


Tailings Dams, Failures, and the proposed Casino Mine



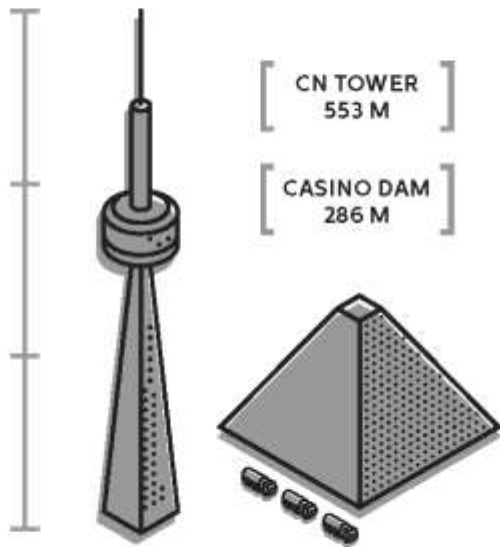
February 23rd, 2016 – Hellaby Hall Presentation

Topics to be covered

- Yukon Conservation Society
- Overburden and Waste Rock
- Tailings – Dry and Wet
- Acid Rock Drainage
- Historical Yukon Tailings
- Faro
- Current Yukon Tailings
- Tailings Dam Failures
- Future Tailings Dams
- Casino
- Conclusion

Yukon Conservation Society 

Tailings Dams, Failures, and the proposed Casino Mine



[CN TOWER
553 M]

[CASINO DAM
286 M]

Tues, Feb 23, 5:30pm Hellaby Hall
ycspipe@ycs.yk.ca 668-5678 www.yukonconservation.org

Yukon Conservation Society

- Established in 1968 – because of the concerns raised by the impacts of the 1960s mining boom
- To pursue ecosystem well-being throughout the Yukon and beyond, recognizing that human well-being is ultimately dependent upon fully functioning healthy ecosystems.
- That mining in the Yukon occurs only in places where such activities are ecologically and culturally acceptable.



Problems with Mining

- Surface Disturbances
- Contaminants



Hard Rock Problems

- Placer
- Hard Rock



Overburden and Waste Rock

- These are mining words – do not reflect the values we place on surface ecosystems
- **Overburden** - materials overlying an ore or mineral body that are displaced during mining without being processed. They are typically shoveled to one side. Sometimes they are placed behind a dam type control structure.
- **Waste Rock** – rock that is removed but does not have mineral potential. It can be used to build infrastructure and roads.

Acid Rock Drainage

- Acid rock drainage (ARD) or acid mine drainage (AMD): acidic water that is created when sulphide minerals are exposed to air and water and produce sulphuric acid.
- Acid breaks down rock, which in turn releases other metals into the environment.

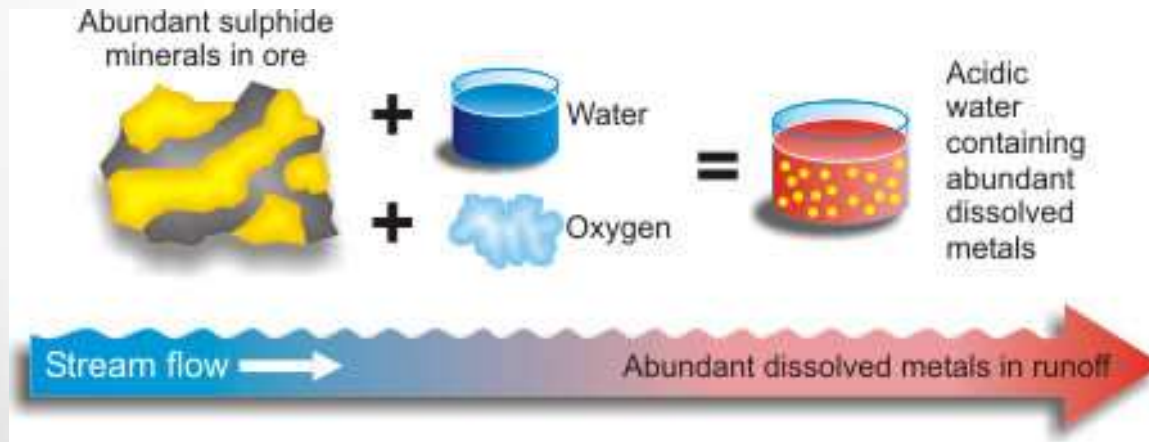


Photo Credit - Canadian
Geoscience Education
Network

Waste Rock Issues



Clinton Creek – Photo credit www.emr.gov.yk.ca

What Are Tailings?

