

EA0607-002  
DM8715  
23 pages

**Alistair MacDonald**

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**From:** David Swisher [dswisher@centurymining.com]  
**Sent:** Friday, July 21, 2006 2:32 PM  
**To:** president@nwtmn.ca  
**Cc:** Alistair MacDonald; dswisher@centurymining.com  
**Subject:** Tamerlane response to NWTMN

Dear Robert,

Please find attached two documents containing your original letter to Lynn Carter of the Mackenzie Valley Land and Water Board, June 19, 2006 and Tamerlane's responses dated July 21, 2006. Additionally, a CD with support information will be mailed to you. If you have any questions, please don't hesitate to call me.

Thank you,

**David Swisher**

Tamerlane Ventures Inc.  
Senior Project Manager  
360.332.4653

Attachments included by MVEIRIS  
staff

August 2, 06

018745  
22/06/06

# Tamerlane

VENTURES INC.



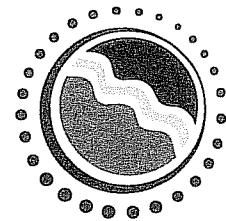
July 21, 2006

Robert Tordiff  
President  
Northwest Territory Métis Nation  
206 McDougal Road  
P.O. Box 720  
Fort Smith, NT  
X0E 0P0

Alistair MacDonald  
Environmental Assessment Officer

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**Mackenzie Valley**  
Environmental Impact Review Board

**RE: Response to Northwest Territory Métis Nation concerns June 19, 2006**

Dear President Tordiff,

Please find Tamerlane's responses to your communities concerns sent to the Mackenzie Valley Land and Water Board June 19, 2006, items 1-34.

**Q1.** This application was dated by the MVLWB on June 01, 2006 and the NWTMN received the application on June 8, 2006 requesting a response date to the MVLWB for June 23, 2006. As per the IMA Agreement the beginning of the response time period referred to in Schedules 4.1 (a) (b) sub sections 2 and 7 allows the NWTMN 30 days after receipt of information. Therefore, the response date for the NWTMN would be July 7<sup>th</sup>, 2006. We are however requesting and additional 90 days beyond July 7<sup>th</sup> for full review both of these applications. I have received requests from the Councils in the communities of Hay6 River and Fort Resolution for this extension.

**R1.** Not applicable to Tamerlane

**Q2.** We would like to receive a map showing where R-190 is located in the geological formation (page 19, Figure 2.3-3).

✓ **R2.** Please see attached adobe figure 2.3-3 indicating the location of R-190 in the geological formation. If a larger map is required, please request and provide mailing address for shipment. *Attachment #1*

**Q3.** A map showing where the waste storage location is and the amount of waste storage there will be.

**R3.** Please refer to the project description report, figure 1.4-1 showing the location of the temporary aggregate/waste storage area.

As indicated in the project description report, section 2.8.1 “Waste Rock Storage”, underground waste rock will remain underground as backfill in either the primary or secondary stopes when feasible. During the development stages, waste rock will be temporarily stockpiled on the surface. The material will be reused in a cement batching facility and sent underground for use in the primary stopes. Furthermore, there are no plans to leave any stockpiled material on the surface after the completion of the advanced mineral exploration project.

- Q4.** Larger view map (page 5, 4.1.4-1) of the site design as the map in the application is barely visible due to color and smallness in size.
- R4.** Two larger maps will be mailed to the NWT Métis Nation, attention Robert Tordiff. Please distribute as you see fit.
- Q5.** Why is the DMS design only preliminary? (page 22)
- R5.** Tamerlane has already conducted phase I, dense media separation (DMS) testing through an independent lab (MSRDI located in Vail, Arizona) to determine the lead and zinc recovery analysis utilizing the DMS circuit. In addition, Tamerlane has entered into contract with an independent consultant (Confidential Metallurgical Services) and MSRDI to further test the DMS layout design to attain a direct shipped product. Information will be forthcoming upon completion of the testing.
- Q6.** What will be the amounts of solid non-combustible and non-hazardous waste? Where is the proposed local area landfill? How will this material be transported?
- R6.** Although difficult to estimate the amount of solid non-combustible and non-hazardous waste, Tamerlane will ensure that all non-combustible and non-hazardous waste be accounted for and disposed of in an appropriate manner. There are local landfill locations in either Hay River or Fort Resolution that may be considered. Material will be either transported by an independent approved transportation company or an approved enclosed container. As indicated in the project description report, all solid wastes will be managed in accordance with NWT regulations.
- Q7.** Where is the location for the infiltration basin?
- R7.** Please refer to the project description report, figure 1.4-1, showing the location of the proposed infiltration basin. The proposed infiltration basin is a previously disturbed quarry.
- Q8.** Would like to see the approved method of disposal of hazardous materials waste that Tamerlane is proposing to use. Would also like to know which on-site or off-site facility that is planned for this and will the site be able to handle it? Would like to be provided with more information if it is on-site as currently there are no

facilities at Pine Point which will have the ability for hazardous waste disposal. (Page 25, 2.8.4)

**R8.** The DMS circuit has no treatment chemicals or hazardous waste. The only known hazardous wastes are fuel, lubrication and used oils, all of which will be stored and contained in an engineered enclosure (refer to project description report, section 2.10.3). In the unlikely event that any spills occur, they will be dealt with in accordance with Tamerlane's hazardous materials spill contingency plan (refer to project description report, appendix D).

**Q9.** Would like to see a map location of the area well for the DMS circuit (Page 26, 2.9.2) and request to see more information as to whether or not the well can provide the amount of water required.

