intervals), the filter may be plugged and manual cleaning of the screen is required.

NOTE: *More detailed instructions for maintenance of the Filtomat filter are in the manufacturer manual available at the Building 891 Groundwater Treatment Facility.*

Operator

- [1] **IF** the filter is to be cleaned manually,
THEN place P-101 and P-102 in OFF.
- [2] Obtain a confined space entry permit in accordance with 1-E36-HSP-6.04.
- [3] Contact an EG&G Rocky Flats, Inc. industrial hygienist to screen the filter vault for oxygen deficiency, flammable or toxic gases.
- [4] Ensure that P-101 and P-102 are properly tagged and locked out in accordance with 1-15320-HSP-2.08, Lockout/Tagout.
- [5] Wear the proper personal protective equipment as specified in the Rocky Flats Plant Operable Unit 1 Groundwater Treatment Facility Health and Safety Plan.
- [6] Close V-53, Collection Gallery Filter Inlet, and V-55, Collection Gallery Filter Outlet.
- [7] Open the top of the filter by removing the retaining bolts and lifting off the top.
- [8] Remove the screen by lifting the screen out.
- [9] Clear the screen, and ensure that all obstructions are removed.

11.1 Self-Cleaning Filter Manual Cleaning (continued)

Operator (continued)

- [10] Assemble the filter, and install the top.
- [11] Ensure that the bolts are tight.
- [12] Open V-53 and V-55.
- [13] Place the local pump controls in AUTO.
- [14] Record all activities in the Daily Log including:
 - Date.
 - Time.
 - Activity.

11.2 Self-Cleaning Filter Bypass Operation

If after manual cleaning of the Filtomat filter the automatic backwash cycles continues too frequently, the filter may be bypassed. Bypassing the filter allows the Building 891 Groundwater Treatment Facility to continue operation while the extended filter is being repaired. The filter may be bypassed using the following steps:

Operator

- [1] Close V-53, Collection Gallery Filter Inlet, and V-55 Collection Gallery Filter Outlet.
- [2] Open V-54 Collection Gallery Filter Bypass.
- [3] Record all activities in the Daily Log including:
 - Date.
 - Time.
 - Activity.

12. RECORDS

Management of all records is consistent with 1-77000-RM-001, Records Management Guidance for Records Sources.

The daily logs generated as a result of this procedure are considered quality records and are managed in accordance with 3-21000-ADM-17.01, Quality Assurance Records Management.

The daily logs are part of the Administrative Record and are also managed in accordance with 3-21000-ADM-17.02, Administrative Records Screening and Processing in addition to 3-21000-ADM-17.01

12. Records (continued)

There are no nonquality records generated by this procedure.

ERP Records Source/Project Manager

- [1] Ensure that the original and one copy of the daily logs are submitted to the ERP PFC in accordance with 3-21000-ADM-17.01.

Submission of record copies to the ERP PFC will satisfy Administrative Record requirements.

13. REFERENCES

Rocky Flats Plant Operable Unit 1 Groundwater Treatment Facility Health and Safety Plan

1-E36-HSP-6.04, Confined Space Entry Program

1-15320-HSP-2.08, Lockout/Tagout

1-77000-RM-001, Records Management Guidance for Records Sources

2-F94-ER-ADM-02.01, Personnel Training and Qualification (until the procedure is issued, use 2-11000-ER-ADM-02.01, Training, and 2-11000-ER-ADM-02.02, Personnel Qualification.)

