

APPENDIX G
HORIZONTAL DIRECTIONAL DRILLING INADVERTENT
RELEASE CONTROL AND MITIGATION PLAN



**HORIZONTAL DIRECTIONAL DRILLING
INADVERTENT RELEASE CONTROL AND
MITIGATION PLAN**

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Sign-off Sheet

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Table of Contents

1.0	INTRODUCTION.....	1
2.0	HDD PROCESS.....	1
3.0	DRILLING FLUID RELEASE.....	2
3.1	PREVENTION.....	2
3.2	DETECTION AND MONITORING PROCEDURES.....	2
4.0	NOTIFICATION PROCEDURES.....	3
5.0	CORRECTIVE ACTION.....	4
5.1	UPLAND RELEASE:.....	4
5.2	WATERBODY RELEASE:.....	5
5.3	WETLAND/RIPARIAN AREA RELEASE:.....	5
6.0	ABANDONMENT.....	6
7.0	PROJECT COMPLETION AND CLEANUP.....	6



BADGER STATE SOLAR, LLC HORIZONTAL DIRECTIONAL DRILLING INADVERTENT RELEASE CONTROL AND MITIGATION PLAN DATED MAY 1, 2019

1.0 INTRODUCTION

This Horizontal Directional Drilling (HDD) Inadvertent Release Control and Mitigation Plan describes measures Badger State Solar, LLC (Badger State) will implement during horizontal directional drilling (HDD) procedures conducted for the Badger State Solar Project ("Project"). Badger State may use the HDD method for installation of underground collector line where the line would cross sensitive areas such as wetlands or waterbodies as well as roads. Ideally, the HDD method involves no disturbance to wetlands or the bed or bank of the waterbody being crossed. The use of HDD allows the road, railroad, steep slope, or other feature to be crossed without excavating between the HDD entry and exit points. However, if a natural fracture or unconsolidated area in the ground is encountered, an unexpected release of drilling fluid to the environment could occur, also sometimes referred to as an inadvertent release or frac-out.

The selection and supervision of the drilling contractor will be the responsibility of Badger State. This plan is completed for permitting purposes. Badger State will provide this plan and any permitting requirements to the drilling contractor. The drilling contractor will be responsible for designing a project specific HDD Inadvertent Release Control and Mitigation Plan for construction purposes.

The objective of this Horizontal Directional Drilling Inadvertent Release Control and Mitigation Contingency Plan is to:

- 1) Provide procedures that will minimize the potential for release of drilling fluid into sensitive resource areas such as wetlands and waterbodies or onto the adjacent surface soils, and
- 2) Establish operational procedures and responsibilities for the containment and cleanup of inadvertent releases associated with the HDD method.

2.0 HDD PROCESS

The HDD method is a technically advanced process involving specialized equipment and skilled operators. The method involves placing a drill unit on one side of the stream, road, railroad, steep slope, or other feature and drilling a small-diameter pilot hole under along a prescribed profile. After the pilot hole has been completed, specialized reaming tools are used to enlarge the pilot hole to accommodate the desired diameter for the collector line.

The directional drilling process uses drilling fluid consisting primarily of water and bentonite, a naturally occurring clay. Drilling fluid removes the cuttings from the borehole, stabilizes the walls of the borehole, and acts as a coolant and lubricant to the drill bit during the drilling process. The drilling fluid mixture consists of water and a small percentage of bentonite clay and inert solids generated during the drilling process from the borehole. Under certain conditions, an additive may need to be mixed with the drilling fluids/mud for viscosity or lubricating reasons. Only non-hazardous additives will be used and a Material Safety Data Sheet (MSDS) for the additives will be maintained on-site.

