



Lupin Operation
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by email

Mr. Philippe di Pizzo
Executive Director
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

**RE: Supplementary Information Provided for Request to Dispose of
Contaminated Soils Underground at Lupin**

Dear Mr. di Pizzo,

Kinross has reviewed the comments submitted to the Water Board following our request for approval to dispose of contaminated soils in the crown pillar stopes of the Lupin Mine. Responses to the technical comments submitted by INAC, Nunavut Department of Environment, and Environment Canada – Environmental Protection Operations are provided in the attached document.

The recent agreement signed by Wolfden Resources to acquire Lupin from Kinross may significantly alter the timing and scope of the waste disposal plan as presented.

Yours truly,
signed by

Michael Tansey
Reclamation Manager, Lupin Mine

cc: Shawn Healey Mark Ioli



**SUPPLEMENTARY INFORMATION:
REQUEST FOR APPROVAL TO DISPOSE OF
CONTAMINATED SOILS UNDERGROUND AT LUPIN MINE**

WATER LICENCE NWB1LUP0008

LUPIN MINE, Nunavut

Response to Comments received from:

- Indian and Northern Affairs Canada (INAC), Water Resources
- Environment Canada
- Govt. of Nunavut, Department of Environment (GN-DOE)

Submitted: August 28, 2006

1.0 Indian and Northern Affairs Canada (INAC)

Comment: *INAC suggests that Kinross define the type of fuel contamination before placing soils below ground.*

Response: Soil contamination was characterized in the Phase 2 Environmental Site Assessment conducted in July 2005. A copy of this report has recently been provided to the NWB. In soil, selected analysis for hydrocarbons was completed for benzene, ethylbenzene, toluene, xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbon (PHC) fractions F1 to F4, and glycols. No glycol concentrations in soil exceeded the CCME criteria. The primary indicator parameters for hydrocarbons were the F1 and F2 fractions which is typical for diesel fuel type contamination. The BTEX and few PAH exceedences invariably coincided with elevated F1 or F2 concentrations.

Comment: *INAC suggests that Kinross segregate out any soils contaminated with heavy hydrocarbons, such as hydraulic fluid.*

Response: Although the field investigation suggests that diesel fuel is the primary source of soil contamination, it may be possible to segregate heavy hydrocarbons in areas such as around the maintenance shops, when they can be identified.

Comment: *INAC suggests that Kinross determine/suggest another method of disposal of soils contaminated with heavier hydrocarbons.*

Response: Greases will be transported offsite for disposal and other heavy hydrocarbons will be segregated and burned when they can be identified.

Comment: *INAC suggests that Kinross provide the NWB with a better justification for the permafrost encapsulation (of contaminated soils) and a method to monitor the formation and maintenance of frozen conditions within the contaminated soils before placement of the esker sand.*

Response: Encapsulating the contaminated soils in permafrost has never been a stated objective for disposal nor is it required. The fact that permafrost presently exists in the upper levels of the mine is not the driving force behind using the stopes as repositories. More important considerations are that the contaminated material can be consolidated in an isolated underground location, comprising a relatively small footprint, deeply buried, and surrounded by relatively impermeable rock walls. Such is the case with crude oil in the natural environment.

Comment: *INAC suggests that Kinross contour the topography to improve drainage away from the stopes to reduce the infiltration of water and a deepening of the active layer in the disturbed area.*

Response: The site is located on a topographic dome in which groundwater and surface water discharges radially in all directions. As such, the site is not located within a catchment that has an ongoing groundwater flux – the only groundwater source on the site is precipitation. The final contouring of the covered stopes will be

consistent with existing topography and will direct precipitation flow away from the covered stopes.

2.0 Environment Canada

Comment: *What are the depths of the stopes proposed for use? What volume of contaminated soils can the stopes contain? How will the material be placed? Indicate location of stopes in relation to any water bodies.*

Response: As stated in the Lupin reclamation plans submitted to the Nunavut Water Board, the remediation strategy for surface soils containing residual hydrocarbons or elevated concentrations of metals is either direct burial in the TCA or disposal within the mined-out workings. Disposal in the TCA will not be an option once restoration is complete and the preferred disposal method for contaminated surface soils at this point is to place these materials underground.

There are 5 stopes open to surface in the West Zone portion of the Lupin orebody. The widths of the stopes vary between 2.0 and 4.0 metres. The length and depth of the stopes is listed in the table below and can be seen on the attached long section and plan views.