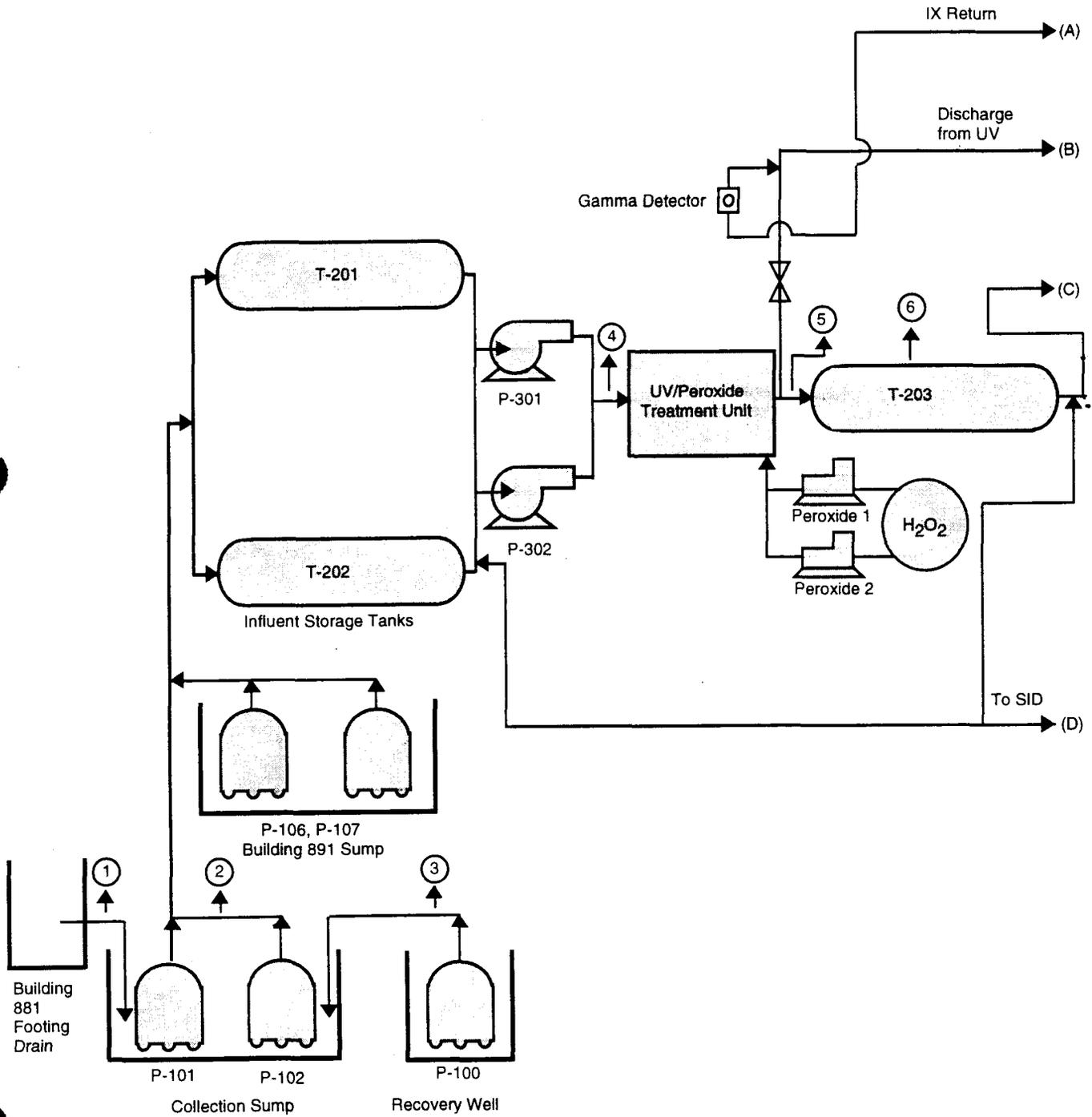
3-21000-ADM-17.01, Quality Assurance Records Management.

3-21000-ADM-17.02, Administrative Records Screening and Processing.

