12 Appendix C – Technical Memoranda

12.5 Seepage Analyses for Upper and Lower Reservoirs

Eagle Mountain Pumped Storage Project – Seepage Analyses for Upper and Lower Reservoirs

Prepared by: Nick Miller and Dick Westmore, GEI Consultants, Inc.

January 5, 2009, revised January 5, 2011

This memorandum summarizes preliminary estimates of seepage from the proposed Upper and Lower Reservoirs for the Eagle Mountain Pumped Storage Project. In addition, this TM provides opinions on the potential effectiveness of using the available fine mine tailings as a seepage control blanket to minimize seepage losses from the Upper and Lower Reservoirs. This treatment measure was proposed in the earlier project concepts developed in the 1990s. We also assessed the potential effectiveness of other seepage control measures at the two reservoirs.

Due to the current access constraints at the site, all geotechnical and geological information used for the seepage estimates was obtained from prior investigations and studies conducted by GeoSyntec Consultants, GSi/Water, and GeoPentech in support of studies for a proposed landfill. The results of those studies represent an initial step in characterizing potential seepage impacts associated with the Eagle Mountain Project. Seepage impacts are of particular concern to the Metropolitan Water District of Southern California (MWD), the State Water Quality Board, and others in the region.

Site Geology

Bedrock geologic units present at the site can be generally classified as either igneous or meta-sedimentary. The igneous units include several varieties of granitic rock including porphyritic quartz monzonite, diorite, monzonite porphyry, and granodiorite. The meta-sedimentary units include quartzites, meta-arkoses, and marbles formed by metamorphosis and/or hydrothermal-alteration or sandstones, conglomerates, arkoses, and carbonate rocks deposited in the Paleozoic or Precambrian age.

Surficial geology of the Eagle Mountain area generally consists of unconsolidated alluvial deposits. The alluvial deposits include sands, silts, gravels, and debris-flow deposits. The most significant alluvial deposits are found on the eastern edge of the site area, where they form a laterally extensive alluvial fan that extends and thickens to the east into the Chuckwalla Valley. Some of these deposits are exposed in the east wall of the east pit and underlie the eastern portion of the Lower Reservoir.

The alluvial deposits within the Chuckwalla Valley extend to significant depths below the ground surface and generally consist of sands, silty sands, sands and gravel, cobbles and boulders. Within the sandy alluvial deposits in the Chuckwalla Valley a predominately clay layer was logged in borings at depths varying from about 600 to 900 feet, and is generally about 100 to 300 feet in thickness.

The entire Central Pit (Upper Reservoir) is incised into bedrock. Alluvial deposits in the area of the Upper Reservoir are smaller in extent and are generally confined to laterally discontinuous, generally thin deposits along the bottoms of the canyons.

Rock containing little to no mineral value (waste rock and tailings) generated by the former Kaiser operations were deposited in numerous areas near the site. These mining by-products include several distinctly different materials, including both bedrock and alluvial overburden, and tailings produced as a result of the mining and separation of iron ore-bearing rock from host rock. The tailings include both fine and coarse varieties.

The hydraulically-placed fine tailings exist in settling ponds to the southeast of the proposed Upper Reservoir. Total volume of these materials is estimated to potentially be over 19 million cubic yards. Laboratory testing indicated that the fine tailings vary in composition, ranging from silty sand and sandy silt to clayey silt to silty clay. In general, soils with higher sand content are located near the slurry discharge point while finer grained soils are present in the distal portions of each pond.

Coarse tailings were placed at several locations around the site, although the largest deposit lies in a stockpile located immediately south of the proposed Lower Reservoir. The total volume of coarse tailings in this stockpile is estimated to be about 50 million cubic yards. The majority of the coarse tailings were classified as clean gravels or sandy gravels containing significant percentages of cobbles and boulders and few fines.

The chemical composition of these materials will be fully investigated during Phase 1 Pre-design investigations. Those studies are described in Section 12.1 of this document.

Upper Reservoir

The Upper Reservoir will occupy the former Central Pit of the Kaiser Mine. The reservoir is elongated generally east-west, with a maximum dimension of about 5,300 feet. North-south dimensions vary between 1,500 and 2,000 feet near the maximum planned reservoir surface (El. 2485). The existing low point in the Upper Reservoir is located in the eastern half of the pit and extends down to El. 2230. Due to topographic conditions, there will be two dams required to create the upper reservoir. The current concept is to construct these dams using roller-compacted concrete (RCC) with aggregate materials being derived from the abundant coarse mine tailings at the site or from other on-site aggregate sources with suitable characteristics for RCC.

Available geologic mapping shows the north side of the pit to be underlain by granitic rock units, while the central and southern portions of the pit are underlain by metasedimentary units and iron ore. Areas of the proposed Upper Reservoir are also covered with coarse tailings. Two borings completed in the bottom of the Upper Reservoir site (MW-10 and CH-10) provide insights on the hydrogeologic character of the rock materials. Rock core was obtained from boring CH-10. The boring was drilled to a total depth of 1,389 feet. Water was first observed at a depth of 1,309 feet. Rock lithology in the upper 350 feet of the boring was found to be moderately fractured, interbedded igneous and metasedimentary rock. Monitoring well MW-10, a 13.5-inch diameter borehole, was drilled to a total depth of 1,480 feet below ground surface. Water was first encountered at a depth of 506 feet; however, the static water level subsequently dropped and later stabilized at a depth of 1,040 feet. Borehole locations and logs are provided in the Appendix of this report.

Lower Reservoir

The Lower Reservoir will be located in the former East Pit of the Kaiser Mine. No dams are required to provide the needed storage at the Lower Reservoir. The pit has a maximum dimension of about 5,400 feet in an east-west direction, and a maximum dimension of about 2,000 feet in a north-south direction when measured at the normal maximum reservoir water surface at El. 1092. The pit narrows to the west to a minimum width of about 300 feet. The pit includes two low points or bowls, one in the east, and one in the western half of the pit. These low points are separated by a bedrock saddle, which is mantled with tailings deposits on the west side. The low point within the east bowl is at El. 776, while the lowest point within the west bowl is at El. 715. The intervening saddle is at about El. 880.

The proposed Lower Reservoir can be divided into two zones on the basis of geology. The eastern one-quarter of the site is excavated in Quaternary alluvial sediments, including fan deposits and debris flow deposits. In the eastern wall of the pit, a vertical section of about 300 feet of alluvial deposits is exposed. The western three-quarters of the site are underlain by granitic rocks and undifferentiated metasedimentary rocks and rocks of the upper quartzite unit. The granitic rocks are located along the northern face of the pit, while the metasedimentary rocks are found along the south pit face and the lower portions of the north face. Quartzite is located in the central portion of the pit and underlies the unconsolidated deposits.

A total of eight borings were used to characterize the geology in the area that would be occupied by the Lower Reservoir and surrounding areas; these include: MW-13, CH-5A, P-1, MW-1, MW-2, P-11, P-12, and C-10. Borings MW-13, CH-5A were completed along the western and northwestern corner of the Lower Reservoir site. These two borings show slightly fractured, interbedded igneous and metasedimentary rock extending to depths below El. 500. The static water level was subsequently measured in boring MW-13 at about 285 feet below the ground surface. The boring for P-1 is located on the bedrock saddle which divides the East Pit into two sections. This boring was drilled to a depth of 270 feet, and also shows interbedded igneous and metasedimentary rock for the entire depth. A static water level was subsequently measured at 177 feet below the ground surface in P-1.

Boreholes MW-1, MW-2, P-11, P-12, and C-10 were located east of the pit, and were projected onto the geologic section prepared for our analysis. The logs of these boreholes were reviewed to estimate the extent of alluvial deposits found on the eastern edge of the site. Generally, the alluvial deposits form a laterally extensive alluvial fan that extends and thickens to the east into the Chuckwalla Valley. These five borings encountered predominately fine to coarse sand, with gravel and cobbles in several locations. The borings also indicate a relatively thin, predominately clay layer interbedded within the primarily sandy alluvial deposits. The clay layer ranges in elevations from about 600 to 900 feet, and is generally about 100 to 300 feet thick. The groundwater in the bedrock and alluvium generally drops from west to east and from north to south. The groundwater was estimated to be approximately 240 feet below the ground surface at the point where boring P-12 is projected onto the geologic section. Borehole locations and logs are provided in the Appendix.

Seepage Analyses

The expected quantity of seepage through the Upper and Lower Reservoirs was evaluated by performing seepage analyses. The seepage analyses were performed using the two-dimensional, finite element program GeoStudio 2007, specifically the SEEP/W module.

The majority of the seepage from the proposed reservoirs is anticipated to travel from west to east towards the Chuckwalla Valley, similar to the existing ground water conditions at the site. Based on these ground water levels and the geologic conditions, the hydraulic gradient produced by the proposed reservoirs will be greater in the west-east direction than the hydraulic gradient in the north-south direction; therefore, all seepage flow rates and annual seepage volumes were estimated using west-east profiles. However, there is potential for seepage from the proposed reservoirs to travel from north to south. For this reason, north-south seepage profiles were also developed for both reservoirs only for estimating the ground water levels at specific down-gradient facilities of concern. We performed the analyses for the reservoirs using cross sections prepared for the locations shown in plan view on Figure 1. The representative cross sections used for the Upper Reservoir and Lower Reservoir seepage analyses are shown on Figures 2 through 5.

Hydraulic Conductivity

The estimates of hydraulic conductivity for the various geologic materials present at the site were developed based on the available results of field permeability tests, laboratory permeability tests, correlations with published values based on material descriptions and gradations, and empirical correlations between grain size and permeability. The hydraulic conductivity values used in the seepage analyses are presented in Table 1.

Table 1. Summary of Material Hydraulic Conductivities

Material	Hydraulic Conductivity (centimeters/sec)	Hydraulic Conductivity (feet/sec)	Conductivity Ratio
Rock – Upper Reservoir (moderately fractured)	1.00E-04	3.28E-06	1.00
Rock – Lower Reservoir (slightly fractured)	1.00E-05	3.28E-07	1.00
Sand	5.00E-03	1.64E-04	0.25
Clay (sandy)	1.00E-05	3.28E-07	1.00
Liner - (fine tailings)	2.16E-06	7.09E-08	1.00

The value for hydraulic conductivity of the rock in the Lower Reservoir was based on packer pressure testing conducted in 5 boreholes (borings 2, 3, 5A, 11 and 12). None of these boreholes were located within the Lower Reservoir, but are considered to be representative of the rock unit surrounding and within the reservoir. The calculated hydraulic conductivities ranged from 1 x 10-6 cm/s (centimeters/second) to 1 x 10-4 cm/s, with a geometric mean of 1 x 10-5 cm/s. The geometric mean was selected to represent the rock at the Lower Reservoir. Based on boreholes CH-10 (located in Upper Reservoir) and CH-5A (located on rim of Lower Reservoir), the rock at higher elevations is considered to be more fractured, which typically increases the hydraulic conductivity. Because the rock at the Upper Reservoir is considered to be more fractured than the rock in the Lower Reservoir, the hydraulic conductivity was increased by an order of magnitude to account for increased fracturing.

The alluvial deposits will have the highest conductivity and are represented by the sand category in Table 1. The hydraulic conductivity used for the sand category was based on the average of 17 empirical correlations between grain size and permeability. The range of hydraulic conductivities for the sand category was between 1 X 10-2 cm/s to 1 X 10-5 cm/sec, with an average of 5.0 X 10-3 cm/s.

The hydraulic conductivity used for the clay layer was based on an average of two laboratory permeability tests, which gave a value of 1.0 X 10-5 cm/s. Estimates of hydraulic conductivities for the fine tailings liner were based on an average of field and laboratory permeability tests. The results of field permeability tests on the fine tailings ranged from 9.2 X 10-9 to 4.3 X 10-7cm/s; laboratory permeability test yielded results between 5.8 X 10-9 to 8.2 X 10-6 cm/s. The average hydraulic conductivity from these field and laboratory tests was 2.16 X 10-6 cm/s. This averaged hydraulic conductivity value was adjusted proportionally to evaluate varying thicknesses of the liner. Calculations for the hydraulic conductivity used for the various materials are presented in the Appendix.

West-East Profile Analysis Results

Seepage flow rates and gradients were estimated for both the Upper and Lower Reservoirs of the Eagle Mountain Pumped Storage Project at both the minimum and maximum water surface elevations. Seepage flow rates were also estimated using liner thicknesses of 3, 5, and 8 feet for both reservoirs, at minimum and maximum water storage elevations. The seepage blankets would only be placed on the reservoir floors and on zones of the reservoir basin slopes where ground slopes are flat enough to support stable fill placement under rapid draw-down reservoir conditions. For the initial analyses, only seepage blankets were considered. Other treatment measures to reduce reservoir seepage are described later in this memorandum.

The seepage flow rates were determined based on a unit width of the geologic section. To estimate the total seepage rate for the entire reservoir, the unit width seepage rate was multiplied by the average top width for that water surface elevation. The minimum and maximum average top widths for the two reservoirs are shown in Table 2.

Table 2. Reservoir Water Surface Elevation Average Top Widths

Reservoir	Minimum Water Surface Elevation Average Top Width (feet)	Maximum Water Surface Elevation Average Top Width (feet)	Average Top Width Used for Average Annual Seepage Calculations (feet)
Central Pit Upper Reservoir	595	1485	1040
East Pit Lower Reservoir	680	1100	890

The estimated unit width seepage quantities and average annual seepage volumes for the Upper Reservoir are presented in Table 3. Seepage quantities and volumes for the Upper Reservoir with various liner options are also shown in Table 3. The resultant groundwater levels from seepage of the Upper Reservoir at maximum water surface elevation are shown on Figure 6.

Table 3. Upper Reservoir Seepage Analysis Results – Seepage Blanket Only

	Parameter	Max.	Min.	Average
NO LINER	Unit Width Seepage Rate (cfs)	0.00195	0.00124	0.00160
	Annual Seepage (ac-ft/yr)	2097	535	**1202**

3' THICK LINER	Unit Width Seepage Rate (cfs)	0.00178	0.00106	0.00142
	Annual Seepage (ac-ft/yr)	1913	456	**1068**
5' THICK LINER	Unit Width Seepage Rate (cfs)	0.00174	0.00091	0.00133
	Annual Seepage (ac-ft/yr)	1874	394	**1000**
8' THICK LINER	Unit Width Seepage Rate (cfs)	0.00170	0.00070	0.00120
	Annual Seepage (ac-ft/yr)	1823	303	**903**

cfs – cubic feet per second ac-ft/yr – acre-feet per year
Max. – Maximum Min. – Minimum

The estimated unit width seepage quantities and average annual seepage volumes for the Lower Reservoir are presented in Table 4. Seepage quantities and volumes for the Lower Reservoir with various liner options are also shown in Table 4. The resultant groundwater levels from seepage of the Lower Reservoir at maximum water surface elevation are shown on Figure 7. The remaining computer outputs of the analyses are included in the Appendix.

Table 4. Lower Reservoir Seepage Analysis Results – Seepage Blanket Only

	Parameter	Max.	Min.	Average
NO LINER	Unit Width Seepage Rate (cfs)	0.00356	0.00181	0.00269
	Annual Seepage (ac-ft/yr)	2836	891	**1731**
3' THICK LINER	Unit Width Seepage Rate (cfs)	0.00348	0.00177	0.00262
	Annual Seepage (ac-ft/yr)	2768	871	**1690**
5' THICK LINER	Unit Width Seepage Rate (cfs)	0.00347	0.00175	0.00261
	Annual Seepage (ac-ft/yr)	2765	863	**1683**
8' THICK LINER	Unit Width Seepage Rate (cfs)	0.00347	0.00175	0.00261
	Annual Seepage (ac-ft/yr)	2764	860	**1681**

cfs – cubic feet per second ac-ft/yr – acre-feet per year
Max. – Maximum Min. – Minimum

Based on the seepage analyses of the Eagle Mountain Pumped Storage Project and assuming no reservoir seepage treatments, the estimated annual average seepage volume from the Upper Reservoir is approximately 1,200 acre-feet, and the estimated annual average seepage volume from the Lower Reservoir is approximately 1,700 acre-feet. The estimated annual seepage volume for the Lower Reservoir is about 500 acre-feet more than the Upper Reservoir because the eastern wall of the Lower Reservoir primarily consists of alluvial sediments and debris flow deposits, which have significantly higher hydraulic conductivities.

Based on the seepage analysis, the fine tailings blanket liner options for the Upper Reservoir reduce the average annual seepage volume. The estimated reduction in average annual seepage volume for the Upper Reservoir ranged from about 11 to 25 percent, depending on the liner thickness. The maximum reduction for the Upper Reservoir was approximately 300 acre-feet annually, with an eight-foot thick liner in place.

