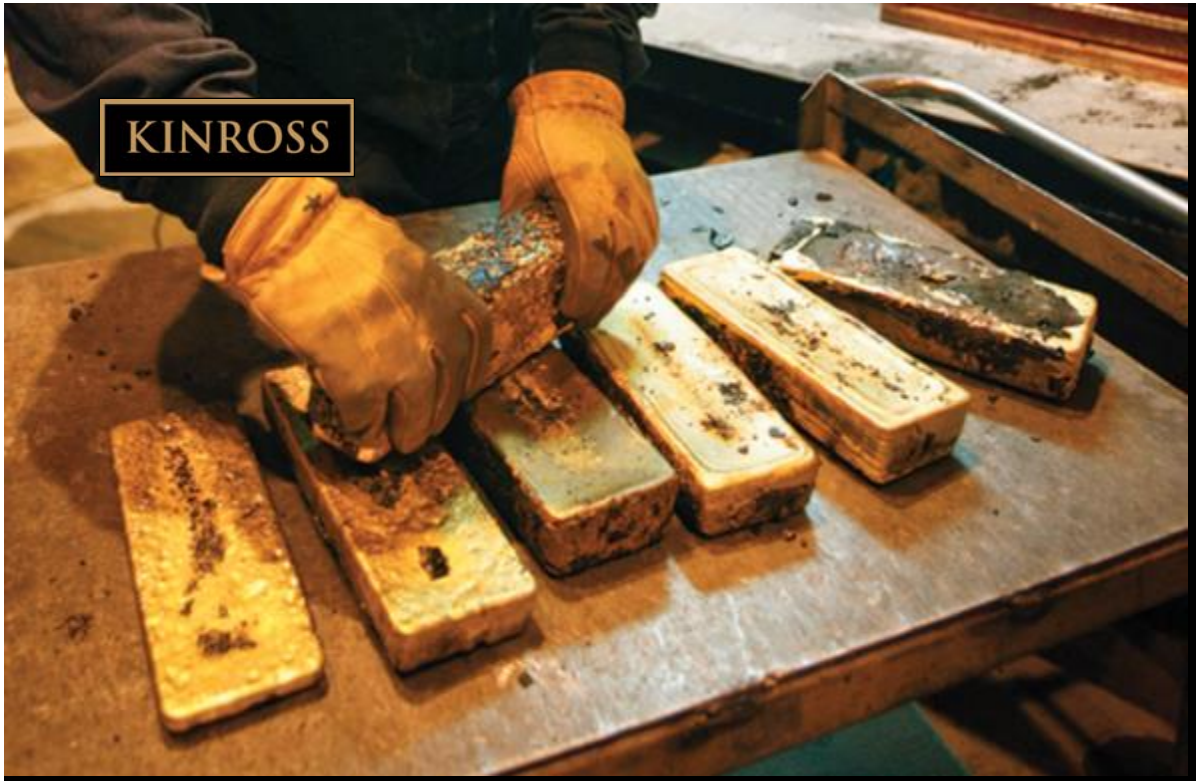