APPENDIX 1

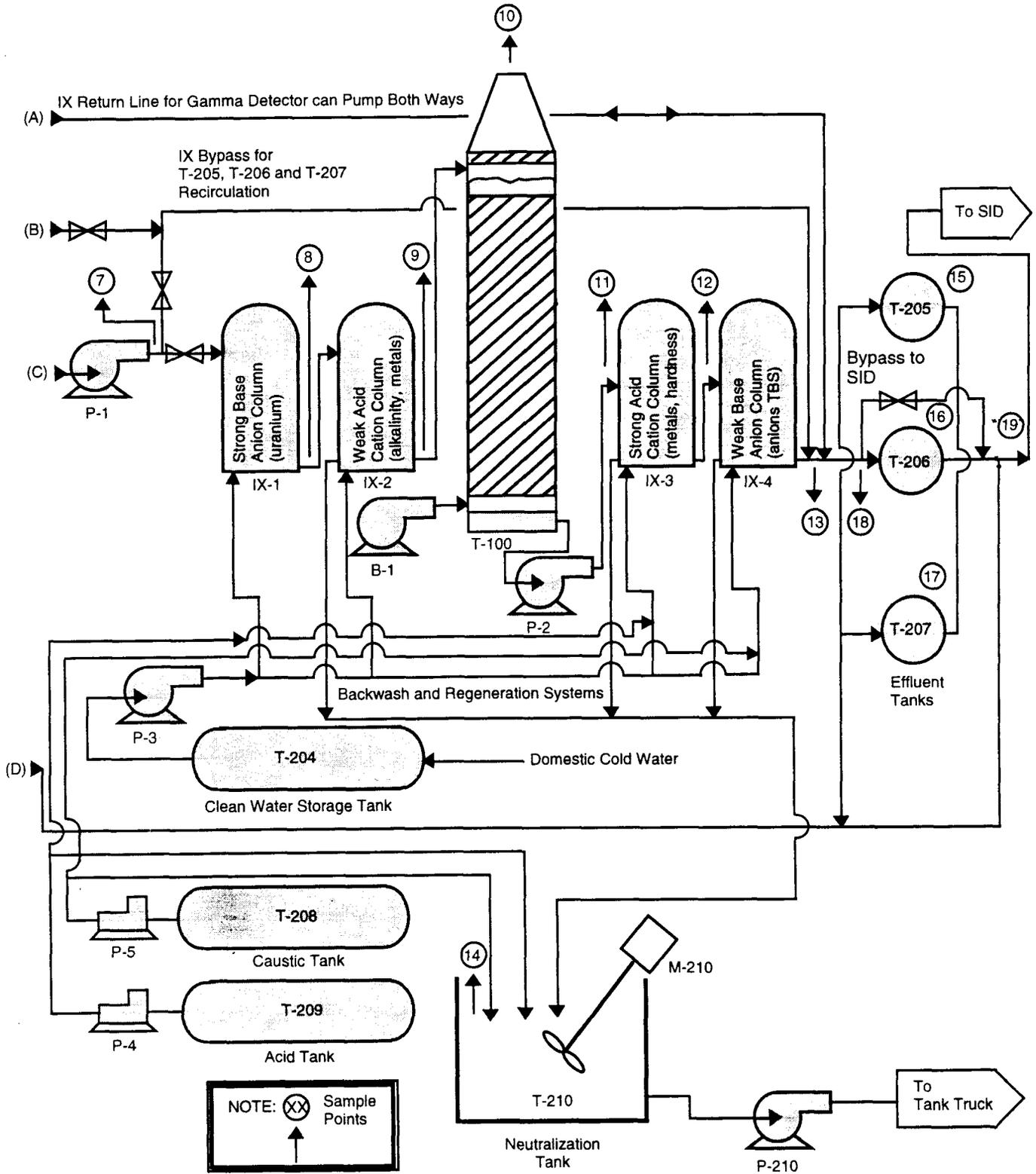
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GROUNDWATER RECOVERY/STORAGE SYSTEM DIAGRAM



