Alistair MacDonald

From: David Swisher [dswisher@tamerlaneventures.com]
Sent: September 10, 2007 9:54 AM
To: Alistair MacDonald
Cc: 'Rick Hoos'; 'David Swisher'
Subject: RE: Remaining 2nd Round IR Responses

Good morning Al,

Please see the following:

- Calculated flood levels
  - Calculated from the Flood Risk Map for the Hay River Area, the rail loadout area lies between contours 172.5 & 172.0. The DFL (design flood level) for the rail loadout area is at 172.3. Accordingly, Flood proofing requires raising of structures above this elevation. Any wooden substructure must be a minimum of .3m above the DFL and floor elevations a minimum of .5m above the DFL. Tamerlane's proposed rail loadout facility will be concrete foundation and walls and will be constructed ~ 1.0m above the DFL.

- (Final Analysis Attached) Basal inflow analysis (currently being reviewed and recalculated by EBA hydrogeologist)
- (Attached) Injection well picture
- (Attached) Injection well usage locations
- (Attached) MSDS sheets for reagents

Thanks,

David Swisher
Vice President / Senior Project Manager
Tamerlane Ventures Inc.
441 Peace Portal Drive
Blaine, WA 98247
Wk: 360.332.4653
Cell: 867.875.7449
Fax: 360.332.4652
Email: dswisher@tamerlaneventures.com

From: David Swisher [mailto:dswisher@tamerlaneventures.com]
Sent: Thursday, August 30, 2007 2:38 PM
To: Alistair MacDonald
Cc: Rick Hoos; David Swisher
Subject: Remaining 2nd Round IR Responses

Hello Al,

Please see the attached final second round IR responses along with the modified DAR summary report. Any changes in the summary report are in green font. I'm also working on some points of clarification surrounding the following:

- Calculated flood levels

- Basal inflow analysis (currently being reviewed and recalculated by EBA hydrogeologist)
- Injection well picture
- Injection well usage locations
- MSDS sheets for reagents

If you have any questions, please don't hesitate to call me.

Thanks,

David Swisher
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September 7, 2007

EBA File: 1740149.005

Tamerlane Ventures Inc.
441 Peace Portal Drive
Blaine, WA 98230
USA

Attention: Mr. David Swisher
Vice President/Senior Project Manager

Dear Mr. Swisher:

Subject: Basal Inflow Evaluation, Pine Point Pilot Project Near Hay River, Northwest Territories

1.0 INTRODUCTION

Further to your recent request to EBA Engineering Consultants Ltd. (EBA), we present here our evaluation of anticipated basal inflow at the Pine Point Pilot Project (R-190 site), near Hay River, NWT. For this site, basal inflow refers to estimated groundwater inflow through the open bottom of a roughly circular freeze wall proposed to be installed around the ore deposit.

This letter is supplementary to previous correspondence assessing the feasibility of re-injecting mine inflow water back into the Presquile Dolomite formation. This letter contains all of our calculations, results, interpretation and conclusions regarding this work.

2.0 PROJECT UNDERSTANDING

We understand the following relating to this assignment:

- The freeze wall is to be roughly circular, 5 m thick, 600 m diameter and extend to a depth of 185 m below ground level (bgl).
- The freeze wall will be terminated in the Pine Point Formation which underlies the Presquile Dolomite formation. The Presquile Dolomite hosts the ore body and its upper part constitutes a 61 m thick vuggy, karstic aquifer. The Presquile aquifer is confined by the overlying Watt Mountain Dolomite and has a static potentiometric surface at 25 m bgl.
- The proposed mine workings will have a foot print of approximately 150 m x 180 m, with workings confined to levels between 140 m and 170 m bgl. A vertical, concrete-lined main shaft 7.3 m (24 ft) in diameter will extend from the surface down to the

workings, and terminate in a sump below the workings down to 185 m bgl. A typical drift within the mine will be 4.5 m wide and 4.5 m high. A ventilation raise 2.4 m (8 ft) in diameter will extend from the mine workings to the surface.

- Specific portions of the mine workings will be open for up to 15 months.

A schematic diagram of the subsurface stratigraphy, freeze wall, Presquile aquifer and approximate range of mine workings is shown in Figure 1.

3.0 PURPOSE AND SCOPE

The purpose of this assignment is to determine the approximate anticipated basal inflow to the proposed mine workings within the freeze wall, as described above.