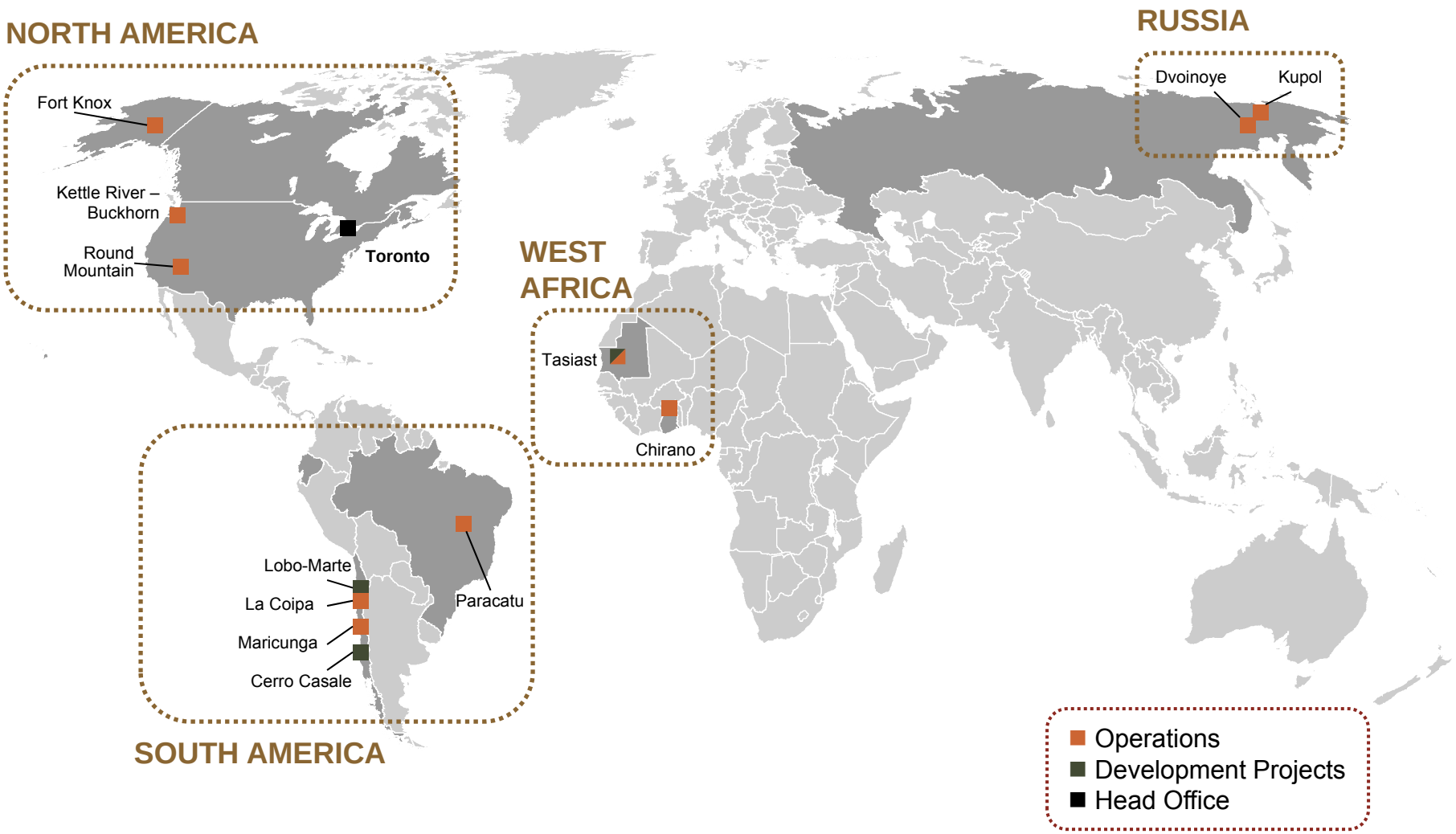


