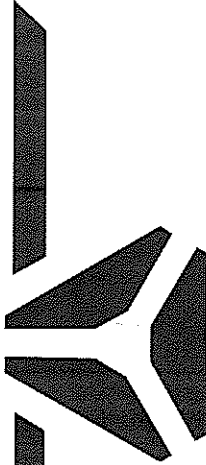


UM 17686  
EA 0607-002

# Tamerlane

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VENTURES INC.

**Technical Review Sessions**  
**July 17 & 18**



# Technical Questions

## Topic 1

- a) **Upwelling of water below mine workings into the mine, is it manageable?**
- Extensive Dewatering data utilized which proves the low permeability of the E-facies of the Presquile sedimentary-dolomite zone.
  - Drill Logs utilized to determine base with sufficient safety factor for low permeable zone.
  - Well documented E-facies of the Presquile zone from the past mining spanning over 23 years.

# Technical Questions

## Topic 1

- b) **Justify Beak 1981 study as main input for desktop study? Used for pumping out system vs. freeze wall system!**
- 7 hydrogeological reports utilized to determine groundwater characteristics for the purpose of freeze wall application.
  - Groundwater modeling conservatively indicate velocities well within tolerable limits for freezing. .26m/day
  - Main assumption in desktop evaluation was 2% porosity when we actually have >5%.
  - Pumping conducted has established baseline the needed hydrogeologic parameters.
  - Following formation of frozen earth wall, additional pumping will be conducted and compared to baseline data to confirm effectiveness.

# Technical Questions

## Topic 1

- c) **Estimated inflow to underground workings at 55 cubic meters/hr. What method & assumptions used? Steady-state or avg. pumping rate over dewatering PPPP? Range of uncertainty in this estimate?**
- 55 m<sup>3</sup>/hr was estimated from the Stevenson International & Brown, Erdman & Associates reports which indicated these flows at 450-500' below the surface.
  - This is a conservative estimate as there is a decline in water intrusion at depth, therefore, much less water is expected at the 600' target depth.
  - See figure 2.6-1 of the DAR.

# Technical Questions

## Topic 1

- d) **Pump system designed at 2273 m<sup>3</sup>/hr....what is basis for this? Any contingency plans if these flows are met?**
- The safety factor is around 4-5 which was Tamerlane's decision to account for necessary back-up for supplying the surface processing.
  - The vertical conveyor is over-designed from 120 tph to 220 tph.
  - Most systems are over-designed to account for surge capacity as well as back-up capacity.
  - Flexibility

# Technical Questions

## Topic 1

- e) **What is the relationship between an operational failing of the freeze wall and water inflow? 5-10% less effective, what happens? Implications?**
- What is margin of error?**
- There is none! The freeze wall will be established before lateral development takes place.
  - Once the freeze wall is established, no operational failing can occur.

# Technical Questions

## Topic 1

- f) What is the freezing temperature used for design of system? Justification for freeze temp.**
- Assumed a groundwater temperature of 5° C and a coolant temperature of -25° C.
  - Formation of frozen barrier was verified through numerical modeling.
  - All water samples, salinity, was of no concern.
  - Example: Sea water contains 3-3.5% NaCl which has been proven to freeze within these same parameters.

# Technical Questions

## Topic 1

- g) What conditions need to be achieved before freeze wall is fully developed? Tolerance of drilling accuracy? Corrective measure for out of tolerance drilling?**
- Temperature parameters met measured by temperature monitoring points along the freeze barrier.
  - Tolerance for drilling accuracy is a 2 meter cylinder to be confirmed by gyroscopic surveys.
  - Further infill drilling as necessary.