APPENDIX 1

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APPENDIX 2

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VALVES

VALVE NO.	DESCRIPTION	TYPE
V-1	P-1 Service Inlet	2-in. Ball
V-2	P-1 Service Outlet	2-in. Ball
V-3	Bag Filter Outlet	2-in. Ball
V-4	IX-1 Inlet Isolation	1 1/2-in. Ball
V-5	IX-1 Outlet Isolation	1 1/2-in. Ball
V-6	IX-2 Inlet Isolation	1 1/2-in. Ball
V-7	IX-2 Outlet Isolation	1 1/2-in. Ball
V-8	Degasifier Inlet Isolation	1 1/2-in. Ball
V-9	Degasifier Outlet/P-2 Inlet	1 1/2-in. Ball
V-10	P-2 Outlet	1 1/2-in. Ball
V-11	IX-3 Inlet Isolation	1 1/2-in. Ball
V-12	IX-3 Outlet Isolation	1 1/2-in. Ball
V-13	IX-4 Inlet Isolation	1 1/2-in. Ball
V-14	UV #2 Sample Port	1/2-in. Ball
V-15	P-3 Inlet	2-in. Ball
V-16	P-3 Outlet	3-in. Ball
V-17	IX-2 Subsurface Backwash Inlet	2-in. Ball
V-18	IX-1 Subsurface Backwash Inlet	2-in. Ball
V-19	IX-3 Subsurface Backwash Inlet	2-in. Ball
V-20	IX-4 Subsurface Backwash Inlet	2-in. Ball
V-21	Bag Filter #2 Inlet	2-in. Ball
V-22	Bag Filter #2 Outlet	2-in. Ball
V-23	Caustic Makeup Water	1-in. Ball
V-24	Acid Makeup Water	1-in. Ball
V-25	P-5 to T-210 Influent	1 1/2-in. Ball
V-26	P-4 to T-210 Influent	1 1/2-in. Ball
V-27	P-5 Service Outlet	3/4-in. Ball
V-28	P-4 Service Outlet	3/4-in. Ball
V-29	P-5 Service Inlet	3/4-in. Ball
V-30	P-4 Service Inlet	1-in. Ball
V-31	T-208 Outlet	3/4-in. Ball
V-32	T-209 Outlet	1-in. Ball
V-33	BLR-2 Outlet	1 1/2-in. Ball
V-34	Degasifier Drain	1-in. Ball

APPENDIX 2

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VALVE NO.	DESCRIPTION	TYPE
V-35	Bag Filter 2 Drain	1/2-in. Ball
V-36	Bag Filter 1 Drain	1/2-in. Ball
V-37	P-5 Caustic Sample Port	1/4-in. Ball
V-38	P-4 Acid Sample Port	1/4-in. Ball
V-39	IX-2 Effluent Sample Port	3/4-in. Ball
V-40	IX-1 Effluent Sample Port	3/4-in. Ball
V-41	IX-3 Sample Port	3/4-in. Ball
V-42	IX-4 Sample Port	3/4-in. Ball
V-43	IX-2 Vent	3/4-in. Ball
V-44	IX-1 Vent	3/4-in. Ball
V-45	IX-3 Vent	3/4-in. Ball
V-46	IX-4 Vent	3/4-in. Ball
V-47	IX-2 Acid Regenerant	1 1/2-in. Ball
V-48	IX-3 Acid Regenerant	1 1/2-in. Ball
V-49	IX-4 Caustic Regenerant	1 1/2-in. Ball
V-50	P-100 Outlet	1 1/2-in. Ball
V-51	P-101 Outlet	1-in. Ball
V-52	P-102 Outlet	1-in. Ball
V-53	Collection Gallery Filter Inlet	2-in. Ball
V-54	Collection Gallery Filter Bypass	2-in. Ball
V-55	Collection Gallery Filter Outlet	2-in. Ball
V-56	P-101, P102 Effluent	2-in. Ball
V-57	T-201, T-202 Influent	2-in. Ball
V-58	Domestic Influent Backflow Preventor	2-in. Ball
V-59	Domestic Influent Backflow Preventor	2-in. Ball
V-61	T-201 Secondary Containment Purge	2-in. Ball
V-62	T-202 Secondary Containment Purge	2-in. Ball
V-63	UV Influent T-201, T-202 Secondary Containment Purge	2-in. Ball
V-64	UV Influent T-201 Secondary Containment Purge	2-in. Ball
V-65	Caustic Dilution Water Flow Control	3/4-in. Gate
V-66	Acid Dilution Water Flow Control	3/4-in. Gate
V-67	Caustic Pressure	2-in. Ball
V-68	Acid Pressure	2-in. Ball
V-69	UV Effluent T-203 Secondary Containment Purge	2-in. Ball
V-70	T-204 Secondary Containment Purge	2-in. Ball
V-71	Chemical Metering Isolation	3/4-in. Ball
V-72	Chemical Metering Isolation	3/4-in. Ball
V-73	T-201 and T-202 Secondary Containment Purge	2-in. Ball