**R9.** A specific location is not currently identified for an area well due to the fact that there are past wells in the area which may be utilized only if there is not enough make up water for the DMS circuit coming from the shaft bottom sump. A hydrogeology study of the R-190 deposit was conducted by Stevenson International groundwater consultants LTD in November, 1983 as well as Brown, Erdman & Associates LTD in 1981. These reports confirm vast volumes of water in the area. Copies of both reports will be transferred to CD and mailed to the NWT Métis Nation, attention Robert Tordiff. *See documents R9 Hydro + R9 Hydro*

**Q10.** There were problems with power for other communities in the South Slave when the Pine Point Mine was in existence. There could potentially be the same problem with this project. Would like to see more information and back up on the requirements for the power supply to this project. We are also requesting to see a map location of a possible diesel power plant and can the diesel power plant provide the extra 4 to 6 MW that will be required for the average power consumption and peak period? (Page 27, 2.10.1)

**R10.** Tamerlane is currently in discussions with the NWT Power Corporation concerning the use of line power or generation. Tamerlane is developing a more detailed load analysis of the power requirements for the NWT Power Corporation and currently anticipates a much lower power usage than originally outlined in the project description report. Due to the small nature of the advanced mineral exploration project, Tamerlane does not expect to have any adverse affects on any community in the South Slave region. If it is determined to utilize diesel power, it is anticipated to locate the generation facility within the proposed outline of figure 1.4-1 of the project description report. A preliminary power usage estimate will be copied to CD and mailed to the NWT Métis Nation, attention Robert Tordiff. *Attachment #2*

**Q11.** What types of explosives will be stored? What sort of temporary structure are they proposing to store in the explosives in? Would like to see more information on the upgrade to the existing road into this site. We also have safety concerns as they are proposing to have site temporary structure only 800 meters north of

*(109 pages)*  
*Test on MVEIRB website*  
*(170 pages)*

Territorial Highway 5. We would also like to see any plans for an underground explosive facility (Page 28, 2.10.4)

- R11.** Currently, the specific types of explosives to be used for the advanced mineral exploration have not been chosen. The temporary construction explosives storage facility will be designed, located and operated in accordance with the NWT Mine Health and Safety Act and Regulations. As required by these regulations, Tamerlane will obtain an Explosives Magazine Permit for its proposed temporary construction explosives storage facility.
- Q12.** Is only a gate going to be enough for security? We are requesting a detailed map of what the road system throughout the project and where the gate will be located (Page 28, 2.10.5)
- R12.** Because of the exploration projects remote nature, Tamerlane does not expect security issues, however, if the need arises, increased security will be evaluated. Tamerlane does not expect to add additional roadways as outlined on figure 1.4-1 of the project description report.
- Q13.** What is the after affect of the area that is to be frozen? What are the effects after the freezing is no longer required? Would like to see more information on this, as this is an area of karst topography and discontinuous permafrost. What is the reclamation plans for the freezing area? (Page 29, 2.10.7)
- R13.** Tamerlane is currently waiting on bid packages from experienced consultants and operators to conduct further studies that will determine the economic viability of applying freeze technology to the R-190 deposit area. It is uncertain when these detailed studies will be completed, however, information will be forthcoming. A support document from Thyssen mining will be copied to CD and mailed to the NWT Métis Nation, attention Robert Tordiff. *Attachments # 3+4*
- Q14.** What are the reclamation/closure plans for the whole project site? The NWTMN would like o see restoration of the project site back to its natural state, not the current disturbed site.
- R14.** As outlined in the project description report, section 9.0, provided no further steps are taken to expand the exploration project to a full-scale mining operation, reclamation activities will be designed to promote site restoration that is consistent with the site's condition before the exploration program and be in accordance with Section 15 of the Mackenzie Valley Land Use Regulations.
- Q15.** What total area will be cleared for the project?
- R15.** As indicated in the project description report, section 1.4, the exploration project footprint is anticipated to encompasses approximately 2.5 hectares.
- Q16.** How many trees will be removed if necessary and what are the plans for any tree removal?

- R16.** As indicated in response 15, the anticipated footprint for the exploration project is approximately 2.5 hectares. Portions of this area have tree cover which will need to be removed. The specific number of trees that will need to be removed has not been determined.
- Q17.** How many soil layers will be disturbed and how deep will any soil removal be?
- R17.** The surface footprint for the exploration project is sitting on approximately 30 meters of glacial till and gravels. The existing till and gravels in the footprint area will be graded and contoured so as to minimize any pooling and supply natural drainage from the area.
- Q18.** What types of job opportunities will be available to individuals trained after the project closes? What type of training is involved with the other job specific training?
- R18.** It is Tamerlane's objective to prove the economic viability of the R-190 exploration project so as to enhance the development of the area into a full-scale mining operation that will sustain many years of growth. Training will be provided as outlined in the project description report, section 2.11.4.
- Q19.** How many people on the PPPP manpower could realistically be hired in the Northwest Territories or from the communities of the South Slave? (Page 31, 2.11-1)
- R19.** Tamerlane's intention is to hire skilled and non-skilled employees from the local area which includes communities of the South Slave region. The number of employees hired in the region will depend on local interests and skill levels. For safety reasons, a reasonable number of Non-skilled employees will be trained and introduced into the work force working with skilled employees. Skill levels will vary.
- Q20.** Would like to see a copy of the Emergency Response Plan. What type of vehicle will be dedicated for ground evacuation? In the application it states that this vehicle may include medic-evacuation options. Would like more detailed information on any evacuations. (Page 31, 2.11.5)
- R20.** Please refer to the Project Description Report, Appendix D. Hazardous Materials Spill Contingency Plan, and section 2.11.5, Emergency Medical Response.

