septic system will be designed, constructed, operated, and permitted as per applicable NDEQ Title 124 regulations.

4.2.1.7 Liquid Waste Disposal

As discussed in Section 3.1.7, from 2015 through 2021, the majority of the wastewater produced at the MEA satellite facility requiring disposal will be the production bleed (25 to 65 gpm over the life of project). Starting in 2022, the wastewater flows will rise sharply as the bleed from the RO process used during restoration must be addressed.

Other liquid production wastewater will consist of process liquids (e.g., affected well development water, laundry water, and plant washdown water). These waste streams will account for an intermittent discharge with a maximum average of 1 to 2 gpm. The disposal water balance discussed below is of such a magnitude that these small quantities of wastewaters will be easily managed in the proposed disposal system. The well development water will be collected using a dedicated vacuum truck and delivered to the well work-over fluid tank located in the satellite building (**Figure** 5.7-2). The other liquid wastes (i.e., laundry and plant washwater originated in restricted areas) will flow to plant sumps and be transferred to a wastewater tank located within the satellite building. All of the above waste streams and tankage will be disposed of through the DDWs. The satellite building will not have a laboratory and a septic system will be used for discharges from toilets, lavatories and a sink in the lunchroom/break area. The MEA water balance is discussed in Section 3.1.7, with discussions on the management of the production and restoration waste streams.

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Upon well completion, all water generated during baseline or operational monitoring, is discharged to the surface with the exception of well rehabilitation work and excursions. When a monitor well is on excursion, the purge water is collected and disposed in the wastewater disposal system or taken to the evaporation ponds at the CPF. All water and solids resulting from well rehabilitation will be captured in water trucks and discharged into the wastewater disposal system or taken to the evaporation ponds at the CPF.

Restoration for MU-1will begin approximately in the sixth year of operation. Two major waste streams generated during restoration that will require disposal will be RO bleed and brine. The RO bleed will be disposed of over the life of the project (2021 through 2037) at an average rate of 80 to 250 gpm. The amount of brine to be disposed of will range from 167 to 250 gpm beginning in the year 2022 and continuing until 2037.

4.2.1.8 Deep Disposal Well

Like the CPF, CBR will initially use two DDWs as the primary liquid waste disposal system at the MEA site. The basic components of the system include:

- Alarmed and ventilated equalization/storage tanks in the satellite plant
- Underground piping to the deep disposal well
- A deep disposal wellhouse containing a set of filters, flowmeters, check valve, and annulus fluid tank

The DDWs will be operated without the need for surge tanks or surge/evaporation ponds.

CBR currently operates two non-hazardous Class I injection wells in the CPF license area for disposal of wastewater (DDW-1 and DDW-2). The wells are permitted under NDEQ regulations in Title 122 (NDEQ 2010b) and operated under a Class I UIC Permit. CBR has operated the initial DDW-1 at the current license area for more than 10 years with excellent results and no serious compliance issues. The second disposal well (DDW-2) started up on November 30, 2011. CBR expects that the liquid waste stream at the satellite facility will be chemically and radiologically similar to the waste disposed of in the current DDWs. Radiological data for the years 2008 and 2012 for DDW-1 injection stream are shown in **Table 4.2-1,** and radiological data for DDW-2 for the year 2012 in **Table 4.2-2.** The non-radiological data for DDW-1 and DDW-2 injection stream for 2010 are presented in **Table 4.2-3**.

Deleted: The proposed project at Marsland is the third project to be developed by CBR in Nebraska that uses DDWs to dispose of a non-hazardous waste stream associated with ISR Uranium mining operations from the basal sandstone of the Chadron Formation. ¶

The DDW at Marsland will be designed, constructed and operated like those at the CPF. The primary potential environmental impacts are surface spills from pipe failure and casing failures that release injection fluid into drinking water aquifers or the mining zone. To minimize these potential impacts the DDWs are:

- Monitored and alarmed 24-hours per day, 365 days per year to quickly detect and respond to above ground pipeline failures
- Double cased into the Pierre Shale formation with continuous flow and pressure monitoring of the injection fluid and pressure monitoring in the casing annulus
- Located inside the monitor well rings in the overlying aquifers and the mining zone
- Subject to Mechanical Integrity Testing every 2 years.

This combination of controls has and will effectively control the potential impacts to the environment.

CBR has submitted an application to the NDEQ for an Area Permit to install and operate Class I Nonhazardous Waste Injection Wells on private lands within the MEA license boundary. When approved, the Class I area permit:

- Allows initial construction and operation of two deep disposal wells
- Provides requirements for construction, monitoring, reporting, operation, abandonment, and aquifer restoration
- Allows Cameco to construct and operate additional, similarly constructed injection wells in the same injection zone, provided:
    - The NDEQ is notified of Cameco's intent to construct additional well as specified in the area permit
    - Plans and specifications for the additional wells accompany the NDEQ notification to the NDEQ
    - The additional proposed well(s) meet the requirements specified in the area permit and are approved by the NDEQ

The purpose of establishing an Area Permit is to allow for multiple injection wells to be installed at the MEA site over the expected multi-year life of the project. This permit application is for the initial two Class I Nonhazardous Waste Injection Wells to be installed under the Area Permit.

Cameco is aware that a permit modification would be required for any wells added to the Area Permit at a later date. The permit application was prepared in accordance with regulatory requirements presented in the NDEQ Assessment Section, Title 122 Rules and Regulations for Underground Injection and Mineral Production Wells (Effective April 02, 2002). The formation receiving the injected waste fluids (Injection Zone) shall be restricted to the Lower Dakota, Morrison, and Sundance Formations, which have been demonstrated to be located below the lowermost underground source of drinking water. In addition, the Lower Dakota, Morrison, and Sundance Formations exhibit water quality that is not considered under state and federal regulations to be underground sources of drinking water due to measured concentrations of their total dissolved solids.

