

BUCKHORN BULLETIN

Okanogan Highlands Alliance



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OHA Heads to Washington Water Court



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Why We Do What We Do

Kinross Gold Corporation of Ottawa, Ontario, Canada in the name of a wholly owned subsidiary, Crown Resources of Denver, Colorado has patented national forest land on Buckhorn Mountain and wants to mine gold to provide ore for its mill near Republic, WA. In order to mine, the company would have to dewater the mountain. This would dry up wetlands and headwater streams and adversely affect senior water rights. After mining, water that would normally flow down streams and wetlands would go to refill the aquifer. This is predicted to take 15-25 years or more. The mineshafts would cause preferential pathways for water currently flowing down Myers Creek to instead flow down Toroda Creek. This shift in the way water flows off the mountain is predicted to be permanent.

Much of the gold bearing ore in Buckhorn Mountain

is below the water table in rock that when blasted apart, could cause significant water pollution. Groundwater would have to be treated before being released. Both the quantity and quality of the project modeling is inadequate to ensure that the water would be protected. This was one of the fatal flaws of the previous mine proposal and it has the potential to derail this one as well.

The proposed mine threatens the short and long-term health and safety of water resources on Buckhorn Mountain as well as the viability of ecologically significant streams, wetlands, and wildlife habitat. The mitigation offered in exchange for the predicted harm does not come close to offsetting or compensating for the losses in aquatic resources. In light of the growing evidence on the impact of climate change and its affect on water supply, we feel that the hydraulic impacts both to water quantity and quality are extremely significant.

PERMITS APPEALLED

Hearing Set for May 12-30

The Okanogan Highlands Alliance (OHA) challenge of Washington State Department of Ecology's environmental review and permitting for the large-scale cyanide-leach gold mine Kinross/Crown proposes on Buckhorn Mountain is now before the Environmental Land Use Hearings Board (ELUHB). OHA has convened an outstanding team of legal and technical experts who will provide insightful and compelling testimony. OHA has been joined in some of the appeals by the Center For Environmental Law and Policy (CELP) and the Washington Environmental Council (WEC) whose expertise and resources will strengthen this effort.



Crown/Kinross Motion for Summary Judgement

Relying on the sheer volume of studies and paper that has been produced over the past decade or so, Crown/Kinross asked the hearings board to throw out OHA's challenge of the adequacy of the SEIS. Our response was to point out Crown/Kinross seemingly unending effort to: (1) find or create water where it does not exist; (2) permanently shift water from one overused basin to another; (3) downplay the impact of exposing highly contaminated rock to air and moving water; (4) predict the fate and transport of groundwater through a highly fractured and poorly understood aquifer; (5) and "mitigate" impacts to high altitude functioning headwater wetlands, seeps and springs with poorly defined, out-of-kind and out-of-place valley floor mitigation proposals. Crown Resources once again comes before a State of Washington Environmental Hearings Board and asks that we trust it.

Just as the PCHB was not fooled a decade ago, neither should the ELUHB be. OHA demonstrated in its response, and in the incorporated declarations and analysis of our expert witnesses, that despite creating massive paperwork, the SEIS for the Buckhorn Mountain Project still fails to provide the accurate and reasonably thorough analysis necessary for making the critical decisions needed for this project. Summary judgment should be denied.

WHO is the EHLUB?

The Environmental Land Use Hearings Board (ELUHB) is a new board created by the Washington State legislature in 2003 to hear appeals of agency decisions that promote economic development in economically disadvantaged areas. Projects under the ELUHB receive an expedited appeal procedure that consolidates all appeals. The hearings board convenes a 6 person panel that includes the Pollution Control Hearings Board (PCHB) and the Shoreline Hearings Board and takes place in Lacey, Washington.

OHA has appealed;

1. the Supplemental Environmental Impact Statement
2. the General Stormwater Construction Permit,
3. 9 separate Water Rights, the Clean Water Act Section 401 Water Quality Certification,
4. the National Pollution Discharge Elimination System (NPDES) waste discharge permit, and
5. the Tailings Dam Expansion.

The appeals constitute 73 issues that have been pared down to 17 general issues.

The schedule for the hearing is set for May 12-30. Until then briefs presenting the technical arguments are exchanged between the parties. The format of the hearing will be a trial in front of a panel of 6 judges.