- Tailings – the mud or powder which is left over after ore is crushed, processed, and metals extracted
- Tailings come from hardrock mining – they tend not to be created by placer mining
- Wet or Dry Tailings - typically either classified as wet or dry (but are really a combo)
- Paste Tailings – thickener added to wet tailings, used as backfill in underground shafts

Dry Tailings

- Dry Tailings – water is mostly extracted, either mechanically or allowed to drain out
- Can be mounded, or stored behind a dam
- There are still environmental concerns



Whitehorse Copper, Photo Credit – Lewis Rifkind

Current Yukon Dry Tailings

- Minto Mine has a drystack tailings pile
- Starting to move – but there is a plan...
- Note: company is paying for stabilization



Wet Tailings

- Wet Tailings – less expensive up front, but expensive afterwards. Must be maintained.



Faro Tailings Dams

- Current information on this site is 'limited'



Photo Credits – YCS Airforce and LightHawk.org

Other Wet Tailings



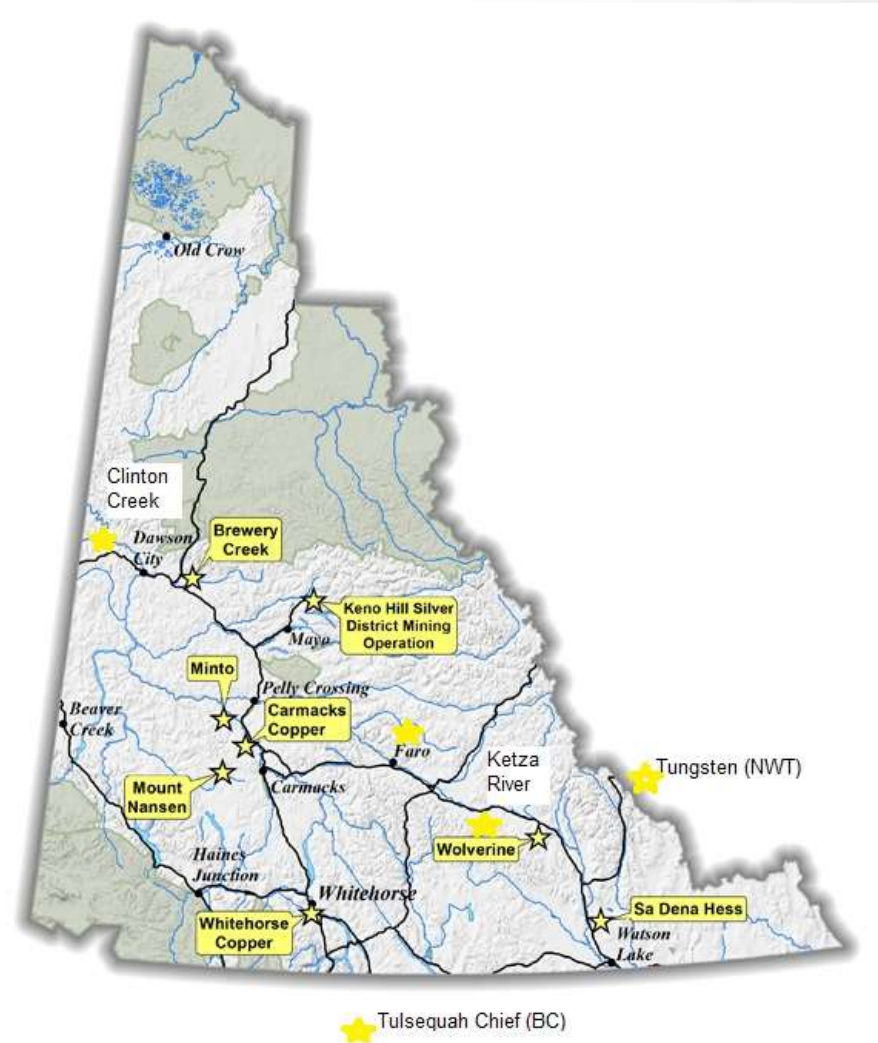
Wolverine Mine Tailings Facility – Photo credit www.emr.gov.yk.ca