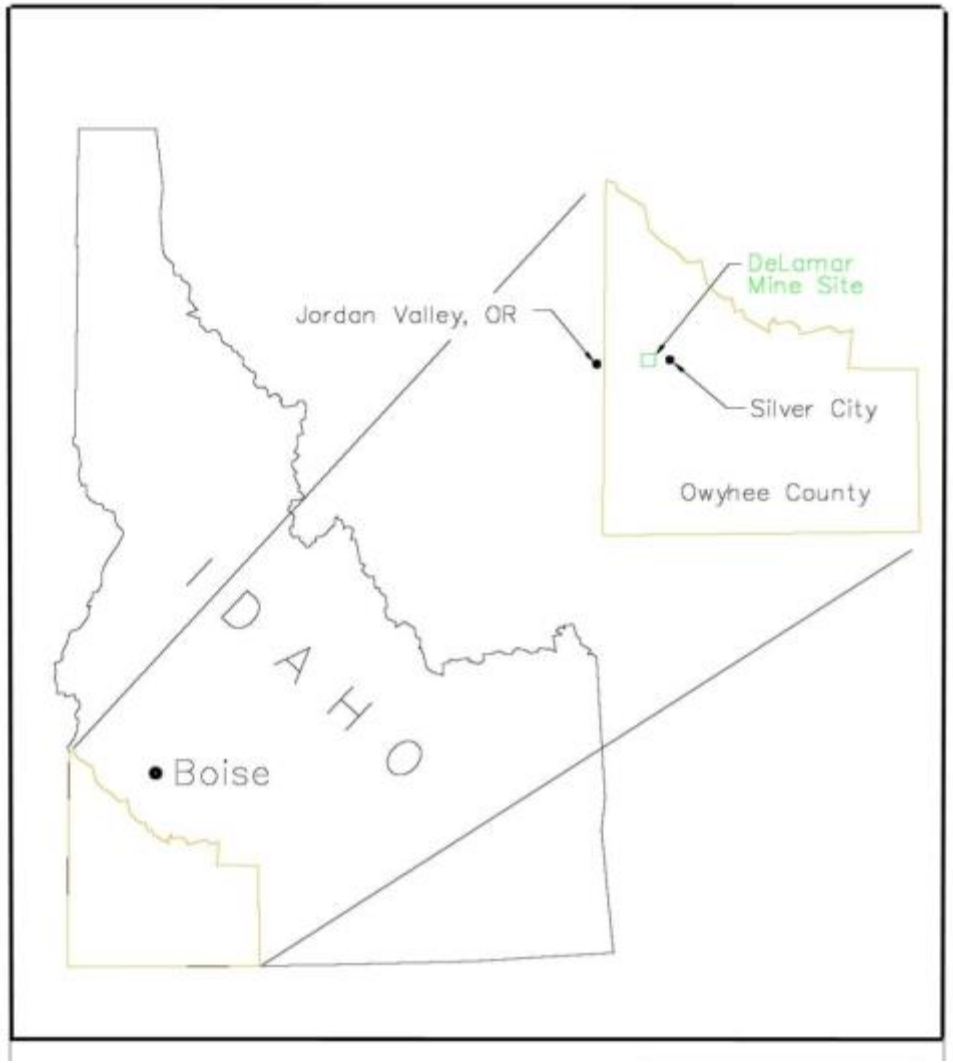
CLOSURE OF THE KINROSS DELAMAR MINE

Steve Smith – Environmental Manager – Reclamation Operations (ROBU)

OPERATIONS MAP



DELAMAR MINE LOCATION



DELAMAR SITE HISTORY

- Historic Mining District 1863 to 1914
- Ownership 1977-1993 – Earth Resources and NERCO
- 1993 – Kinross purchase NERCO property from Kennecott
- Kinross production 1993-1998
- Care & Maintenance 1999-2002; Closure began in 2003