Stope #	Length	Depth
1	38 m	27 m
2	33 m	7 m
3	39 m	70 m
4	81 m	70 m
5	17 m	5 m

Stope #1 originally extended from surface to the 87-metre level (i.e. 87 metres deep), but was backfilled to the 27-metre level to allow for mining of the crown pillar portion in 1997.

Dump blocks will be constructed at the ends and/or sides of stopes 1, 2, 3 and 5 to allow for safe dumping into the voids. Stope #4, however, will require 3 drop raises to be developed on the west side of the stope. These drop raises will be approximately 10 metres deep, by 2.4m x 2.4m in area. As illustrated on the long section view, the upper portion of stope #4 is already partially filled with development waste. In order to gain access to the open void below the sill pillar, the raises will be drilled and blasted from surface to breakthrough into the stope just below the sill pillar. Waste soil can then be dumped through the raises to fill the stope below 27-metre level. Another raise may be developed in the stope #2 area to fill the void below the sill pillar in that location.

Stopes 1, 2 and 5 are inaccessible from underground and completely isolated. Stopes 3 and 4 extend most of the way down to 87-level, but a muck bridge has

developed a short distance above 87-level in the stope #3 and #4 area which prohibits any backfill from reaching the level. There is no access to any of the stopes from the intermediate levels.

Once the stopes are filled, a 1-metre cap of sand will be placed on the backfill and the sand will be capped by at least a metre of surface till, which has been stockpiled beside the stopes. After construction of the three drop raises into the stopes, the volume that may be contained in the stopes is at least 44,750 cubic metres.

As shown on the attached area plan, the closest body of water to the open stope location is the upper sewage pond, approximately 400 metres to the south. The closest body of fresh water to the open stope location is Boot Lake, approximately 800 metres to the west. Contwoyto Lake is located approximately 1400 metres northeast.

Comment: *Information regarding the long-term monitoring of the stopes to ensure the containment of materials is required. Does Kinross intend to install ground monitoring wells? How often would they be monitored?*

Response: A more relevant sampling point will be at the waterbody downstream of the stopes, at SNP 925-01, the freshwater intake location on Contwoyto Lake. This sampling station will also be monitored on an annual basis, as in the current water licence.

Comment: *What concentrations of hydrocarbons and metals are present in the soils to be disposed of? The soils should be characterized and the results provided to the NWB.*

Response: Soil contamination was characterized in the Phase 2 Environmental Site Assessment conducted in July 2005. A copy of this report has recently been provided to the NWB.

Comment: *Are the soils co-contaminated, or will soils contaminated with metals be disposed of separately from soils contaminated with hydrocarbons? Will measures be taken to reduce concentrations prior to disposal?*

Response: Co-contamination of hydrocarbons with metals occurs in some areas. Where co-mingled, it is not possible to separate the contaminants and the soil will be disposed of in the three larger stopes. Soils contaminated with ore fines, lead nitrate and/or cyanide will be isolated in the 2 smaller stopes.

Comment: *What volume of contaminated soils require disposal? Does this volume include a swell factor? Can the volume of soils be contained within the available stopes, or will additional disposal locations be required?*

Response: The following table is from the Phase II ESA Report, a copy of which has been provided to the NWB:

Estimated Volumes of Hydrocarbon Contaminated Soil

Area	General Area	Approximate Length (m)	Approximate Width (m)	Average Thickness (m)	Approximate Volume (m ³)
1	Satellite Tank Farm and Powerhouse	150	50	1.3	9,800
2	Mill and Office Emergency Tanks	200	75	1.3	19,500
3	Main Tank Farm Loaders	25	50	1.3	1,600
4	Main Tank Farm Bedding Sand	120	50	0.3	1,800
5	Emergency Powerhouse	25	25	1.3	800
6	South Burn Pit	50	25	1.3	1,600
7	Landfill	too large to excavate - to be managed in place			
8	RTL Shop	50	25	1.3	1,600
9	North Burn Pit	25	25	1.3	800
10	Incinerator	25	25	1.3	800
11	Cold Storage #1	25	25	1.3	800
12	Former Airstrip Fuelling Area	25	25	1.3	800
Estimated Bank Cubic Metres of Contaminated Soil					40,000

Approximately 2000 cubic metres of soil with traces of ore fines would also be disposed of in the open stopes, as well as approximately 800 cubic metres of soil containing lead nitrate and/or cyanide.