Upon completion of Tamerlane's Emergency Response Plan (ERP), the following will be included but not limited to:

- An emergency response coordinator
- A site hazard assessment
- An ERP committee
- Site personnel accountability method
- Posted & designated escape routes and assembly points

- Reporting procedures
- Alarm system notification
- Procedures for key employees who are required to remain to operate critical equipment
- Identity of medically trained employees
- Posting of emergency numbers and contacts throughout facility
- Emergency drills
- Annual employee reviews

- Q21.** Would like to see copies of the Project Schedules. (Page 32, 2.12)
- R21.** A preliminary project schedule will be copied to CD and mailed to the NWT Métis Nation, attention Robert Tordiff. *Attachment #5*
- Q22.** How is Tamerlane proposing to transport any of the materials being transported out of the project site location? How many vehicles will be used? Is the railroad system is going to utilized in any way, how so?
- R22.** Please refer to the project description report, section 2.7.6, Concentrate Handling. Furthermore, Tamerlane estimates 25-50 truck trips per day hauling concentrate. To minimize exposure, Tamerlane is investigating hauling concentrate during the graveyard shift hours.
- Q23.** How will the seepage be captured for reuse in the DMS circuit? Or how will the discharged seepage be transported into the infiltration basin? (Page 25, 2.8.2)
- R23.** Please refer to the project description report, section 2.7.2, DMS Facility. Furthermore, it is envisioned that all seepage transport will be shipped through plastic piping methods.
- Q24.** What is the total number of freezing pipes required?
- R24.** Preliminary studies by EBA Engineering Consultants Ltd. have not indicated the number of holes required due to additional studies being conducted to determine the most economical approach.
- Q25.** How much calcium chloride will be required for the freezing pipes to obtain the required ground temperatures for this project? What are the storage capabilities for the amount of calcium chloride required on the project?
- R25.** Tamerlane is currently waiting on bid packages from experienced consultants and operators to conduct further studies that will determine the economic viability of applying freeze technology to the R-190 deposit area. It is uncertain when these detailed studies will be completed, however, information will be forthcoming. A support document from Thyssen mining will be copied to CD and mailed to the NWT Métis Nation, attention Robert Tordiff. *Attachments #3+4*

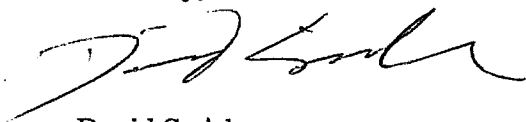
- Q26.** In the additional information submitted to the MVLWB on June 6, 2006 by Tamerlane Ventures Inc. we would like an explanation on the disposal considerations for the ferrosilicon as well as storage conditions and location.
- R26.** The ferrosilicon is recycled in a closed loop circuit and typically delivered to the site in one tonne bulk bags and stored in a designated area in the plant. Because ferrosilicon is inert in nature, there is no hazard or special storage needs. Ferrosilicon is the same ingredient used in the diamond industry for their dense media circuits. A copy of the ferrosilicon Materials Safety Data Sheets (MSDS) will be copied to CD and mailed to the NWT Métis Nation, attention Robert Tordiff. *Attachment # 6*
- Q27.** Map showing the location for waste rock and proposed amount to be placed in each deposit pile.
- R27.** Please refer to **R3**.
- Q28.** In the application there is a copy of the Feasibility Assessment (Phase 1), under the recommendations of this report it is recommended that there be further studies done in the next phase on the conceptual design of the ground freezing system. When will this be completed: The information enclosed on ground freezing is insufficient, we would like to see information specific to the project site.
- R28.** Please refer to **R25**.
- Q29.** As information leading up to this application (noted in the application under Table 3.2-1) a letter was sent to the Northwest Territory Metis Nation dated April 19, 2006, Tamerlane Ventures Inc. states that a DMS system has never been used in the Pine Point area. The NWTMN membership will be making formal requests for full presentations on all aspects of the proposed project be presented in simple non-technical terms to representatives from Hay River and Fort Resolution Metis councils as well as Environmental staff from the Northwest Territory Metis Nation. In this letter the NWTMN was also advised that airborne topographic surveys are being planned for this summer. To date, the NWTMN have not received any information on when this will be conducted.
- R29.** Tamerlane and its technical support groups would again, be willing to present a review of the advanced mineral exploration project to representatives from Hay River and Fort Resolution. I would remind you that presentations have already taken place with President Danny Beck (Hay River Métis Council) and his delegation April 26<sup>th</sup>, 2006. Additionally, a meeting was arranged and invoiced by President Lloyd Cardinal (Fort Resolution Métis Council) and his delegation May 31, 2006 of which there was no call and no show for the meeting. Through the presentation, faxes and phone calls, an update was provided to President Beck and President Cardinal as to the status of EBA's summer study schedules. In regards to the airborne topographic surveys, they are completed for the summer. As President Lloyd Cardinal is aware, two members of the Fort Resolution Métis Council were employed and instrumental in the completion of this survey.



- Q30.** The Northwest Territory Metis Nation also would like to have project site visits with representatives from the NWTMN and Tamerlane Ventures Inc. in order to visibly see the project site and proposed locations of all operations.
- R30.** Tamerlane would be more than willing to accommodate pre-planned site visits.
- Q31.** How deep with the chutes be for the underground mining?
- R31.** Uncertain of the meaning of chutes. The planned shaft will be sunk to an approximate depth of 180 meters.
- Q32.** How long will it take the ground to unfreeze after the freezing pipes are moved upon completion of the work to be carried out under this proposed project?
- R32.** Please refer to **R25**.
- Q33.** Will the quarries be drained? If so, how will it be done? Will there be any contaminated sedimentation a result of any water used in the proposed project?
- R33.** Please refer to the project description report, page vii, Definition of Infiltration Basin. Furthermore, Tamerlane anticipates no contaminated sedimentation as a result of the exploration project.
- Q34.** There is still ongoing research being done by EBA Consulting for this proposed project, when is a time frame for when the final report on this research be available? What are the effects for waterfowl in this area?
- R34.** EBA Engineering Consultants Ltd. is in its second season of environmental baseline studies and anticipates a completion to these studies at the end of August, 2006.

