

# NorthMet Project – Change Definition Form (CDF)

**Topic:** East Dam GoldSim Modeling Changes

**Version:** CDF 251 Version 1

**Date:** September 12, 2014

This form has been developed to document changes to the NorthMet Project and/or Project Water Modeling in response to direction from the Co-Lead Agencies. The forms will be used during the water modeling process. At the end of the process, the Project Description, Data Packages and Management Plans will all be updated as needed to reflect the content of all forms submitted during the process.

## Change Type:

Plant Site GoldSim Model Revision

## Rationale for Change:

An East Side Seepage Containment System has been added to the NorthMet Project (the Project) in order to collect potential seepage from the Flotation Tailings Basin (FTB) in the area of the FTB East Dam (see documents submitted via email FTB Containment System Update 9-12-14.pdf). The addition of this engineering control to the Project requires changes to the Plant Site GoldSim model.

## Description:

The East Side Seepage Containment System as currently proposed extends between the bedrock highs on the east side of the basin. The east side system will utilize the configuration proposed for the remainder of the system, consisting of a cutoff wall and collection trench with drain. The drain will discharge to a lift station, which will initially discharge collected seepage to Cell 2E for subsequent use as process water. As tailings basin capacity is utilized and dams are raised, the collected seepage will be discharged to the combined Cell 1E/2E basin.

Model components need to be added to the GoldSim model to represent (1) the toe of the East Dam and (2) the containment system proposed along the downstream side (east side) of the East Dam (see attached conceptual drawing sheets of the proposed East Containment System). These changes will *only* be made to the "Project" model, and do not affect the "Continuation of Existing Conditions" model. For reporting in the FEIS, water quality at the East Toe under "Continuation of Existing Conditions" will be assumed to be equivalent to background groundwater quality.

The toe of the East Dam will be modeled in a manner consistent with the modeling of the other toes (such as the North Toe). This includes accounting for flow and load to the East Toe and splitting the flow to the East Toe between groundwater flow and upwelling seepage at the toe.

The East Side Seepage Containment System will be modeled in a manner consistent with the modeling of the Seepage Containment System that is located to the north and west of the FTB. This includes collecting some portion of the total seepage (proposed herein to be 100%, see following discussion), routing the collected portion back into the FTB Pond, and allowing the uncollected portion (proposed herein to be 0%) to flow to Mud Lake Creek via the proposed drainage swale.

The capture efficiency of the East Side Seepage Containment System is assumed to be 100% (i.e., all water that reports to the East Containment System, both surface and/or groundwater, is captured). As was previously documented (see the attached technical memo and Figure 1), groundwater and surface water flows are currently into the tailings basin (flow from east to west) in the area where the East Dam will eventually be constructed. The construction of the East Dam and the associated tailings deposition behind the dam will result in hydraulic heads that will allow water to flow to the east towards the toe of the dam. However, given the fact that the hydraulic heads further east of the dam are higher than heads will be near the toe of the dam (which will be constrained by the ground surface), any seepage leaving the FTB at the East Dam will emerge either at the toe of the dam or in the topographic low area just outside of the dam. The purpose of the East Side Seepage Containment System is to efficiently collect this seepage, while minimizing the collection of unimpacted water that will continue to flow from east to west towards the FTB. The unimpacted water flowing towards the FTB will be directed to the swale that is to be constructed north of the East Dam consistent with the Project as described in the SDEIS (i.e. there is no Project change in the management of this unimpacted water).

Other changes to the Plant Site GoldSim model that will be made to reflect this Project refinement are:

- All water captured by the East Containment System will be pumped back into the overall Plant Site process either for reuse or for treatment by the WWTP and discharge. This is consistent with the approach for the proposed FTB Containment System and the South Seepage Management System.
- Surface runoff from the outer face of the East Dam and the small watershed area between the East Dam and the East Containment System will be captured by the East Containment System. Because the system is proposed to be 100% efficient, none of this flow from the FTB will be routed downstream to Mud Lake Creek via the drainage swale.
- The contributing watershed area to Mud Lake Creek after the East Dam and drainage swale are constructed will decrease slightly (compared to the modeling for the SDEIS) to account for the small watershed area now captured by the East Containment System.
- Input time-series tables governing seepage and loading throughout the FTB will be modified. Columns for the East Toe will be added to all tables listed below. The

proportion of flow and load reporting to the East Toe through time will be determined by MODFLOW as it was for the SDEIS modeling. The input tables that will be modified to include the East Toe, and updated once MODFLOW modeling is finished, are (see the attached tables, from Attachment B of the Water Modeling Data Package, Volume 2 - Plant Site):