The fine tailings blanket liner in the Lower Reservoir was estimated to be relatively ineffective. This is because the upper half of the walls in the pit, which consist of the alluvium deposit, are

too steep to support the fine tailings liner. And, since the majority of seepage from the Lower Reservoir will be through this alluvium deposit, the analyses indicated little change due to the various liner options. The estimated reduction in average annual seepage volume for the Lower Reservoir was about 2.5 percent, regardless of the liner thickness. The maximum reduction for the Lower Reservoir was approximately 50 acre-feet annually, with an eight-foot thick liner constructed where possible. Based on this analysis, additional seepage reduction measures beyond a fine tailings blanket liner will be required for the Lower Reservoir.

North-South Profile Analysis Results

Seepage and ground water elevations along a north-south profile toward the CRA were estimated for both the Upper and Lower Reservoirs of the Eagle Mountain Pumped Storage Project at both the minimum and maximum water surface elevations. The seepage analysis from the proposed Upper Reservoir at maximum water surface elevation is shown on Figure 8. Generally, the maximum water surface elevation in the Upper Reservoir is projected to cause the ground water levels near the location of the CRA to rise approximately 45 feet above the estimated existing ground water levels. Results of the seepage analysis from the proposed Lower Reservoir at maximum water surface elevation are shown on Figure 9. Generally, the maximum water surface elevation in the Lower Reservoir is projected to cause the ground water levels near the location of the CRA to rise approximately 150 feet above the estimated existing ground water levels. The remaining computer outputs of the analyses are included in the Appendix.

Potential Impacts from Reservoir Seepage

Concerns have been raised about the potential impacts of seepage from the reservoirs on the concrete lining of the Colorado River Aqueduct (CRA), which is owned and operated by MWD. The potential impacts to the CRA from reservoir seepage were analyzed using both west-east and north-south profiles for each of the project reservoirs. The impacts of seepage were expected to be the most noticeable in the west-east profiles due to the close proximity of the Lower Reservoir to the CRA; however, the impacts along the north-south profiles were also investigated to fully assess the seepage concerns.

Based on the west-east seepage analysis for the Lower Reservoir, assuming no seepage treatments and continuous seepage at the maximum reservoir water surface elevation, the estimated groundwater elevation near the location of the CRA is estimated to stabilize at approximately El. 915, as shown on Figure 7. The current static groundwater elevation at this location is about at El. 675, which is about 240 feet lower than the modeled ground water surface elevation with fully-developed reservoir seepage. The ground surface elevation near the CRA is approximately El. 1000, which is about 85 feet higher than the groundwater elevation predicted under worse-case conditions for seepage from the Lower Reservoir. Because the estimated ground water elevation is predicted to be well below the ground surface, no uplift forces are predicted on the concrete lining of the CRA.
Based on the north-south seepage analysis of seepage from the Upper and Lower Reservoirs, the Lower Reservoir produced the greatest increases from the estimated ground water elevations; therefore, the Lower Reservoir seepage results were used to analyze the impacts to the CRA facilities. The CRA facilities that could potentially be impacted by reservoir seepage along the north-south profiles include the CRA Pump Station and CRA channel near the pump station, as shown on Figure 1. Based on the north-south seepage analysis from the Lower Reservoir, and assuming no seepage treatments and continuous seepage at the maximum reservoir water surface elevation, the estimated ground water elevation near the location of the CRA is estimated to reach approximately El. 745 feet, as

shown on Figure 9. The current static ground water elevation at this location is assumed to be about at El. 580 feet. However, this elevation may be conservatively high, because ground water wells and elevation data are not available at this location, but data was extrapolated to develop a conservative estimate. Therefore, the existing ground water elevation is estimated to be about 165 feet lower than the modeled ground water surface elevation with fully developed reservoir seepage. The ground surface elevation near the CRA is approximately El. 985 feet, which is estimated to be about 240 feet higher than the ground water elevation predicted under worse-case conditions for seepage from the Lower Reservoir. Because the estimated ground water elevation is predicted to be well below the ground surface, no uplift forces are predicted on the concrete lining of the CRA or at the pump station.

In addition, we estimate that the steady-state groundwater profile for the Lower Reservoir shown on Figure 7 will take at least 15 years to fully develop from the estimated seepage volume, assuming a two year filling period and the reservoir remains at the maximum water surface elevation after filling. We also estimate that the steady-state groundwater profiles for the Upper Reservoir shown on Figures 6 and 8 will take at least 50 years to fully develop, assuming a two year filling period and the reservoir remains at the maximum water surface elevation after filling. Furthermore, it is estimated to take at least 30 years for groundwater levels near the Upper Reservoir to reach and daylight at the nearest surface drainage channel. If the groundwater levels do daylight in the adjacent surface drainage channels, any seepage will be collected and conveyed to the Lower Reservoir. However, the reservoirs can never be completely full at the same time, and reservoir levels will cycle up and down in response to energy demands and hydroelectric operations. Realistically, we expect that the estimated steady-state groundwater levels from seepage from the Eagle Mountain Project may not fully develop during the estimated project service life of 50 years.

Hydrocompaction has also been identified as a potential impact that could be associated with seepage from reservoirs of the Eagle Mountain Project. The potential for hydrocompaction in soils is related to the grain size of the sediments and how they were deposited. Fan deposits, such as those present near the project site, when deposited by flash-flood type of events, are highly susceptible to compaction when wetted either from above or below. Under worse-case conditions, our analyses indicate that groundwater levels will be about 80 feet below ground surface and will not reach the near-surface zones where hydrocompaction would be the most problematic.

Studies conducted for MWD in the Chuckwalla Aquifer (Upper Chuckwalla Groundwater Basin StorageGeoPentech 2003) addressed hydrocompaction. The studies suggested that to depths of 100 feet, hydrocompaction could range from 0.56 to 1.8 percent, depending on soil composition. As such, surface subsidence may total from 0.5 to 1.8 feet. Therefore, additional reduction of seepage is needed and seepage recovery wells are needed to reduce hydrocompaction to negligible levels.

Other Seepage Treatment and Monitoring Measures

The Project plans to limit seepage from the project reservoirs to the maximum extent possible. This includes the Upper Reservoir, Lower Reservoir, and the brine disposal ponds[1] that will be part of the water quality management system for the project, which is described in the draft License Application. A more-detailed hydrogeologic analysis will be prepared during final design of the project. We will also undertake detailed geologic mapping of the reservoirs during project design. Upon completion of the hydrogeologic analysis and detailed geologic

1 The brine ponds will be lined with clay or geomembrane materials, and to the extent that can be realistically achieved, they will be “zero seepage” facilities.

mapping, engineering design solutions will be provided to reduce seepage from the project reservoirs in order to reduce the potential for hydrocompaction and impacts to groundwater levels and water quality.

Seepage control from the project reservoirs will be accomplished using systematic procedures and steps that have been applied successfully at similar projects. These procedures will include the following:

- After access to the site is obtained, a team of geologists and geotechnical engineers will conduct a detailed reconnaissance of the reservoir basins and pond areas to identify zones where leakage and seepage would be expected to occur. These areas will include faults, fissures and cracks in the bedrock, and zones that have direct connection to the alluvial deposits of the Chuckwalla Valley. During the reconnaissance, the team will evaluate the effectiveness of various methods for seepage and leakage control to mitigate the effects of these particular features.

- Seepage and leakage control methods will be further investigated utilizing data from the geologic reconnaissance and hydrogeologic modeling studies. Potential methods for seepage and leakage control will include curtain grouting of the foundation beneath the dam footprint and around the reservoir rim, as needed; backfill concrete placement and/or slush grouting of the faults, fissures and cracks recognized in the field reconnaissance; placement of low permeability materials, as technically feasible, over zones too large to be grouted and over areas of alluvium within the Lower Reservoir; seepage and leakage collection systems positioned based on the results of the hydrogeologic analyses; and clay or membrane lining of the brine ponds associated with the project's water quality management system. The collection systems would recycle water into the project reservoirs or the RO (reverse osmosis) system.

- Design and construction of the seepage and leakage control measures, which will be aided by the results of the groundwater modeling.

- Design and construction of a comprehensive monitoring program, consisting of observation wells and piezometers that will be used to assess the effectiveness of the seepage and leakage control measures.

- Based on monitoring results, additional actions may be taken to further control leakage and seepage from the reservoirs and ponds. Such measures may include curtain grouting and the expansion of seepage and leakage collection systems.

We modified the seepage model described above to reflect implementation of the above noted measures, in addition to the use of seepage blankets on the bottom and flatter-sloped areas of the two reservoirs. We assumed that the following measures would provide the indicated levels of seepage reduction:

- Grouting measures in fractured bedrock zones are expected to reduce the effective seepage area by 30% in the Upper Reservoir and 20 % in the Lower Reservoir. Grouting in the Lower Reservoir was not assumed to be possible or effective in the exposed alluvium on the eastern end of the reservoir. The

percentage reduction due to grouting of fractured bedrock zones was estimated based on rock quality index (RQI) test results from the earlier subsurface exploration programs. The RQI for the top 100 feet of the boreholes was averaged for each reservoir. The percentage reduction was estimated assuming 100-RQI_{avg} divided by two.

- The exposed alluvium in the eastern portion of the Lower Reservoir extends over a total perimeter distance of approximately 5,000 feet with the maximum depth of approximately 315 feet below the normal water surface elevation. The average slope of the pit walls in this zone is about 3 to 1 (horizontal: vertical), although the upper half of the pit has steep slopes near 1.5 to 1 in inclination. A possible treatment option, which will be investigated during final design for feasibility and effectiveness, would be to blanket the entire zone with a stepped RCC or soil cement overlay. This would reduce the effective seepage area by at least 80%. However, this approach could be very expensive. Therefore, other treatment options will be explored during final design.

Results of these analyses are presented below:

Table 5. Upper Reservoir Seepage Analysis Results – Grouting and Seepage Blanket

	Parameter	Max.	Min.	Average
3' THICK LINER	Unit Width Seepage Rate (cfs)	0.00126	0.00078	0.00102
	Annual Seepage (ac-ft/yr)	1351	338	**768**
5' THICK LINER	Unit Width Seepage Rate (cfs)	0.00124	0.00072	0.00098
	Annual Seepage (ac-ft/yr)	1332	310	**738**
8' THICK LINER	Unit Width Seepage Rate (cfs)	0.00122	0.00061	0.00092
	Annual Seepage (ac-ft/yr)	1308	265	**689**

cfs – cubic feet per second ac-ft/yr – acre-feet per year
Max. – Maximum Min. – Minimum

Table 6. Lower Reservoir Seepage Analysis Results – Grouting, Seepage Blanket and RCC or Soil Cement Treatment over the Alluvium

	Parameter	Max.	Min.	Average
3' THICK LINER	Unit Width Seepage Rate (cfs)	0.00206	0.00135	0.00171
	Annual Seepage (ac-ft/yr)	1641	665	**1099**
5' THICK LINER	Unit Width Seepage Rate (cfs)	0.00170	0.00106	0.00138
	Annual Seepage (ac-ft/yr)	1358	521	**890**
8' THICK LINER	Unit Width Seepage Rate (cfs)	0.00131	0.00090	0.00111
	Annual Seepage (ac-ft/yr)	1045	443	**713**

cfs – cubic feet per second ac-ft/yr – acre-feet per year
Max. – Maximum Min. – Minimum

Based on the seepage analysis of the Upper Reservoir, the grouting of rock fractures could potentially reduce seepage from the reservoir an additional 200 to 300 acre-feet depending on the fine tailings blanket liner thickness. The estimated total reduction in average annual seepage volume from the Upper Reservoir, using both grouting and blanket liner, ranged from about 36 to 41 percent, depending on the liner thickness. The maximum reduction for the Upper Reservoir was approximately 500 acre-feet annually, with an eight-foot thick liner plus grouting in place. The estimated groundwater levels resulting from seepage from the Upper Reservoir utilizing the additional seepage control measures are a minimum of approximately 125 feet lower than the estimated ground surface and are shown on Figure 10 at the average reservoir water surface elevation.

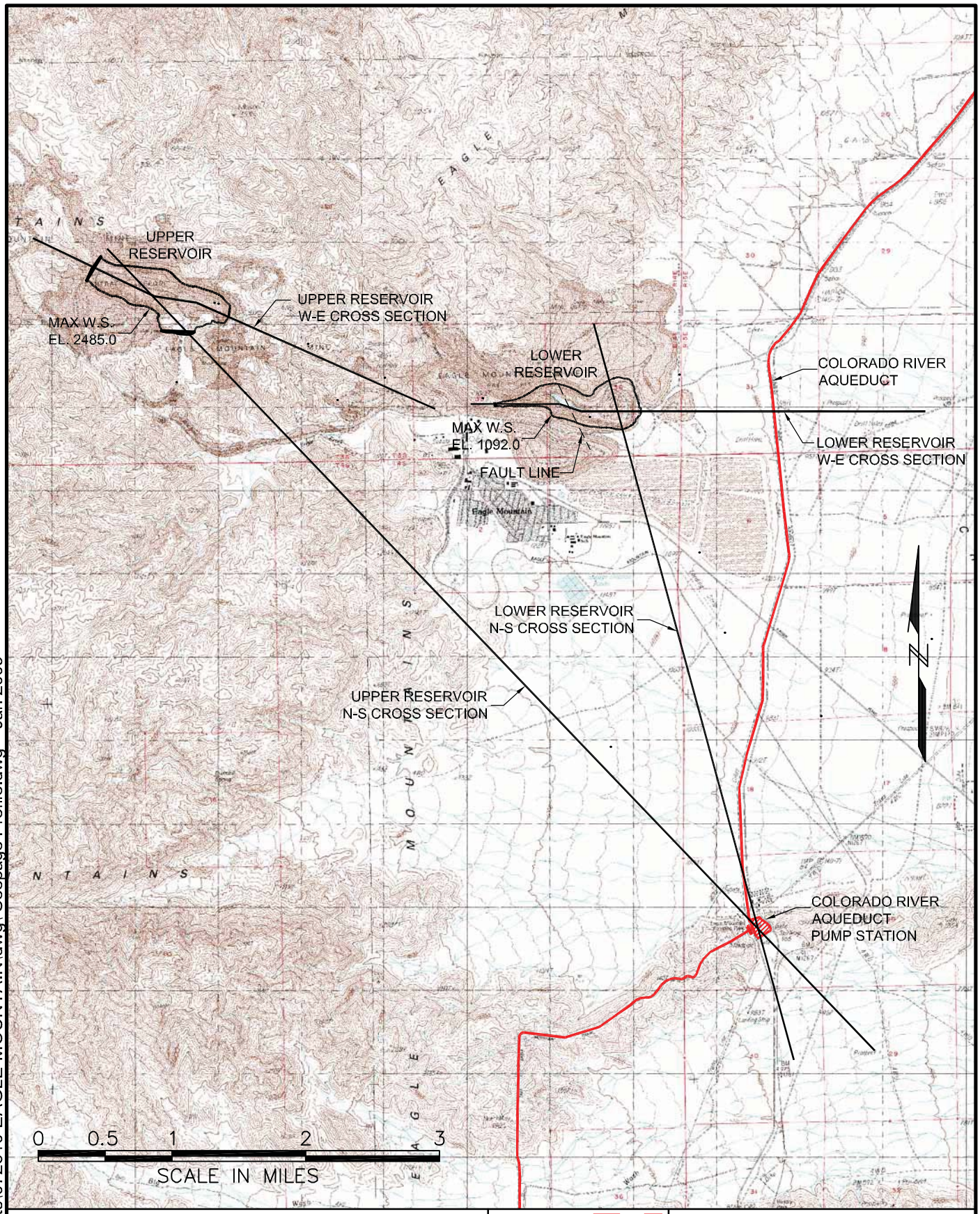
Based on the seepage analysis of the Lower Reservoir, the grouting of rock fractures and RCC or soil cement treatment on the alluvium could potentially reduce seepage from the reservoir an additional 600 to1,000 acre-feet depending on the fine tailings blanket liner thickness. The estimated total reduction in average annual seepage volume from the Lower Reservoir using a blanket liner, grouting rock fractures and treatment of alluvium, ranged from about 37 to 59 percent, depending on the liner thickness. The maximum reduction for the Lower Reservoir was approximately 1,000 acre-feet annually. The estimated groundwater levels resulting from seepage from the Lower Reservoir utilizing the additional seepage control measures are a minimum of approximately 265 feet lower than the estimated ground surface and are shown on Figure 11 at the average reservoir water surface elevation.

We anticipate that any water that may escape the engineered seepage and leakage solutions will be captured by groundwater wells that will be operated to mitigate above-normal hydrostatic pressures on the CRA. The groundwater level control wells will be operated to maintain the groundwater levels within $\pm$5 feet of the historic levels in areas where hydrocompaction could potentially occur and adversely impact the CRA or other infrastructure. The combined pumping from the wells will be about 100 gpm from each of the proposed extraction wells for a total of 900 gpm. These wells will return the intercepted water to the Lower Reservoir. The wells, if found to be needed, will be located based on the results of detailed hydrogeologic modeling studies. Groundwater level and quality monitoring will be performed at monitoring wells and the project's extraction and water supply wells. Groundwater level and water quality sampling will be performed at:

- One up-gradient and 3 to 5 down-gradient wells around each reservoir and the brine disposal pond to detect seepage.
- Nine monitoring wells in the valley sediments to assess changes related to seepage or from project pumping.
- Two residential/municipal wells nearest the project to ensure safe drinking water.
- Extraction wells
- Groundwater levels will initially be monitored on a monthly basis, which may later be extended to quarterly or annual monitoring. Water quality sampling and testing will be performed initially on a quarterly basis.