Keno Tailings Pond – Photo credit www.aadnc-aandc.gc.ca

Historical Yukon Tailings

- Wolverine (bankrupt)
- Ketz River (abandoned)
- Clinton Creek (abandoned)
- Keno (abandoned)
- Faro (abandoned)
- Whitehorse Copper
- Mt Nansen (abandoned)
- Sa Dena Hess
- Tulsequah Chief
- Tungsten Mine (abandoned)



Map: www.emr.gov.yk.ca (but edited by YCS)

Paying For It

- Faro
 - 70 million tonnes of tailings and 320 million tonnes of waste rock located across the mine complex
 - estimated 400 years to remediate costing \$1 billion
- Mt Nansen: \$23 million
- Keno: unknown
- Clinton Creek: unknown
- **Privatizing the profit but socializing the risk**

Tailings Dam Failures

Mt Polley tailings dam failure. 2014 – photo credit www.cbc.ca



Spanish Tailings Dam failure, 1998 – Photo credit www.pebblescience.org



- Hungarian Tailings Dam failure, 2010 – photo credit [Der Standard](http://DerStandard)

Yukon Tailings Failures

Faro, 1975



Faro Mine tailings spill 1975

Mt Polley, 2014



Mt. Polley 2014



Faro 1975

Faro Mine tailings spill 1975

Photo credits – CBC and unknown

What is Casino?

casinomining.com/project/overview/index.html



CASiNO

COMPANY • CASINO PROJECT • ENVIRONMENT • COMMUNITY • ECONOMICS • NEWS • CONNECT



CASINO PROJECT

PROJECT OVERVIEW

PROJECT PROPOSAL

PROJECT TIMELINE

PROPOSED MINE

PRODUCT

GEOLOGY

DOWNLOADS ARCHIVE

Currently in the environmental assessment review phase, the Casino project is a copper, gold, molybdenum and silver deposit, located about 300 km northwest of Whitehorse, in west-central Yukon, Canada. Casino is typical of many porphyry copper deposits, ranking among the largest in the world.

The deposit is centered on the 70 million year old Patton Porphyry, which intrudes older, surrounding rocks in the area.

The company proposes to mine the economically valuable material from the ground, by using a conventional open-pit, truck and shovel operation. The mill will process about 120,000 tonnes of ore per day over a 22-year mine life.

The project is in the Yukon Plateau, a region characterized by weathered bedrock landscape, treed and rolling topography, and moderate to deeply cut valleys. The region is mainly unglaciated. The Yukon River flows westward about 16 km north of the project site. Annual precipitation ranges between 400 mm (plateau) to 1,500 mm (mountains).

Casino is located on Crown Land that is administered by the Yukon Government. The Yukon Land Claims Final Umbrella Agreement shows that Casino lies within the traditional territory of the Selkirk First Nation and the project's road access falls within the traditional territories of both the Selkirk and Little Salmon/Carmacks First Nations. The Tr'ondëk Hwëch'in traditional territory lies to the north of the property.



What is Casino?