We know from our past experience, having stopped an open-pit mine proposal in January 2000, that the current mine proposal also fails to meet the requirements of the laws that protect people and the environment.

Blasting mine shafts would pull the plug on the seeps, springs and creeks that people, fish and wildlife depend on. It would take decades for the mountain's water table to fill, but it would never return to its current flow pattern, impacting water resources forever. On top of this the water could become contaminated, in the long-term, with acids and metals.

The Groundwater Flow Model

Joel Massmann, Ph.D., P.E. Reviewed of the groundwater flow model used to support the Final Supplemental Environmental Impact Statement (FSEIS) for the Buckhorn Mountain Project. The model is described in the September 7, 2006 report prepared for the Department of Ecology by URS.

The issues and concerns identified relate to the way in which the model results are used. The predictions derived from the groundwater model are used in the FSEIS in an inappropriate way. A regional scale model, whose predictive capabilities have been demonstrated to be very limited at best, is used to design site-specific mitigation activities with no apparent regard for uncertainties or factors of safety. The model is used to support conclusions regarding impacts that occur at discrete locations, such as seeps and springs, even though the model has not been shown capable of predicting flows to these features.



How Model Predictions are Used

Model predictions related to water levels and streamflows are used to evaluate and quantify impacts throughout the FSEIS

Many of the applications require model predictions at spatial scales that are smaller than regional. The regional scale model developed for the Buckhorn Mountain groundwater system was not intended for these types of applications and

cannot reliably predict these types of impacts. The errors associated with small-scale and transient predictions have not been fully quantified, but they are large relative to the design decisions that are being made based on model output.

1. To estimate water inflows to the mine and to size the water treatment facility .
2. To quantify groundwater mounding in the vicinity of the infiltration gallery and outfalls and to evaluate where and when the groundwater recharge from these facilities would discharge.
3. To quantify the size and shape of the groundwater capture zone that is expected to result from mine dewatering activities.
4. To predict the timing and magnitude of water level changes in the vicinity of the mine.
5. To predict groundwater discharge to seeps and springs within the area of influence of the mine.
6. To predict groundwater discharge to streams that originate on Buckhorn Mountain and to calculate changes in base flow during and after mining operations.
7. To select mitigation measures for streams.
8. To predict impacts to wetlands.
9. To predict the long-term shift in the groundwater divide on the mountain.
10. To design mitigation measures for impacts to aquatic and water resources.

Model Uncertainties for Transient Simulations

The uncertainties in baseflows to streams are calculated by subtracting the calculated flows from the observed flows. The errors for summer flows range from approximately 18% to 700%. The average summertime or low flow error for the 10 hydrographs included in the URS report is approximately 150%. In most cases, the model error is significantly larger than the predicted impact. It is important to note that the predicted impacts are used to develop mitigation activities.

The errors described show that there is a general bias associated with the summer-time or low water levels. The calculated low water levels are all less than the observed low water levels for the hydrographs that are included in the URS report. This violates the accepted calibration objective of unbiased or random errors.

Over-predicting summertime water levels may likely result in under-predictions of impacts to seeps, springs, and streams. The water level predictions are also used to determine the capture zone for the well dewatering systems and to quantify the impact of the mining activities on the locations of the mountain's groundwater divide.

It is not clear that the developers of the FSEIS were fully aware of or sensitive to the limitations of the model predictions. This can be demonstrated by the use of model results to predict changes in base flow over a 50 year time period. Some of these predicted changes are on the order of 10 gpm or less during the low-flow summer months. However, the URS modeling report, the calibrated results for these locations show errors much larger than 10 gpm.

The uncertainties and errors from the modeling report have not been included or recognized in the FSEIS report. This disconnect occurs throughout the FSEIS report.

Surface Water Issues

Malcolm Leytham with Northwest Hydraulic Consultants reviewed surface water issues for the proposed mine and a brief review of the Hydrologic Monitoring Plan. He noted a number of inconsistencies related to water rights and a significant omission related to estimation of haul road sediment loading to Marias Creek.