The currently available void spaces within the underground workings will be adequate to accommodate the soils contaminated with petroleum hydrocarbons and metals.

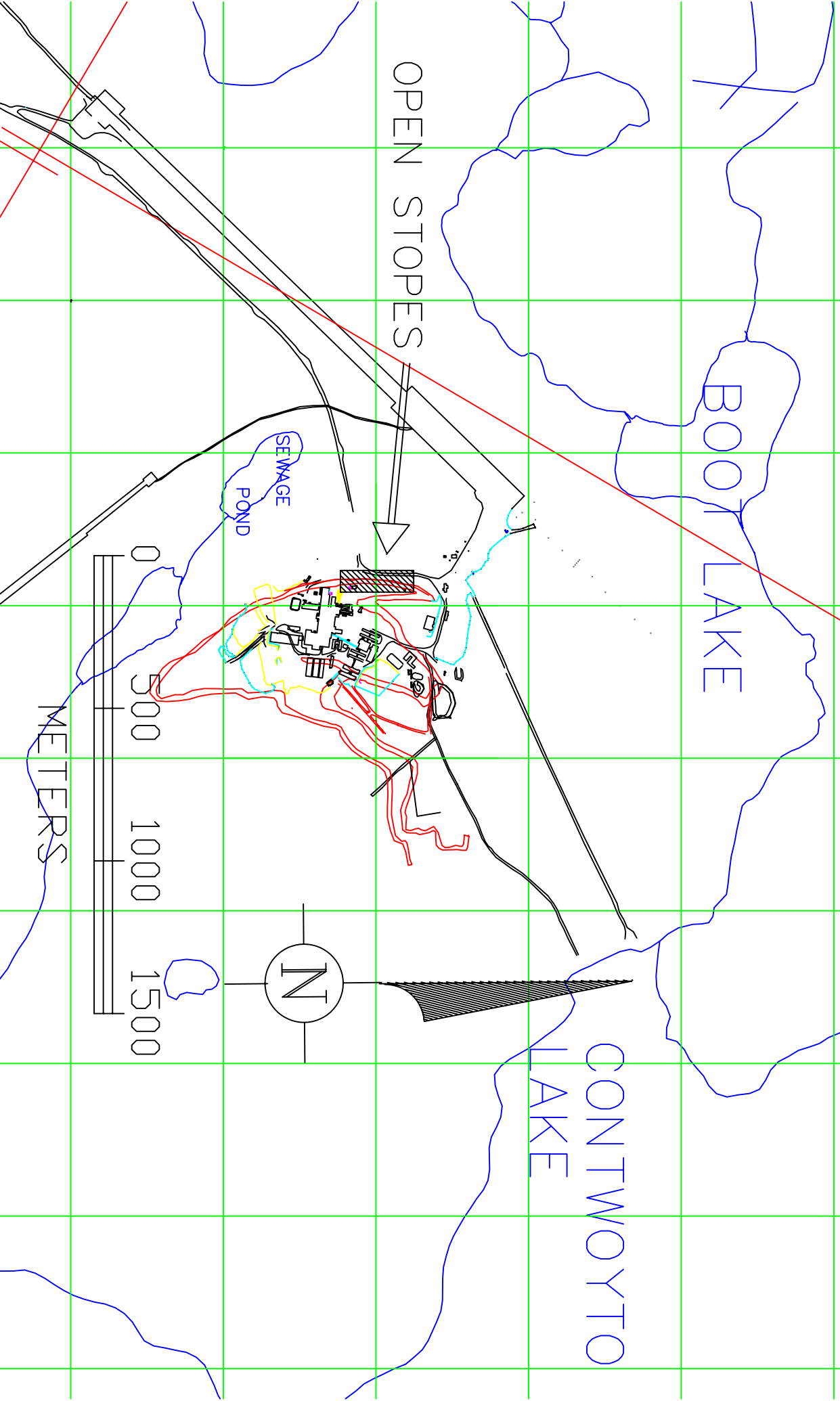
3.0 Government of Nunavut - Department of Environment (DOE)

Comment: *DOE questions why remediation techniques such as land farming are not being considered.*