After an exhaustive search, no appropriate analytical method or equation was found that would accommodate the proposed mine geometry and be valid for the large hydraulic head that will be developed within the Presquile aquifer across the freeze wall. Therefore, a numerical modelling approach was adopted using the commonly-used hydrotechnical seepage analysis software package SEEP/W. An equivalent hydraulic conceptual model for the proposed mine workings was developed which is suited for SEEP/W modelling. A series of modelling runs were conducted using representative hydraulic characteristics (obtained from previous hydrogeology reports for the R-190 area). In addition, a series of sensitivity runs were carried out by varying individual model parameters and observing the sensitivity of results to those changes.

4.0 HYDRAULIC CONCEPTUAL MODEL

Figure 2 shows a hydraulic conceptual model which is considered to approximately represent the proposed mine workings and main shaft/sump. For this level of semi-quantitative analysis, the ventilation raise was ignored. The following are key points about the conceptual model:

- The shaft and mine workings are represented as openings at the center of a circular freeze wall. Even though the actual workings and shaft may be off center, the total inflow calculated with this simplification is considered to be representative for the purposes of this assignment. (Note: design of the actual mine and dewatering system will require a more sophisticated analysis and can refine the approximate inflows presented here).
- The freeze wall forms an impermeable ring 300 m away from the center line.
- The Watt Mountain unit is considered to be an impermeable boundary at the top of the model domain. There will in reality be minor leakage downward through the Watt Mountain unit, but this is calculated to be less than 1 m^3/hr over the whole diameter of

the freeze wall (assuming uniform hydraulic conductivity of 10^{-9} m/s as reported in Stevenson's 1983 report) so is ignored.

- Three water-bearing units are contained within the model domain:
  - Presquile aquifer (upper 34 m of the Presquile Dolomite) with hydraulic conductivity K_1 and thickness D_1; D_1 was obtained from previous hydrogeology reports, and K_1 was calculated by dividing the known transmissivity of the Presquile aquifer by D_1.
  - Lower portion of the Presquile Dolomite, with K_2 and D_2. D_2 was calculated as the difference between the thickness of the total Presquile Dolomite and the aquifer portion (61 m – 34 m = 27 m). K_2 was assumed, taken about two orders of magnitude lower than K_1 based on the lower water production in test well pumping in lower parts of the Presquile Dolomite.
  - Pine Point Formation, with K_3 and D_3. K_3 was taken from the Stevenson 1983 report (note: this was based on a lab permeability test of a core sample, and did not include the influence of fractures). D_3 was assumed to be about 60 m, based on geologic cross-sections presented in previous reports. An impermeable model boundary was assigned at the bottom of the Pine Point Formation.
- The concrete-lined shaft is represented as an impermeable cylinder 7.3 m in diameter extending from the top of the model down to 140 m depth along the center line;
- The sump is represented as a permeable cylinder 7.3 m in diameter extending from 170m down to 185 m depth along the center line;
- The long-duration mine workings are represented as a cylindrical opening between the 140 m and 170 m level (i.e., 30 m high) with volume equal to that of the longest drift likely to be present in the mine. The total open volume of a drift spanning the full width of the anticipated workings footprint would be 4.5 m x 4.5 m x 180 m = 3,645m^3. An equivalent cylindrical volume 30 m tall would have a diameter of about 12.5 m.
- The static potentiometric level for the Presquile aquifer is at 25 m bgl, representing a confined hydraulic head of approximately 115 m in height (taken above the mid-point of the aquifer at about 140 m depth). This constitutes a pressure head that would be present throughout the porous and highly permeable Presquile aquifer. We assigned the base of the Pine Point Formation (at 244 m depth) as a zero datum for calculating total head for modelling purposes. Using this datum, the total head at the top of the Presquile aquifer layer would be 244 m - 25 m = 219 m. By definition, this total head value is constant vertically throughout the water-bearing layers above the zero datum and would act to force water under the freeze wall and toward the mine openings and sump.

- We assumed that the laterally extensive Presquile aquifer would act effectively as a constant head water source around the freeze wall (i.e., a continuous source of water for basal inflow over the life of the mine). This assumption would be supported physically by the replenishing effect to the Presquile aquifer of re-injecting water back into this aquifer outside of the freeze wall.

5.0 NUMERICAL MODEL

SEEP/W has an axisymmetric modelling capability which allows a two-dimensional (2D) simulation to represent a circular three-dimensional (3D) model domain. The 2D SEEP/W results represent one radian (57.3o) of arc around a circular model domain. Total 3D results are obtained by simply multiplying the 2D results by 2□ (or 6.28) to represent the full inflow around the entire circular domain.