Should you have any questions concerning Tamerlane's responses, please do not hesitate to contact me.

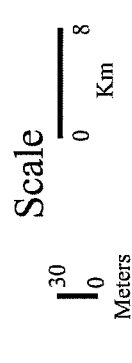
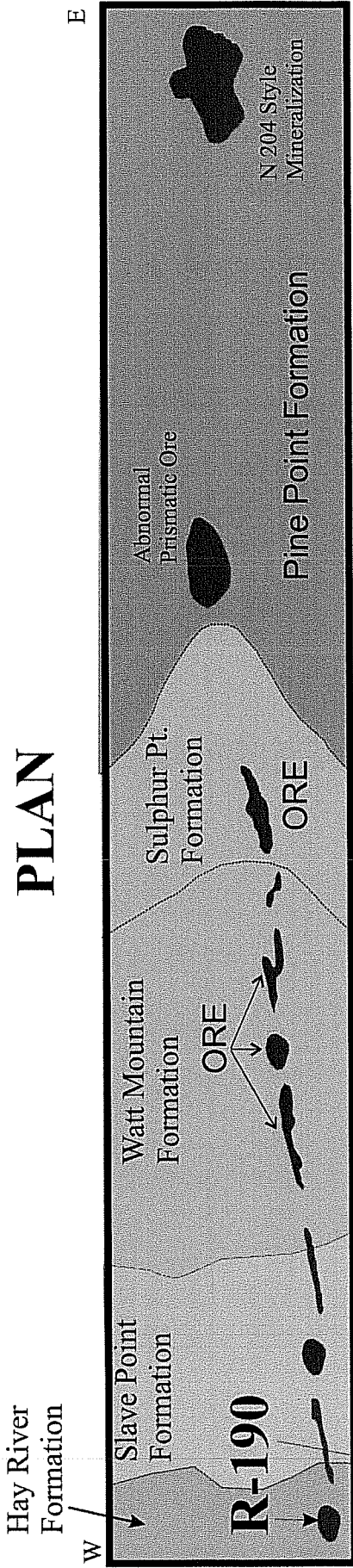
Sincerely,



David Swisher  
Tamerlane Ventures Inc.  
Senior Project Manager  
(360) 332-4653

Figure 2.3-3

# Schematic Plan and Longitudinal Section Showing Deposits



Attachment #2

Pine Point Pilot Project Power Demand

Area	Number Units	Connected Base HP	Connected Base kW	Load Factor %	Load kW	Utilisation Factor	Total Energy/mth kW hours
<b>Surface General</b>							
Office, security	1	30	22	40%	9	90%	5,801
Parking lot (plug ins)	1	120	90	40%	36	40%	10,313
Workshop equipment	1	60	45	70%	31	20%	4,512
Lighting	1	30	22	90%	20	60%	8,701
Heat Trace	1	70	52	100%	52	40%	15,039
Pumps	1	80	60	60%	36	50%	12,891
Air Compressors	3	750	1679	67%	1125	90%	728,738
Batch plant	1	75	56	80%	45	30%	9,668
Hot water heaters	1	300	224	100%	224	65%	104,738
Heating	2	20	30	100%	30	40%	8,594
Vent fans	1	200	149	95%	142	100%	102,053
Magazine lighting	1	15	11	90%	10	60%	4,351
Magazine heating	1	20	15	100%	15	40%	4,297
<b>Freeze Ring</b>							
Refrigeration	3	375	280	75%	210	100%	151,200
Pumps	3	30	67	60%	40	100%	29,004
<b>DMS</b>							
Heating	1	20	15	100%	15	40%	4,297
DMS Circuit	1	643	480	80%	384	80%	221,184
Crusher	1	150	112	75%	84	50%	30,213
<b>Main Shaft</b>							
Hoist	1	2000	1492	40%	597	90%	386,726
Vertical Conveyor	2	250	373	40%	149	90%	96,682
Heating	1	20	15	100%	15	40%	4,297
Pumps	1	25	19	75%	14	67%	6,748
Lighting	1	10	7	90%	7	50%	2,417
Heat Trace	1	30	22	100%	22	40%	6,445
<b>Ventilation Shaft</b>							
Primary Fan	1	900	671	95%	638	100%	459,238
<b>Underground</b>							
Compressors booster	1	500	373	80%	298	100%	214,848
Jumbos	2	150	224	80%	179	60%	77,345
Long Hole Drills	2	125	187	80%	149	60%	64,454
Rock bolter	1	100	75	80%	60	70%	30,079
Lighting	1	60	45	90%	40	100%	29,004
Pumps - Main	2	250	373	80%	298	80%	171,878
Pumps - Sumps	4	50	149	60%	90	80%	51,564
Vent Fans - stopes	6	30	134	70%	94	100%	67,677
Vent Fans - development	3	40	90	90%	81	100%	58,009
Crusher	1	200	149	75%	112	50%	40,284
Crusher auxiliaries	1	95	71	70%	50	50%	17,859
Workshop	1	60	45	50%	22	40%	6,445
Workshop equipment	1	34	25	80%	20	10%	1,461
Conveyors	1	125	93	75%	70	50%	25,178
Conveyor auxiliaries	1	30	22	85%	19	60%	8,218
Rockbreaker	1	75	56	80%	45	60%	19,336
Lunch room	1	20	15	80%	12	100%	8,594
<b>SUB-TOTAL</b>		<b>8,168</b>			<b>5,588</b>		<b>3,310,381</b>
Contingency		10%			10%		10%
<b>Total Connected HP</b>		<b>8,985</b>					
<b>Total Load (kW)</b>					<b>6,147</b>		
Diversification Factor					70%		
<b>Maximum Demand</b>					<b>4,303</b>		
Energy consumption/mth						<b>3,641,419</b>	
Energy consumption/day						<b>121,381</b>	



**TMCC**

**THYSSEN MINING**

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*"Keep safety in mind as your constant companion..."*

July 6<sup>th</sup>, 2006

Mr. David Swisher  
Tamerlane Ventures Inc  
441 Peace Portal Drive  
Blaine WA 98230  
USA

Dear David,

Re: Application of ground freezing technique in mining

The Thyssen group of companies has used ground freezing as a safe and effective method of stabilizing wet, unconsolidated ground during shaft sinking operations since 1903. The technique was first used to sink shafts for the German coal mines and was brought to North America by Thyssen in the nineteen sixties, to sink numerous shafts for the potash mines in Saskatchewan. Thyssen has completed about 80 shafts using this technique and still uses the method at one or two projects each year. The method is used occasionally at a larger scale to create a "freeze curtain" or even freeze a complete ore body, as is the case in two of the uranium mines in Northern Saskatchewan.

