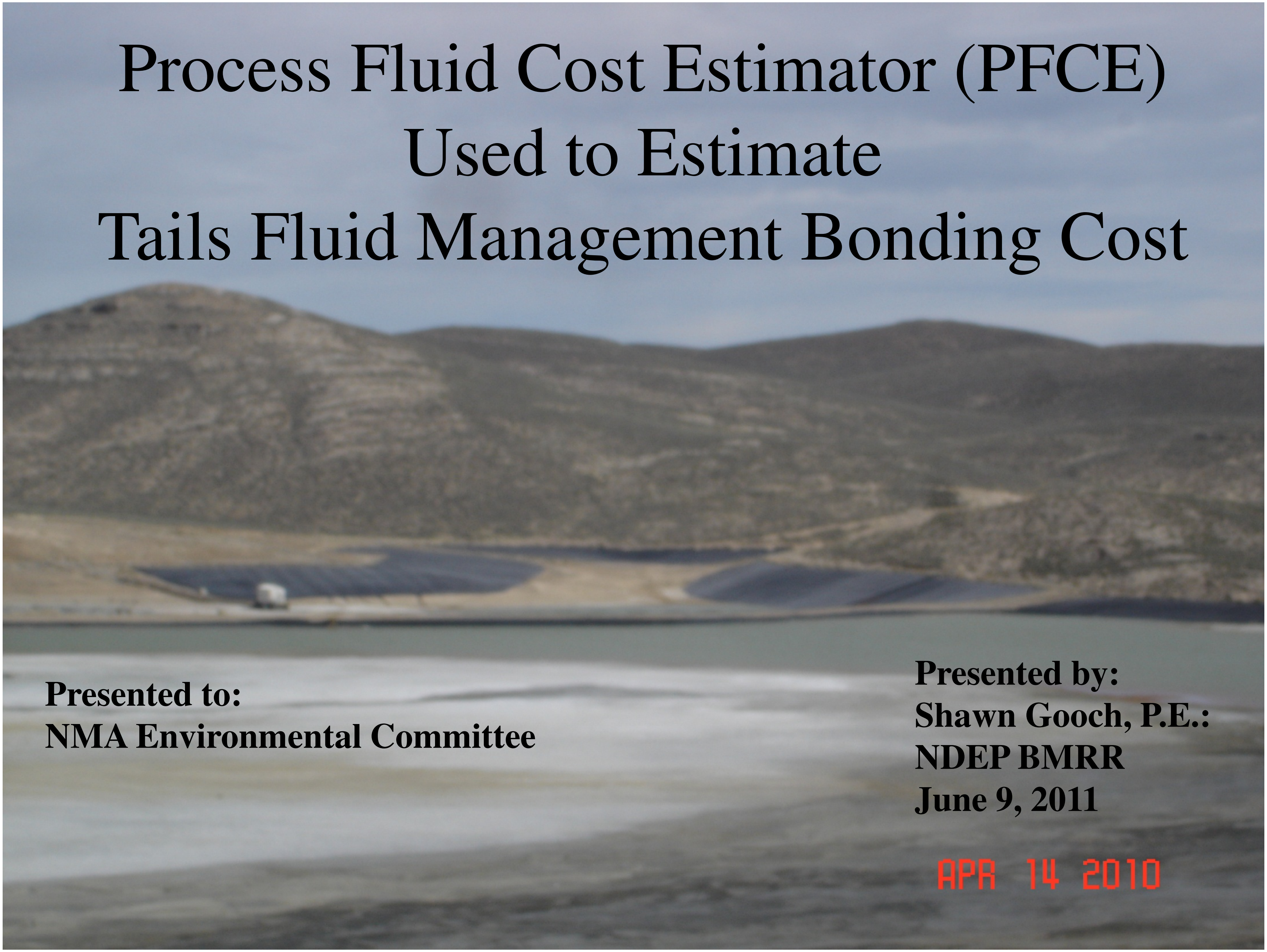
Process Fluid Cost Estimator (PFCE) Used to Estimate Tails Fluid Management Bonding Cost