For this modelling effort, no-flow boundary conditions were assigned for the impermeable shaft (down to 140 m level), the top of the model (base of Watt Mountain unit), the freeze wall and the bottom of the model (base of Pine Point Formation). Unit flux boundary conditions were assigned to the permeable perimeter surface of the mine opening "cylinder" and the sump (collectively shown by dashed lines on Figure 2). For a unit flux boundary condition, any water reaching cells at this boundary is removed from the model domain (analogous to being pumped out of the mine). Finally, a constant head boundary condition was assigned to the vertical column of cells within the Pine Point Formation directly below the bottom of the freeze curtain.

This is a steady state model, which means that it is not time-dependent and the basal inflows are as large as they can get. The results represent conditions when a steady flow of water is established between the source area (the Presquile aquifer outside of the freeze wall) and the sink area (the mine workings and sump inside the freeze wall). We assume that basal inflow to mine workings that remain open for 15 months would approach steady state conditions.

The model set up, cell mesh, water bearing layer geometry and hydraulic properties, and boundary conditions are shown in Figure 3.

6.0 MODEL RESULTS

A graphic representation of the steady state model results is shown in the second figure in Appendix A. Equipotential lines (lines of equal total head) extend in toward the mine opening and decrease from the bottom of the freeze ring toward the mine openings (where pressure head is zero or atmospheric). Groundwater flow lines enter the domain horizontally below the freeze wall and arc upwards into the mine area. This will be the general pattern of actual basal inflow as well.

Due to contrasts in hydraulic conductivity of the three water-bearing layers (increasing upwards), the flow lines are directed preferentially toward the high permeability Presquile aquifer layer, then laterally toward the mine workings. Because the actual mine workings would be much more complex and distributed, the groundwater flow paths shown here are not meaningful. However, the total flux of groundwater reporting to the mine workings and sump is considered to be meaningful and useful for the objective here.

For the base case model run (parameters as shown on the figures), the total 3D basal inflow to the mine workings and sump is 941 m3/hr. Under steady state conditions (i.e., after a sufficiently long time), a phreatic water surface (dewatering surface) would tend to develop within the Presquile aquifer layer within the freeze ring. The highest groundwater velocities are developed where water in the aquifer below this phreatic surface enters the mine opening (about the 150 m level).

7.0 SENSITIVITY ANALYSIS

Table 1 shows the results of nine different sensitivity cases, in addition to the base case (No.1). The overall range of basal inflows determined for the sensitivity cases was 696 to 3,120 m^3/hr. The following is a summary of the sensitivity results:

- Case 1 – base case.
- Case 2 - K_2 decreased by order of magnitude; moderate decrease in basal inflow;
- Case 3 – K_2 increased by order of magnitude; minor increase in basal inflow;
- Case 4 – Diameter of equivalent mine opening decreased to 10 m; negligible decrease in basal inflow;
- Case 5 - Diameter of equivalent mine opening increased to 20 m; minor increase in basal inflow;
- Case 6 – K_3 doubled; large increase (82%) in basal inflow;
- Case 7 - K_3 increased 4x; very large increase (217%) in basal inflow;
- Case 8 – K_1 decreased by order of magnitude; moderate decrease in basal inflow;
- Case 9 – K_1 increased by order of magnitude; minor increase in basal inflow;
- Case 10 – D_3 doubled; moderate increase in basal inflow.

These results show that the basal inflow modelling results are moderately sensitive to values of K2 (hydraulic conductivity of lower part of Presquile Dolomite) and K1 (hydraulic conductivity of Presquile aquifer), but most sensitive to values of K3 (hydraulic conductivity of the Pine Point Formation). This is intuitively correct, since increased permeability of this unit, underlying the freeze wall, would allow more water to flow up and into the mine workings area.

8.0 CONCLUSIONS

1. Basal inflow was determined using numerical modelling methods to be 941 m^3/hr.
2. Downward leakage through the Watt Mountain Dolomite will occur, but at negligible rates (<1 m^3/hr) compared with the basal inflow.
3. Basal inflow estimates are most sensitive to values of hydraulic conductivity for the Pine Point Formation.

9.0 CLOSURE

We trust this evaluation is satisfactory for your current needs. This letter is to be read in conjunction with our General Conditions (attached), which form part of this report. If you have any questions, please contact us at your convenience.

Yours truly,
EBA Engineering Consultants Ltd.