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VALVE NO.	DESCRIPTION	TYPE
V-74	UV Effluent Camlock	2-in. Ball
V-75	UV Basket Strainer Influent	2-in. Ball
V-76	Basket Strainer Camlock	2-in. Ball
V-77	P-301, P-302 Effluent Camlock	2-in. Ball
V-78	UV Influent Sample Port	1/2-in. Ball
V-79	UV #1 Effluent Sample Port	1/2-in. Ball
V-80	Gamma Detection Isolation	2-in. Ball
V-81	H ₂ O ₂ Tank Sample Port	1/2-in. Ball
V-82	H ₂ O ₂ Outlet	1/4-in. Ball
V-83	Chemical Metering Isolation	3/4-in. Ball
V-84	H ₂ O ₂ P-1 Influent	1/4-in. Ball
V-85	H ₂ O ₂ P-2 Influent	1/4-in. Ball
V-86	T-209 Influent Line Sample Port	1/4-in. Ball
V-87	T-208 Influent Line Sample Port	1/4-in. Ball
V-88	H ₂ O ₂ P-1 Effluent	1/4-in. Ball
V-89	Air Scour Unloader	1 1/2-in. Butterfly
V-90	H ₂ O ₂ P-2 Effluent	1/4-in. Ball
V-91	H ₂ O ₂ Splitter Pump Influent	1/2-in. Ball
V-92	Splitter Pump Purge	1/2-in. Ball
V-93	UV Chamber #1 Effluent Pressure	1/2-in. Ball
V-94	IX-4 Effluent	1 1/2-in. Ball
V-95	Plant Effluent	2-in. Ball
V-96	Plant Effluent Sample Port	1-in. Ball
V-97	T-210 Purge Port	1/2-in. Ball
V-98	T-210 Sightglass	2-in. Ball
V-99	P-210 Effluent Isolation	2-in. Ball
V-100	P-210 Discharge Isolation	2-in. Ball
V-101	T-210 Effluent Bypass	2-in. Ball
V-102	Influent Secondary Containment Purge	2-in. Ball
V-103	Truck Dock Influent	2-in. Ball
V-104	Truck Dock Influent Secondary Containment Purge	2-in. Ball
V-105	Influent Line Secondary Containment Purge	2-in. Ball
V-106	Effluent Tank Bypass (underground)	N/A
V-107	UV #1 Drain	1/2-in. Ball
V-108	Recirculation Isolation	2-in. Ball
V-109	UV #2 Drain	1/2-in. Ball
V-110	Makeup Water	2-in. Ball