The drilling fluid is prepared in the mixing tank using both new and clean recycled drilling fluid. The fluid is pumped through the center of the drill pipe to the drilling tools. Return flow is through the annulus created between the wall of the drilled hole and the drill pipe. During pilot-hole drilling, the cuttings are returned to a small excavation at the entry point called the entry pit. From the entry pit, the returned fluid is pumped to the fluid processing equipment. Typically, shaker screens, desanders, desilters, and centrifuges process and remove increasingly finer cuttings from the drilling fluid. The cleaned fluid is

BADGER STATE SOLAR, LLC HORIZONTAL DIRECTIONAL DRILLING INADVERTENT RELEASE CONTROL AND MITIGATION PLAN DATED MAY 1, 2019

recycled to the mixing tank for reuse in the borehole. The cuttings removed by the cleaning process are disposed of at a site approved to accept this type of material.

3.0 DRILLING FLUID RELEASE

The primary environmental risk associated with the HDD crossing method comes from the potential for inadvertent release of drilling fluid into a waterbody, wetland, or sensitive features. A drilling fluid release is indicated when drilling pressure is not maintained and/or a loss of circulation of drilling fluids occurs. Minimal, consistent losses of drilling fluid are common during the drilling process due to the fluid filling natural voids in layers of loose sand, gravel, or fractured rock encountered along the drilling path. Larger losses of circulating drilling fluid and a reduction in drilling pressure indicate that seepage is occurring outside of the hole.

3.1 PREVENTION

Drilling fluid releases can occur when the drilling path encounters naturally occurring fractures in bedrock or other voids in the strata that allow the pressurized drilling fluid a less resistant path to the surface (i.e. an inadvertent release). Drilling fluid releases may also be caused by blockage of the return flow path around the drill pipe where pressurization of the drilling fluid rises above the containment capability of the overburden soil material. The geometry of the HDD profile can also affect the potential for drilling fluid seepage. HDDs will be designed with smooth and gradual vertical curves in the crossing profile to minimize the potential for pressure buildup.

The drilling contractor is responsible for execution of the HDD, including actions for detecting and controlling drilling fluid seepage, as well as containment and cleanup of inadvertent returns. The drill entry and exit points are the areas with the highest potential for drilling fluid seepage. Appropriate containment materials will be staged near the entrance and exit locations for quick deployment should an inadvertent return occur within these areas

The drilling contractor will be responsible for implementing mitigation contingency procedures and will ensure that all workers are properly trained and familiar with the necessary procedures for response to an inadvertent release, prior to commencement of drilling operations. The Construction Contractor will be notified immediately when an inadvertent release is detected. The Construction Contractor will be responsible for ensuring that Badger State is aware of the inadvertent release, coordinating personnel, response, and coordination to ensure proper clean-up, and timely reporting of the incident is conducted. The Construction Contractor will ensure all waste materials are properly disposed according to state and local regulations.

The Construction Supervisor/Foreman and HDD contractor will be familiar with all aspects of the drilling activity, the contents of this contingency plan and the conditions of approval under which the activity is permitted to take place. The Construction Supervisor/Foreman will have the authority to stop work and commit the resources (personnel and equipment) necessary to implement this plan. The Construction Contractor will assure that a copy of this plan is available (onsite) and accessible to all construction personnel.

3.2 DETECTION AND MONITORING PROCEDURES

To determine if an inadvertent release has occurred, HDD activities will be constantly monitored, either by the Construction contractor, HDD operator, Badger State environmental representative, or any combination of the three.

BADGER STATE SOLAR, LLC HORIZONTAL DIRECTIONAL DRILLING INADVERTENT RELEASE CONTROL AND MITIGATION PLAN DATED MAY 1, 2019

Monitoring procedures will include:

- Providing continuous inspection along the drill path during active drilling with mud circulation. Construction observers will be briefed on what to watch for and will be made aware of the importance of timely detection and response actions to any release of drilling mud.
- Having appropriate operational communication equipment (e.g., radio and/or cell phone) available at all times during installation of the HDD crossing, with the ability to communicate directly with the HDD operations control center.
- Maintaining continuous examination of drilling mud pressure gauges and return flows to the surface pits. If the HDD operator realizes a sustained loss in fluid pressure or loss of circulation, the operator will immediately notify the construction observers of the assumed position of the drill head.
- If a release occurs in a wetland, provide for containment of the drilling fluids, continued inspection to determine any potential for movement of released drilling mud within the wetland, and collection of drilling mud returns at the location for future analysis, as required.