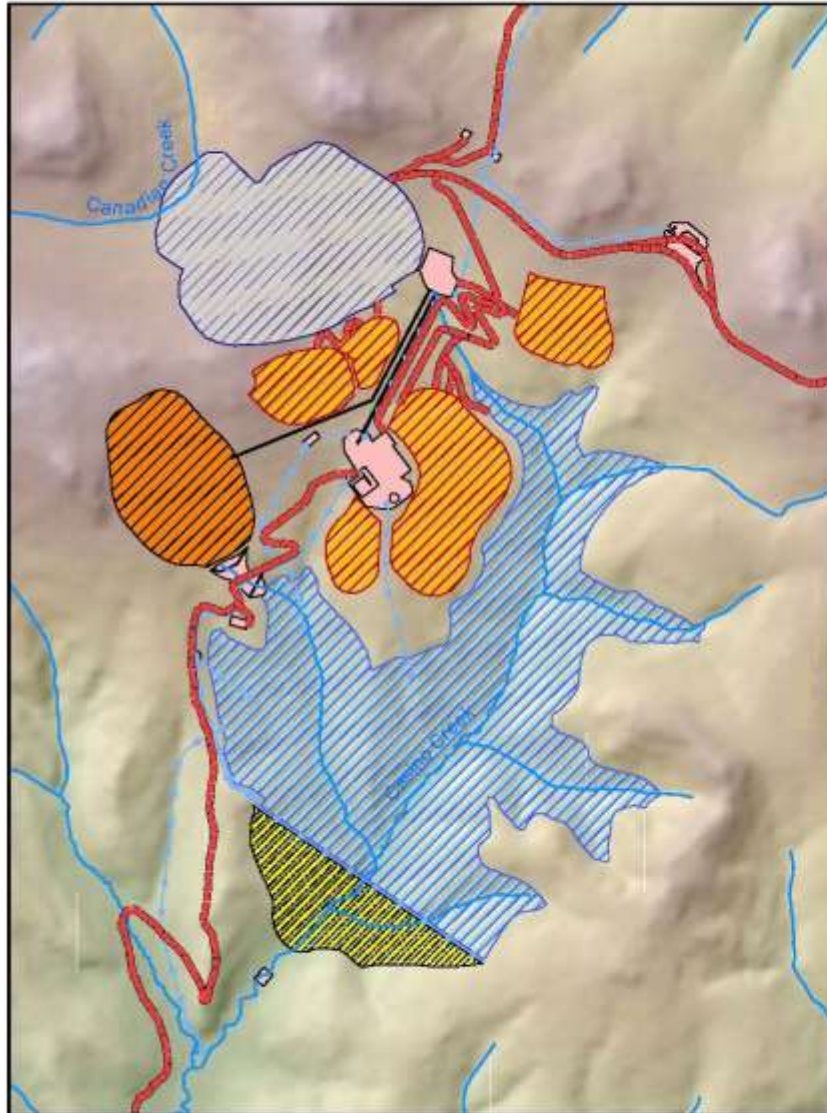
Photo Credit <http://www.arcticgas.gov>



Photo Credits – Western Copper and Gold

Casino Overview

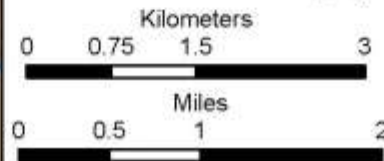
Casino Mine Project – YESAB Adequacy Review Report Background