The freezing technique is arguably the least intrusive method of stabilizing wet, unconsolidated ground, compared with alternatives such as grouting and dewatering. The system uses brine in a closed circuit of interconnected pipes and freezes the water-bearing ground temporarily, until the required excavation (shaft, tunnel or chamber) has been excavated and permanent ground support has been installed. The brine typically has a temperature of around -15 degrees Celsius, and is cooled in a freeze plant which uses ammonia as a refrigerant. After completion of the excavation, the freeze plants are turned off, the brine is removed from the system and the freeze pipes are filled with grout. The frozen ground will thaw and return to its normal state within a period of weeks or months, depending on the scale of the freeze operation.

The most obvious risk from an environmental point of view is leakage of brine. Each freeze pipe is pressure tested before being used to minimize this risk. The network of surface lines connecting the vertical freeze pipes and the freeze plants is usually placed in concrete trenches that enable early detection, containment and repair of any leaks. A leak occurring in one of the vertical freeze pipes can occur if blasting takes place in close proximity. For this reason, each freeze hole is surveyed prior to it being used to ensure that it does not deviate towards the future excavation. Any leakage is noticed straight away due to a drop in the amount of return brine and the pipe is easily isolated from the rest of the system. Any leaked brine usually ends up in the shaft where it can be contained and removed. Due to the presence of ground water



**TMCC**

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*"Keep safety in mind as your constant companion..."*

around the freeze circle, any brine that leaks into the ground will be diluted to the extent that it is very unlikely to have any measurable or noticeable impact on the environment.

If you have any further questions regarding this matter, please do not hesitate to contact me.

Sincerely,

Rene Scheepers  
President – Thyssen Mining Construction of Canada Ltd

*Attachment #9*

---

**From:** Rene Scheepers [mailto:RScheepers@thyssenmining.com]  
**Sent:** Thursday, July 06, 2006 1:18 PM  
**To:** David Swisher  
**Cc:** Andrew Goode  
**Subject:** RE: freeze drilling experience

David,

According to our records, Thyssen used ground freezing to stabilize the collar of a ventilation shaft at Pine Point in 1985. It appears that the ground was frozen to a depth of 23m and the shaft then raised to a total depth of approximately 58m. I'm not sure how accurate these figures are but I'll try and find out a little more. The project was completed successfully and it was a world first to raise a shaft through frozen ground. We don't know of any shafts since that were raised like this either.

Regards,

Rene



Attachment #6



**75% Ferrosilicon  
Material Safety Data Sheet**

**Alloy & Metal Processors, Inc**  
623 33<sup>rd</sup> Place North  
Birmingham, Alabama 35222

**Emergency Phone Numbers**  
AMP Safety Dept: (205) 322-2344  
CHEMTREC (24 HRS): (800)424-9300  
Revision Date: 12-21-2004

**SECTION 1: PRODUCT INFORMATION**

**PRODUCT NAME:** 75% Ferrosilicon

**SYNONYMS:** Ferrosilicon, Ferro Silicon Alloys, FeSi, Fe<sub>2</sub>Si<sub>3</sub>, 75% Si

**DESCRIPTION:** Additive to metal in steel plants and iron foundries for production of steel, other metals, and foundry products. Silvery gray to metallic surface consisting of fine powders to granules and lumps/briquettes up to several inches in size. Normally odorless. Garlic like smell may occur on contact with water or humidity.

**CAS NUMBER:** 37322-17-1 ( 8049-17-0) For ingredient CAS numbers, see Section 3 – Composition and Information on ingredients)

SECTION 2 – Hazardous Material Identification System (HMIS)	
HEALTH	1
FLAMMABILITY	1
REACTIVITY	1
PERSONAL PROTECTION	E

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS			
COMPONENT	TRADE NAMES AND SYNONYMS	CAS #	% BY WEIGHT
Silicon (Si)	Silicon Alloy, Elemental Silicon, Amorphous Powder	7440-21-3	70-80
Iron (Fe)	Ferric Oxide, Iron Oxide	7439-89-6	20-30
Chromium (Cr)	Chromium Compounds II & III	7440-47-3	<0.5
Nickel (Ni)	Nickel Catalyst	7440-02-0	<0.5
Aluminum (Al)	Aluminum Metal, Aluminum Powder, Elemental Aluminum	7429-90-5	0.1 - 2.0
Calcium (Ca)		7440-70-2	<2.0
Trace Elements: As, C, Cu, Mg, Mo, Pb, P, S, Sb, V, Zn, Zr			< 0.1

SECTION 4: HAZARDS IDENTIFICATION									
COMPONENT	CAS#	% BY WEIGHT	LISTED CARCINOGEN						
			OSHA PEL (mg/m <sup>3</sup> )	OSHA CEILING (mg/m <sup>3</sup> )	ACGIH TVL (mg/m <sup>3</sup> )	ACGIH STEL (mg/m <sup>3</sup> )	NTP	IARC	OSHA
Silicon (Si)	7440-21-3	70-80	15T/5R	NA	10T	NA	No	No	No
Iron (Fe)	7439-89-6	20-30	None	NA	None	NA	No	Yes	No
Chromium (Cr)	7440-47-3	<0.5	0.1T	NA	0.5T	NA	Yes	No	Yes
Nickel (Ni)	7440-02-0	<0.5	1T	NA	10T/5R	NA	Yes	Yes	Yes
Aluminum (Al)	7429-90-5	0.1 - 2.0	15T/5R	NA	10T	NA	No	Yes	No
Calcium (Ca)	7440-70-2	<2.0	None	NA	None	NA	No	No	No

NOTE(S): T = Total dust; R = Respirable Dust; F = Fume

Exposure limits listed for each ingredient is for exposure to dust that may be generated during product transfer and handling.