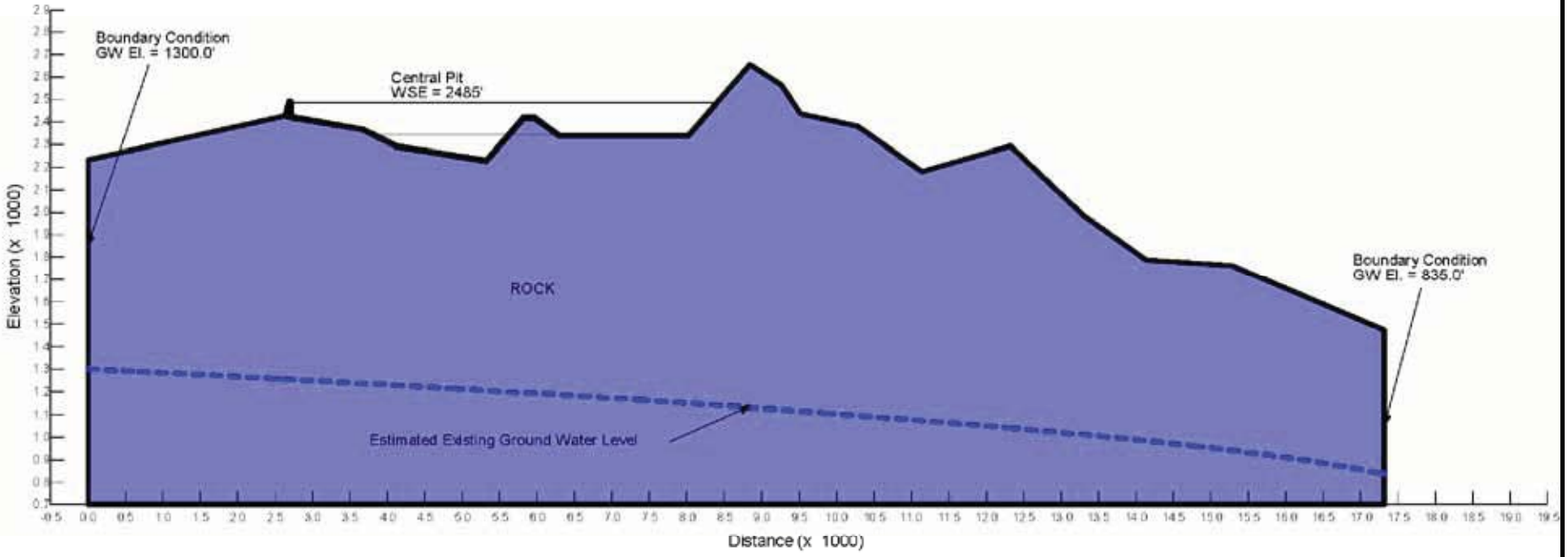
Based on implementation of the above-noted measures, we believe that our engineering design would mitigate any potential impacts to the CRA. The proposed measures to minimize and collect seepage will help insure that seepage emanating from the reservoirs is returned to the reservoirs prior to reaching the CRA.

Source: GeoPentech, 2003. Upper Chuckwalla Groundwater Basin Storage, Draft Report. Produced for Metropolitan Water District.



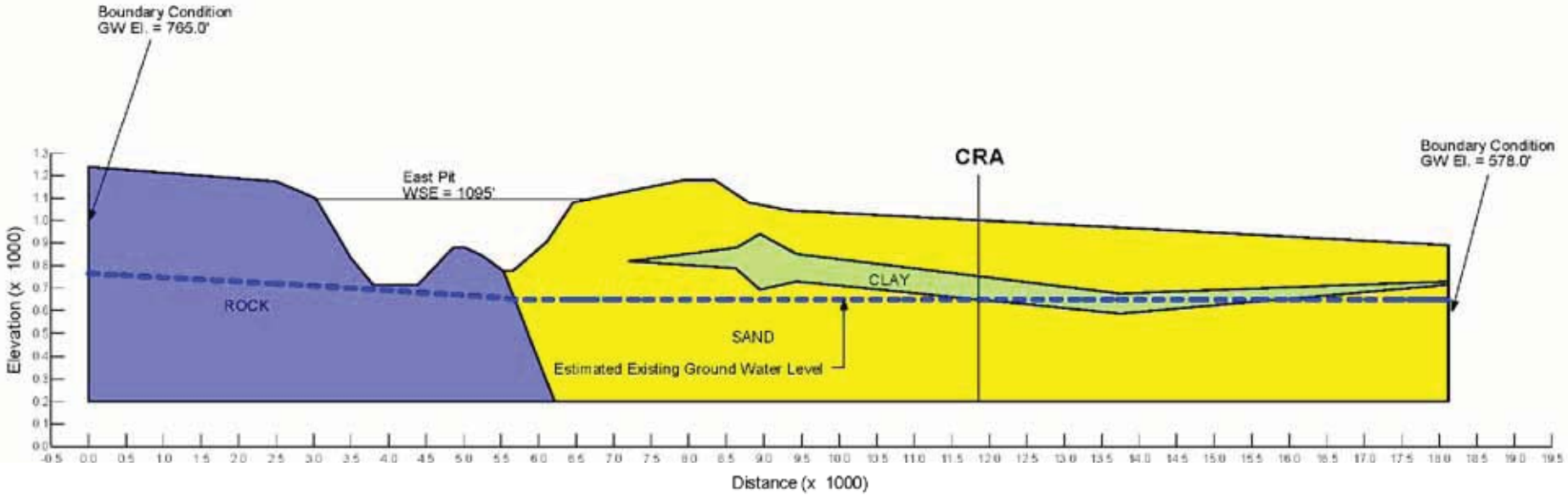
P:\Land Projects\072610 EAGLE MOUNTAIN\dwg\ Seepage Profile.dwg Jan 2009

Eagle Mountain Pumped Storage Project Eagle Mountain, California	GEI Consultants	PLAN VIEW OF RESERVOIR GEOLOGIC CROSS SECTIONS
Eagle Crest Energy	Project 080472	December 2008 Figure 1



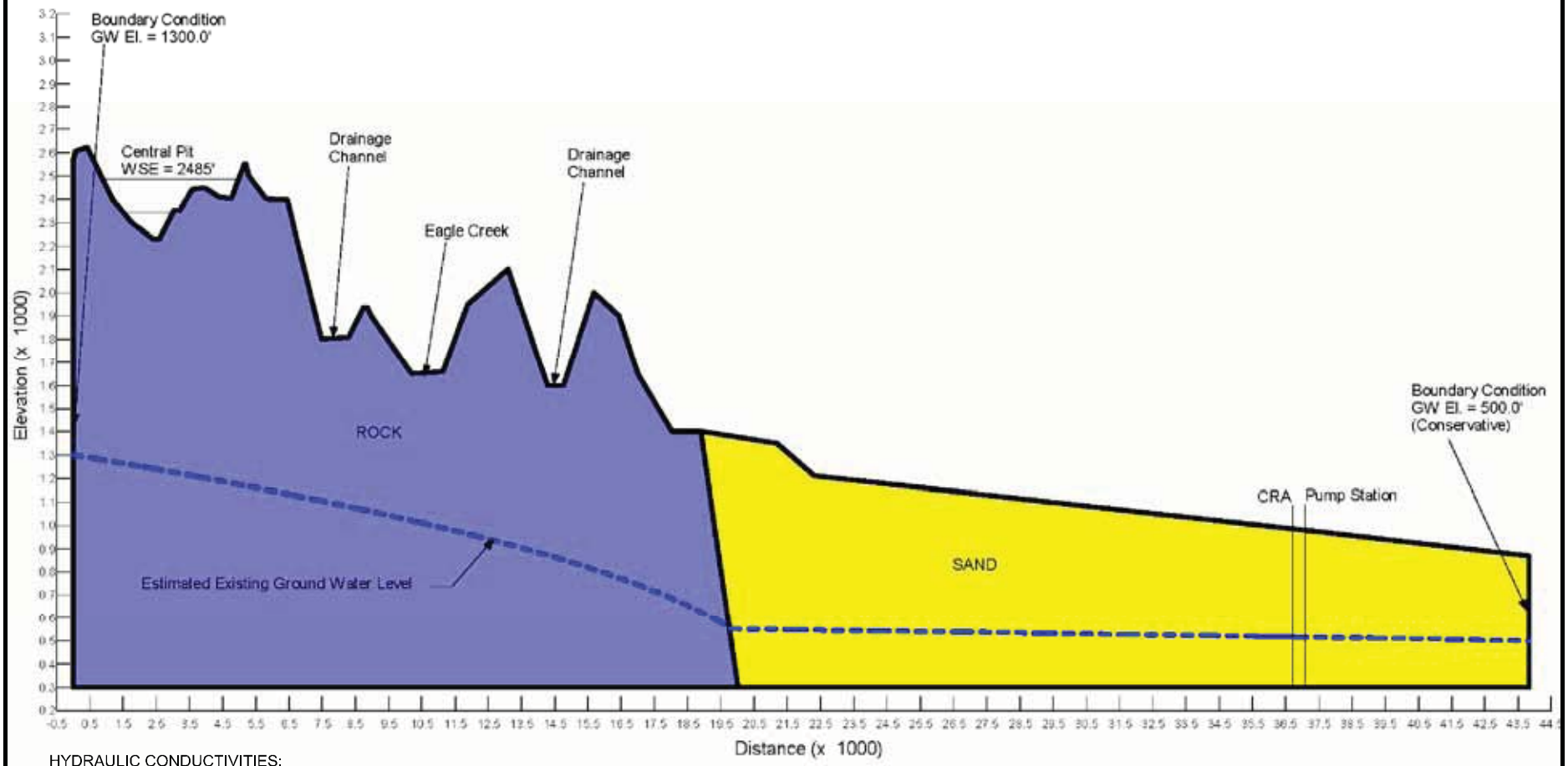
HYDRAULIC CONDUCTIVITIES:
ROCK = 1.0e-04 cm/s
LINER = 2.2e-06 cm/s

Eagle Mountain Pumped Storage Project Eagle Mountain, California	GEI Consultants	UPPER RESERVOIR WEST-EAST GEOLOGIC CROSS SECTION
Eagle Crest Energy	Project 080472	December 2008 Figure 2



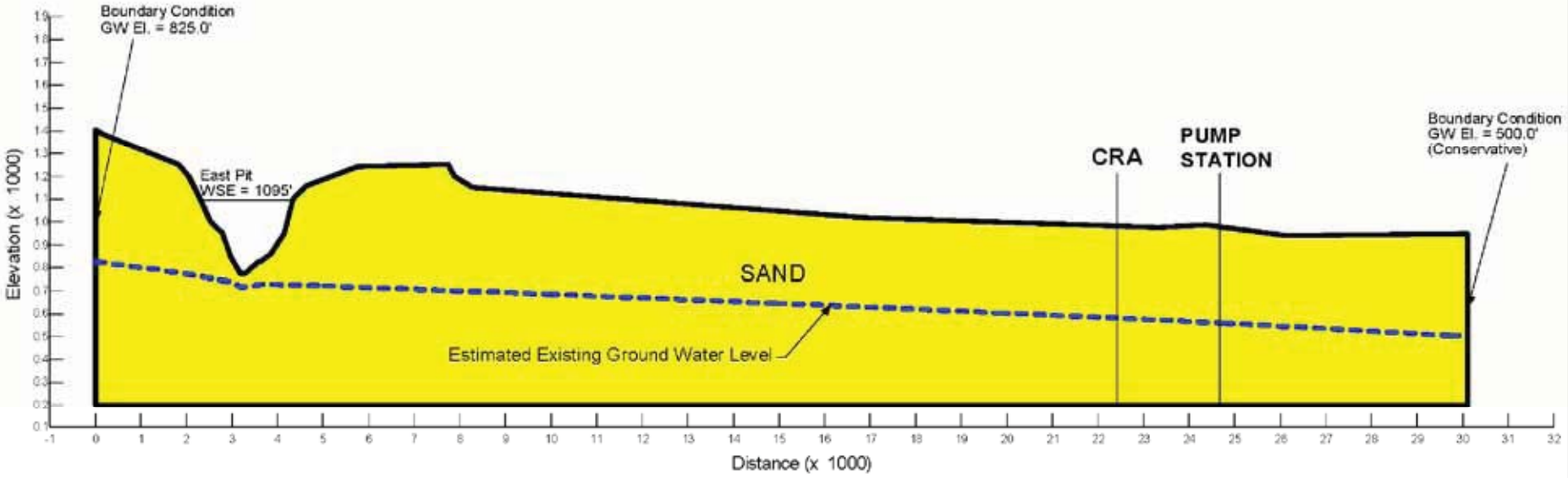
HYDRAULIC CONDUCTIVITIES:
ROCK = 1.0e-05 cm/s
SAND = 5.0e-03 cm/s
CLAY = 1.0e-05 cm/s
LINER = 2.2e-06 cm/s

Eagle Mountain Pumped Storage Project Eagle Mountain, California	GEI Consultants	LOWER RESERVOIR WEST-EAST GEOLOGIC CROSS SECTION
Eagle Crest Energy	Project 080472	December 2008 Figure 3



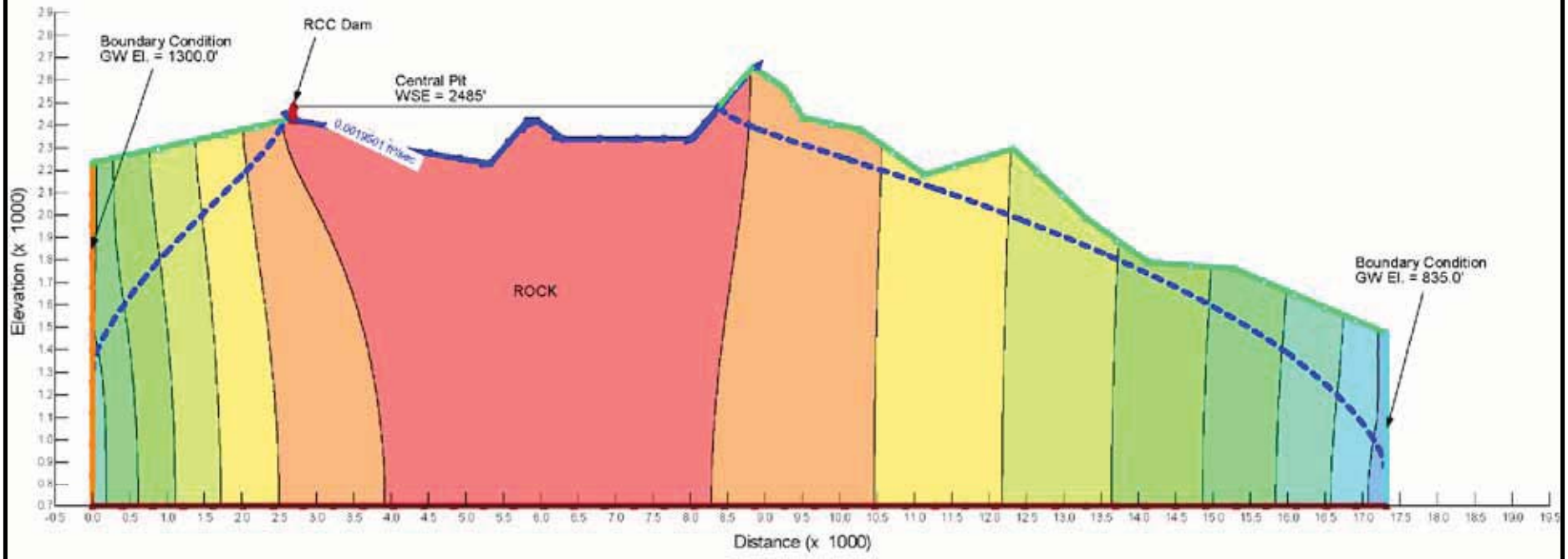
HYDRAULIC CONDUCTIVITIES:
ROCK = 1.0e-05 cm/s
SAND = 5.0e-03 cm/s

Eagle Mountain Pumped Storage Project Eagle Mountain, California	GEI Consultants	UPPER RESERVOIR NORTH-SOUTH GEOLOGIC CROSS SECTION
Eagle Crest Energy	Project 080472	December 2008 Figure 4