Presented to:
NMA Environmental Committee

Presented by:
Shawn Gooch, P.E.:
NDEP BMRR
June 9, 2011



Background

- The tails drain down subcommittee of the Nevada Mining Association's Environmental subcommittee met on April 28, 2011. The goal of the subcommittee was to evaluate whether a standardized cost estimating procedure for Tails Storage Facility (TSF) similar to the standardized procedure developed for Heap Leach Facilities (HLF) could be developed. The Heap Leach Drain down Estimator (HLDE) was developed by Newmont Mining Corporation and JBR Environmental Consultants to provide a simplified tool for estimating drain down curves of post mining operation HLF. Unfortunately, HLDE does not allow adequate detail of the hydraulic input parameters and the physical complexities encountered in a TSF to be feasible in estimating acceptable drain down curves for TSF. The general consensus reached was to allow the use of a post operational drain down curve generated for a TSF to be used to estimate the bonding cost associated with the stabilization of process fluids with the Process Fluids Cost Estimator (PFCE). A drain down curve included in the water balance study for submittal to BMRR Regulation Branch in support of a Water Pollution Control Permit would be a preferred source.

Background

- Based on the discussion of the tails drain down subcommittee on April 28, there are several key items that an operator must consider when using this drain down curve and PFCE to estimate the fluid management reclamation bonding cost for a TSF.

- The following list includes items to be included in the development of a post operation drain down curve used in a cost estimate for a TSF. It should not be considered a complete list but a list of several items that the committee felt distinguish a TSF from a HLF where HLDE is recommended.

Documentation:

- A technical report documenting the procedures, methods and any commercial computer models used in the development of the results of the water balance and drain down curve should be included in the documentation accompanying the cost estimate. This technical report should include a notation from the preparer that the modeling is indeed appropriate for use in estimating PFS costs using the procedure selected. This report may be the same report submitted to BMRR Regulation Branch as technical support of the application for a Water Pollution Control Permit if it contains appropriate documentation. BMRR recommends that operators submit the same report to both branches for separate permits in order to minimize confusion between reports.

Recirculation:

- Typically, a TSF surface at or near the residual supernatant pond is comprised of very fine sediments and slimes generating a relatively impervious boundary. It follows that process fluids pumped directly to the supernatant pond from process, reclaimed, under drain or storm water ponds, (POND) without passing through an evaporator will constitute a majority of the volume of the recirculation. However, a post operation drain down curve developed for a TSF cost estimate should include consideration of the seepage of supernatant pond fluids into the tails matrix. Dependent on the hydraulic conductivity, hydraulic head and the supernatant footprint of the TSF this flow can range from near zero to significant values. If an assumption that the tails act as an impermeable layer is to be proposed, then adequate documentation of this assertion is necessary. Otherwise, the water balance should include appropriate infiltration volumes with associated contribution to the total fluid volume within the tails matrix available for drain down.


PONDS
FEB 10 2011

Evaporation:

- Consideration of several sources of evaporation should be included in the post operation drain down curve used for tails PFS cost estimation. These include the following but other sources may also be considered relevant.

Evaporation:

- Supernatant Pond Evaporation: The maximum volume and lateral extent of a supernatant pond may be dictated by regulatory permits. Values used in the surface evaporation calculations at the starting point should reflect regulatory limits. In the case where regulatory limits do not exist, an operational pool configuration that reflects full scale mine production should be used for the starting configuration for evaporation calculations.

Evaporation:

- POND Evaporation: Surface evaporation calculations should reflect post mining operational POND surface area.