H. Scott Schillereff

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Attachments:

Table 1	- Summary of Sensitivity Analysis Results
Figure 1	- Hydrogeologic Setting of Pine Point R-190 Mine Site
Figure 2	- Equivalent Hydraulic Conceptual Model for SEEP/W
Figure 3	- SEEP/W model set-up
Figure 4	- SEEP/W results for Case 1
Appendix A	- General Conditions

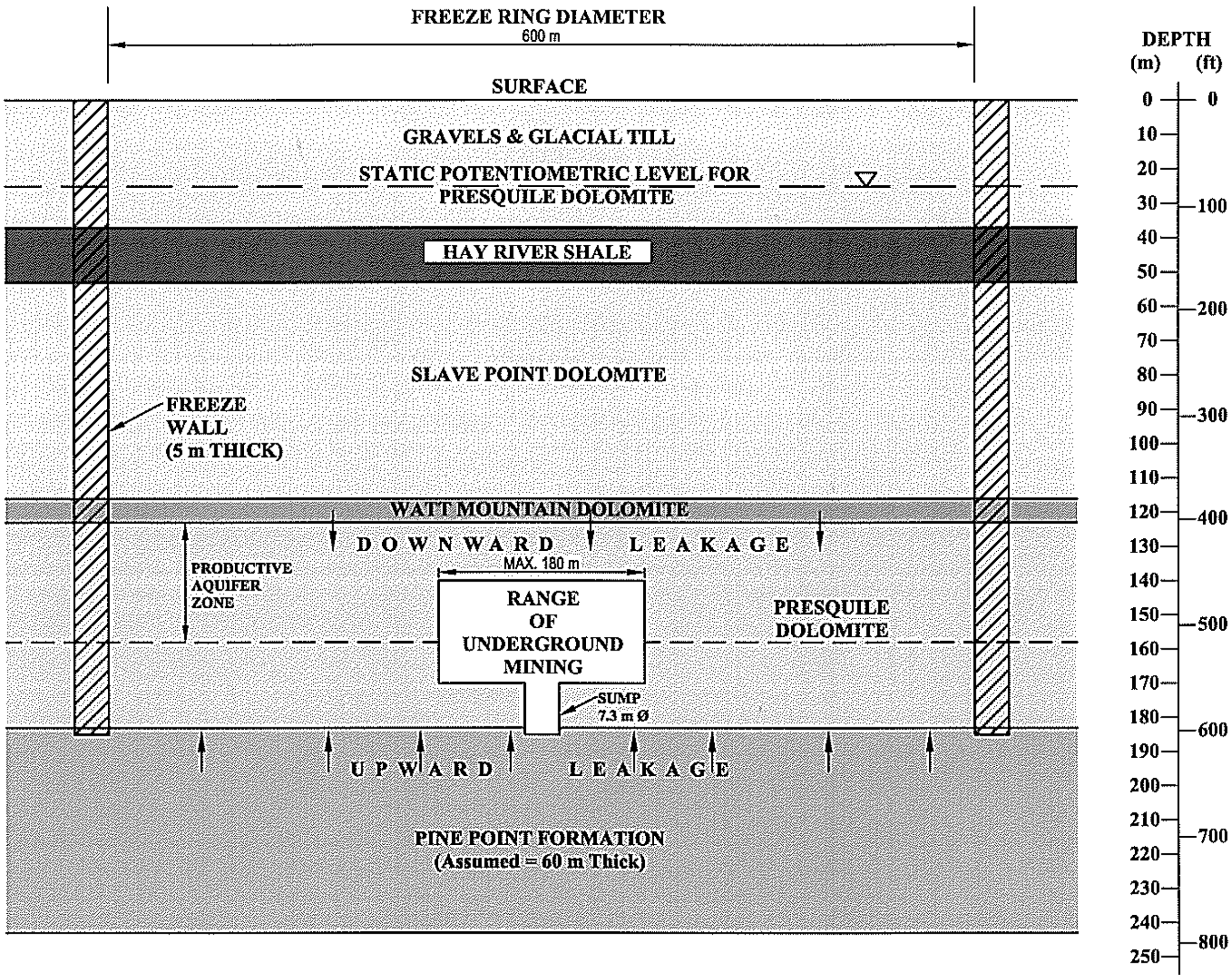
/bi

TABLE

TABLE 1: SUMMARY OF SENSITIVITY ANALYSIS RESULTS

Case Number	Permeability of Semi-permeable Zone (m/s)	Equivalent Mine Opening Diameter (m)	Permeability of Pine Point Formation (m/s)	Permeability of Productive Aquifer (m/s)	The Thickness of Pine Point Formation (m)	Q_{inflow} (m^3/hr)