Casino Mine Site Detail

Legend

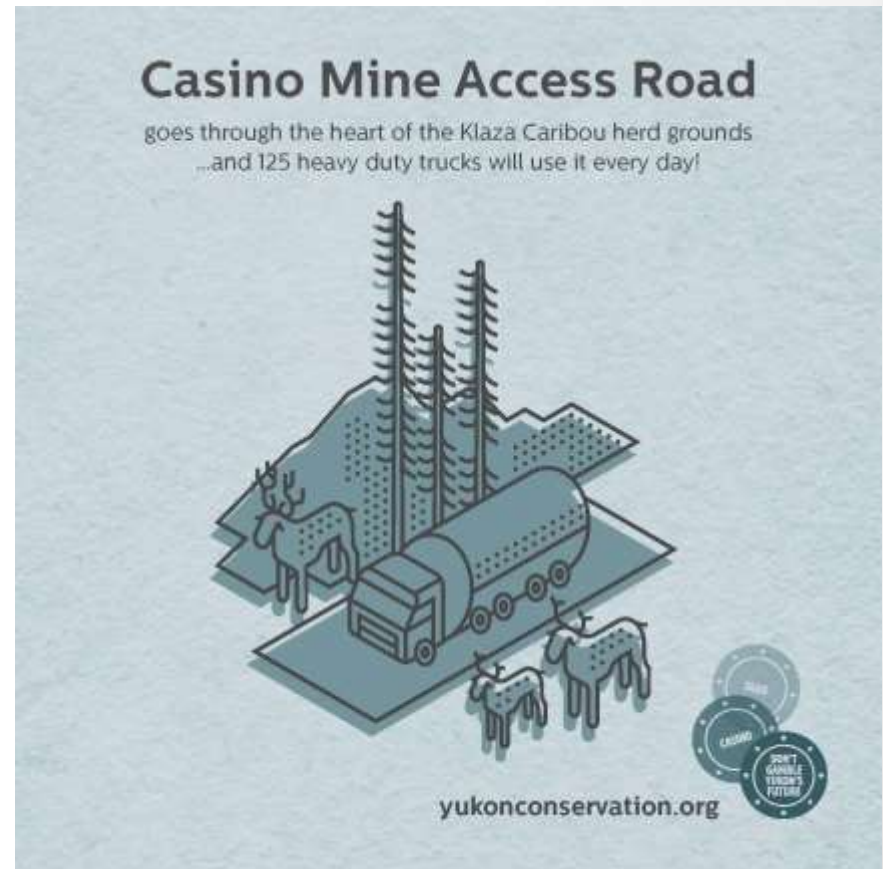
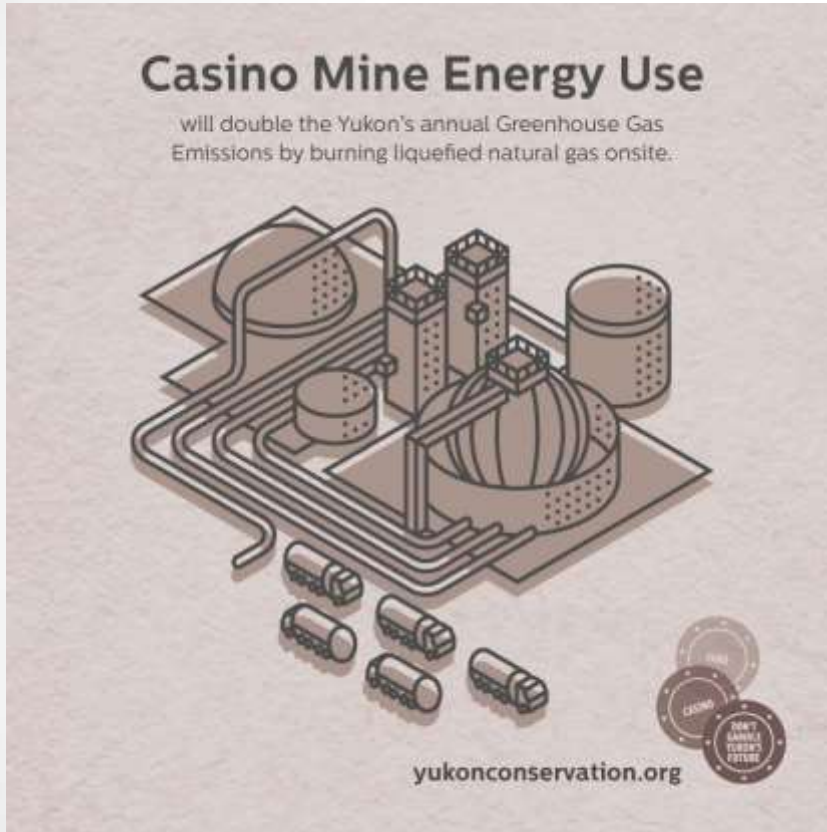
- Project Roads
- Pipelines, Channels, etc
- Tailings Management Facility (TMF)
- Open Pit
- Stockpiles
- Main TMF Dam
- Heap Leach Facility
- Other Facilities



Project Component Height Comparison



Casino Has Some Issues



Greenhouse Gases

Table 8.4-2 Casino Greenhouse Gases Emission Estimates

Year	Greenhouse Gas Release Projections (kt of CO ₂ e)			Annual Total (in kt of CO ₂ e)
	Mine Fleet	Power Generation	Other	
-3	106	75	0.2	183
-2	130	75	0.6	206
-1	182	75	1.0	259
1	387	202	3.5	592
2	430	202	3.4	636
3	480	202	3.3	685
4	477	202	4.1	683
5	426	202	5.2	633
6	443	202	5.4	650
7	510	202	4.1	716
8	510	202	3.8	716
9	510	202	3.9	716
10	477	202	3.8	683
11	526	202	4.6	732
12	443	202	4.8	650
13	463	202	4.4	669
14	502	202	4.1	706
15	441	202	3.8	647
16	414	202	3.5	619
17	327	202	2.2	531
18	317	202	1.2	520
19	263	202	4.2	469
20	136	202	5.4	343
21	136	202	5.4	343
22	152	202	3.1	357

Notes:

1. Equipment speeds (other than haul trucks) are based on general mining practices.
2. It was assumed that all vehicles will use diesel fuel and generators will use diesel and LNG.
3. The fuel rates for all vehicles were taken from Caterpillar's Performance Handbook Edition 29.
4. Fuel consumption for vehicles are average and a load factor of 1 was applied. This assumes that equipment will not be overloaded and will be used on average grades and experience some high rolling resistance.
5. Working time was calculated as the productive time, which includes loading, unloading, and transporting.
6. The Main Power Plant will be active for the entire operations phase with 90% efficiency.