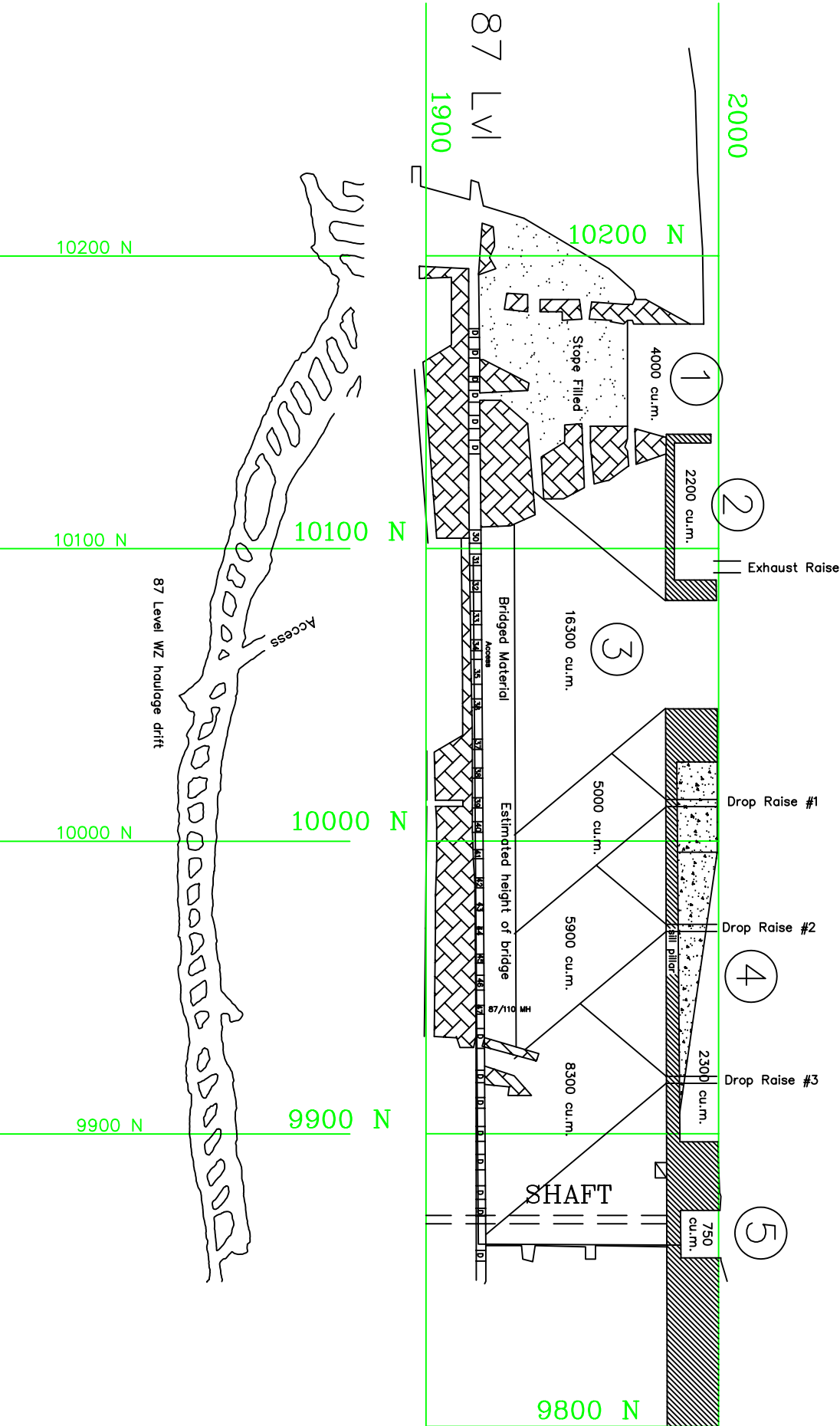
Response: Land farming may be carried out in the main tank farm area, to deal with the main, satellite and powerhouse tank farm bedding sand and off-load area material. This would reduce the overall quantity requiring disposal in the stopes.

Comment: *DOE would like information on the levels and types of contamination within the soils, as well as the volumes being considered.*

Response: This information is described in detail in the report on the Phase 2 Environmental Site Assessment, conducted in July 2005. A copy of this report has recently been provided to the NWB. Volumes are indicated above.



West Zone Crown Pillar Stopes



11 VK
FARM

①
Open to 27 lv

②
7m deep

③
open to 87 lv(?)

WZ OPEN STOPS

CZ Exh Rse Stope
(approximate)

exhaust fan

1
ramp

2
7m to sill

④

3

⑤
7m deep

EMERGENCY POWERHOUSE

fresh air fan

HOIST ROOM

SHAFT HOUSE

STA