The review focus is on three main interrelated issues:

- *the estimation of base flow,*
- *the validity of base flow data used in development of the groundwater model, and,*
- *the adequacy of the baseline hydrometric data.*

Base flow Separation Analysis - Estimates of base flow for the various streams draining Buckhorn Mountain are crucial to development and calibration of a groundwater model capable of predicting mine impacts. The complete lack of reliable flow data in the period of summer base flow means that there is no basis for calibration of the groundwater model to the summer recession limb of the base flow hydrograph. The appropriate amounts of summer base flow augmentation must be highly uncertain when there is no basis for model calibration for that period.

Typical year base flow - The available limited data show that the adjustment used is inappropriate and likely results in a significant underestimate of the “typical year” base flow used for groundwater modeling.

Time Distribution of Recharge - Calibration of the transient groundwater model also focused on water year 1994. Unfortunately in terms of timing of recharge, 1994 is not a typical year, and the assumed distribution of recharge is inconsistent with precipitation and melt data from 1994 assumed by URS in calibration of the groundwater model and puts into further doubt the validity of the URS groundwater model calibration.

Adequacy of Baseline Data - Period of Record - The baseline hydrometric (i.e. hydrologic and meteorological) data are inadequate to support either reliable analysis of the environmental impacts of the mine or to support the proposed Adaptive Management Plan (AMP) (Golder, 2006). For all water quantity impacts, the AMP comprises monitoring, data evaluation and analysis, and potential adaptive management actions in response to change attributable to the mine. The availability of what for most monitoring locations is less than one year of concurrent precipitation data and irregular stream discharge measurements, is entirely insufficient to either characterize the pre-mining site hydrology or provide the basis for development of site hydrologic models.

Data Reliability - The reliability of site precipitation and streamflow data are a concern both with respect to the existing inventory of baseline data and future monitoring activities.

Hydrologic Monitoring Plan - Post-Closure Monitoring - “only the upper elevation Nicholson Creek and Marias Creek (stream flow) stations will be monitored” and “only the upper elevation Nicholson Creek and Marias Creek seeps and springs will be monitored” (Golder, 2007). No post-closure monitoring is being proposed for any of the Myers Creek tributaries (Bolster, Gold or Ethel Creeks). This is a glaring omission in the monitoring plan given that mining is expected to result in decrease in flows in the Myers Creek tributaries and is incompatible with the Adaptive Management Plan which calls for mitigation action in response to changes in monitored discharges attributable to the mine.

Sediment Inputs to Marias Creek - One of the major impacts of the project will be increased sediment loadings to Marias Creek from the Marias Creek Haul Route. Ecology's subcontractor, URS, undertook a detailed analysis of sediment production for both pre- and post- haul road construction conditions but failed to account for, or even mention, the effects of differences in traffic loads on sediment production. Ore and backfill hauling trucks would make about 50 round trips per day, averaging 1 every 7 minutes between 6:00 a.m. and 6:00 p.m. In addition, employee vehicles and supply trucks would add trips. This increase in traffic loads can be expected to result in a significant increase in sediment loadings to Marias Creek, particularly during wet weather and result in significant unmitigated impacts to aquatic resources in Marias Creek.

Water Quality Issues

Ann Maest, PhD, reviewed water quality predictions and potential impacts to surface water and groundwater from the proposed Buckhorn Mountain Project based on information provided in the Environmental Impact Statement, the NPDES permit, and related documents. Ann is an aqueous geochemist with expertise in the fate and transport of natural and anthropogenic contaminants in groundwaters, surface waters, and sediments. The past 15 years, she has focused on the impacts of hardrock mining on water quality. She is currently serving on the National Academy of Sciences Committee on Earth Resources, which oversees mining and energy studies for the Academy.

Overall, predictions of operational and post-closure water quality are too optimistic, due in large part to underestimation of contaminant concentrations from geochemical testing results. The amount of rock predicted to become acidic over short and longer time frames is also underestimated, and plans for management and identification of acid-generating rock are poorly defined.

The geochemical tests used to define potentially acid-generating (PAG) rock will underestimate the acid-generation potential of rocks in the development rock stockpile and in the underground mine.

The short test length and high detection limits for metals renders most of the humidity cell test results almost useless as indicators of water quality.

The prediction that development rock will not become acidic in the time that it is exposed during mining is not supported by the mineralogic information or the HCT data.

Predictions of operational and post-closure water quality underestimate the ability of the mined materials to generate acid and leach contaminants because they rely upon a series of assumptions and analytical and modeling approaches that underestimate the reactivity of mined materials.