The dispersion modelling and predictions for air quality considered two cases:

- The "Baseline Case", which reflect the existing conditions described in Section 8.3; and
- The "Project Case", which represents the baseline with the addition of the calculated emission rates for the components and activities associated with the Casino Project.

Greenhouse gas emissions by province and territory, Canada, 1990, 2005 and 2013

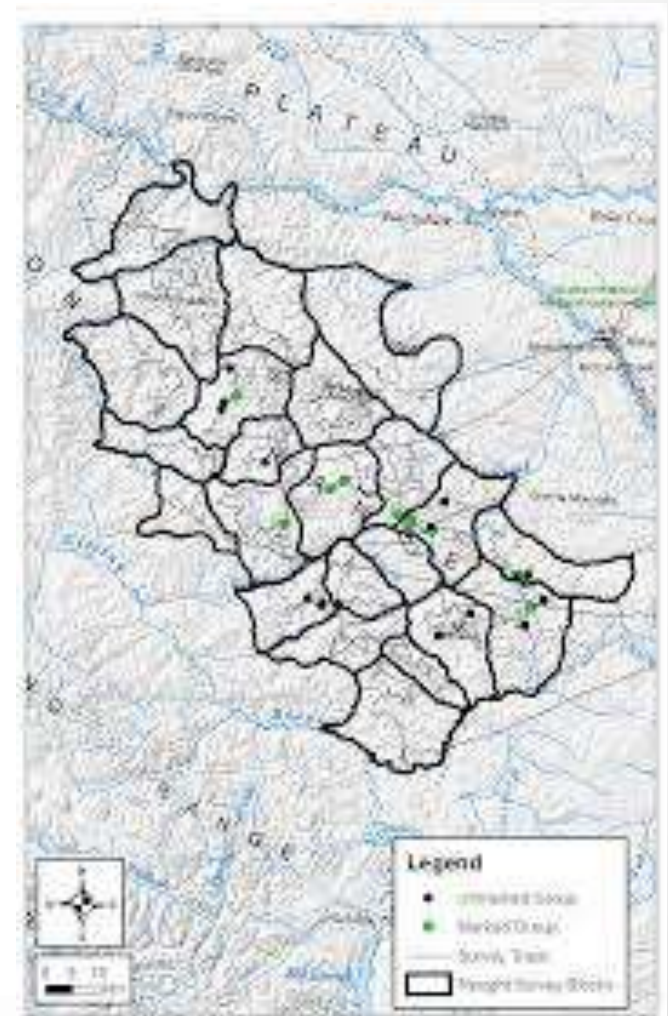
Province or territory	1990 greenhouse gas emissions (megatonnes of carbon dioxide equivalent)	2005 greenhouse gas emissions (megatonnes of carbon dioxide equivalent)	2013 greenhouse gas emissions (megatonnes of carbon dioxide equivalent)
Newfoundland and Labrador	9.8	10.3	8.6
Prince Edward Island	2.0	2.1	1.8
Nova Scotia	20.2	24.0	18.3
New Brunswick	16.5	20.6	15.7
Quebec	89.8	90.2	82.6
Ontario	182.0	211.0	170.8
Manitoba	18.7	20.7	21.4
Saskatchewan	45.0	69.5	74.8
Alberta	174.6	233.8	267.2
British Columbia	51.9	64.4	62.8
Yukon	0.5	0.5	0.4
Northwest Territories and Nunavut	1.6	2.0	1.7