SITE CONDITIONS AT SHUT-DOWN

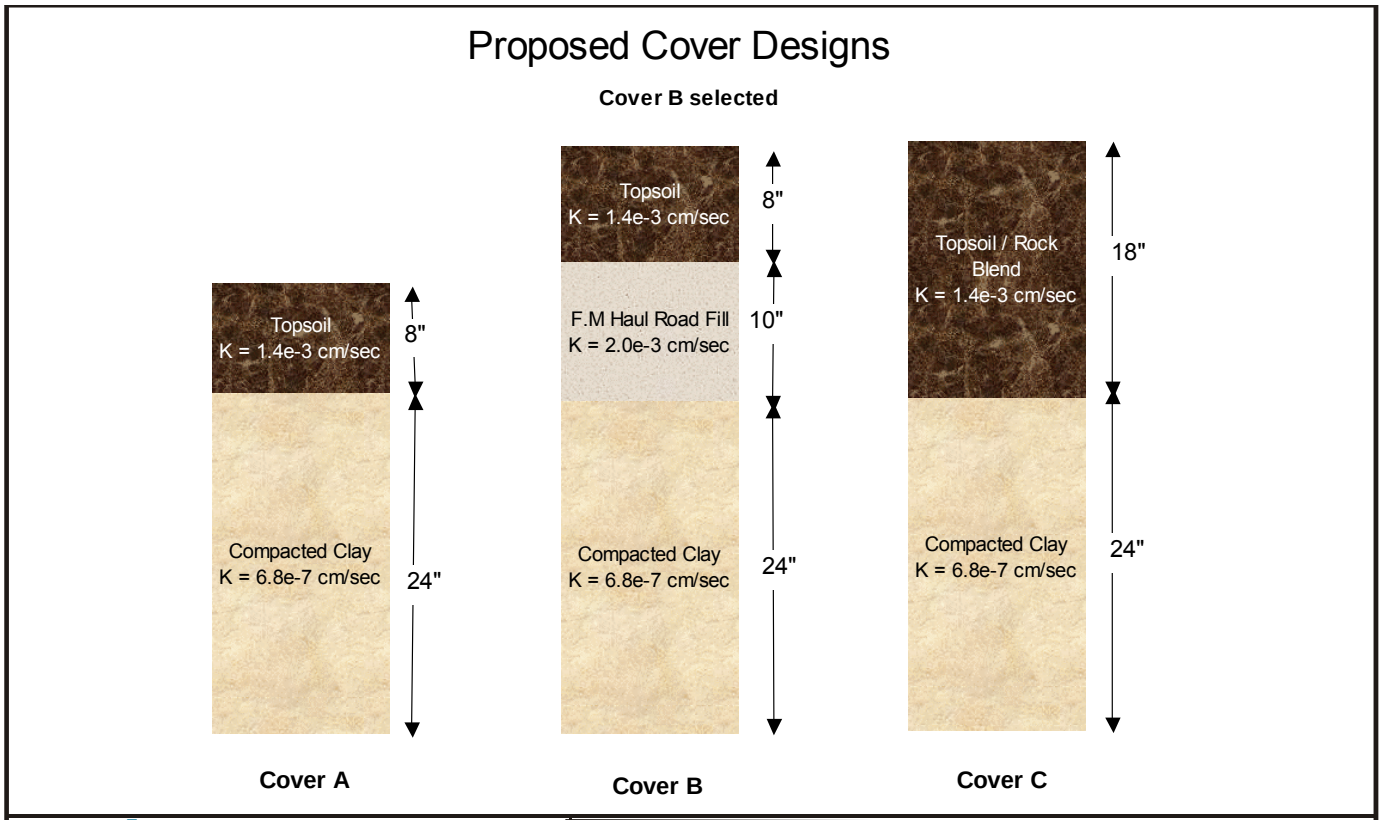
- Prolonged low metal prices forced shut-down and subsequent closure
- Record high precipitation during shut-down period
- ARD conditions at waste rock facilities and open pits
- Tailings pond also used for ARD storage