Alloy & Metal Processors, Inc. Material Safety Data Sheet: 75% Ferrosilicon

<b>EMERGENCY OVERVIEW:</b> Not a fire or spill hazard. Low toxicity; dry dust is a nuisance particulate. Generally, health effects are provided for exposure to dust that may be generated during product transfer and handling.
<b>POTENTIAL HEALTH EFFECTS:</b>
<b>Primary Route of Exposure:</b> Inhalation
<b>Relevant Route(s) of Exposure</b>
<ul style="list-style-type: none"><li>• <b>Eye Contact:</b> Contact with particulate may cause slight to moderate eye irritation. Abrasive action of dust particulate can damage eye. Rinse eyes with water/saline solution. Seek medical attention for persistent feeling of discomfort.</li></ul>
<ul style="list-style-type: none"><li>• <b>Skin Contact:</b> Prolonged or repeated contact may cause slight to moderate skin irritation. Wash skin with water and/or a mild detergent.</li></ul>
<ul style="list-style-type: none"><li>• <b>Inhalation:</b> Overexposure by inhalation of airborne particulate, dust, or fumes is irritating to the nose, throat, and respiratory tract. Inhalation of excessive levels of dust or fumes may be harmful. Potential for phosphine/arsine intoxication. Seek medical attention</li></ul>
<ul style="list-style-type: none"><li>• <b>Ingestion:</b> Ingestion is an unlikely route of exposure; no hazard in normal industrial use. Small amounts (&lt;tablespoon) swallowed during normal handling operations are not likely to cause injury, however, swallowing larger amounts may cause injury. If ingested in sufficient quantity, may cause gastrointestinal disturbances. Symptoms include irritation, nausea, vomiting, abdominal pain, and diarrhea.</li></ul>
<b>Target Organs:</b> Respiratory system and eyes
<b>Acute Effects of Exposure:</b> Excessive, short-term exposure to airborne mineral dusts and particulate may cause upper respiratory and eye irritation.
<b>Chronic Effects of Exposure:</b> Excessive, long-term inhalation of airborne mineral dusts and particulate may contribute to the development of bronchitis, reduced breathing capacity, and may lead to the increased susceptibility to lung disease.
<b>Signs and Symptoms of Exposure:</b> (Dust) Tearing of eyes, burning sensation in the throat, cough, and chest discomfort.
<b>Medical Conditions Generally Known to be Aggravated by Exposure:</b> The excessive inhalation of mineral dust may aggravate pre-existing lung conditions such as, but not limited to, bronchitis, emphysema, and asthma.
<ul style="list-style-type: none"><li>• <b>Reproductive Hazards:</b> No known reproductive hazards</li></ul>
<b>POTENTIAL ENVIRONMENTAL EFFECTS:</b> Derived from natural ores; no adverse environmental effects known. However, prevent spilled product from entering streams, water bodies, and waste water systems. This material is used as an agricultural product.
<b>SECTION 5: FIRST AID MEASURES</b>

**FIRST AID PROCEDURES:**

- **EYE CONTACT:** Remove material by immediately flushing with clean, flowing, lukewarm water (low Pressure) for at least 15 minutes. Get medical attention if pain or irritation persists.
- **SKIN CONTACT:** Immediately wash affected area with mild soap and water to remove any dust adhering to the skin. Get medical attention if irritation develops or persists.
- **INHALATION:** If exposed to excessive levels of dusts or fumes. Remove to fresh air and get medical attention if cough or other symptoms develop. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek medical attention.

Alloy & Metal Processors, Inc. Material Safety Data Sheet: 75% Ferrosilicon

- **INGESTION:** Ingestion is an unlikely route of exposure. If ingested in sufficient quantity and victim is conscious give 1-2 glasses of water. Never give anything by mouth to an unconscious person. Leave decision to induce vomiting to qualified medical personnel, since particles may be aspirated into the lungs. Seek immediate medical attention.
- **NOTE(S) TO PHYSICIANS:** None

**SECTION 6: FIRE FIGHTING MEASURES**

- **FLAMMABLE PROPERTIES:** This product does not represent a hazard to health, safety, or environment when handled and stored as advised. Flammable and noxious gases may be formed in contact with moisture, acids, or bases. Ferrosilicon dust suspended in air may under certain conditions cause dust explosions.
- **EXTINGUISHING MEDIA:** Dry sand, CO<sub>2</sub>, or dry powder. Dry ferrosilicon in the form of granules is not combustible. Ferrosilicon dust suspended in air may under certain conditions cause dust explosions. Use extinguishing media appropriate to combustibles in the surrounding area.
- **PROTECTION FOR FIREFIGHTERS:** Wet material should be kept out of eyes and off skin. As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSEH (approved and equivalent) and full protective gear.