1	1.0×10^{-5}	12.5	6.6×10^{-7}	1.9×10^{-3}	60	**941**
2	1.0×10^{-6}	12.5	6.6×10^{-7}	1.9×10^{-3}	60	**696**
3	1.0×10^{-4}	12.5	6.6×10^{-7}	1.9×10^{-3}	60	**1068**
4	1.0×10^{-5}	10	6.6×10^{-7}	1.9×10^{-3}	60	**979**
5	1.0×10^{-5}	20	6.6×10^{-7}	1.9×10^{-3}	60	**1113**
6	1.0×10^{-5}	12.5	13.2×10^{-7}	1.9×10^{-3}	60	**1793**
7	1.0×10^{-5}	12.5	26.4×10^{-7}	1.9×10^{-3}	60	**3120**
8	1.0×10^{-5}	12.5	6.6×10^{-7}	1.9×10^{-4}	60	**796**
9	1.0×10^{-5}	12.5	6.6×10^{-7}	1.9×10^{-2}	60	**1027**
10	1.0×10^{-5}	12.5	6.6×10^{-7}	1.9×10^{-3}	120	**1158**

FIGURES



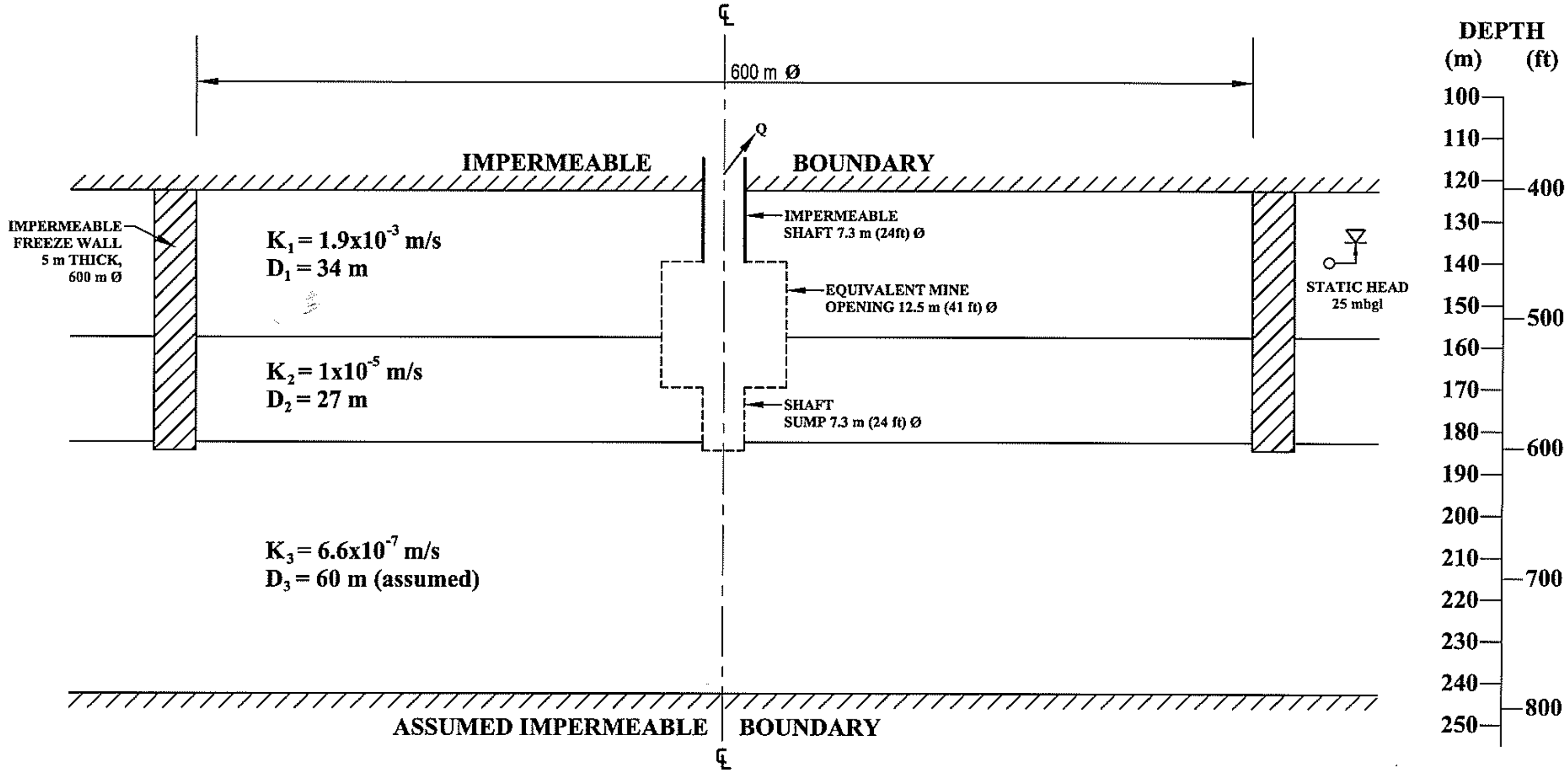
Q:\Kelowna\Drafting\1740149.005\1740149-005.dwg [FIGURE 01] September 05, 2007 - 11:43:37 am (BY: MIKE RUDNISKI)