PREPARATIONS FOR FINAL RECLAMATION AND CLOSURE

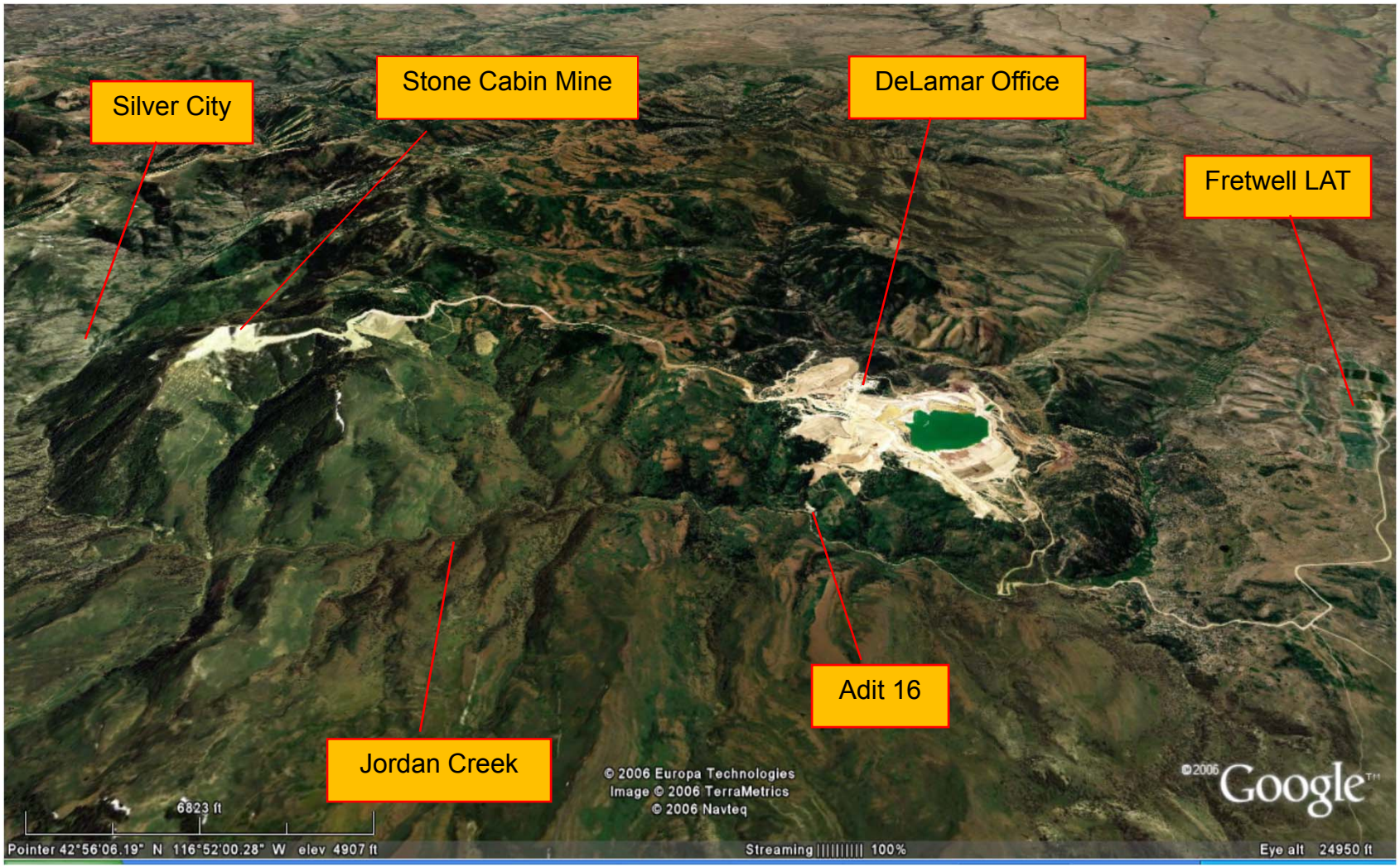
- Lead regulatory agencies are the Idaho Dept. of Lands (IDL) and US BLM
- Supporting agencies include IDEQ, IDWR, and US EPA.
- In early 2002, Kinross established the Reclamation Operations Business Unit (ROBU), a separate unit within the company to manage reclamation and closure sites.
- Later in 2002, Policy and Technical Groups were formed with agency and company staff to update the existing Reclamation Plan into a comprehensive Closure Plan.
- Technical Group met monthly over a two-year period to review, modify and finalize the numerous engineering plans, as well as the overall Closure Plan.
- Approved reclamation projects were authorized to begin in 2003.
- By mid-2004, the guiding Closure Plan, Water Management Plan, engineering design plans, and other support documents had been extensively reviewed, modified, and approved for implementation over a 7-year schedule.