# Technical Questions

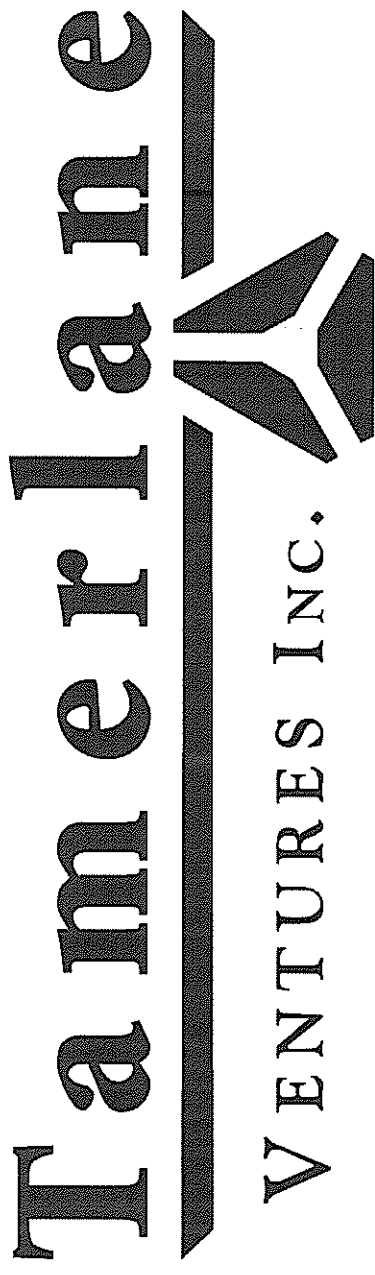
## Topic 1

- h) Scheduling of shaft completed before freeze wall construction, does design of freezing system account for this?**
- The shaft will contain a separate frozen barrier which will not intrude on the progress of the mine freeze wall.
  - Freezing of the shaft allows construction to take place while the frozen barrier is established but before lateral development occurs.

# Technical Questions

## Topic 1

- i) **Did the design establish a maximum allowable groundwater flow velocity to prevent thermal erosion along the freeze wall? How calculated?**
- The water in the shaft utilized for the surface processing is insignificant compared to the structural integrity of the frozen barrier.
  - There is not enough mass to erode the frozen barrier.
  - Example: Oil shale freezing
  - TEMP-W & SEEP-W programs used to model frozen barriers against moving groundwater.



# **Technical Sessions**

## **Topic 2**

# Technical Questions

## Topic 2

- a) **Why was Brown, Erdman & Associates Ltd report not included in DAR? Is Tamerlane aware of this data and water quality sampling?**
- This was an oversight that the data was not included into the DAR.
  - Having reviewed the Brown, Erdman data, we confirm that the results are comparable to those reported in the DAR.

# Technical Questions

## Topic 2

- b) **What is fate of ammonia passing through the DMS? Should its contribution be included in an overall loading estimation?**
- Pressure water spray oxidizes ammonia in the water.
  - 60% of the water is recycled in the DMS plant.
  - These two processes will effectively eliminate most of the ammonia in the discharge water.
  - Because the contribution will be insignificant, it is not necessary to add to the loading estimation.
  - Any ammonia infiltrated into the ground will be assimilated by the natural environment.

# Technical Questions

## Topic 2

- c) **Is ammonia concentrations reporting to surface higher in PPPP than in Giant Mine?**
- No, this is not possible
  - Giant was a Gold mine which used cyanide which when broken down produced ammonia.
  - The PPPP will use emulsion as explosive agent.

# Technical Questions

## Topic 2

- d) **Is a single metal leach test sufficient to estimate expected leaching from ore? Is Ontario tap water acceptable?**
- Two tests were run.
  - First test was determined to have contaminated Ferrosilicon.
  - Second test was initiated with fresh Ferrosilicon.
  - This testing is sufficient for the Pilot Project.
  - Any tap water is acceptable, because tap water was utilized as a base for comparison.
  - The PPPP is situated in a predominate limestone-dolomite environment.

# Technical Questions

## Topic 2

- e) **Will recycling of water in DMS lead to concentrations of leached metals? If occur what is fate? Will they report to infiltration basin?**
- The DMS process is in an alkaline medium with elevated pH, which caused precipitation of soluble metals which would be absorbed onto the surface of the solids.
  - Therefore not reporting to the infiltration basin.



# Technical Questions

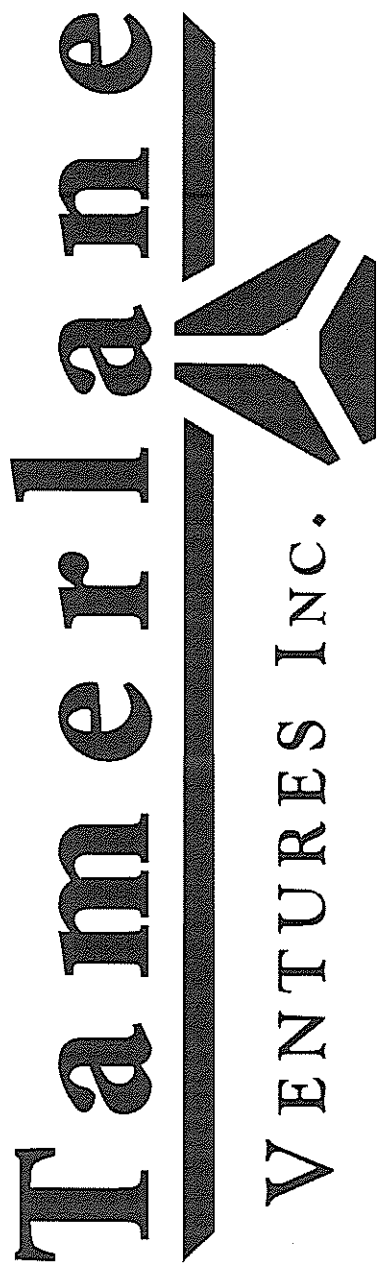
## Topic 2

- f) **What percentage of metal in DMS is lost to receiving environment rather than captured in the concentrate? What's solution & what's suspended?**
- Essentially zero percent – Concentrations will be comparable to concentrations found in the natural groundwater.
  - Approximately half and half.