Predictions of mitigated post-closure mine water quality does not consider the presence of reactive mine wall rock and underestimate the exceedences of groundwater standards in the underground mine

The use of “passivation” techniques is experimental, requires a high degree of engineering success, and is highly unlikely to prevent groundwater exceedences in the underground mine under post-closure conditions.

The quantitation limit (QL) for effluent parameters is not defined in the NPDES permit. If the QL is not at least three to five times lower than the effluent limit, it will not be possible to distinguish a non-detect value from an exceedence.

No specific quality assurance/quality control (QA/QC) criteria are required for sample reporting

No maximum daily limits are set for surface water discharges for a number of important parameters.

The effluent limits for several of the contaminants are set higher than drinking water standards.

The effluent limits for cadmium and nickel are much higher than the federal Clean Water Act limits using the relevant aquatic life hardness-based criterion values at the hardness value suggested in the permit.

Chronic and acute tests should be run when concentrations in the stream are the highest.

The discharge of treated effluent to groundwater will cause exceedences of toxics in surface water

In addition to water quantity or flow monitoring, Myers Creek and tributaries should be monitored for water quality changes that may result from discharge of mine pool water under post-closure conditions

Crown/Kinross and Ecology assert that mitigated post-closure water quality would be similar or better than pre-mining water quality.

If this occurs, it will be the first time in history a mine has improved water quality.



Wetlands and Mitigation

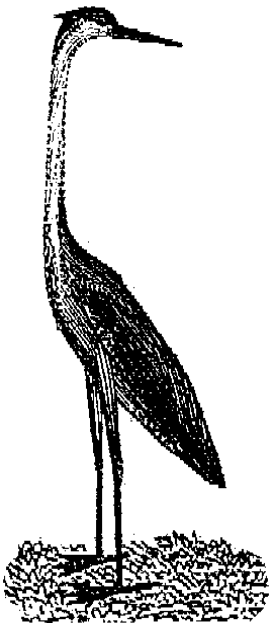
Sarah Cooke, Pd.D. with Cooke Environmental reviewed wetland issues with respect to the impacts from the mine proposed on Buckhorn Mountain

The Buckhorn Mountain Project Final Supplemental Environmental Impact Statement (SEIS) is incomplete and does not contain the detailed inventory and analysis of wetland and stream resources in the affected area and further does not include a detailed assessment of stream functions in the affected area that is required for projects that impact aquatic resources. The mitigation offered is based on preservation of existing wetlands (resulting in net wetland loss), and these wetlands are in a different drainage basin and have different functions than the impacted wetlands (resulting in net loss of wetland functions). The mitigation does not protect or mitigate wetland and stream impacts.

Off-site, out-of-kind mitigation that results in maximum net acreage and functional loss is not normally accepted by any of the review agencies. In this case, the impacts are also difficult to predict, since we really don't even know what the resources are. It seems reasonable to expect that the level of mitigation be clearly beyond what is required, so there is no question that it compensates for unquantified impacts. If the controversy concerning the SEIS and the proposed mitigation shows anything, it shows that the level of mitigation is clearly not more than adequate to offset the unquantified impacts. Not only is the amount and kind of mitigation offered inadequate by normal standards, the mitigation plan does not include the usual performance standards, monitoring, and contingency triggers. The Adaptive Management Plan (AMP) provides protocols for setting up a monitoring and contingency program, but does not include the actual performance standards and contingency actions. It seems odd the agencies would approve a project that provides such incomplete information, provides for such inadequate mitigation, and does not even provide

for thorough monitoring to pick up any impacts that may be experienced but not anticipated.

Given the uncertainty of the mine impacts including dewatering and refilling on both surface and groundwater quantity and quality, the absence of a clearly adequate mitigation plan, and the use of what amounts to off-site out-of-kind mitigation banking, based on preserving existing wetland, the current plan is subject to criticism that it does not adequately assess or compensate for impacts to aquatic resources.



1. Does the SEIS provide a reasonably thorough analysis of the impacts to aquatic resources including wetlands, seeps, and springs?