NOT TO SCALE

CLIENT	BASAL INFLOW EVALUATION PINE POINT PILOT PROJECT
TAMERLANE VENTURES INC.	HYDROGEOLOGIC SETTING OF PINE POINT R-190 MINE SITE

EBA Engineering Consultants Ltd.

PROJECT NO.	DWN	CKD	REV	
1740149.005	MR	SS	-	Figure 1
OFFICE	DATE			
EBA-KELOWNA	August 30, 2007			



NOT TO SCALE

CLIENT	TAMERLANE VENTURES INC.
EBA Engineering Consultants Ltd.	BASAL INFLOW EVALUATION PINE POINT PILOT PROJECT
	EQUIVALENT HYDRAULIC CONCEPTUAL MODEL FOR SEEP/W
PROJECT NO.	1740149.005
DWN	MR
CKD	SS
REV	-
OFFICE	EBA-KELOWNA
DATE	September 04, 2007

Figure 2

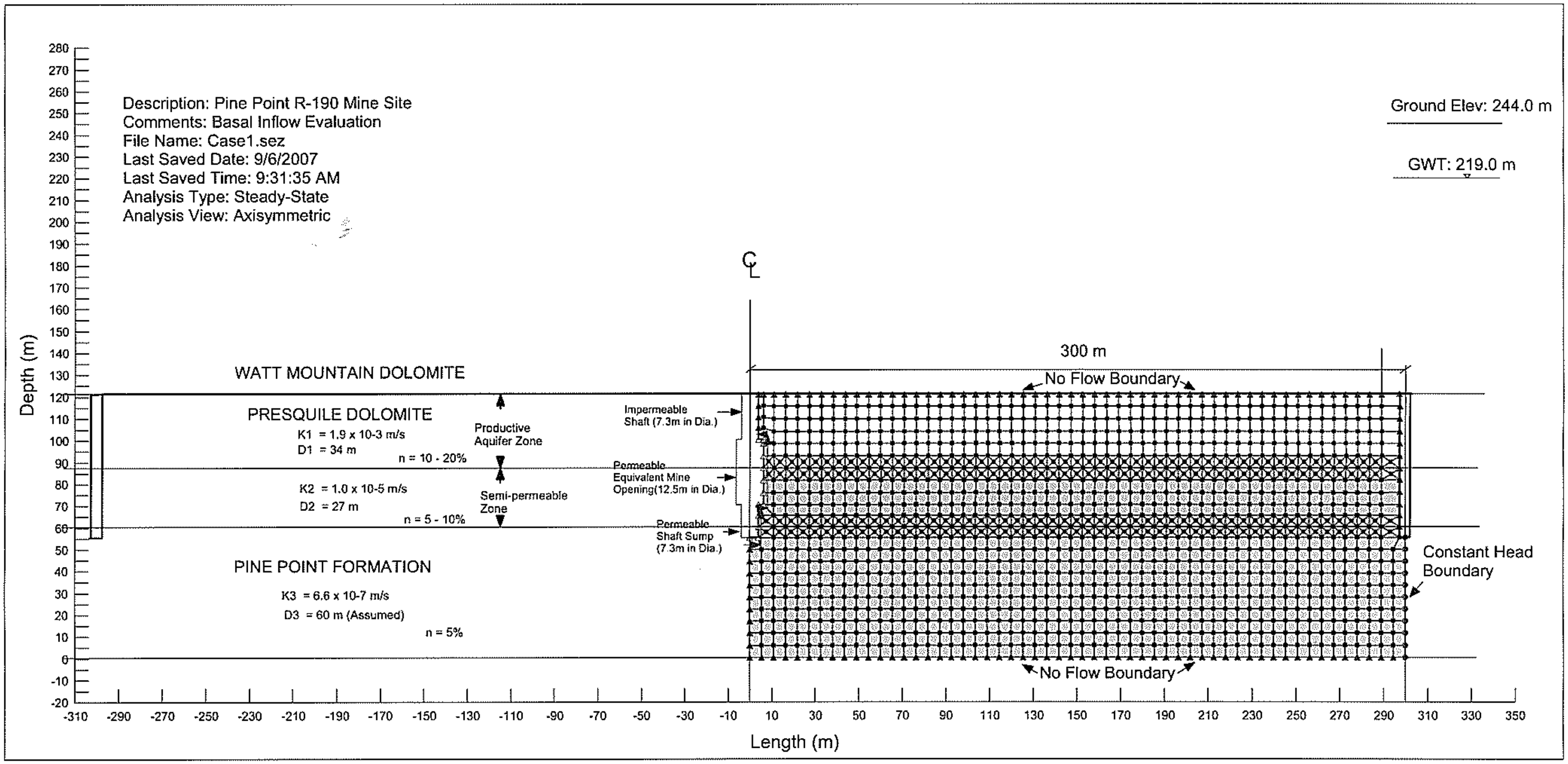


Figure 3 - SEEP/W model set-up

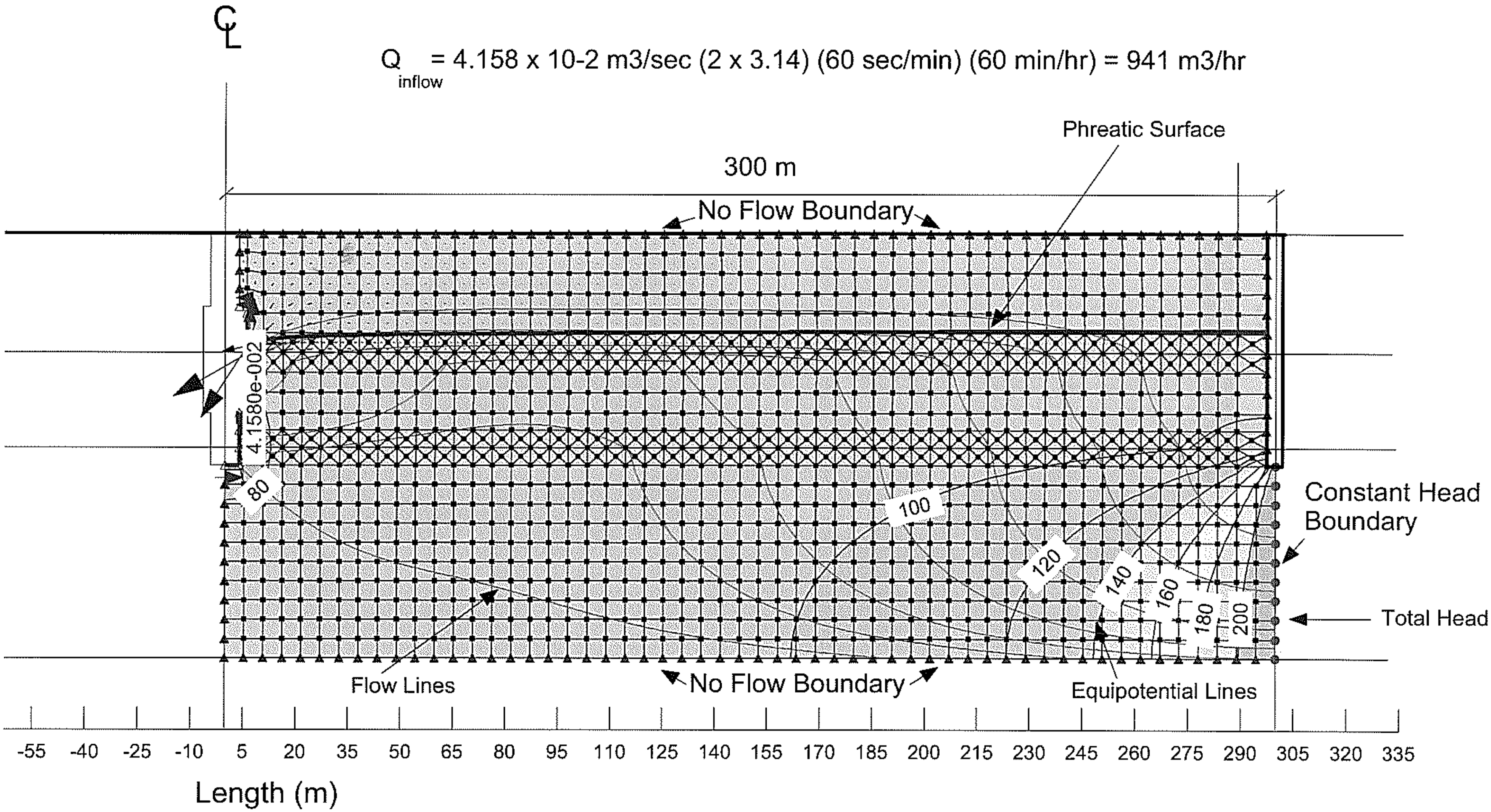


Figure 4 - SEEP/W results for Case 1

APPENDIX

APPENDIX A GENERAL CONDITIONS

ENVIRONMENTAL REPORT – GENERAL CONDITIONS

This report incorporates and is subject to these "General Conditions".

1.0 USE OF REPORT

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of EBA's client. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA's client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 LIMITATIONS OF REPORT

This report is based solely on the conditions which existed on site at the time of EBA's investigation. The client, and any other parties using this report with the express written consent of the client and EBA, acknowledge that conditions affecting the environmental assessment of the site can vary with time and that the conclusions and recommendations set out in this report are time sensitive.

The client, and any other party using this report with the express written consent of the client and EBA, also acknowledge that the conclusions and recommendations set out in this report are based on limited observations and testing on the subject site and that conditions may vary across the site which, in turn, could affect the conclusions and recommendations made.

The client acknowledges that EBA is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the client.

2.1 INFORMATION PROVIDED TO EBA BY OTHERS