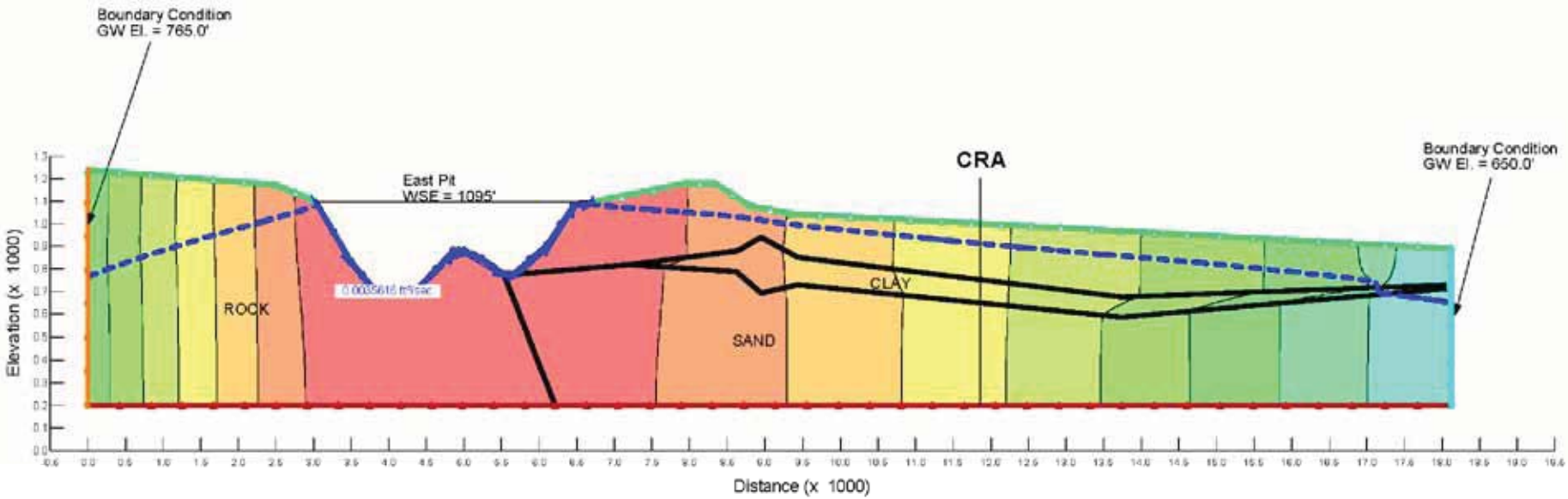
HYDRAULIC CONDUCTIVITIES:
SAND = 5.0e-03 cm/s

Eagle Mountain Pumped Storage Project Eagle Mountain, California	GEI Consultants	LOWER RESERVOIR NORTH-SOUTH GEOLOGIC CROSS SECTION
Eagle Crest Energy	Project 080472	December 2008 Figure 5



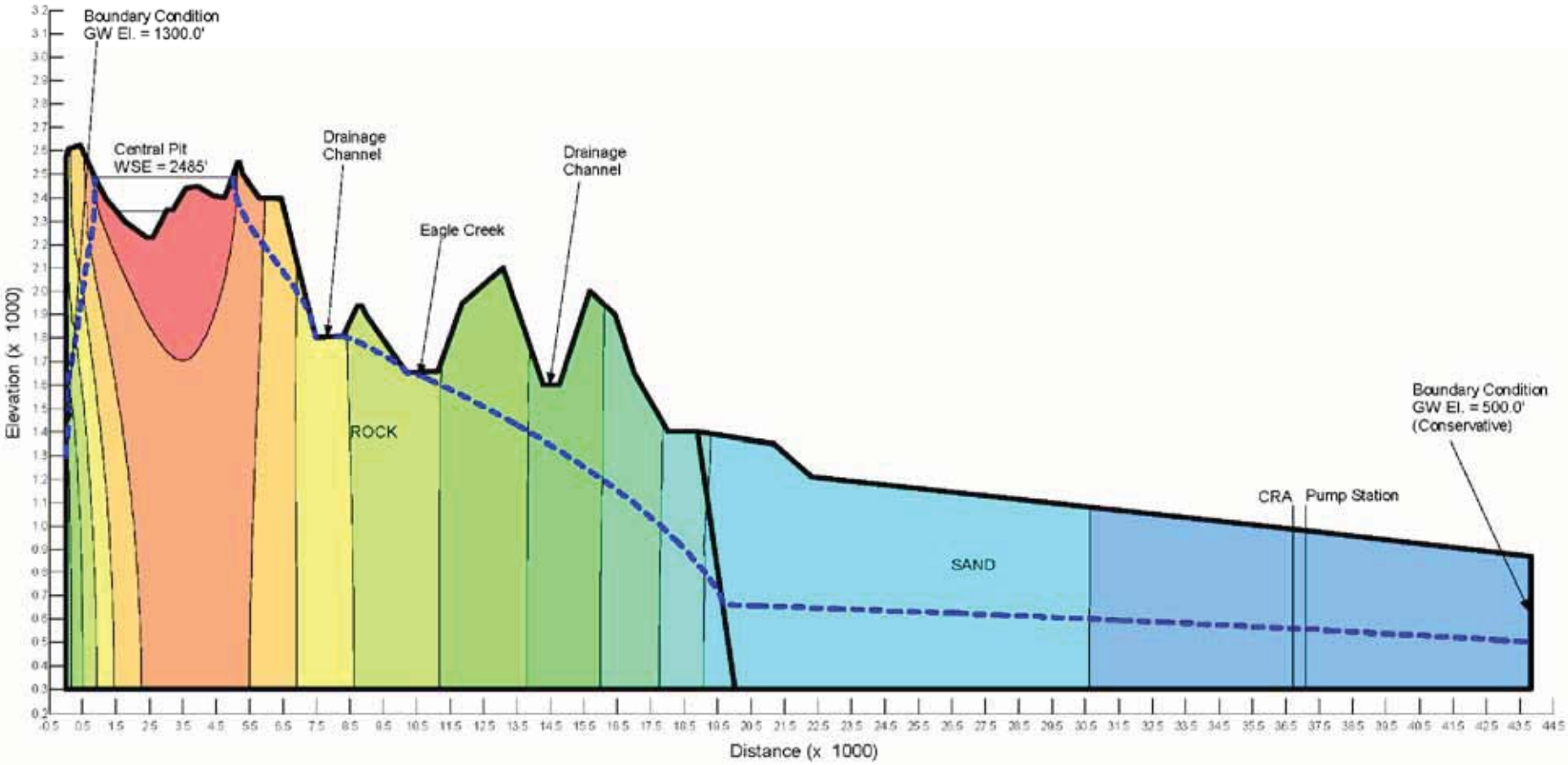
Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.

Eagle Mountain Pumped Storage Project Eagle Mountain, California	GEI Consultants	UPPER RESERVOIR MAXIMUM WATER SURFACE WEST-EAST SEEPAGE RESULTS
Eagle Crest Energy	Project 080472	December 2008 Figure 6



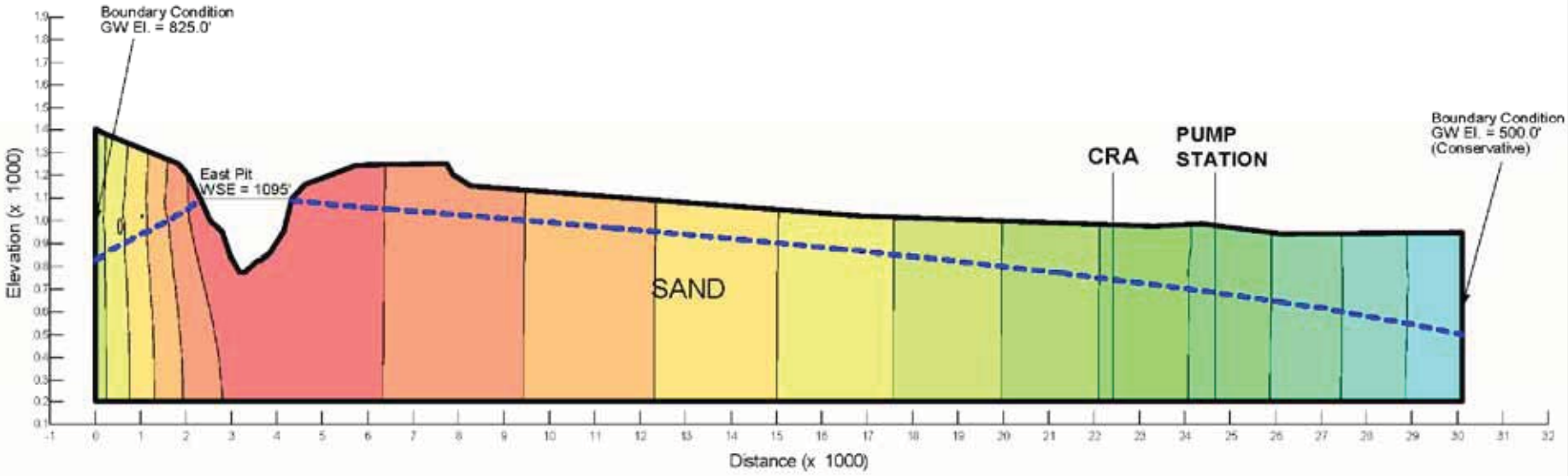
Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.

Eagle Mountain Pumped Storage Project Eagle Mountain, California	GEI Consultants	LOWER RESERVOIR MAXIMUM WATER SURFACE WEST-EAST SEEPAGE RESULTS
Eagle Crest Energy	Project 080472	December 2008 Figure 7



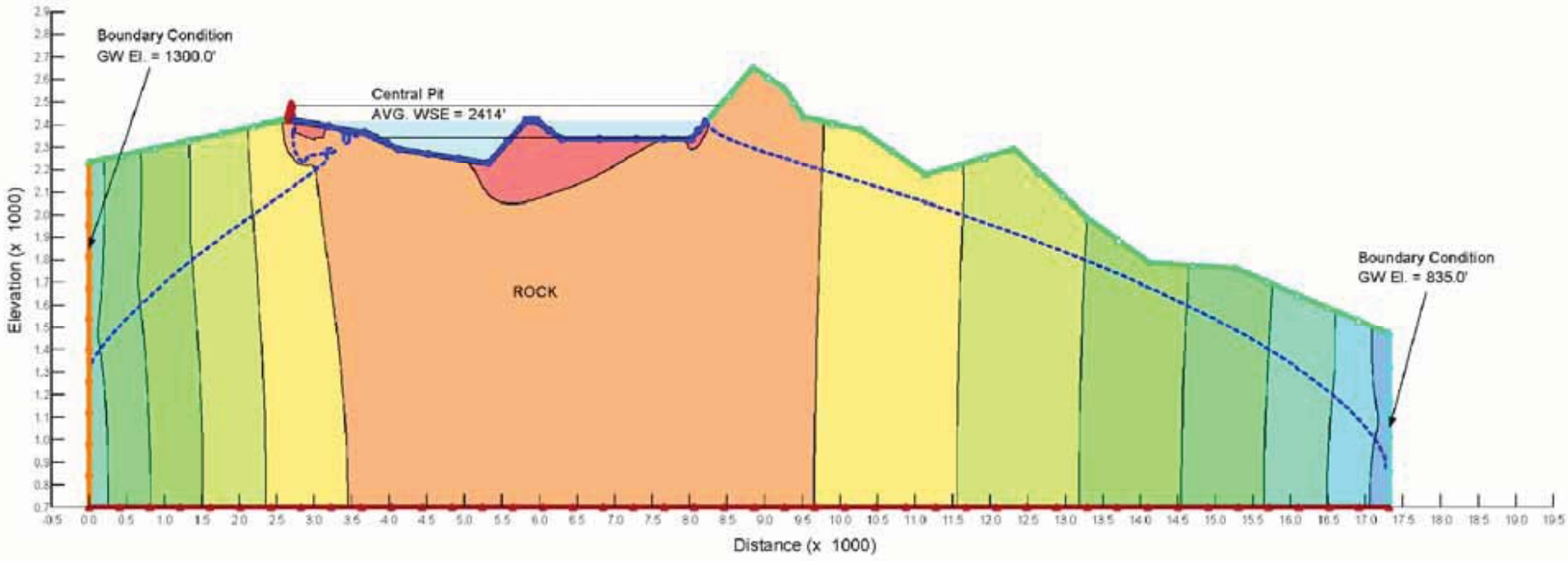
Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.

Eagle Mountain Pumped Storage Project Eagle Mountain, California	GEI Consultants UPPER RESERVOIR MAXIMUM WATER SURFACE NORTH-SOUTH SEEPAGE RESULTS
Eagle Crest Energy	Project 080472 December 2008 Figure 8



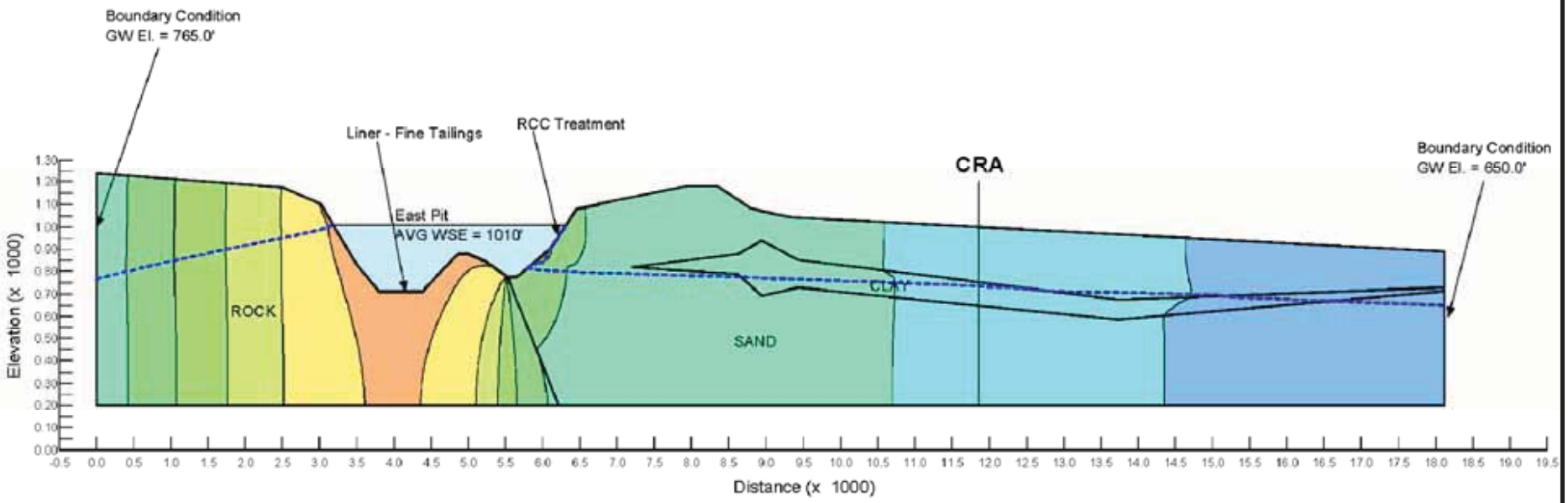
Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.

Eagle Mountain Pumped Storage Project Eagle Mountain, California	GEI Consultants	LOWER RESERVOIR MAXIMUM WATER SURFACE NORTH-SOUTH SEEPAGE RESULTS
Eagle Crest Energy	Project 080472	August 2008 Figure 9



Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.

Eagle Mountain Pumped Storage Project Eagle Mountain, California	GEI Consultants	UPPER RESERVOIR MAXIMUM SEEPAGE TREATMENT RESULTS (AVG. WATER LEVEL)
Eagle Crest Energy	Project 080472	December 2008 Figure 10



Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.