- The SEIS (WDOE 2006a) does not fully describe and analyze the impacts to aquatic resources.
- There is a potential for water quality impacts.
- Groundwater modeling for the project is incomplete and inaccurate.
- There could be many more wetlands affected than the just the 10 to 13 acres considered in the analysis of impacts because of this uncertainty about the effect on flow of seeps and springs
- Snowmelt wetlands are not even considered in the analysis
- The analysis of impacts to headwater streams and wetlands is incomplete in the SEIS.
- Other wetlands adjacent to the EIS study area have not been identified, located, delineated, or assessed and may be directly impacted.
- Difficulty of predicting impacts.
- Functional ratings undervalue impacted wetlands.
- Sensitive plant and animal species are not fully assessed.
- Fish species impacts as a result of reduced flows.
- Stream impacts due to increased siltation from runoff from disturbed areas.
- Stream impacts due to increased siltation from runoff from disturbed areas.
- Poorly Quantified wetland impacts.
- The proposed alternative access route will result in wetland and stream impacts.
- Impact monitoring and adaptive management lacking or insufficient.
- Effects of climate not accounted for.
- Cumulative impacts not considered.

2. Is there an accurate delineation and functional assessment of the impacted aquatic resources?

- Wetland delineation surveys in the study area.
- Functional assessments were done incorrectly.
- Marias Creek wetland impacts are underestimated.
- There will be impacts to other wetlands that are not accounted for.

3. Does the aquatic resource mitigation set out in the ARMP effectively mitigate for the anticipated impacts?

- Preservation is not mitigation.
- Impacts are unpredictable.
- Worst-case impacts not considered.
- A net loss of headwater functions will be experienced as a result of this project.
- Functional rating of impacted wetlands inaccurate
- Condition of mitigation wetlands is poor and not expected to improve much as a result of the preservation activity.
- Mitigation actions and performance evaluation are difficult to determine.
- On-site mitigation is lacking or highly insufficient.
- WDFW and EPA both commented on (in)adequacy of mitigation.
- Toroda Creek will be impacted and these impacts are not sufficiently mitigated.
- Noxious weed control discussion is insufficient.
- Beavers and their activities are not considered.
- Marias Creek wetlands will likely experience indirect impacts that are not considered



From the Pits

On February 29, OHA submitted the first round of expert reports and opinions from our distinguished team of technical experts as well as our legal response to Crown/Kinross motion for summary judgement of our challenge of the SEIS to the Environment and Land Use Hearings Board . It is appalling how similar so many of our issues are so to the ones that OHA prevailed on last time when the PCHB

rejected the open-pit mine proposal. It is as if Crown/Kinross and Ecology failed to read the previous decision for they certainly did nor address the issues.

As you can see from reading the information in this newsletter the issues our arguments are very substantive. The shell-game the mining company is trying to perpetrate, relying on the sheer volume of studies and paper, fails under the scrutiny of expert analysis. What their effort shows is that they really do not know what the impacts of dewatering Buckhorn Mountain would be and since they don't know what the impacts would be, they have not offered enough mitigation to offset a project that has such a high level of uncertainty. If the water court weighs the issues fairly the permits will once again be rejected.

A huge thank you to the new and all the renewing members who have and continue to respond so generously to our year-end request for support. We are working hard to raise the funds needed to take a multinational mining company and a state agency to task for failing to protect public resources and literally giving away public resources. This is a clear case of good science and the law versus big money and politics. If you have not yet donated or you can afford to dig a little deeper, rest assured that your support will go a long way to supporting this focused effort.

OHA Membership Meeting April 8, 2008

Pot luck 5:30 meeting 6:30 at the Community Cultural Center

Your annual membership dues supports our conservation efforts. Thank you!

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This edition of OHA's newsletter written edited by:

David & Hanna Kliegman and others

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The Appeals

The consolidated appeal combines challenges of the Supplemental Environmental Impact Statement, eight water rights decisions, a Clean Water Act Section 401 water quality certification and the NPDES discharge permit and a tailings dam expansion.

The Goals

The overall goal is to once again demonstrate to the water court that the permits for the mine were erroneously issued and violate requirements of the state water code and Clean Water Act. Prevailing on these claims will result in a denial of the project. We are also challenging the specific monitoring and reporting requirements of the NPDES permit.