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VALVE NO.	DESCRIPTION	TYPE
V-111	Inlet H ₂ O ₂ Rotameter 1	1/2-in. Gate
V-112	Inlet H ₂ O ₂ Rotameter 2	1/2-in. Gate
V-113	Inlet H ₂ O ₂ Rotameter 3	1/2-in. Gate
V-114	Outlet H ₂ O ₂ Rotameter 1	1/2-in. Ball
V-115	Outlet H ₂ O ₂ Rotameter 2	1/2-in. Ball
V-116	Outlet H ₂ O ₂ Rotameter 3	1/2-in. Ball
V-117	T-210 Recirculation Isolation	2-in. Ball
V-118	IX Feed Camlock	2-in. Ball
V-119	PSIG IX-1 Purge	1/4-in. Ball
V-120	PSIG IX-2 Purge	1/4-in. Ball
V-121	PSIG IX-2 Purge (no gauge)	1/4-in. Ball
V-122	PSID IX-2 Purge	1/4-in. Ball
V-123	PSID IX-3 Purge	1/4-in. Ball
V-124	PSIG IX-3 Purge	1/4-in. Ball
V-125	PSIG IX-4 Purge	1/4-in. Ball
V-126	PSIG UV #1	1/2-in. Ball
V-127	PSIG UV #2	1/2-in. Ball
V-128	Gamma Detection Isolation	2-in. Ball
V-129	Recirculation Purge	1-in. Ball
V-130	IX-2 Effluent Isolation	2-in. Ball
V-131	IX-4 Effluent Isolation	2-in. Ball
V-132	T-204 Clean Water Line Sample Port	1/4-in. Sample Cock
HV-107	Sump Pump Discharge	2-in. Ball
HV-108	Sump Pump Discharge	2-in. Ball
HV-500	Recirculation From Effluent Storage Tanks	2-in. Ball
HV-501	Recirculation to UV	2-in. Ball
HV-502	Recirculation to IX	2-in. Ball
HV-503	Recirculation	2-in. Ball
FV-7	Dilute Acid for T-210 Neutralization	1 1/2-in. Auto
FV-9	Acid Regenerant	1 1/2-in. Auto
FV-17	Dilute Caustic for T-210 Neutralization	1 1/2-in. Auto
FV-19	Caustic Regenerant	1 1/2-in. Auto
FV-1A	IX-1 Service Inlet	1 1/2-in. Auto
FV-2A	IX-1 Backwash Inlet	1 1/2-in. Auto
FV-5A	IX-4 Backwash Outlet	1 1/2-in. Auto
FV-8A	IX-1 Fast Rinse Inlet	2-in. Auto

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VALVE NO.	DESCRIPTION	TYPE
FV-10A	IX-1 Fast Rinse Outlet	2-in. Auto
FV-11A	IX-1 Air Scour Inlet	1 1/2-in. Auto
FV-12A	IX-1 Subsurface Wash Inlet	1 1/2-in. Auto
FV-13A	IX-1 Air Scour Outlet	1-in. Auto
FV-1B	IX-1 Outlet/IX-2 Service Inlet	1 1/2-in. Auto
FV-2B	IZ-2 Backwash Inlet	1 1/2-in. Auto
FV-3B	IX-2 Acid Regenerant/Settler Rinse Inlet	1 1/2-in. Auto
FV-4B	IX-2 Outlet	1 1/2-in. Auto
FV-5B	IX-2 Backwash Outlet	1 1/2-in. Auto
FV-6B	IX-2 Spent Regenerant Outlet	1 1/2-in. Auto
FV-8B	IX-2 Fast Rinse Inlet	2-in. Auto
FV-10B	IX-2 Fast Rinse Outlet	2-in. Auto
FV-11B	IX-2 Air Scour Inlet	1 1/2-in. Auto
FV-12B	IX-2 Subsurface Wash Inlet	1 1/2-in. Auto
FV-13B	IX- Air Scour Outlet	1-in. Auto
FV-1C	IX-2 Service Outlet/IX-3 Service Inlet	1 1/2-in. Auto
FV-2C	IX-3 Backwash Inlet	1 1/2-in. Auto
FV-3C	IX-3 Acid Regenerant/Settler Rinse Inlet	1 1/2-in. Auto
FV-5C	IX-3 Backwash Outlet	1 1/2-in. Auto
FV-6C	IX-3 Spent Regenerant Outlet	1 1/2-in. Auto
FV-8C	IX-3 Fast Rinse Inlet	2-in. Auto
FV-10C	IX-3 Fast Rinse Outlet	2-in. Auto
FV-11C	IX-3 Air Scour Inlet	1 1/2-in. Auto
FV-12C	IX-3 Subsurface Wash Inlet	1 1/2-in. Auto
FV-13C	IX-3 Air Scour Outlet	1-in. Auto
FV-1D	IX-3 Service Outlet/IX-4 Service Inlet	1 1/2-in. Auto
FV-2D	IX-4 Backwash Inlet	1 1/2-in. Auto
FV-3D	IX-4 Caustic Regenerant/Settler Rinse Inlet	1 1/2-in. Auto
FV-4D	IX-4 Service Outlet	1 1/2-in. Auto
FV-5D	IX-4 Backwash Outlet	1 1/2-in. Auto
FV-6D	IX-4 Spent Regenerant Outlet	1 1/2-in. Auto
FV-8D	IX-4 Fast Rinse Inlet	2-in. Auto
FV-10D	IX-4 Fast Rinse Outlet	2-in. Auto
FV-11D	IX-4 Air Scour Inlet	1 1/2-in. Auto
FV-12D	IX-4 Subsurface Wash Inlet	1 1/2-in. Auto