# Technical Questions

## Topic 2

- g) What is principle aquifer being intercepted by w/g workings? Are highly saline waters expected to discharge to surface?**
- There is none.
  - Groundwater is intercepted by freezing in the Presquile zone.
  - No highly saline waters will be discharged to surface.



# **Technical Sessions**

## **Topic 3**

# Technical Questions

## Topic 3

- a) **Nitrites & Nitrates are not in DAR, are they also byproducts of ANFO blasting? Implications for entering surrounding environment?**
- Nitrites are a byproduct of Emulsion blasting which was acknowledged on page 271 of the DAR
  - Nitrates are nutrients that are assimilated by the groundwater environment.

# Technical Questions

## Topic 3

- b) Implications of discharging highly saline waters to surface on surrounding vegetation?**
- No highly saline waters will be discharged as discussed in Topic 2, item g.

# Technical Questions

## Topic 3

- c) **Waters discharged to surface likely in rooting zone of vegetation adjacent to infiltration basin?**
- Any water infiltrating into the shallow zones will be available to rooting vegetation in vicinity of infiltration basin.

# Technical Questions

## Topic 3

- d) **What method used to determine 100 m<sup>3</sup>/hr and what assumptions? Did this account for potential groundwater mounding over time?**
- Hazen Formula, Moulton Equation, Moretrench American Corp Nomographs.

Table 7.2-2  
Infiltration Basin Permeability Estimates

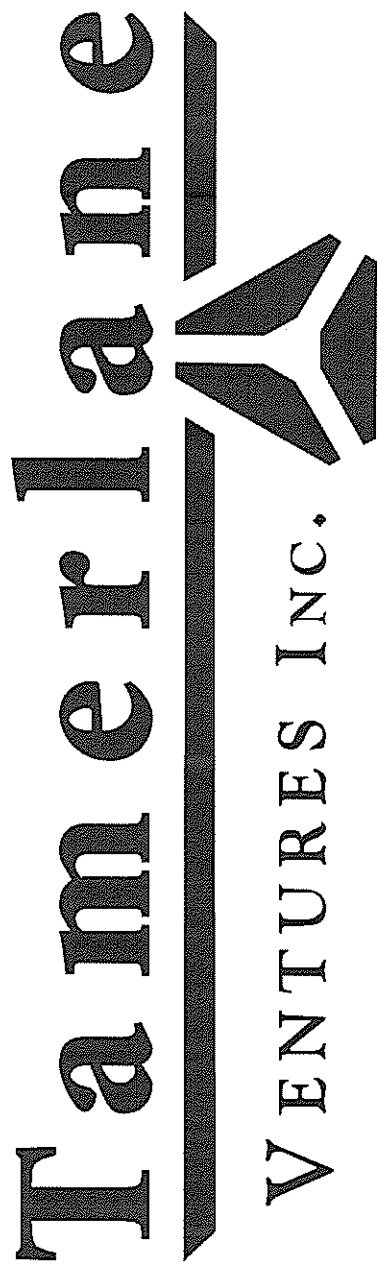
| Estimate Method  | Hydraulic Conductivity<br><i>K</i> (m/s)     |
|--|--|
| Hazen Formula  | $1.7 \times 10^{-2}$                         |
| Moulton Equation   | $9.0 \times 10^{-3}$                         |
| Moretrench American Corp Nomograph for Dense Soil        | $> 1.0 \times 10^{-3}$                       |
| Moretrench American Corp Nomograph for Medium Dense Soil | $> 2.0 \times 10^{-3}$                       |
| Typical Range for Fine Gravel (after R.A. Freeze)        | $1.0 \times 10^{-2}$ to $1.0 \times 10^{-3}$ |
| Typical Range for Silty Sand / Sand (after R.A. Freeze)  | $1.0 \times 10^{-3}$ to $1.0 \times 10^{-5}$ |

# Technical Questions

## Topic 3

- e) **What information is available about the soil profile and depth to water adjacent to infiltration basin?**
- Profile will be confirmed prior to construction of infiltration basin by excavating area were inverted culverts (wet drains) will be excavated
  - Depth to the shallow groundwater associated with the burden is expected to be similar to the R-190 site knowing the gravel and glacial till zones being a consistent depth.