The Issues

Our presentation and challenge will focus on the key issues fatal to the proposed mine. Our primary claims

1. The 3-Dimensional groundwater flow model that the Department of Ecology relies on to predict stream drawdown is fatally flawed. As in 1999, the Department really does not know, with reasonable assurance, the impacts of the project on either water quantity or water quality.
2. The Department of Ecology has failed to require or prepare a functional assessment of the direct and indirect impacts to headwater seeps and springs and has instead simply concluded that it is acceptable to de-water headwater seeps, springs and wetlands and mitigate for those impacts with out-of-kind and tenuous mitigation in the valley below.
3. The Department of Ecology and Kinross have underestimated the type and level of groundwater contamination that the mine workings will produce and the length of time that the contamination will continue. We will demonstrate that the contamination will be significantly worse than predicted and, even if they are able to capture and treat, treatment may be needed in perpetuity.



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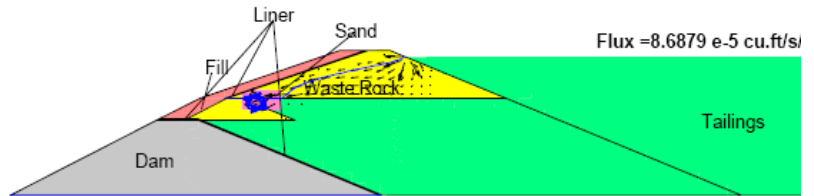
*“If there is no struggle, there is no progress.
Those who profess to favor freedom, yet depreciate
agitation, are men who want crops without plowing
up the ground...Power concedes nothing without a
demand. It never has and it never will”
— Frederick Douglass*

Upstream Tailings Expansion

David Chambers, president of the Center for Science in Public Participation, provides technical assistance on mining and water quality to public interest groups. He has a Masters Degree in Geophysics, a Professional Engineering Degree in Physics, and Ph.D. in Environmental Planning. He has 15 years of management and technical experience in the mineral exploration industry. David chambers provided technical comments to Washington Dam Safety Office raising concerns regarding the review of the proposal to expand the capacity of the Tailings Disposal Facility (TDF) at the Kinross Kettle River Operations, in conjunction with the Buckhorn Mountain Project.

OHA appealed Ecology's approval of the design Report, Plans and Specifications for the Phase V Tailings Impoundment Expansion issued August 24, 2007.

An upstream dam extension was approved for the Kettle tailings impoundment. This type of dam expansion is inherently risky and probably unsafe because of the assumptions made about the seismicity of the area and the stability of the tailings upon which the upstream dam extension will be built.



Problems with Tailing design

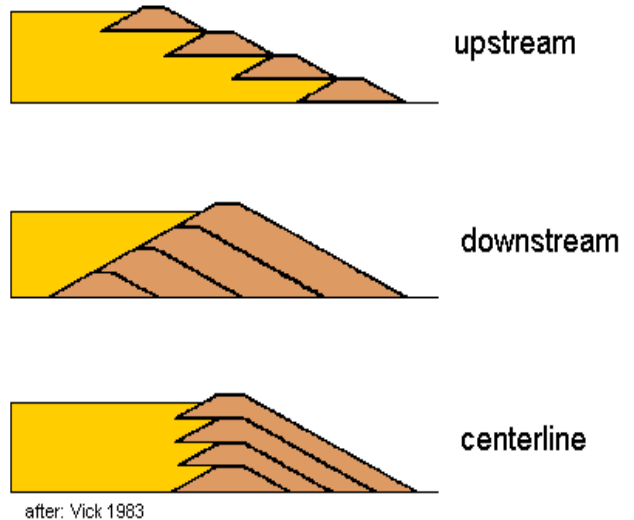
The primary concern with upstream tailings dam construction is its susceptibility to failure during earthquakes. If the tailings upon which the dam is constructed are saturated with water, the tailings do not form a stable foundation for the dam under seismic loading. Tailings are deposited in a saturated state. Tailings materials are relatively uniform in their size and shape, and typically have very low permeability, a fact often cited by mining industry engineers to argue that liners are not needed for tailings facilities. As a result, it is difficult to properly drain the water from all the tailings under the proposed dam expansion. For an upstream-type tailings dam, which uses the tailings themselves as a structural foundation for the dam, the tailings must be dewatered in order to safely support the dam under seismic loading.