RECLAMATION DESIGN BASICS

- Engineered low-permeability covers on waste rock, open pits, tailings pond
- Site-wide water management; segregate impacted water from storm water
- De-water tailings by treatment and land application; construct dry cover



View from the North - 2006



DeLamar Overview

WASTE ROCK #1 CLOSURE -- 2003-2004

- Regraded to 3:1V, low-permeability cover including storm water conveyances

WASTE ROCK #1 CLOSURE -- 2003-2004

- WD1 completed in 2004
- Includes three buried seep collection systems to segregate storm water

INITIAL EFFECTS OF ENGINEERED COVER

- WASTE ROCK #1 -- MOST NOTEABLE
- Pre-reclamation (1999-2002) – ~600 to 800 af/yr

- 2005 – 377 af
- 2009 – 162 af
- 2010 – 166 af
- 2011 – 236 af (Above average snowpack, very wet spring; contingency pond)
- 2012 – 150 af
- 2013 - 125 af (est)

- Still see some climatic variation

MINE PIT CLOSURE – SOMMERCAMP PIT

- No static groundwater encountered
- Regrade to free-draining topography; backfill deeper, more reactive highwalls
- Construct low-permeability cover

MINE PIT CLOSURE -- SOMMERCAMP PIT

- Completed in 2006
- Storm water free-drains to the north

MILL AREA DEMOLITION

- Removed building, refinery, mills, leach tanks, thickeners, AVR plant
- Due to good scrap metal prices, made a small profit
- Essentially everything was salvaged

TAILINGS POND CLOSURE -- 2003-2014

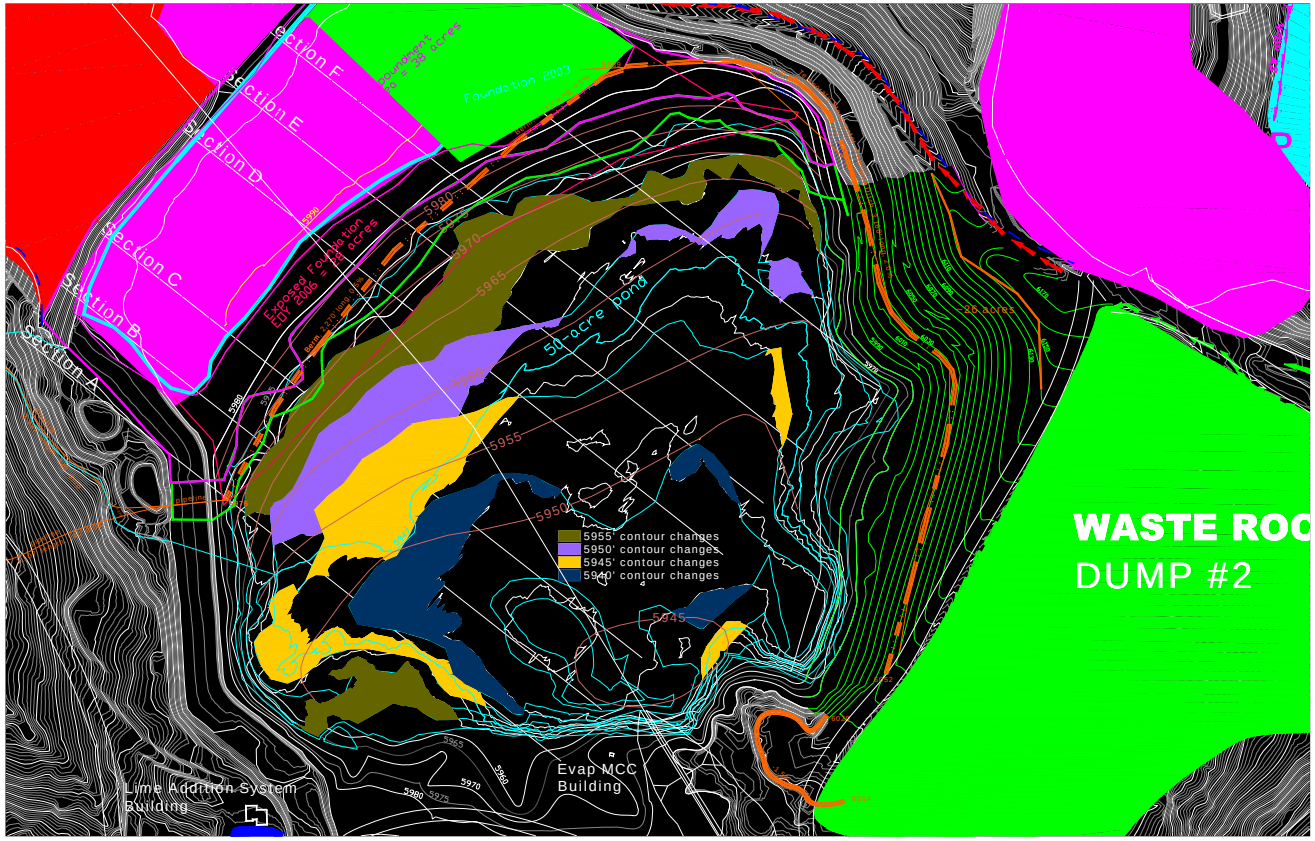
- Very challenging circumstances; limited treat and discharge options
- 200-acre tailings surface
- Set aggressive schedule to retain agency support
- 4-layer cover; foundation, compacted clay, subsoil, soil; approx 8 ft total