- Percentage of seepage that flows to each toe from different source areas (Table 1-25, Table 1-27, Table 1-31, Table 1-35, Table 1-37, and Table 1-39)
  - Volume of saturated material under each source area contributing to each toe (Table 1-26, Table 1-28, Table 1-36, Table 1-38, and Table 1-40)
  - Contributing watershed areas (Table 1-49b)
  - Initial mass and concentration to reflect background groundwater quality (Table 1-52 and Table 1-54)
- Other GoldSim model input values resulting from updates to the MODFLOW model may be required where inputs are governed by MODFLOW model output.
  - An ðeasternð flowpath will not be added to the ðProjectð model or to the ðContinuation of Existing Conditionsð model because flow does not travel east under existing conditions, and the East Containment System is assumed to be 100% effective as proposed here. Table 1-46 of the input tables will not be updated to reflect an eastern flowpath.

### **Other Potential Impacts:**

No change in direct wetland impacts is expected.

No change in geotechnical impacts is expected.

Potential air impacts will be evaluated due to construction of the East Side Seepage Containment System.

No change in the project footprint is expected. The East Side Seepage Containment System fits within the existing project footprint.

**Attachments:**

Conceptual drawing sheets of the East Containmentment

Technical Memorandum from Barr Engineering Co. to Dave Blaha and Fred Marinelli (ERM), Mike Liljegren (MDNR) and Mary Rye (USFS), NorthMet FTB East Dam Conceptual Model ó Draft-02, dated June 20, 2014.

Figure 1 ó Drainage from Spring Mine Lake. Originally created for the purpose of responding to public comments on the SDEIS; sent to ERM on 2/11/2014.

Revised text and input tables mentioned in this CDF will be included following approval of the proposed approach presented in Version 1 of this CDF.

**Project Description Changes:**

The "NorthMet Project, Project Description" document will be updated to reflect the addition of the East Side Seepage Containment System to the overall project. Text associated with this update will be included in this CDF following approval of the proposed approach presented herein.

**Data Package/Work Plan Changes:**

The following sections of the Water Modeling Data Package, Volume 2 - Plant Site will be revised to reflect the proposed change in modeling:

- Section 5.1 Conceptual Model.
- Section 5.1.2 Project Model.
- Section 5.1.2.3 FTB Containment System and South Surface Seepage Management System.
- Section 5.2.2.3 FTB Containment System and South Surface Seepage Management System.
- Section 5.2.2.8 Surface Water. Also will update Figure 5-29 in this section.
- Section 5.2.2.8.1 Flow Augmentation to Prevent Significant Hydrologic Impacts. Also will update Table 5-19 and Table 5-20 in this section.
- Section 6 and all of its subsections (for example 6.1.4 and Figure 6-6, and the whole of 6.4) will be updated as results from the modeling are updated.
- Large Figure 8, Large Figure 9, Large Figure 10, Large Figure 11, Large Figure 12, Large Figure 16, and Large Figure 17.

- Attachment A Summary of MODFLOW model Recalibration.
- Attachment B Input Variables for the Plant Site Model ó this attachment will be revised to include the input values associated with the East Toe and the East Containment System.
- Attachment F Concentration Statistics at the Toes of the Tailings Basin ó this attachment will be updated to include the additional output from the East Toe.
- Attachment G Median loading rates to the Toes of the Tailings Basin (Culpability Analysis) ó this attachment will be updated to include the additional output from the East Toe.

### Management Plan Changes:

Changes will be made to the òNorthMet Project, Water Management Plan ó Plantö to reflect the addition of the East Side Seepage Containment System. For example, Sections 2.1, 4.1, and 7.3 will all be updated to reflect this added engineering control.

### Revision History:

Date	Version	Description
9/10/14	1	Internal draft for PolyMet Review
9/12/14	1	Version 1 sent to Co-Lead Agencies