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VALVE NO.	DESCRIPTION	TYPE
FV-13D	IX-4 Air Scour Outlet	1-in. Auto
HVA-201	Influent From French Drain to T-201	2-in. Ball
HVB-201	Effluent From T-201	2-in. Ball
HVA-202	Influent From French Drain to T-202	2-in. Ball
HVB-202	Effluent From T-202	2-in. Ball
HVA-203	UV Effluent to T-203	2-in. Ball
HVB-203	IX Feed From T-203	2-in. Ball
HVA-204	Regenerant Effluent to T-204	2-in. Ball
HVB-204	Regeneration Clean Water From RFP	2-in. Ball
HVC-204	Regeneration Clean Water to P-3	2-in. Ball
HVA-205	Plant Effluent/T-205 Influent	2-in. Ball
HVB-205	T-205 Discharge	4-in. Butterfly
HVC-205	T-205 Recirculation	4-in. Butterfly
HVA-206	Plant Effluent/T-206 Influent	2-in. Ball
HVB-206	T-206 Discharge	4-in. Butterfly
HVC-206	T-206 Recirculation	4-in. Butterfly
HVA-207	Plant Effluent/T-207 Influent	2-in. Ball
HVB-207	T-207 Discharge	4-in. Butterfly
HVC-207	T-207 Recirculation	4-in. Butterfly
HVD-207	T-207 Isolation	2-in. Ball
HVA-208	Caustic Inlet-Truck Dock	2-in. Ball
HVB-208	Caustic Outlet-T-208	2-in. Ball
HVA-209	Acid Inlet-Truck Dock	2-in. Ball
HVB-209	Acid Outlet-T-209	2-in. Ball
HVA-210	P-210 Inlet	2-in. Ball
HVB-210	P-210 Outlet	2-in. Ball
HVC-210	Discharge Camlock	2-in. Ball
HVD-210	Discharge Truck Dock	2-in. Ball
HVA-301	P-301 Inlet	2-in. Ball
HVB-301	P-301 Outlet	2-in. Ball
HVA-302	P-302 Inlet	2-in. Ball
HVB-302	P-302 Outlet	2-in. Ball
FCV-1	Fail Close Plant Effluent	1 1/2-in. Solenoid
FCV-2	Fail Close Recycle	2-in. Diaphragm
FCV-3	Collection Gallery Flow Control	2-in. Diaphragm
FCV-4	UV Effluent Control	1 1/2-in. Ball