If a release occurs in a wetland or waterbody, the Construction contractor will document monitoring of the release and photographically document the release event. Badger State will maintain photographic documentation of release events.

4.0 NOTIFICATION PROCEDURES

If monitoring indicates a release is occurring, or has occurred, the Construction Contractor will immediately begin corrective action and notify Badger State's construction management personnel.

Badger State will notify the appropriate agencies including the U.S. Army Corps of Engineers, Wisconsin Department of Natural Resources, and the Wisconsin 24-Hour Emergency Hotline at 800.943.0003 within four hours of the discovery of an inadvertent release to a waterbody or wetland.

The following information will be provided:

- Name and telephone number of person reporting.
- Location of the release.
- Date and time of release.
- Type and quantity, estimated size of release.
- How the release occurred.
- The type of activity that was occurring around the area of the inadvertent release.
- Description of any sensitive areas, and their location in relation to the inadvertent release.
- Description of the methods used to clean up or secure the site.

Additional agency notifications and follow-up notifications may be required depending on the severity of the release and the sensitivity of the impacted resource(s).

5.0 CORRECTIVE ACTION

In the event an inadvertent drilling mud release is observed during an HDD crossing, the release will be assessed to determine the amount of drilling mud released and the potential for the release to reach sensitive resource areas (e.g., wetlands or waterbodies). Response measures will vary based on location of the inadvertent release as discussed below.

In the planning for the collector line crossings, drilling fluid seepage containment will be incorporated into the drill plan. The entry or exit locations will generally be located in upland areas on dry land where drilling fluid seepage can be readily detected and contained. The Construction Contractor or HDD operator will be required to have containment and clean-up equipment available at both sides of the HDD crossing location prior to the commencement of the HDD to ensure a timely response in the event of an inadvertent release of drilling fluid.

Containment and response equipment may include but is not limited to:

- straw bales and staking
- silt fence
- plastic sheeting
- shovels and other appropriate hand tools
- squeegees
- pails
- push brooms
- pumps and sufficient hose
- mud storage tanks
- vacuum truck on 24-hour call
- pre-filled sandbags
- geotextile fabric
- light plant/generator

Badger State will address an inadvertent release immediately upon discovery. The following measures will be implemented to minimize or prevent further release, contain the release, and clean up the affected area:

5.1 UPLAND RELEASE:

- The drilling contractor will determine and implement any modifications to the drilling technique or composition of drilling fluid (e.g., thickening of mud by increasing bentonite content, temporary lowering of the downhole pressures) to minimize or prevent further releases of drilling mud.
- Containment structures will be placed at the affected area to prevent migration of the release.
- If the amount of the release is large enough to allow collection, the drilling operator will collect the drilling mud and return it either to the drilling operations or a disposal site by hose or tanker. Any material impacted by bentonite will be removed by hand to a depth of 2 feet, contained, and properly disposed, as required by law. The Contractor will be responsible for ensuring that the bentonite is either properly disposed of at an approved disposal facility or properly recycled in an approved manner. Badger State will notify and take any necessary follow-up response actions in coordination

BADGER STATE SOLAR, LLC HORIZONTAL DIRECTIONAL DRILLING INADVERTENT RELEASE CONTROL AND MITIGATION PLAN DATED MAY 1, 2019

with agency representatives. The Construction Contractor will coordinate the mobilization of equipment stored at off-site locations (e.g., vacuum trucks) on an as needed basis.

- If the amount of the release is not large enough to allow collection, the Construction Contractor or HDD operator will sweep, shovel, or mix released drilling fluid with sand and temporarily leave it in place to dry.
- The drilling operator will reduce drilling operations if the mud release cannot be effectively contained within accessible containment areas.
- If public health and safety are threatened by an inadvertent release, the Construction Contractor or HDD operator will shut down drilling operations until the threat is eliminated. This measure will be taken as a last resort because of the potential for drill hole collapse resulting from loss of down-hole pressure.