During the performance of the work and the preparation of this report, EBA may have relied on information provided by persons other than the client. While EBA endeavours to verify the accuracy of such information when instructed to do so by the client, EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

3.0 LIMITATION OF LIABILITY

The client recognizes that property containing contaminants and hazardous wastes creates a high risk of claims brought by third parties arising out of the presence of those materials. In consideration of these risks, and in consideration of EBA providing the services requested, the client agrees that EBA's liability to the client, with respect to any issues relating to contaminants or other hazardous wastes located on the subject site shall be limited as follows:

1. With respect to any claims brought against EBA by the client arising out of the provision or failure to provide services hereunder shall be limited to the amount of fees paid by the client to EBA under this Agreement, whether the action is based on breach of contract or tort;
2. With respect to claims brought by third parties arising out of the presence of contaminants or hazardous wastes on the subject site, the client agrees to indemnify, defend and hold harmless EBA from and against any and all claim or claims, action or actions, demands, damages, penalties, fines, losses, costs and expenses of every nature and kind whatsoever, including solicitor-client costs, arising or alleged to arise either in whole or part out of services provided by EBA, whether the claim be brought against EBA for breach of contract or tort.

4.0 JOB SITE SAFETY

EBA is only responsible for the activities of its employees on the job site and is not responsible for the supervision of any other persons whatsoever. The presence of EBA personnel on site shall not be construed in any way to relieve the client or any other persons on site from their responsibility for job site safety.

5.0 DISCLOSURE OF INFORMATION BY CLIENT

The client agrees to fully cooperate with EBA with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The client acknowledges that in order for EBA to properly provide the service, EBA is relying upon the full disclosure and accuracy of any such information.