# **Technical Sessions**

## **Topic 4**

# Technical Questions

## Topic 4

- a) **If BIODISK implemented, what is background for content to sewage plant data provided in IR.**
- A BIODISK system will be employed.
  - The data provided were supplied by manufacturer and came from a Toronto Port Authority which is designed to treat effluent for 200 people daily.
  - Similar systems used successfully throughout the North.
    - Snap Lake, Travco, NWT
    - Diamond Mine, BHP, NWT
    - CNR, Alberta
    - Yellowknife, Barrick, NWT

# Technical Questions

## Topic 4

- b) What conditions would lead to implementing adaptive management procedures for discharge of mine and process water? What are unacceptable discharge water characteristics?**
- If we believe water quality parameters of the license will be exceeded, appropriate adaptive management procedures will be implemented.
  - We don't believe the following end of pipe numbers will be exceeded:
    - pH – 6.0-9.5
    - Cu – 0.30 mg/l
    - Lead – 0.20 mg/l
    - Zinc – 0.50 mg/l

# **Technical Questions**

## **Topic 4**

- c) Discuss installation of water quality, baseline data and monitoring points for infiltration basin monitoring!**
- Upgradient & Downgradient groundwater monitoring wells.
  - Locations and depths to be determined.

# Technical Questions

## Topic 4

- d) **Estimated time of reflooding of u/g workings? What is expected water quality pool? Potential contaminants in water pool? Where could this water discharge to surface? Long-term impact on aquatic resources?**
- The underground workings will be filled with cemented backfill, therefore, no flooding of the underground workings will take place.
  - There is no water pool, therefore, no water to discharge.
  - No long term impact on aquatic resources.

# Technical Questions

## Topic 4

- e) **What monitoring for the infiltration basin will take place post closure? What contingency plans to mitigate potential environmental impacts after closure?**
- Upgradient & Downgradient groundwater monitoring wells.
  - Locations to be determined.
  - Testing of residual fines in surface area of infiltration basin.
  - Risk assessment and/or removal of residual fines.

# Technical Questions

## Topic 4

- f) What are best practices and reclamation techniques for a pilot project of this nature?**
- Those have been outlined in the DAR.
  - Tamerlane will employ progressive reclamation and will follow the Jan. 2007 INAC site reclamation guidelines.
  - The PPPP site will be relatively simple to reclaim because of the small footprint, limited infrastructure and nature of terrain.

# Technical Questions

## Topic 4

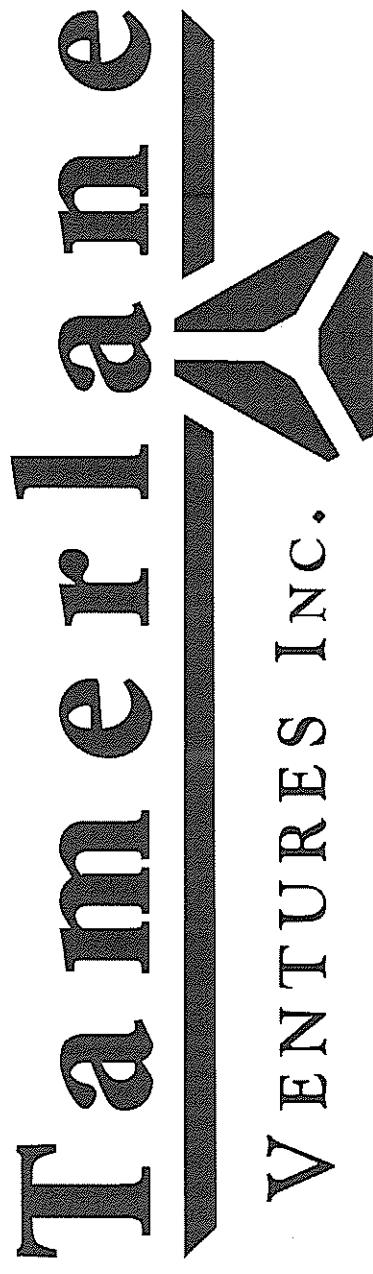
- g) How will freeze pipe brine be removed and what measures will be in place to prevent spillage/seepage along with disposal options.**
- Removed from system and possibly sold to group who may utilize for dust suppressant.
  - If not sold, then returned to supplier for reuse or storage.



# Technical Questions

## Topic 4

- h) How will refilling freeze pipes affect long term groundwater flow in area?**
- As J. Jasper & J. Sopko indicated, the groundwater will simply flow around the pipes and continue its downgradient flow.



# **Pine Point Project**

## **Questions**