Source: Environment Canada

Klaza Caribou Range

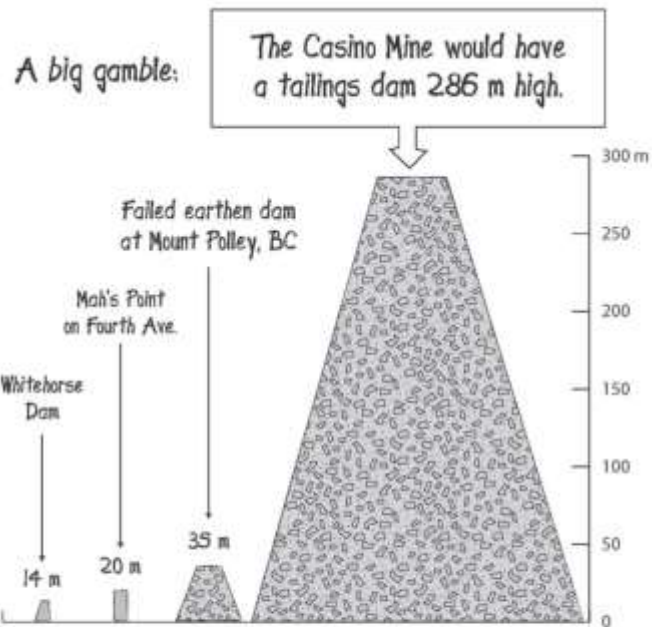


Screenshot from Casino site animation video
- Western Copper and Gold



Klaza Caribou Herd -
www.env.gov.yk.ca

Casino Tailings Dams



And that's just one of our concerns.

Contact the Yukon Conservation Society for more information.
Submit your comments to YESAB.

Visit our website at yukonconservation.org or
Call us at 668-5678 for more information.



Casino Mine Tailings Dam

would be the tallest structure west of Toronto
...and they're banking it'll stand forever!



yukonconservation.org



Casino Facts

- Will store 947 million tonnes of tailings produced by the processing plant, and 658 million tonnes of potentially reactive waste rock generated through mining
- The earth-fill dam would be one of the world's highest dams, and possibly the highest tailings dam.
- An on-site LNG power plant will be used to generate the needed 150 megawatts of power for mine operations
- Freshwater will be supplied from the Yukon River, via a 17-km long pipeline with four booster stations at a rate of 3,400 m³/hr.

Casino Watershed



YESAB Panel Review



Date: February 17, 2016

Casino Mining Project (2014-0002)

Requirement for a review by a panel

Executive Committee Reasons for Decision

In accordance with s. 58(2) of the *Yukon Environmental and Socio-economic Assessment Act*, the Executive Committee has determined that the Casino Mine Project (Project), proposed by the Casino Mining Corporation (CMC), requires a Panel Review for the following reasons:

- a) the project involves technology that is controversial in Yukon; and
- b) the project might contribute significantly to cumulative adverse environmental or socio-economic effects in Yukon.

a) Project involves technology that is controversial in Yukon

The Project involves the construction of a copper, gold and molybdenum mine in central Yukon. The Executive Committee has identified the proposed tailings management facility (TMF) as the technology that is controversial in Yukon.

b) Project might contribute significantly to cumulative adverse environmental or socio-economic effects in Yukon

Prior to providing the reasons for this determination the Executive Committee would like to highlight the specific language in this criterion, namely that the project might **contribute significantly** to cumulative adverse effects. This criterion does not require the Executive Committee to determine whether the project might **have** significant cumulative adverse effects. Rather, it requires the Executive Committee to determine whether the project might **contribute significantly** to cumulative adverse effects.

With this distinction in mind, the Executive Committee has determined that the project might contribute significantly to cumulative adverse environmental effects on the Klaza caribou herd.

Other Tailings Dams

Photo credit – Selwyn Chihong



Photo credit – cbc.ca

Photo Credit – Cathy Archbould



Photo credit – Wellgreen Platinum

Moving Forward

- A future without tailings dams.
- That means a future of dry stack tailings.
- Which means a future without Casino (as currently envisioned).



Remediation and Closure Options

- Every mine site should have closure options that do not include tailings dams
- Brewery Creek



What You Can Do!

- Submit written comments against the Casino tailings dam when it goes to public comments at YESAB
- Go to www.yesabregistry.ca and look for Project Number: 2014-0002, Casino Mine Project
- Encourage the mining industry to look to alternatives to wet tailings dams

- Support the Yukon Conservation Society: for more information, to volunteer, to become a member – www.yukonconservation.org

- Follow us on