5.2 WATERBODY RELEASE:

- If a release occurs within a waterbody, Badger State will contact the appropriate agency(ies) (refer to Section 5.0) as soon as possible to inform them if there is a potential threat to public health and safety, and explain whether or not the release can be corrected without incurring additional environmental impact. If necessary, drilling operations will be reduced to assess the extent of the release and to implement corrective actions.
- If the release is a single-point release, accessible with a hose and truck, the Construction Contractor or drilling operator will attempt to 'cap' the release, if possible, to contain the fluid. With a larger release, the drilling operator may attempt to place a water-filled bladder around the release in order to isolate it from the waterbody prior to removal. The drilling operator may require access to the waterbody edge to install a sump pump at the waterbody edge in order to try to lower the bore hole pressure. After the release is contained, the fluid will be pumped into trucks and reused or disposed of at an appropriate facility.
- If public health and safety are threatened, the drilling operator will turn off drilling fluid circulation pumps. This measure will be taken as a last resort because of the potential for drill hole collapse resulting from loss of down-hole pressure.
- Badger State will assist appropriate regulatory agencies by collecting water samples, if required.

5.3 WETLAND/RIPARIAN AREA RELEASE:

- The Construction Contractor will evaluate the release to determine if containment structures are warranted and can effectively contain the release. When making this determination, the Construction Contractor will also consider if placement of containment structures will cause additional adverse environmental impact.
- If a release occurs within the wetland, the drilling operator will take reasonable measures to re-establish drilling mud circulation; within the limitation of directional drilling technology and Contractor's capability.

BADGER STATE SOLAR, LLC HORIZONTAL DIRECTIONAL DRILLING INADVERTENT RELEASE CONTROL AND MITIGATION PLAN DATED MAY 1, 2019

- The drilling operator will determine and implement any modifications to the drilling technique or composition of drilling fluid (e.g., thickening of mud by increasing bentonite content, temporary lowering of the downhole pressures) to minimize or prevent further releases of drilling mud.
- Upon completion of the drilling operations, Badger State will consult with applicable regulatory agencies to determine any final clean-up requirements for the inadvertent release.
- If public health and safety are threatened by the inadvertent release, the drilling operator will shut down drilling operations until the threat is eliminated. This measure will be taken as a last resort because of the potential for drill hole collapse resulting from loss of down-hole pressure.
- Badger State will assist regulatory agencies with any sampling they may require.

6.0 ABANDONMENT

If corrective actions do not prevent the threat to public health and safety, or if the collector line installation is unsuccessful, Badger State may opt to re-drill the hole along a different alignment after receiving appropriate regulatory approvals. In this case, the following procedures will be implemented to abandon the previous drill hole.

- To seal the abandoned drill hole, thickened drilling mud and cuttings will be pumped into the hole as the drill assembly is extracted.
- Within approximately 10 vertical feet of the surface, the drilling operator will remove drilling mud and cuttings, then fill the drill end points and any mud pits with soil, and grade the location to the original contour.

7.0 PROJECT COMPLETION AND CLEANUP

Clean-up measures following mud releases in uplands, wetlands, and waterbodies will be implemented as determined by this plan and in consultation with the appropriate regulatory agencies. The following measures are to be considered as appropriate:

- Drilling mud will be cleaned up by hand using hand shovels, buckets, and soft-bristled brooms as possible without causing extensive ancillary damage to existing vegetation. Clean water washes may also be employed if deemed beneficial and feasible.
- Containment structures will be pumped out and the ground surface scraped to bare topsoil without causing undue loss of topsoil or ancillary damage to existing and adjacent vegetation.
- Material will be collected in containers for temporary storage prior to removal from the site.
- Potential for secondary impact from the clean-up process will be regularly evaluated and clean-up activities terminated if physical damage to the site is deemed to exceed the benefits of removal activities in consultation with the appropriate regulatory agencies and/or field representatives.