CBR plans to install the DDWs at the satellite facility as the primary liquid waste disposal method. CBR has found that permanent deep disposal is preferable to evaporation in ponds. The basic reasons for this position are as follows:

- The potential for human contact while using a DDW is lower because the waste is handled in enclosed systems.
- The potential for emissions from the pond surface is higher than the enclosed DDW system.
- Evaporation ponds carry the potential for leaks and impacts to the environment.
- Use of evaporation ponds creates a larger amount of 11e.(2) byproduct waste.

Similar to the CPF, two DDWs at Marsland will be located in the vicinity of the satellite building (**Figure 1.7-5**). All tankage, filtration, and process equipment will be located in the satellite facility. Wastewater feed from the satellite facility will pass through a set of bag filters and will be pumped via a PVC/HDPE pipeline to the wellhouse. At the DDW wellhouse, there will be a set of filters, flowmeters, check valves, and an annulus fluid tank. In accordance with NDEQ permitting requirements, CBR will use a computer-based system to continually monitor and record the wellhead injection pressure, injection flowrate, and annulus pressure. Wellhead injection pressure and annulus pressure have audible alarms.

Two dedicated storage tanks located in the satellite building will supply feed to the DDWs. One tank will serve as the primary DDW supply tank, with all makeup water to the DDW flowing to this tank (e.g., RO brine, wellfield bleed, plant sump, and filtered well work-over fluid). At the CPF, a similar DDW water supply tank is operated at a 66 percent level and the primary DDW supply tank at the MEA site is expected to be operated in a similar fashion. All flow to the DDWs will pass through a set of bag filters at the satellite building and the DDW wellhouse. Current plans are to use the second tank for managing special wastewaters that are periodically generated, such as collecting filtered water from the well work-over fluid tank, which is then sent to the primary DDW tank for disposal. This second tank would also be used for surge capacity for the DDW well system when needed. Based upon existing operations, this occurs very infrequently.

The surge capacity will be designed to only handle short-term flows and not for long-term periods when additional capacity is needed and/or the DDWs may not be available. It is important to note that the "surge" does not happen quickly, and the flow balance is rarely disrupted. In addition, the DDW tanks are continuously monitored, and a two-level alarm system is used. Like the CPF, the discharge pump from the DDW tank will be computer-controlled. The pump speeds up and slows down automatically to maintain a 66 percent level. At all times, tank levels can be visually

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assessed on a computer display with graphical readout. When and if the levels become high enough, the lower level and then the higher level audible alarms will sound. If further adjustments do not extinguish the lower and/or higher level alarms, the operators can curtail flows until the upset is resolved. Section 3.1.7 (MEA water balance) discusses actions that will be taken to address longer-term shutdown of the DDWs.

As noted above, the MEA DDW system will be designed and operated similar to that currently used at the CPF. Radiation exposures associated with the tanks in the MEA satellite plant will remain ALARA, as the ventilation system will be designed to incorporate the recent CPF ventilation upgrades described in Section 4.1.2.3. Radiation exposures associated with access to the DDW wellhouses are maintained at ALARA levels, as described in Section 4.1.2.2.

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Deleted: The deep well will be installed in sufficient time to be used for wastewater disposal allowed by the permit. Details of the DDW operations, controls, monitoring, waste management, and spill issues will be addressed in a future NDEQ permit application. No wastewaters will be discharged to the land surface or surface water of the State of Nebraska.

4.2.1.9 Disposal of Other Radioactive Liquids as per NRC License SUA-1534.

In addition to the use of DDWs as a disposal method, the NDEQ has issued CBR an NPDES permit for the CPF license area that allows land application of treated wastewater. CBR has not used this waste disposal method at the current operation. At this time, CBR does not intend to apply for an NPDES permit to allow land application at the satellite facility. It is expected that liquid waste generated in the MEA can be satisfactorily managed with deep disposal. If needed in an emergency situation, contaminated wastewater can be collected and trucked to an approved commercial disposal facility for disposal.

4.2.1.10 Potential Pollution Events Involving Liquid Waste

Although there are a number of potential sources of pollution present at the CPF, existing regulatory requirements from the NRC and NDEQ and provisions of the SHEQMS have established a framework that significantly reduces the possibility of a pollution incident. Extensive training of all personnel is standard policy at the existing Crow Butte facility and will be implemented at the satellite facility. Waste management facilities and systems will be inspected frequently. Detailed procedures are included in the SHEQMS, which will be adapted for use at the satellite facility.

Potential sources of pollution include the following:

4.2.1.11 Wellfield Buildings and Piping

Wellfield buildings are not considered to be a potential source of pollutants during normal operations, as there will be no process chemicals or effluents stored within. The only instance in which a wellfield building could contribute to pollution would be in the event of a release of injection or recovery solutions due to pipe failure. The possibility of such an occurrence is considered to be minimal, as the piping will be leak-checked before initial placement into service. Piping from the wellfield will generally be buried, minimizing the possibility of an accident. In addition, the flows through the wellfield, piping and manifold pressure gauges in the wellhouses are monitored 24 hours per day, 7 days per week by control room operators using visual and audible alarms. Flow monitoring systems will alarm in the event of a significant piping failure, which will allow flow to be stopped, preventing any significant migration of process fluids. Wellfield buildings will also be equipped with wet alarms for early detection of leaks.