**SECTION 7: ACCIDENTAL RELEASE MEASURES**

- **CONTAINMENT:** Product is dry solid (granular or powder) and not readily soluble in water. However, prevent spilled product from entering streams, water bodies, and waste water systems.
- **CLEANUP:** Vacuum or sweep up dry material and place in a container for reuse. Avoid creating excessive airborne dust. Cleanup personnel need to wear approved respiratory protection (air-purifying or air supply), gloves, long sleeved clothing and goggles to prevent irritation from contact and inhalation.
- **COLLECTION:** If possible collect and reuse spilled product.
- **REPORTING:** SEE SECTION 16: REGULATORY INFORMATION
- **EVACUATION:** Isolate hazard area. Keep unnecessary and unprotected personnel from entering.

**SECTION 8: HANDLING AND STORAGE**

- **HANDLING:** Minimize dust generation and accumulation. Avoid breathing dust. Avoid contact with skin and eyes.
- **AVOID IGNITION SOURCES:** Avoid generating sparks and other ignition sources (e.g., welding) in areas with high dust concentrations. Ferrosilicon particles suspended in air at concentrations above 100-300 g/m<sup>3</sup> can cause dust explosions. For a given particle size, the ignition sensitivity and the violence of the explosion decrease with decreasing Si/Fe ratio. Addition of wet material to molten metal may cause explosions.

Alloy & Metal Processors, Inc. Material Safety Data Sheet: 75% Ferrosilicon

- **STORAGE:** Ferrosilicon must be kept in a dry and well ventilated place, and away from acids and bases. Keep container closed when not in use.

**SECTION 9: EXPOSURE CONTROLS/PERSONAL PROTECTION EQUIPMENT**

**ENGINEERING CONTROLS:** If user operations generate dust, fume, or mist, use ventilation to keep exposure to airborne contaminants below the exposure limits listed in Section 4.

**PERSONAL PROTECTIVE EQUIPMENT:**

- **Eye and Face Protection:** Corrosive to eyes. Wear protective safety glasses when dust generation is likely.
- **Skin Protection:** Wear clothing sufficient to cover skin, safety shoes, and split leather palm gloves for hand protection against dry materials.
- **Respiratory Protection:** Use NIOSH/MSHA approved respiratory protection (air purifying or air supplying) when concentrations are above exposure limit value. A respiratory protection program that meets OSHA 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant the use of a respirator.
- **General Hygiene Considerations:** Wash thoroughly after using product. Wash contaminated clothing. Wash hands before eating, drinking or smoking.

**EXPOSURE GUIDELINES:** SEE SECTION 4

**SECTION 10: PHYSICAL AND CHEMICAL PROPERTIES**

**APPEARANCE:** Silvery gray to metallic surface consisting of fine powders to granules and lumps up to several inches in size.

**ODOR:** Odorless

**PHYSICAL/CHEMICAL PROPERTIES:**

Density: Approximately 4.5	Freeze Point: Solid	%Volatile by Volume: NA
Water Solubility: Slightly Soluble	Melting Point: 1100°C	Vapor Density: NA
PH: NA	Boiling Point: NA	Vapor Pressure: NA

**SECTION 11: STABILITY AND REACTIVITY**

**STABILITY:** Stable under normal conditions of storage.

**CONDITIONS TO AVOID:** Wet or areas with excessive humidity.

**MATERIALS TO AVOID:** Water/excessive humidity, acids and bases. Garlic like smell may occur on contact with water or humidity.

**SECTION 11: STABILITY AND REACTIVITY**

**HAZARDOUS DECOMPOSITION PRODUCTS:**

- Highly flammable hydrogen gas (H<sub>2</sub>) and highly flammable and toxic gases of phosphine and arsine (garlic-like smell), both heavier than air, may be formed if Ferrosilicon comes in contact with moisture, acids, or bases.
- A reaction with hydrofluoric acid (HF) or nitric acid (HNO<sub>3</sub>) can lead to the formation of toxic gases such as silicon tetra fluoride (SiF<sub>4</sub>) or nitrous gases (NO<sub>x</sub>).
- Wet product will form highly flammable hydrogen gas if added to molten metal, due to decomposition of water.

**SECTION 12: ECOLOGICAL INFORMATION**

Derived from mineral ores. No data available on any adverse effects of this material on the environment.

**SECTION 13: DISPOSAL CONSIDERATIONS**

- **RCRA:** This product, as manufactured, is not a RCRA listed hazardous waste and does not exhibit any characteristics of a hazardous waste, including toxicity by EPA TCLP method.
- **Disposal Method:** This product is generally suitable for landfill disposal. Follow all applicable Federal, State, and local laws, rules, and regulations regarding the safe disposal of this material. If this product has been altered or contaminated with other hazardous materials, appropriate waste analysis may be necessary to determine proper method for disposal. A qualified environmental professional should determine waste characterization, disposal, and treatment methods for this material in accordance with applicable Federal, State, and local regulations and requirements.

**SECTION 14: TRANSPORTATION INFORMATION**

**USDOT INFORMATION:** This product is not regulated by USDOT as a hazardous material (49 CFR 172.101). No UN code assigned. No placard required for transportation.

**LABEL INFORMATION:**

**CAUTION:**

Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling and use. Keep in a closed container in a well ventilated area.

**FIRST AID MEASURES**

- **EYE CONTACT:** Remove material by immediately flushing with clean, flowing, lukewarm water (low Pressure) for at least 15 minutes. Get medical attention if pain or irritation persists.
- **SKIN CONTACT:** Immediately wash affected area with mild soap and water to remove any dust adhering to the skin. Get medical attention if irritation develops or persists.
- **INHALATION:** If exposed to excessive levels of dusts or fumes. Remove to fresh air and get medical attention if cough or other symptoms develop. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek medical attention.

Alloy & Metal Processors, Inc. Material Safety Data Sheet: 75% Ferrosilicon

- **INGESTION:** Ingestion is an unlikely route of exposure. If ingested in sufficient quantity and victim is conscious give 1-2 glasses of water. Never give anything by mouth to an unconscious person. Leave decision to induce vomiting to qualified medical personnel, since particles may be aspirated into the lungs. Seek immediate medical attention.