Eagle Mountain Pumped Storage Project Eagle Mountain, California	GEI Consultants	LOWER RESERVOIR MAXIMUM SEEPAGE TREATMENT RESULTS (AVG. WATER LEVEL)
Eagle Crest Energy	Project 080472	December 2008 Figure 11

APPENDIX

GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
9/4/2008
NDM

EAGLE MOUNTAIN - CENTRAL PIT SEEPAGE RESULTS

SEEPAGE BLANKET ONLY

Reservoir Paramters

Max WSE	2485	ft
Min WSE	2343	ft
Max Reservoir WSE Area	48	acres
Min Reservoir WSE Area	191	acres
Max WSE Average Top Width	1485	ft
Min WSE Average Top Width	595	ft
Average Top Width	1040	ft

	Parameter	Max	Min	Average
NO LINER	Unit Width Seepage Rate (cfs)	0.00195	0.00124	0.00160
	Annual Seepage (ac-ft/yr)	2097	535	**1202**
3' THICK LINER	Unit Width Seepage Rate (cfs)	0.00178	0.00106	0.00142
	Annual Seepage (ac-ft/yr)	1913	456	**1068**
5' THICK LINER	Unit Width Seepage Rate (cfs)	0.00174	0.00091	0.00133
	Annual Seepage (ac-ft/yr)	1874	394	**1000**
8' THICK LINER	Unit Width Seepage Rate (cfs)	0.00170	0.00070	0.00120
	Annual Seepage (ac-ft/yr)	1823	303	**903**

GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
9/4/2008
NDM

EAGLE MOUNTAIN - CENTRAL PIT SEEPAGE RESULTS

GROUTING AND SEEPAGE BLANKET

Reservoir Paramters

Max WSE	2485	ft
Min WSE	2343	ft
Max Reservoir WSE Area	48	acres
Min Reservoir WSE Area	191	acres
Max WSE Average Top Width	1485	ft
Min WSE Average Top Width	595	ft
Average Top Width	1040	ft

	Parameter	Max	Min	Average
NO LINER	Unit Width Seepage Rate (cfs)	0.00195	0.00124	0.00160
	Annual Seepage (ac-ft/yr)	2097	535	**1202**
3' THICK LINER	Unit Width Seepage Rate (cfs)	0.00126	0.00078	0.00102
	Annual Seepage (ac-ft/yr)	1351	338	**768**
5' THICK LINER	Unit Width Seepage Rate (cfs)	0.00124	0.00072	0.00098
	Annual Seepage (ac-ft/yr)	1332	310	**738**
8' THICK LINER	Unit Width Seepage Rate (cfs)	0.00122	0.00061	0.00092
	Annual Seepage (ac-ft/yr)	1308	265	**689**

GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
9/4/2008
NDM

EAGLE MOUNTAIN - EAST PIT SEEPAGE RESULTS

SEEPAGE BLANKET ONLY

Reservoir Paramters

Max WSE	1095	ft
Min WSE	925	ft
Max Reservoir WSE Area	163	acres
Min Reservoir WSE Area	63	acres
Max WSE Average Top Width	1100	ft
Min WSE Average Top Width	680	ft
Average Top Width	890	ft

	Parameter	Max	Min	Average
NO LINER	Unit Width Seepage Rate (cfs)	0.00356	0.00181	0.00269
	Annual Seepage (ac-ft/yr)	2836	891	**1731**
3' THICK LINER	Unit Width Seepage Rate (cfs)	0.00348	0.00177	0.00262
	Annual Seepage (ac-ft/yr)	2768	871	**1690**
5' THICK LINER	Unit Width Seepage Rate (cfs)	0.00347	0.00175	0.00261
	Annual Seepage (ac-ft/yr)	2765	863	**1683**
8' THICK LINER	Unit Width Seepage Rate (cfs)	0.00347	0.00175	0.00261
	Annual Seepage (ac-ft/yr)	2764	860	**1681**

GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
9/4/2008
NDM

EAGLE MOUNTAIN - EAST PIT SEEPAGE RESULTS

GROUTING, SEEPAGE BLANKET, AND RCC TREATMENT

Reservoir Paramters

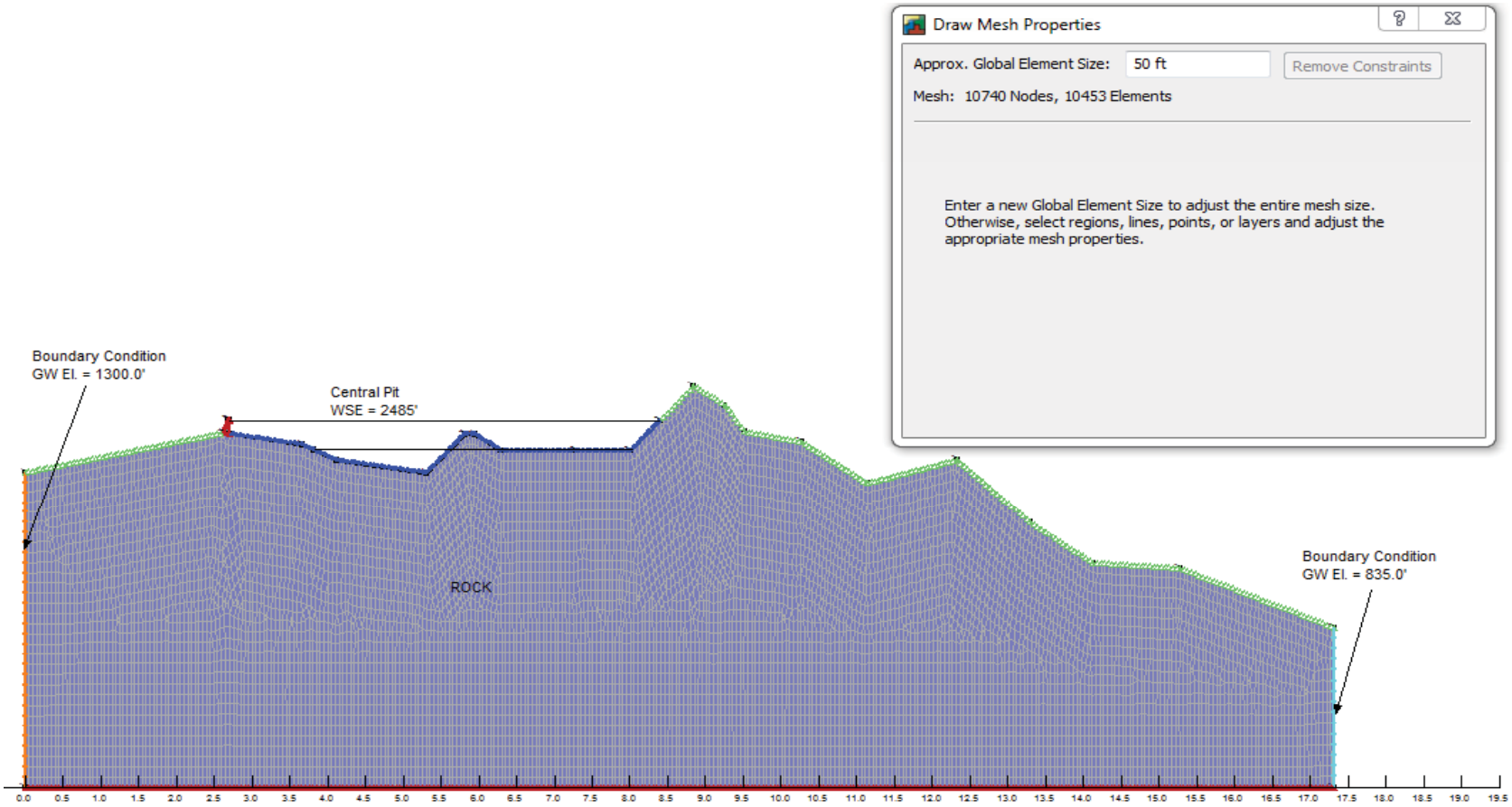
Max WSE	1095	ft
Min WSE	925	ft
Max Reservoir WSE Area	163	acres
Min Reservoir WSE Area	63	acres
Max WSE Average Top Width	1100	ft
Min WSE Average Top Width	680	ft
Average Top Width	890	ft

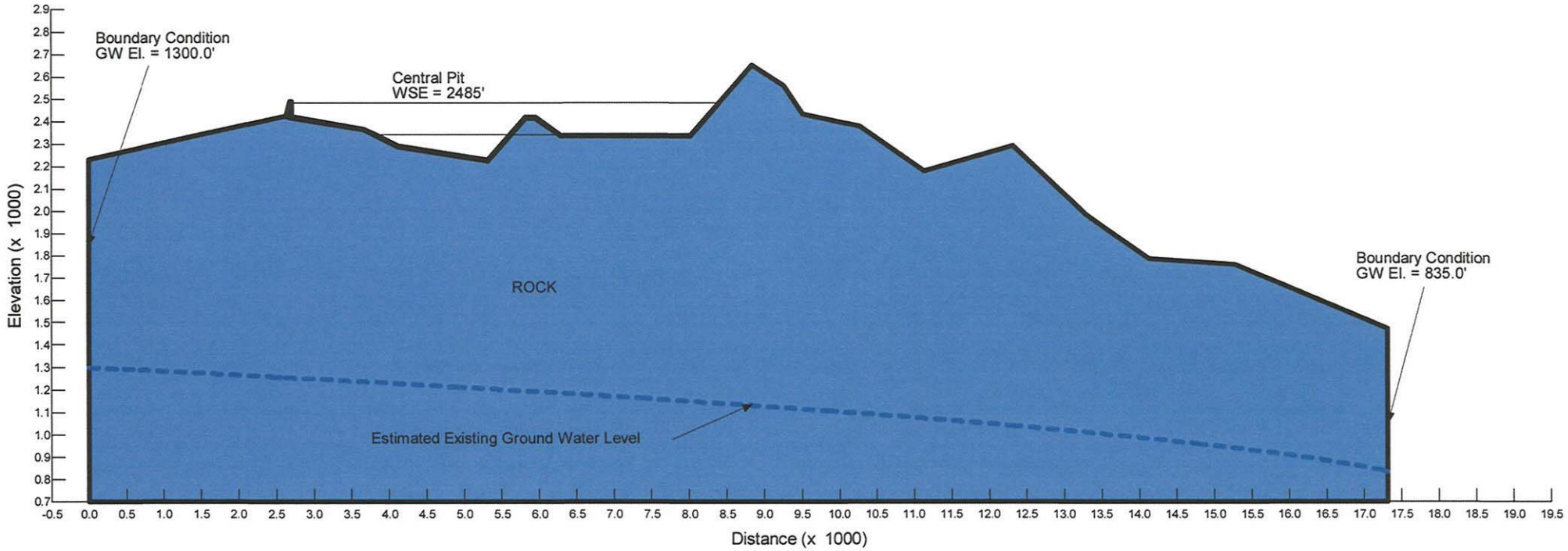
	Parameter	Max	Min	Average
NO LINER	Unit Width Seepage Rate (cfs)	0.00356	0.00181	0.00269
	Annual Seepage (ac-ft/yr)	2836	891	**1731**
3' THICK LINER	Unit Width Seepage Rate (cfs)	0.00206	0.00135	0.00171
	Annual Seepage (ac-ft/yr)	1641	665	**1099**
5' THICK LINER	Unit Width Seepage Rate (cfs)	0.00170	0.00106	0.00138
	Annual Seepage (ac-ft/yr)	1358	521	**890**
8' THICK LINER	Unit Width Seepage Rate (cfs)	0.00131	0.00090	0.00111
	Annual Seepage (ac-ft/yr)	1045	443	**713**

Eagle Mountain Pumped Storage Project
Upper Reservoir - SEEP/W Output

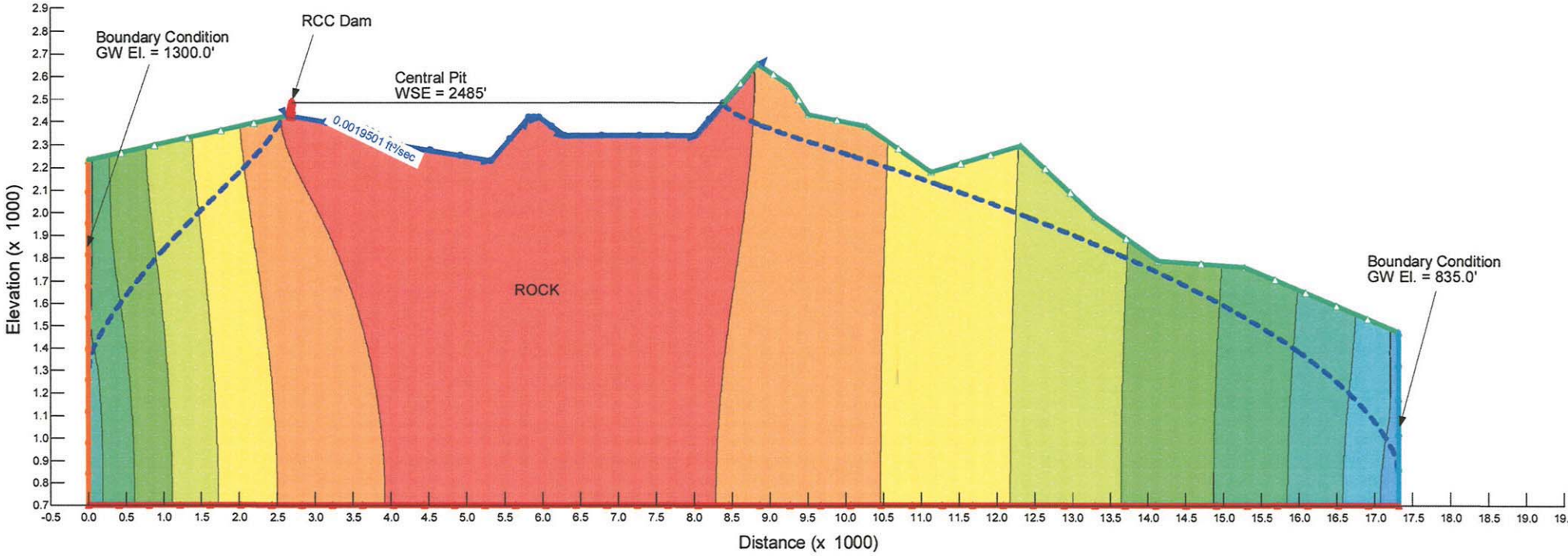
GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
1/4/2011
NDM

Model Mesh Properties - Upper Reservoir (East-West)



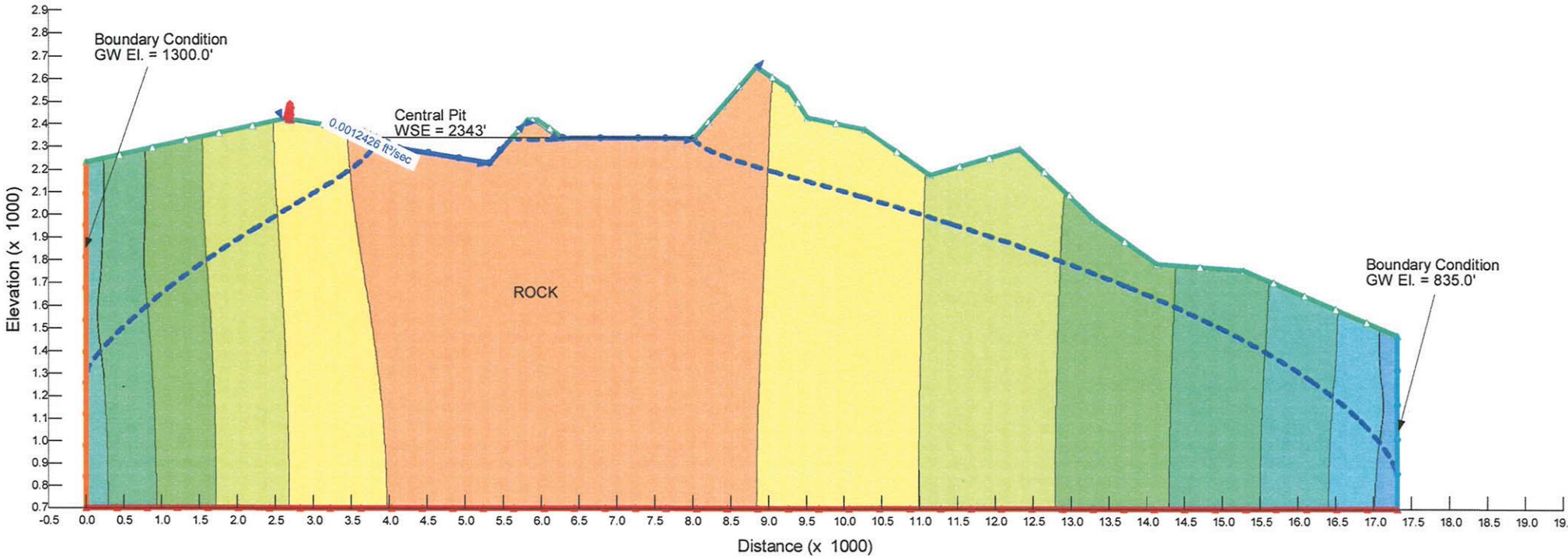


EXISTING CONDITIONS



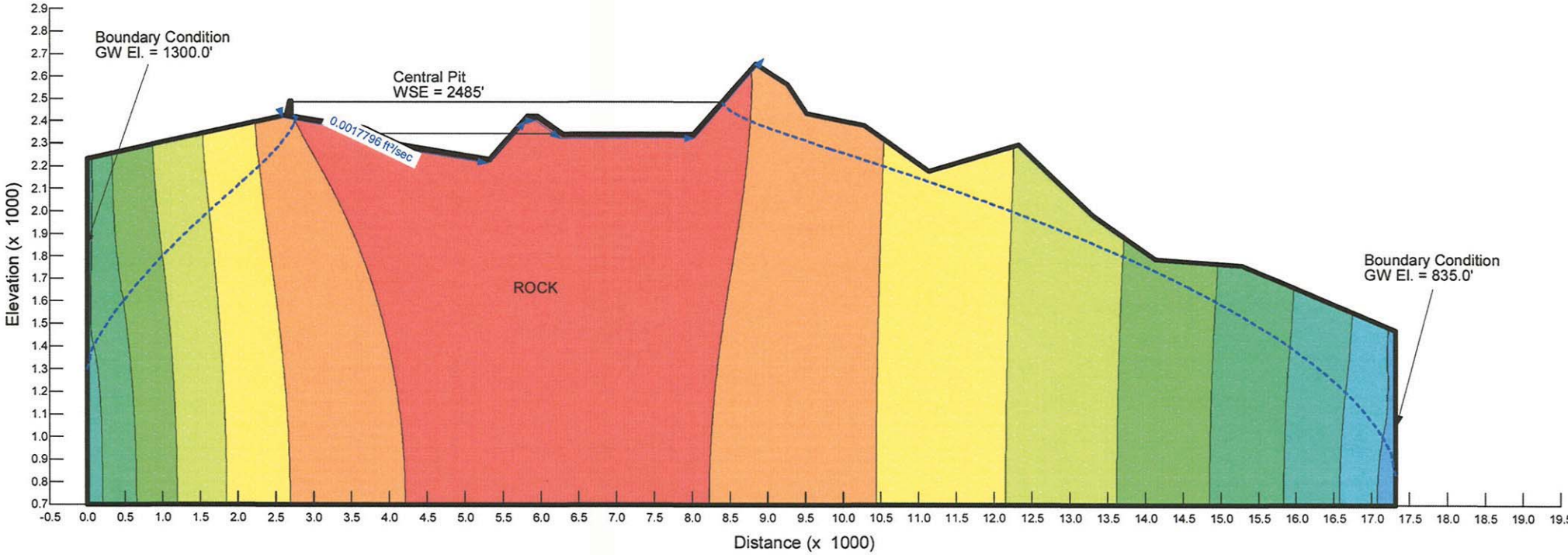
NO LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.