6.0 STANDARD OF CARE

Services performed by EBA for this report have been conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Engineering judgement has been applied in developing the conclusions and/or recommendations provided in this report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of this report.

7.0 EMERGENCY PROCEDURES

The client undertakes to inform EBA of all hazardous conditions, or possible hazardous conditions which are known to it. The client recognizes that the activities of EBA may uncover previously unknown hazardous materials or conditions and that such discovery may result in the necessity to undertake emergency procedures to protect EBA employees, other persons and the environment. These procedures may involve additional costs outside of any budgets previously agreed upon. The client agrees to pay EBA for any expenses incurred as a result of such discoveries and to compensate EBA through payment of additional fees and expenses for time spent by EBA to deal with the consequences of such discoveries.

8.0 NOTIFICATION OF AUTHORITIES

The client acknowledges that in certain instances the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by EBA in its reasonably exercised discretion.

9.0 OWNERSHIP OF INSTRUMENTS OF SERVICE

The client acknowledges that all reports, plans, and data generated by EBA during the performance of the work and other documents prepared by EBA are considered its professional work product and shall remain the copyright property of EBA.

10.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by EBA shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancies, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by EBA shall be deemed to be the overall original for the Project.

The Client agrees that both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. The Client warrants that EBA's instruments of professional service will be used only and exactly as submitted by EBA.

The Client recognizes and agrees that electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.