TAILINGS POND CLOSURE -- 2006

- Continued cover advance with declining water levels
- Foundation instability increasing
- Completed tailings embankment in 2006-2007

TAILINGS POND CLOSURE -- 2006

- Stability concerns increased later in the construction season
- Began testing and changing over to smaller, LGP equipment
- October 2006 pond sonar survey; subsurface tailings waves



TAILINGS POND CLOSURE -- 2007

- Continue cover advancement
- Transition to LGP and geo-grid/geo-textile reinforced haul routes
- De-watering ACCELERATED due to reduced ARD flows to be stored
- Storm water diversion adjacent and on reclaimed areas

TAILINGS POND CLOSURE – LAND APP

- Land application best (only) reasonable option for de-watering
- Very closely controlled and monitoring by IDEQ
- Private land lease; very positive effect on landowner

TAILINGS POND CLOSURE -- 2008

- Constructed water management pond
- Replaces lost water treatment/storage awaiting land application season
- Enlarged in 2012 to 350 acre-ft capacity

TAILINGS POND CLOSURE -- 2010

- Continue cover advance with typical LGP D5 and 35 ton trucks
- Tailings surface essentially de-watered
- Increased management required for pore water and seeps

TAILINGS CLOSURE -- WATER ISSUES

- Increase in accumulated pore water drainage and seeps
- Increased water handling, tailings slimes handling
- Prepare to begin spillway excavation

TAILINGS POND CLOSURE -- 2011

- Heavy snowpack and heavy spring rains
- Early season de-watering challenges
- Late season very successful

TAILINGS POND CLOSURE -- 2012

- Normal spring weather patterns
- Previous year tailings drying and consolidation improve working conditions
- Successful construction season

TAILINGS POND CLOSURE -- 2013

- Cover essentially complete, some localized areas and topsoil remaining
- Spillway excavation essentially complete and functional
- Variety of smaller projects in 2014 to finish earthworks

DELAMAR CLOSURE

- Key lesson learned (or confirmed)

- Need to focus on water inventory minimization during operation, especially as closure approaches.

- If not constrained by regulatory commitments or other requirements; then, more efficient to nearly complete tailings de-watering before cover construction.

DELAMAR CLOSURE

– 1990’s -- 2012


KINROSS