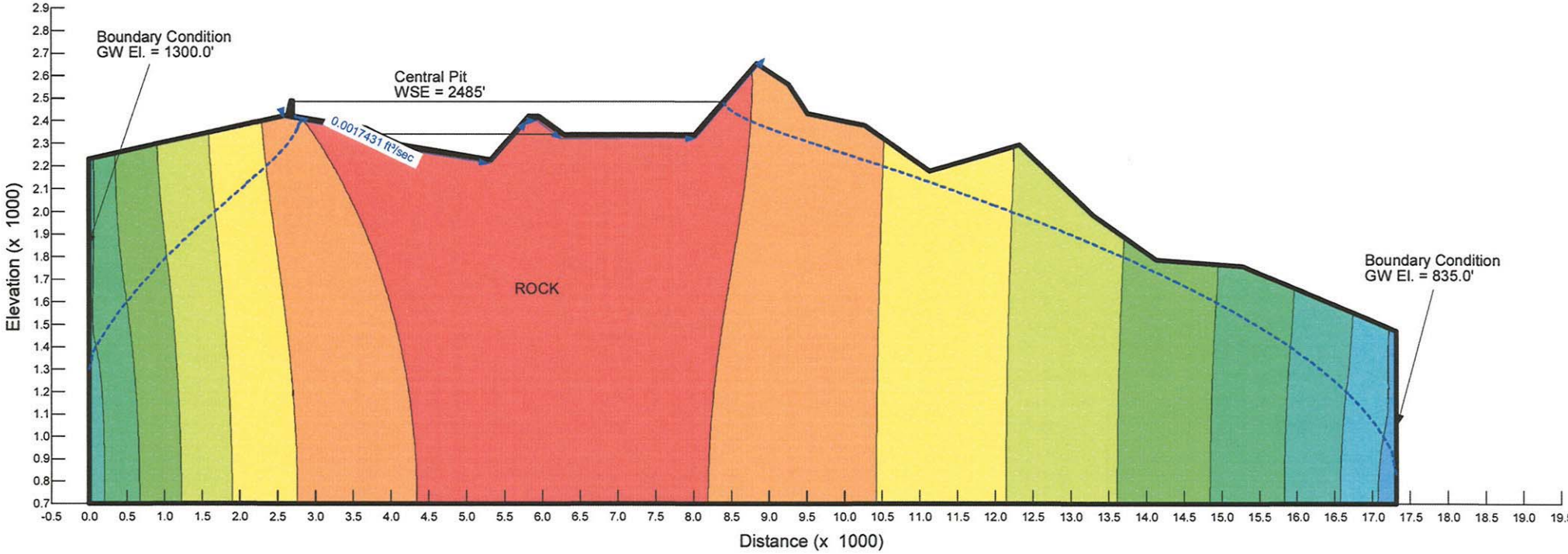
NO LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.



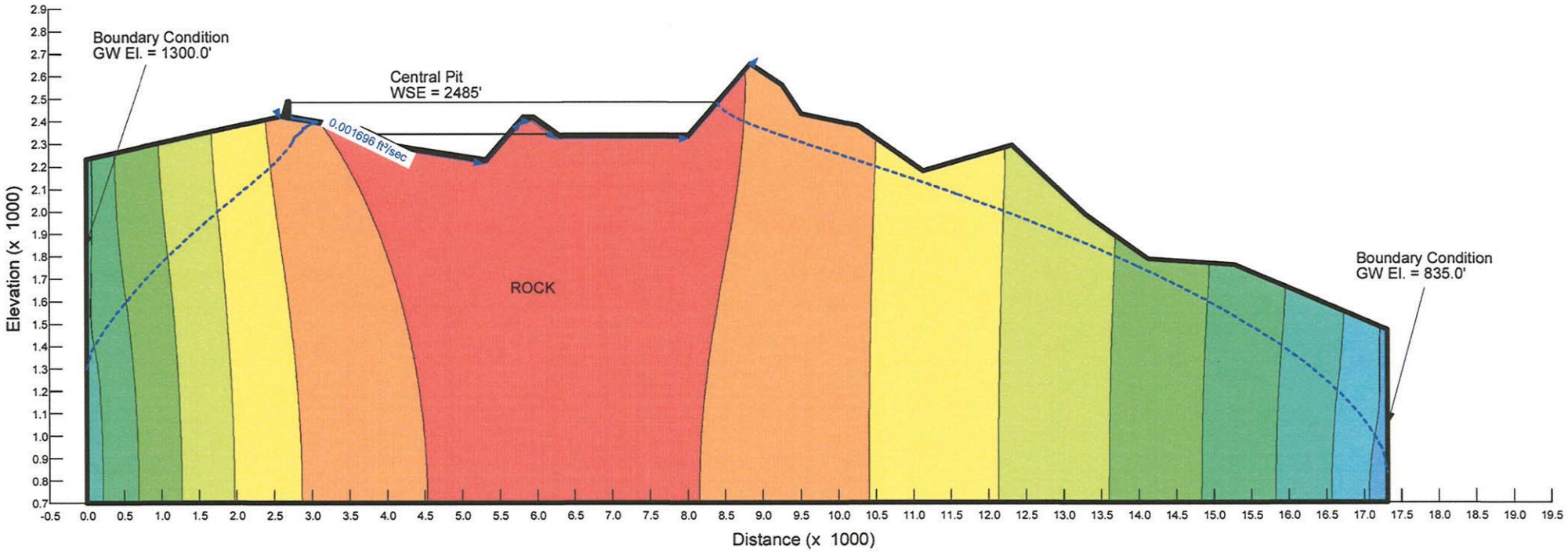
3' LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.



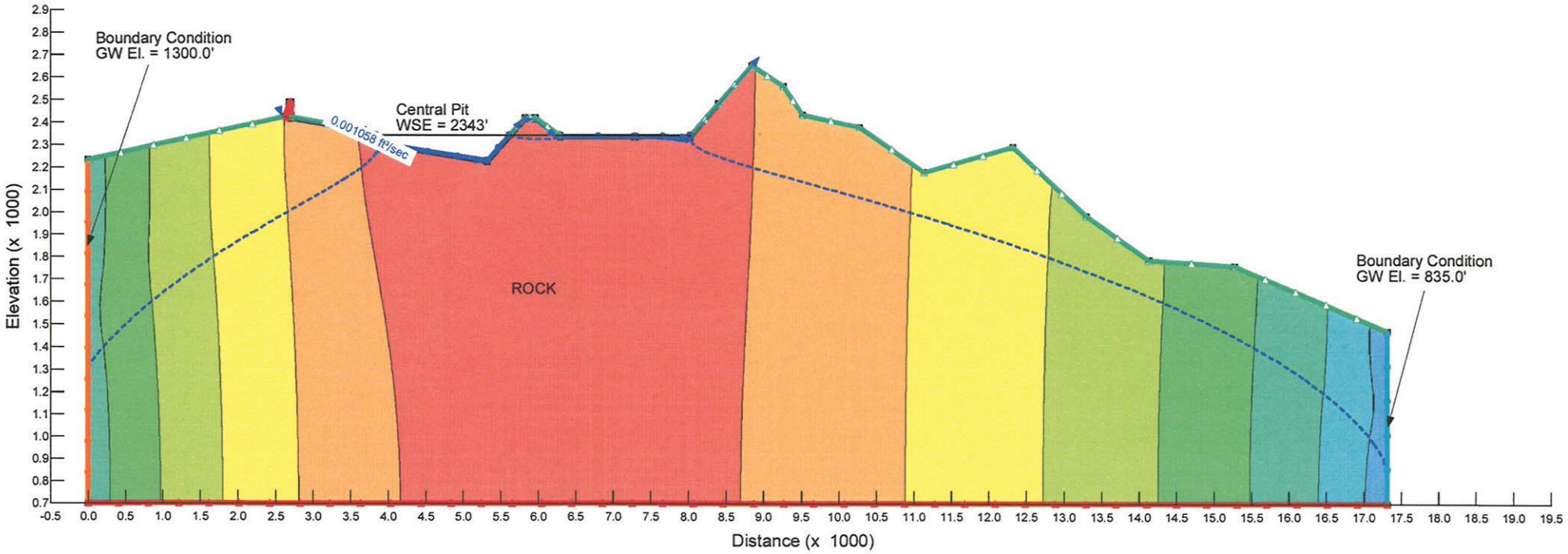
5' LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.



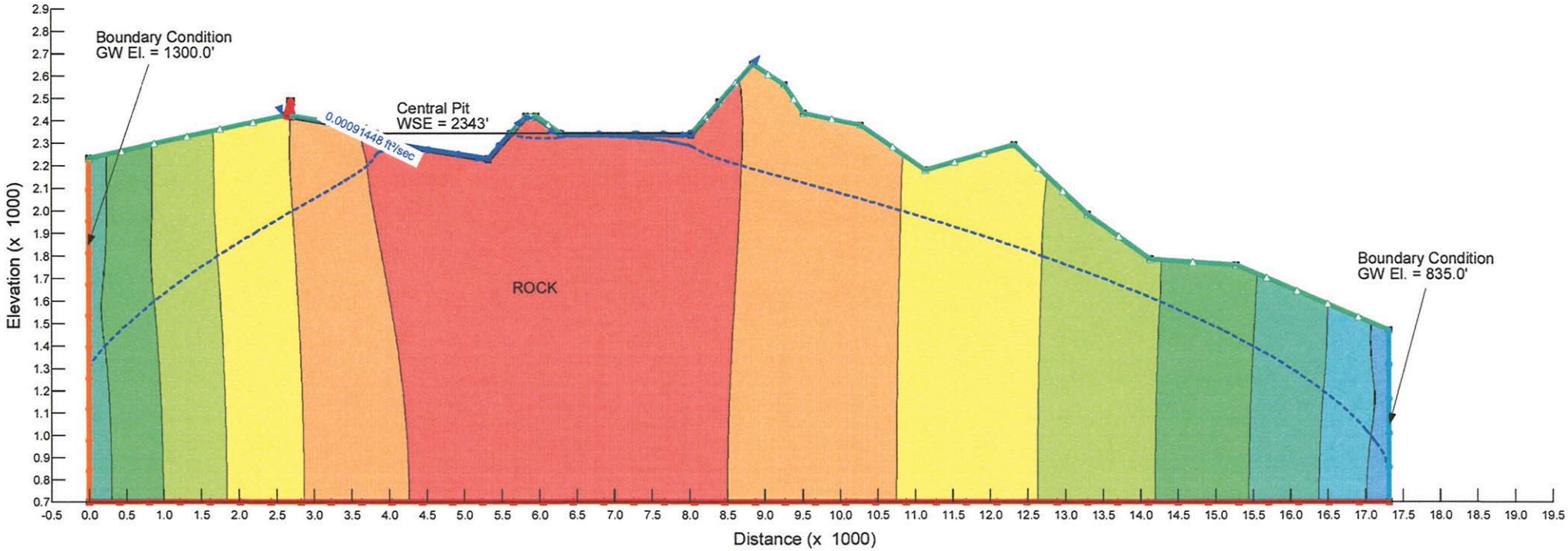
8' LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.



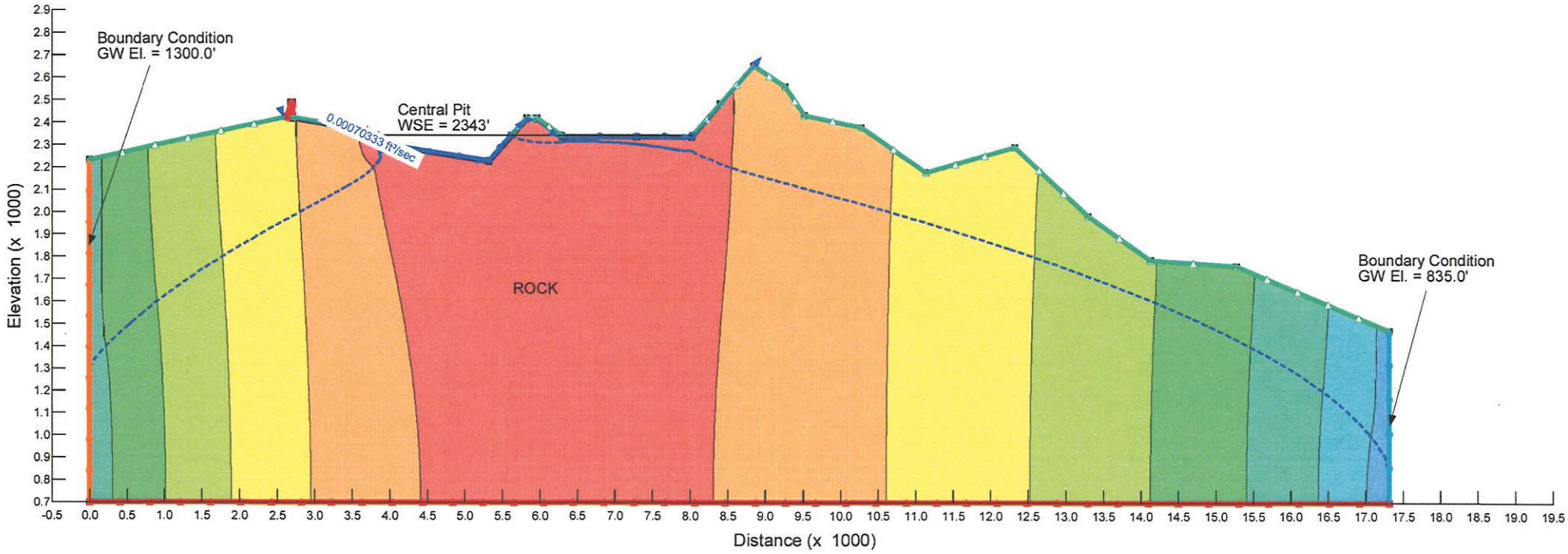
3' LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.



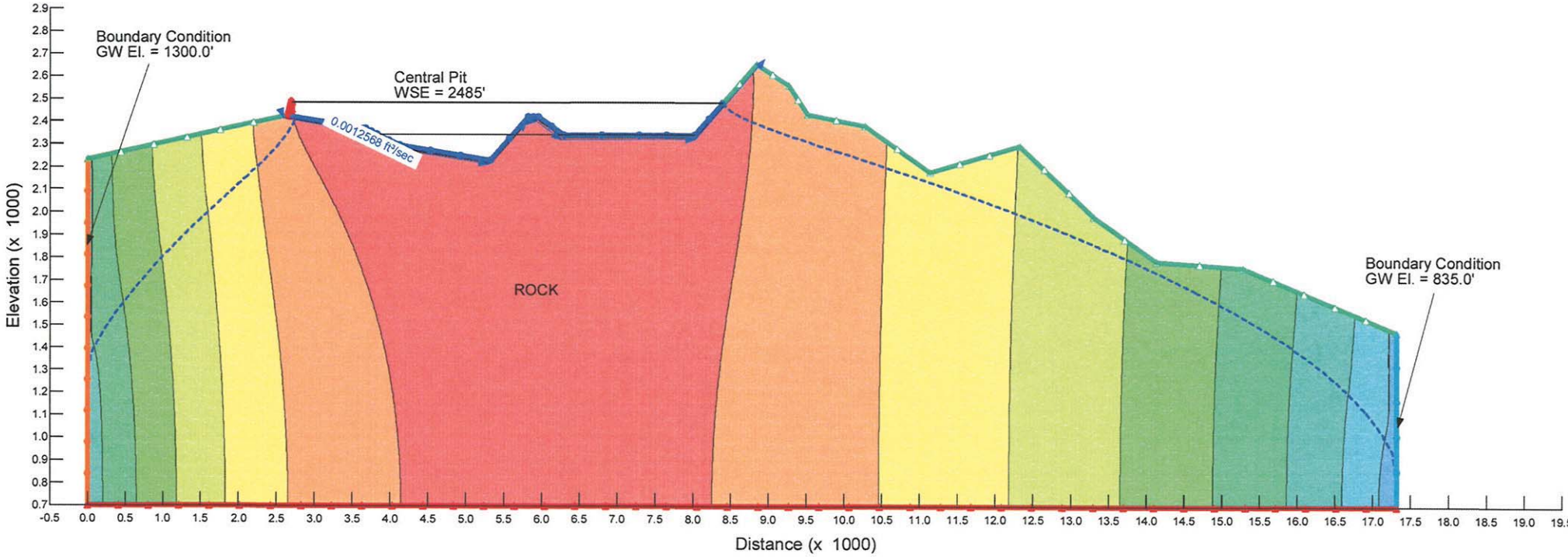
5' LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.