Kettle TDF Construction-The TDF was constructed with three conventional downstream raises – Phases I - III. A fourth raise, Phase IV, was constructed using the upstream method.

TDF Seismic Risk Evaluation - The use of a lower number than the Maximum Credible Earthquake for peak ground accelerations calculations is of concern, especially in light of the type of dam construction being proposed, upstream type, which is the most susceptible to seismic risk.

Safe Construction Approach for the TDF - The Buckhorn DSEIS does not discuss the costs or technical feasibility of using a centerline or downstream extension of the existing TDF. An extension of this type could encapsulate the existing upstream Phase IV extension, and would probably provide greater long term dam stability than the existing dam configuration.

Types of sequentially raised tailings dams



How We Got Here

April 1990 Battle Mountain Gold Co submits a five page Catagorical Exclusion with Crown Resources to develop an open-pit, cyanide-leach gold mine mine on Buckhorn Mountain.
 March 1992 the Okanogan Highlands Alliance was formed.
 March 1994 Washington State passes Metals Mining & Milling Act
 January 1997 Final EIS released
 January 1999 Federal court upholds FEIS
 March 1999 Clinton administration revolks Record of Decision for mine based on Millsite Decision of 1872 Mining Law

May 1999 Gorton Rider exempts BMG from millsite provision
 January 2000 PCHB revokes BMG's water rights and water quality certification
 July 2001 BMG abandons efforts to mine on Buckhorn
 March 2002 Crown Resources declares bankruptcy
 May 2002 Kinross purchases Echo Bay including the Republic mill, tailings and mines
 February 2004 Kinross announces intent to purchase Crown
 September 2006 Ecology publishes final SEIS

Goundwater Hydrology

Anne Udalay a licensed hydrogeologist reviewed whether the FSEIS and supporting documents for the proposed Buckhorn Mountain project adequately address potential impacts to surface and ground water that may be caused by development.

One critical goal of an EIS is to evaluate the hydrologic and hydrogeologic conditions of a site in order to establish baseline conditions from which potential impacts can be extrapolated, and (should the project proceed) to establish a baseline for monitoring. A second critical goal of an EIS is to accurately predict impacts that will result from project development. The FSEIS has not accomplished either of these goals.

The FSEIS and supporting documents demonstrate that surface water and ground water will be impacted by development of the proposed Buckhorn Mountain Project. For example:

- Mining will permanently divert some ground water flow from the Myers Creek drainage into the Toroda Creek drainage; the amount of this permanent diversion appears to be significantly underestimated by the FSEIS and supporting documents.

- During and after mining, some portion of the headwaters of Ethyl Creek, Bolster Creek, and Gold Creek will be dewatered and the baseflows of the streams are predicted to permanently decrease, which can be expected to permanently decrease flow in Myers Creek.

- During and after mining, discharge to certain springs and seeps will be reduced or eliminated

However, fundamental hydrogeologic data needed to develop a conceptual hydrogeologic model that could effectively predict the effects of mine development remain unavailable. In addition, baseline conditions for such essential criteria as the position of the groundwater divide between Myers Creek and Toroda Creek, stream flow, and groundwater recharge have not been defined. Therefore, the definition of baseline conditions is not adequate to allow definition of appropriate mitigation measures, or evaluation of proposed mitigation measures.



1) Hydrogeologic data are insufficient to support development of a comprehensive conceptual hydrogeologic model of the affected area.

2) The interpreted position of the groundwater divide between the Myers Creek and Toroda Creek drainages is inconsistent with that reported hydrogeologic data.

3) The numerical model used as the basis for evaluating potential impacts to surface water and ground water is unreliable and inaccurate.

4) The numerical model used as the basis for evaluating potential impacts to surface water and ground water cannot and does not attempt to evaluate impacts to springs, seeps, or wetlands.

5) Critical assumptions and development plans used to estimate impacts differ among supporting documents; however, the conclusions of the supporting documents are presented in the FSEIS as reliable without discussion of the effects of these differing assumptions. Therefore, the FSEIS does not accurately or consistently describe the proposed development.

6) The potential for increased groundwater discharge to the mine workings during severe storm events is not addressed.

7) The volume of water requiring treatment and subsequent discharges to outfalls appears to be underestimated.

8) Details of critical plans and operational requirements are either unclear or explicitly deferred for later publication and review.