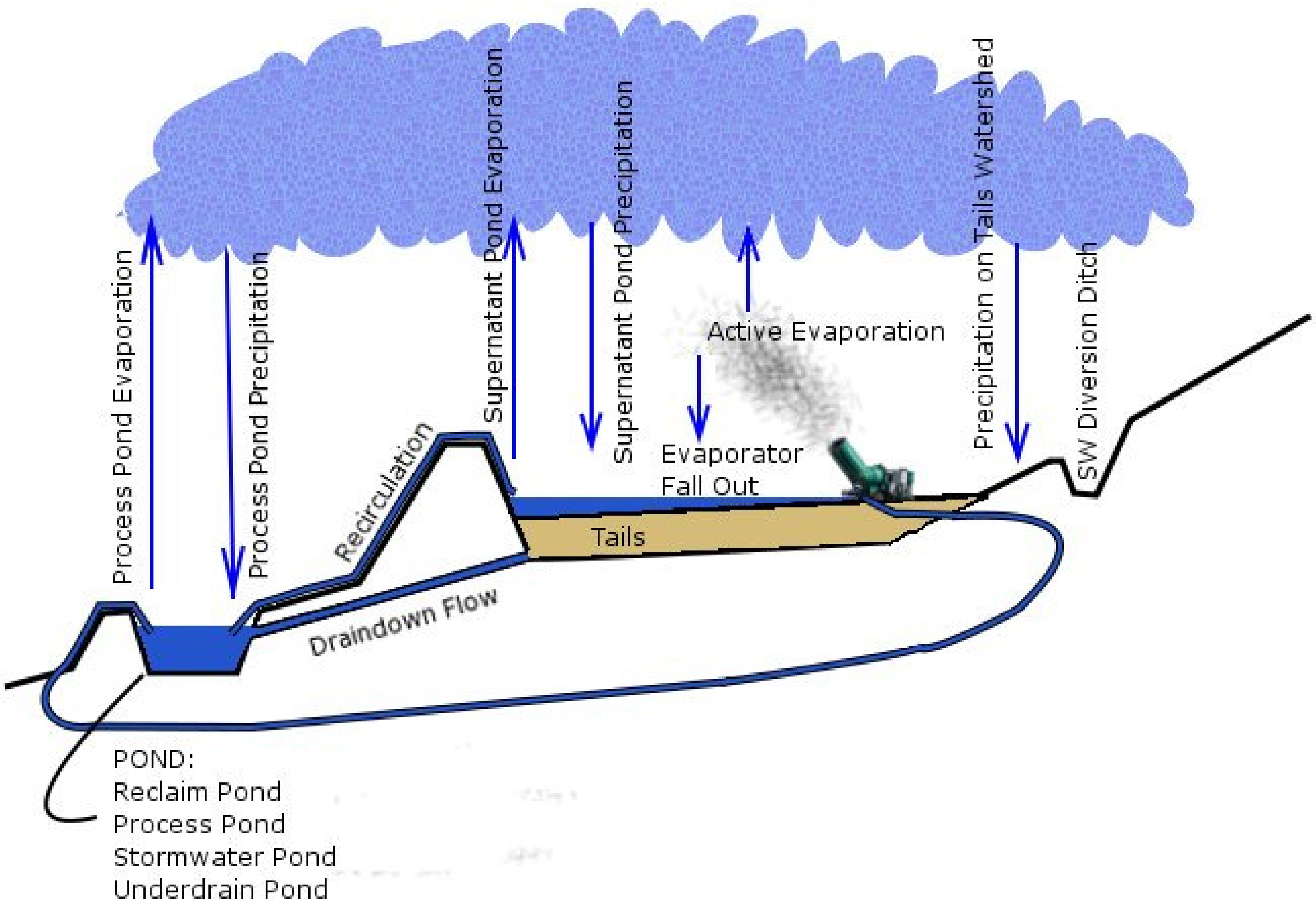
- Active Evaporation: Mechanical evaporators may be employed at the POND, the supernatant pond or both. The volume of fall out from an evaporator on a TSF surface should be added to the volume of the supernatant pond only when the source of the flow to the evaporator is not directly from the supernatant pond.

Precipitation:

- Supernatant Pond: All precipitation falling directly on the interior surface of the tails impoundment should be added to the volume of the supernatant pond without reductions due to infiltration, interception or other losses. Precipitation falling on that portion of the catchment that excludes the interior surface of the impoundment should be added to the supernatant pond volume excluding justified infiltration and interception or other losses.

- POND: All precipitation falling directly on the interior surface of the POND should be added to the volume of the supernatant pond.

Water Balance Conceptual Diagram



Water Balance Block Diagram

Tailings Interstitial Water	+	**POND Volume**	+	Supernatant Pond Volume	+	Meteoric Water Influx	-	Evaporation: Active, Pond and Passive


Questions?
FEB 10 2011