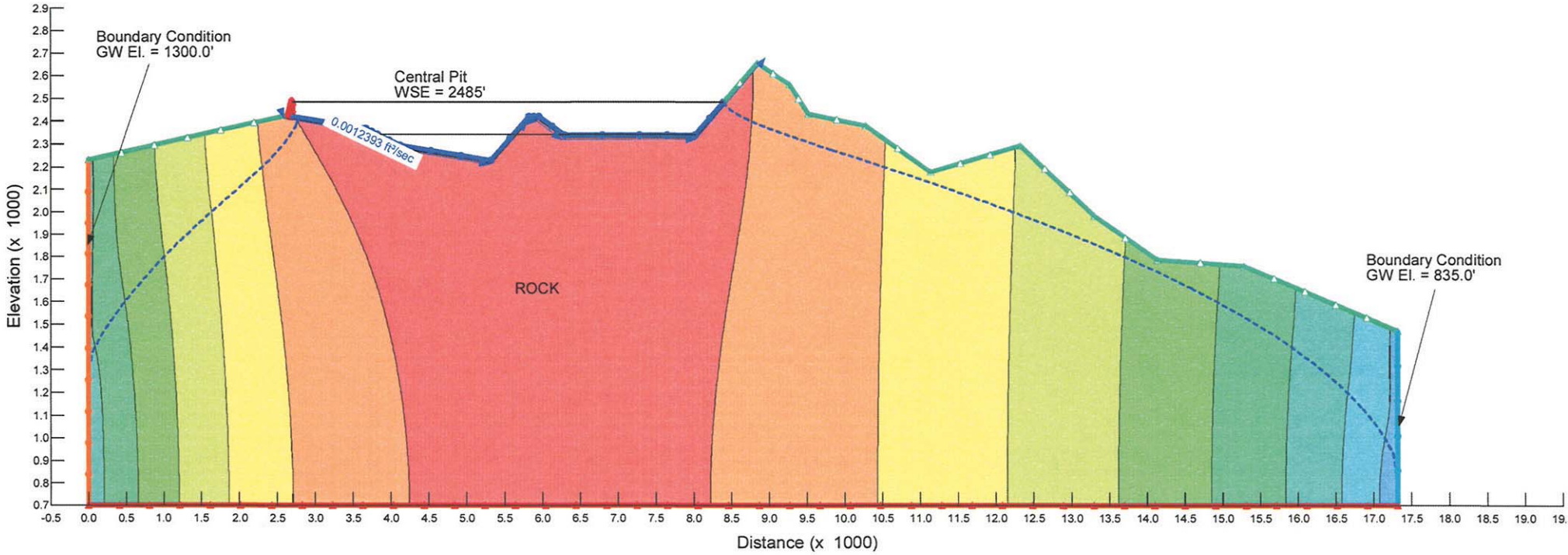
8' LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.



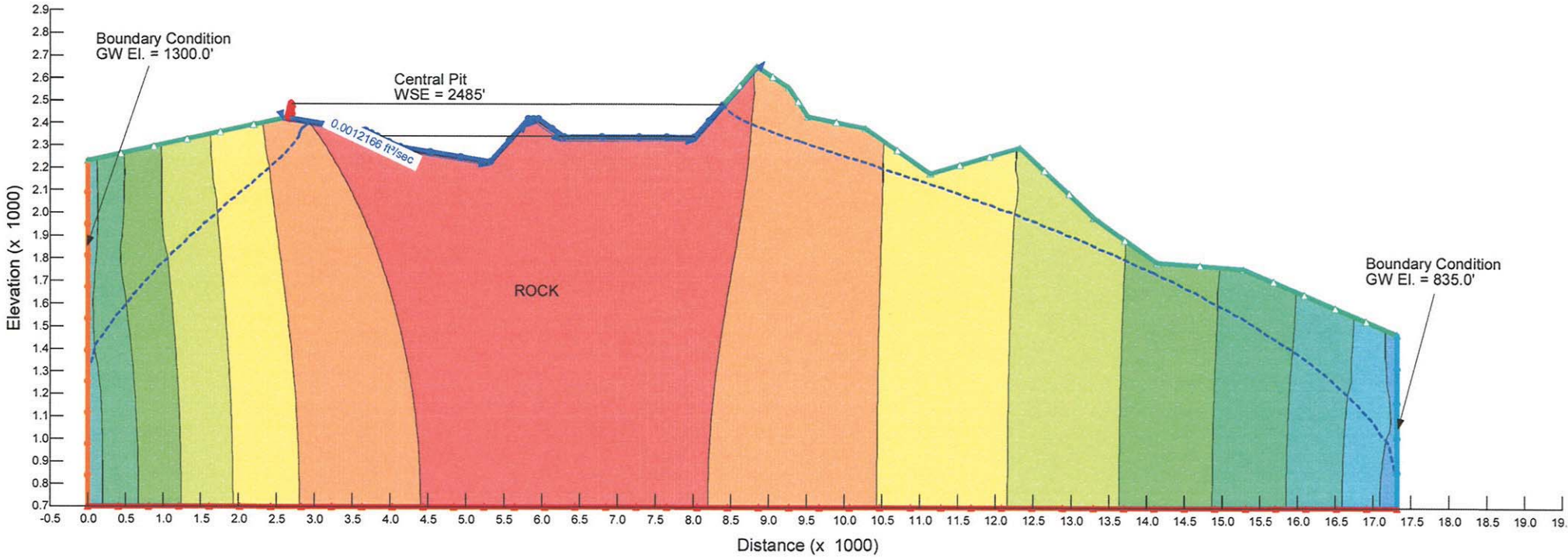
3' LINER W/ GROUTING

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.



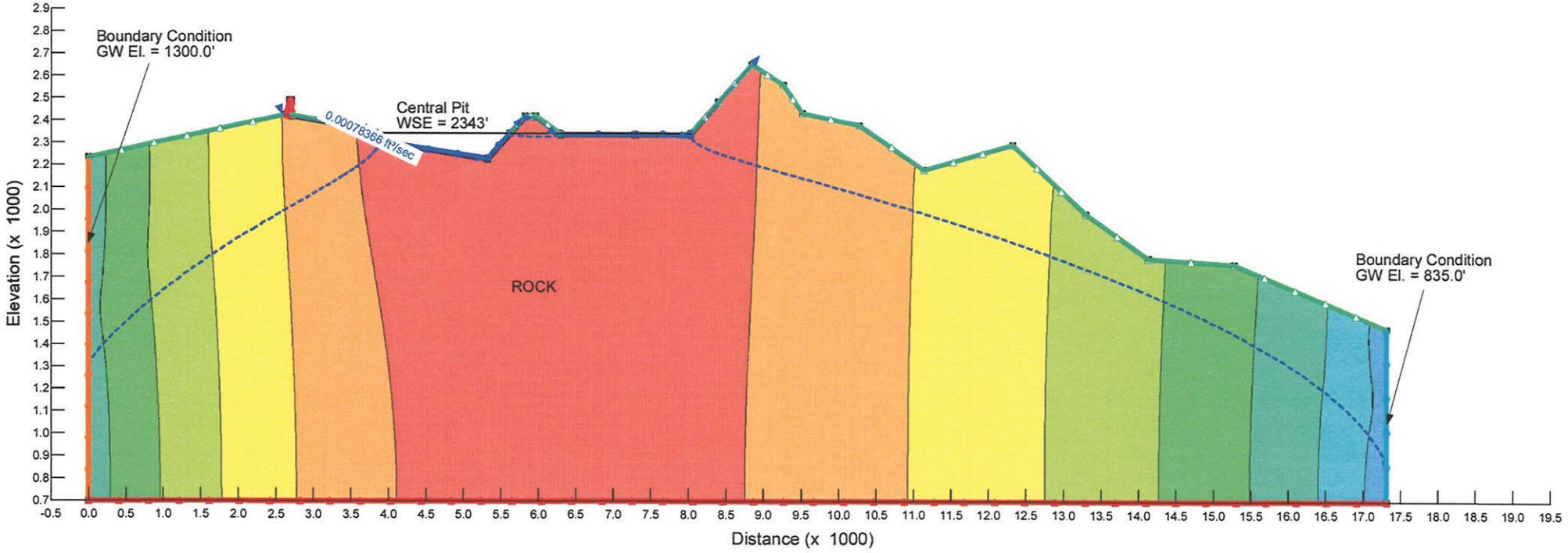
5' LINER W/ GROUTING

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.



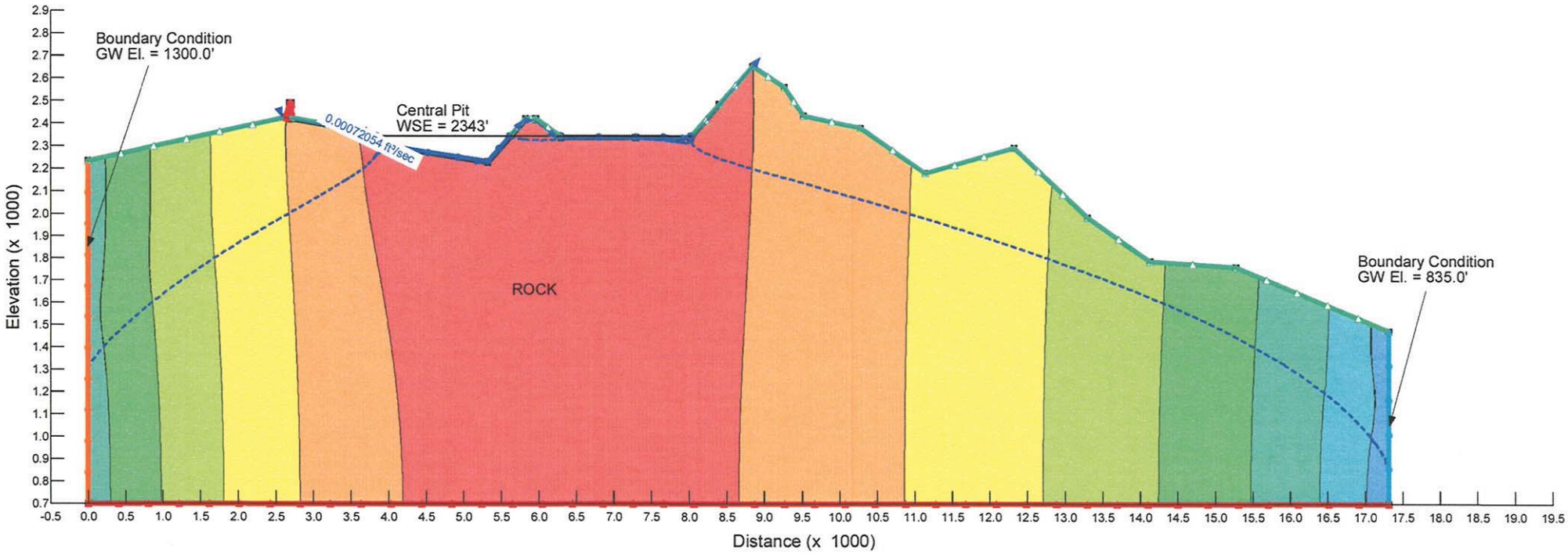
8' LINER W/ GROUTING

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.



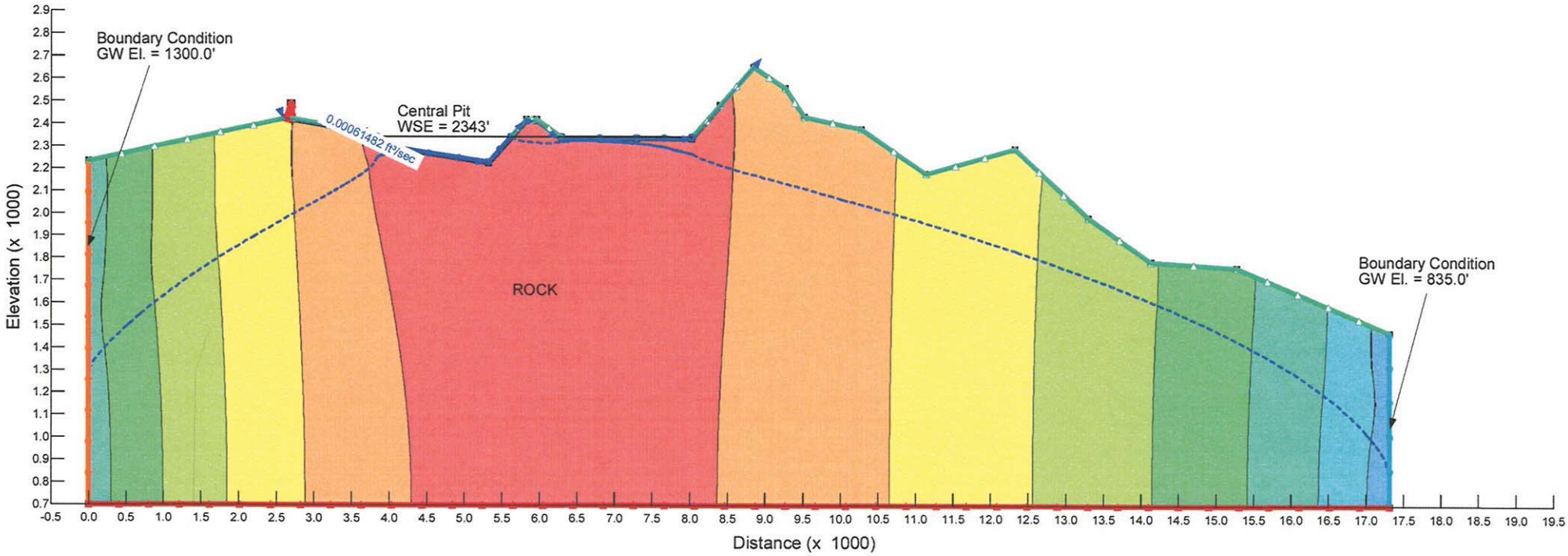
3' LINER W/ GROUTING

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.



5' LINER W/ GROUTING

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.