**SECTION 15: REGULATORY INFORMATION**

**COMPONENTS LISTED IN FEDERAL REGULATIONS AND STATE "RIGHT-TO-KNOW" LAWS:**

Product	CAS #	FEDERAL AGENCIES				
		RCRA	CERCLA	SARA III	EHS	TSCA
75% Ferrosilicon	37322-17-1	NO	NO	YES	NO	YES

**SECTION 16: OTHER INFORMATION**

**HAZARDOUS MATERIAL IDENTIFICATION SYSTEM**

HEALTH	REACTIVITY
0 - No hazard: Exposure to this substance offers No significant risk to health.	0 - Stable: substances which will remain stable when exposed to heat, pressure, or water.
1 - Slight Hazard: Irritation or minor injury would result from exposure to this substance. Protective measures are indicated.	1 - Normally Stable: Substances may become unstable at elevated temperatures and pressures or when mixed with water. Approach with caution.
2 - Dangerous: Exposure to this substance would be hazardous to health. Protective measures are indicated.	2 - Unstable: Violent chemical changes are possible at normal or elevated temperatures and pressures. Potentially violent or explosive reaction may occur when mixed with water. Monitor from a safe distance.
3 - Extreme Danger: Serious injury would result from exposure to this substance. Do not expose any body surface to these materials. Full protective measures should be taken.	3 - Explosive: Substances that are readily capable of detonation or explosion by a strong initiating source, such as heat, shock, or water. Monitor from behind explosion resistant barriers.
4 - Deadly: Even the slightest exposure to this substance would be life threatening. Only specialized protective clothing, for these materials, should be worn.	4 - May Detonate: Substances are readily capable of detonation and/or explosion at normal temperatures and pressures. Evacuate area if exposed to heat or fire.

FLAMMABILITY	PERSONAL PROTECTIVE EQUIPMENT- PPE
0 - Will not burn: Substances that will not burn.	A - Safety Glasses
1 - Flash point above 200 ° F: This substance must be preheated to ignite. Most combustible solids would be in this category.	B - Safety Glasses + Gloves
2 - Flash Point below 200°F: Moderately heated conditions may ignite this substance. Caution procedures should be employed when handling.	C - Safety Glasses + Gloves + Synthetic Apron
3 - Flash point below 100°F: Flammable, volatile or explosive under almost all normal temperature conditions. Exercise great caution in storage or handling of these materials.	D - Face Shield + Gloves + Synthetic Apron
4 - Flash point below 73°F. This substance is very flammable, volatile or explosive depending on its state. Extreme caution should be used in handling or storing these materials.	E - Safety Glasses + Gloves + Dust Respirator
	F - Safety Glasses + Gloves + Synthetic Apron + Dust & Vapor Respirator
	G - Safety Glasses + Gloves + Dust & Vapor Respirator
	H - Splash Goggles + Gloves + Synthetic Apron + Vapor Respirator
	I - Safety Glasses + Gloves + Dust and Vapor Respirator
	J - Splash Goggles + Gloves + Synthetic Apron + Dust And Vapor Respirator
	K - Air line Hood or Mask + Glove + Full Suit + Boots
	X - Ask Supervisor or Safety Coordinator for Guidance and handling instructions.

<b>SECTION 17: ACRONYMS AND ABBREVIATIONS USED IN THIS MSDS</b>	
ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
CAA	Clean Air Act; 40 CFR Subchapter C – Air Programs ( Parts 50-99)
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, 40 CFR 302.4; Designation, Reportable Quantities, and Notification (Table 302.4)
CWA	Clean Water Act; 40 CFR Subchapter D – Water Programs (Parts 100-149)
EPA	United States Environmental Protection Agency
HMS	Hazardous Materials Identification System of the National Paint & Coating Association
IARC	International Agency for Research on Cancer
Mg/m <sup>3</sup>	Milligrams per cubic meter
MSHA	Mine Safety and Health Administration
N/A	Not Applicable
NFPA	National Fire Protection Association
NIOSH	Nation Institute of Occupational Safety and Health
NTP	United States National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act (EPA), 40 CFR 261 – Identification and Listing of Hazardous Waste.
REL	Recommended Exposure Level (NIOSH)
RQ	Reportable Quantity
RTECS	Registry of Toxic Effects of Chemical Substances. This database contains toxic effects data on some 140,000 chemicals. Researched and maintained by NIOSH
SARA	Superfund Amendments and Reauthorization Act, 40 CFR 372.65 – Toxic Chemical Release
SARA EHS	SARA Extremely Hazardous Substances , 40 CFR 355 – Emergency Planning and Notification (Appendices A & B)
STEL	Short Term Exposure Limit (ACGIH)
STP	Standard temperature and Pressure (T = -70 Deg F, P = 1 atm)
TCLP	Toxicity Characteristics Leaching Procedure (EPA Method 1311)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substance Control Act, 40 CFR 716.120 – Health and Safety Data Reporting
TWA	Time Weighted Average based on 8 Hour Exposure
USDOT	United States Department of Transportation

**SECTION 18: DISCLAIMER**

This Material Safety Data Sheet (MSDS) is to be used only for this product in its present form. If this product is altered or used as a component in another material, the information on this MSDS may not be applicable. This document is generated for the purposed of distributing health, safety, and environmental data. This MSDS is not specification document sheet, nor should any data be constructed as a specification. Some of the information and conclusions are not based on direct test data of the product, but from information obtained from agencies and programs such as OSHA, EPA, NIOSH, NTP, NFPA and ACGIH. The user of this product has sole responsibility to determine the suitability of this product for any use and manner of use intended, and for determining the regulations applicable to such use in the relevant jurisdiction. This MSDS is updated on a periodic basis in accordance with applicable health and safety standards.