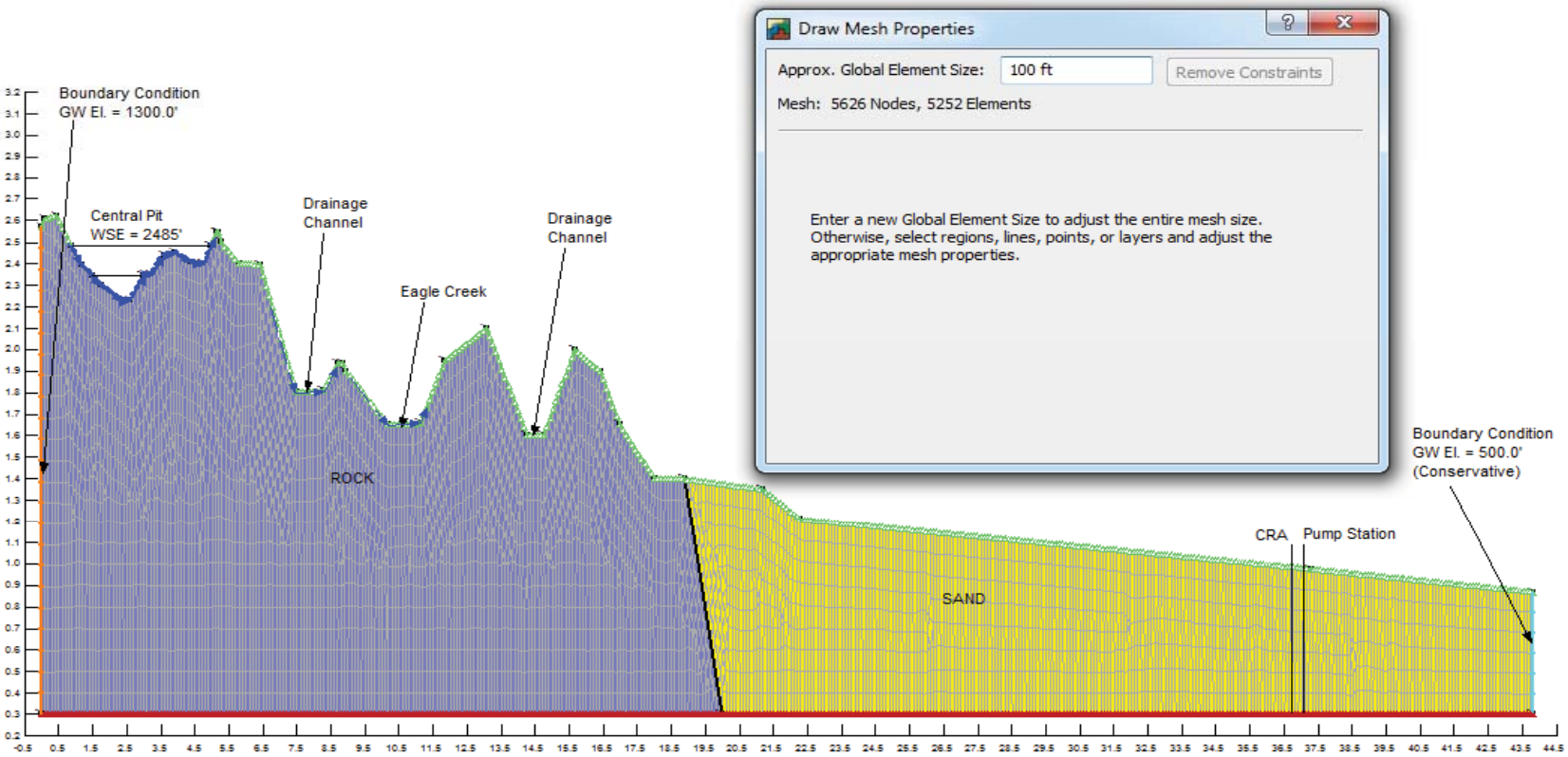


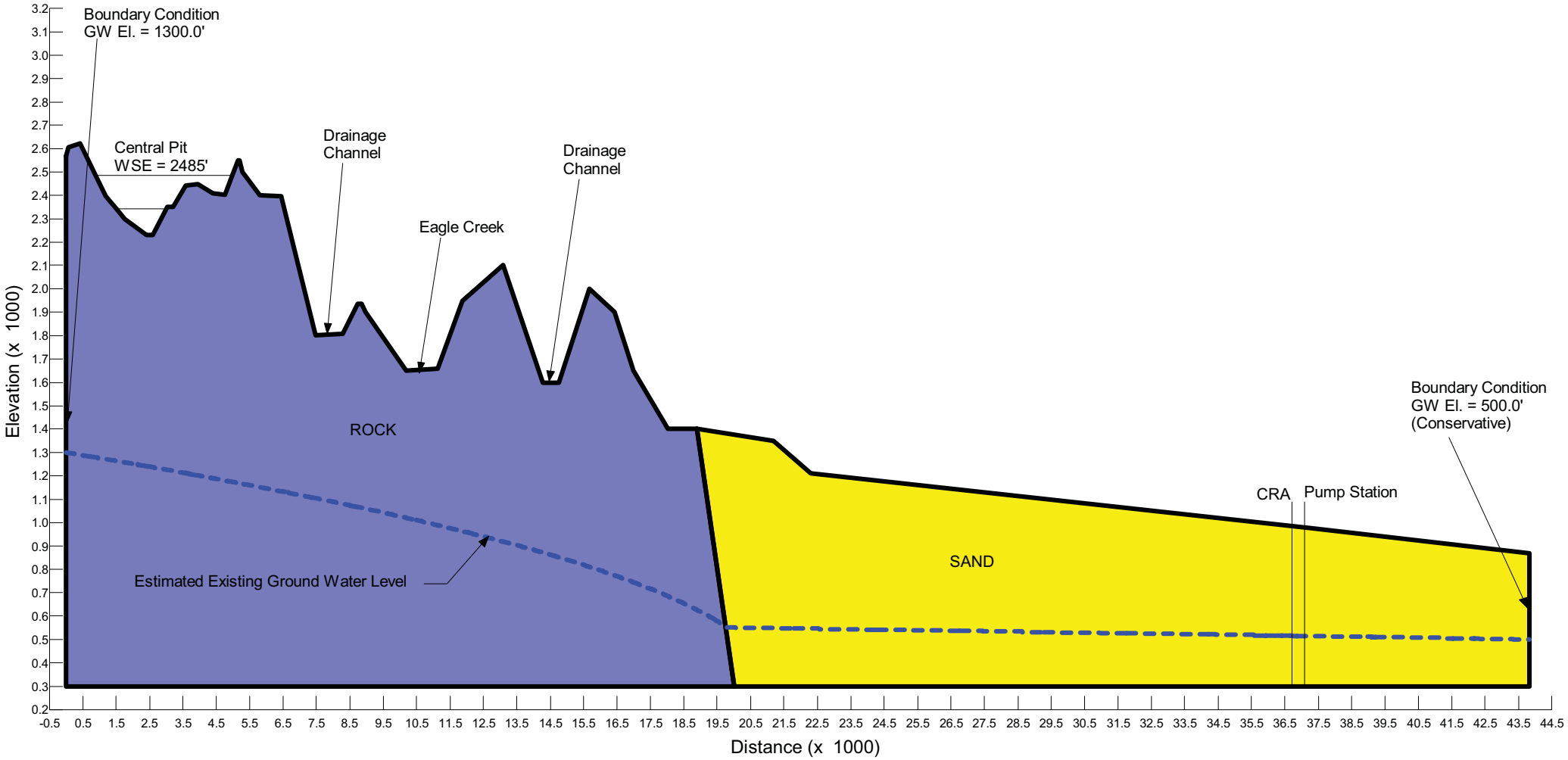
8' LINER W/ GROUTING

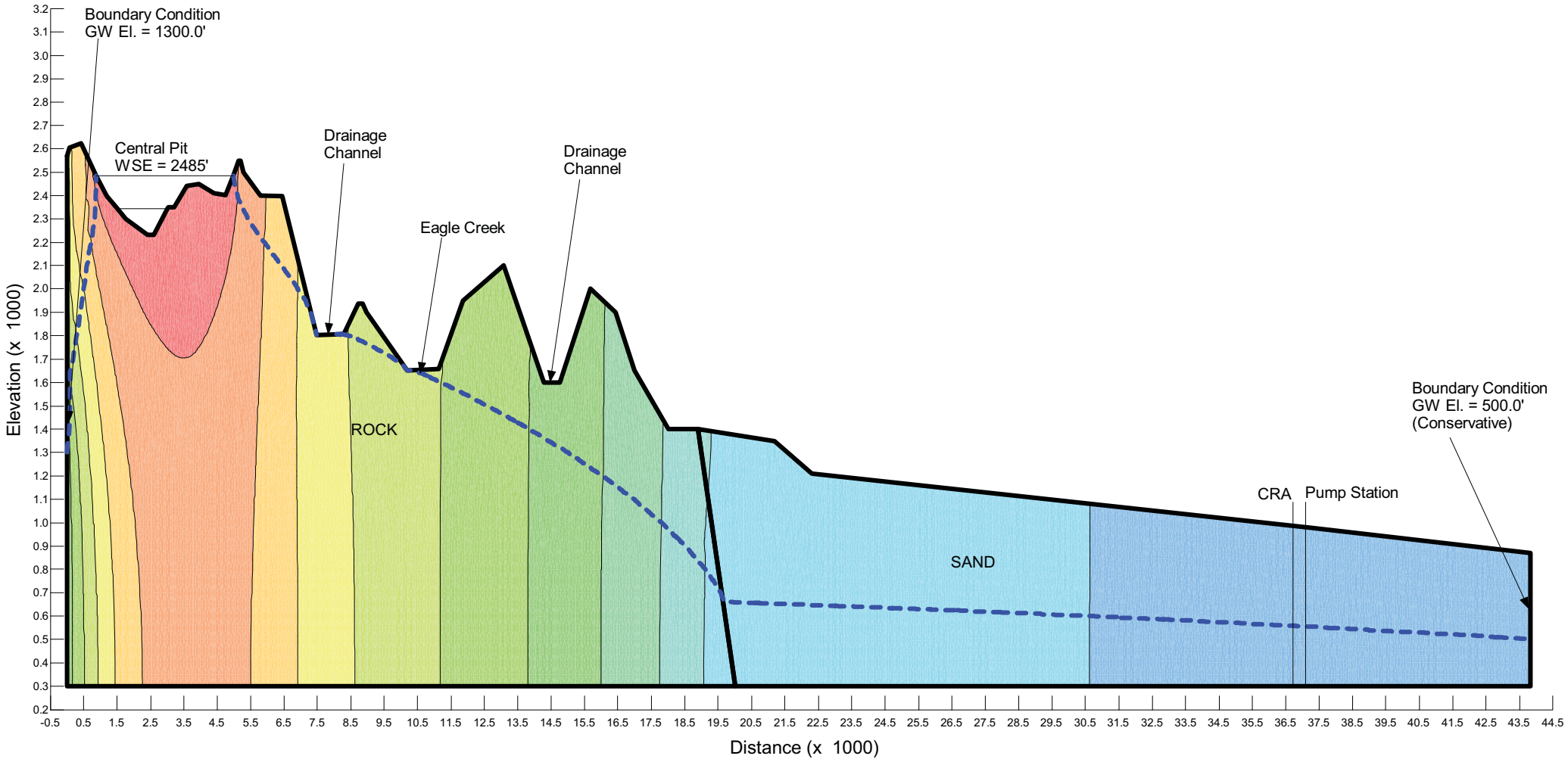
Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.

GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
1/4/2011
NDM

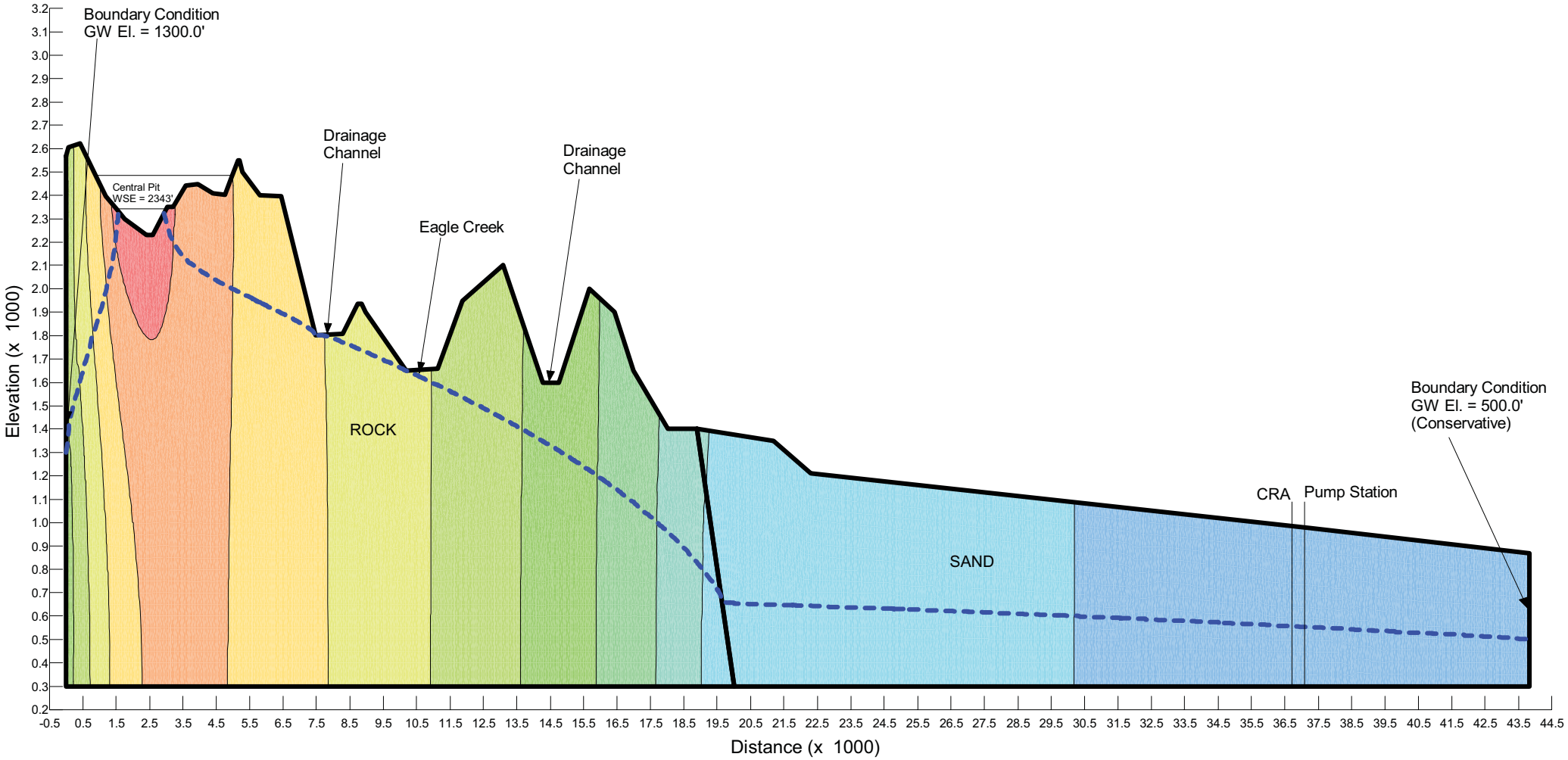
Model Mesh Properties - Upper Reservoir (North-South)




Boundary Condition
GW El. = 1300.0'
Central Pit
WSE = 2485'
Drainage
Channel
Eagle Creek
Drainage
Channel
ROCK
Estimated Existing Ground Water Level
SAND
CRA
Pump Station
Boundary Condition
GW El. = 500.0'
(Conservative)
Elevation (x 1000)
Distance (x 1000)



Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.

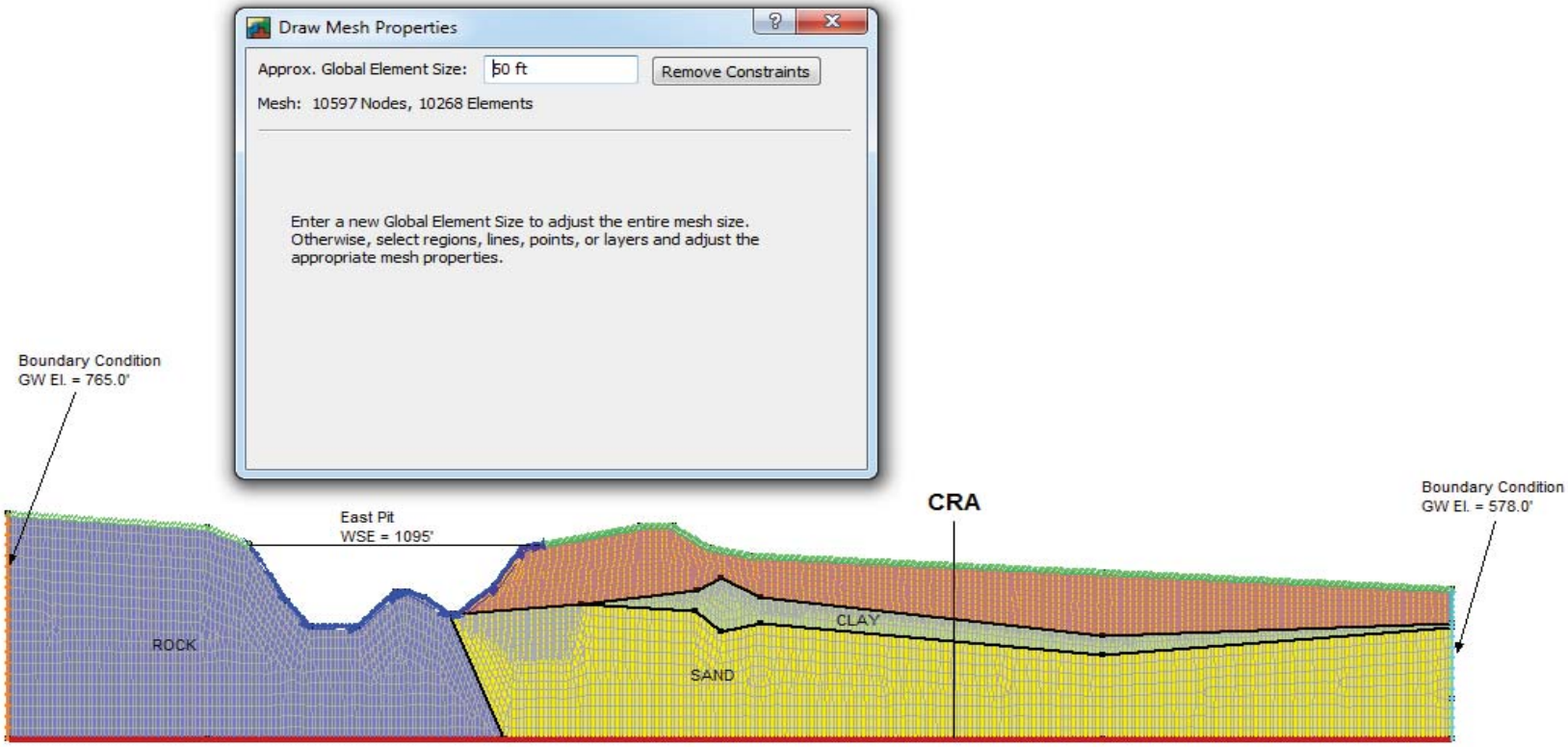


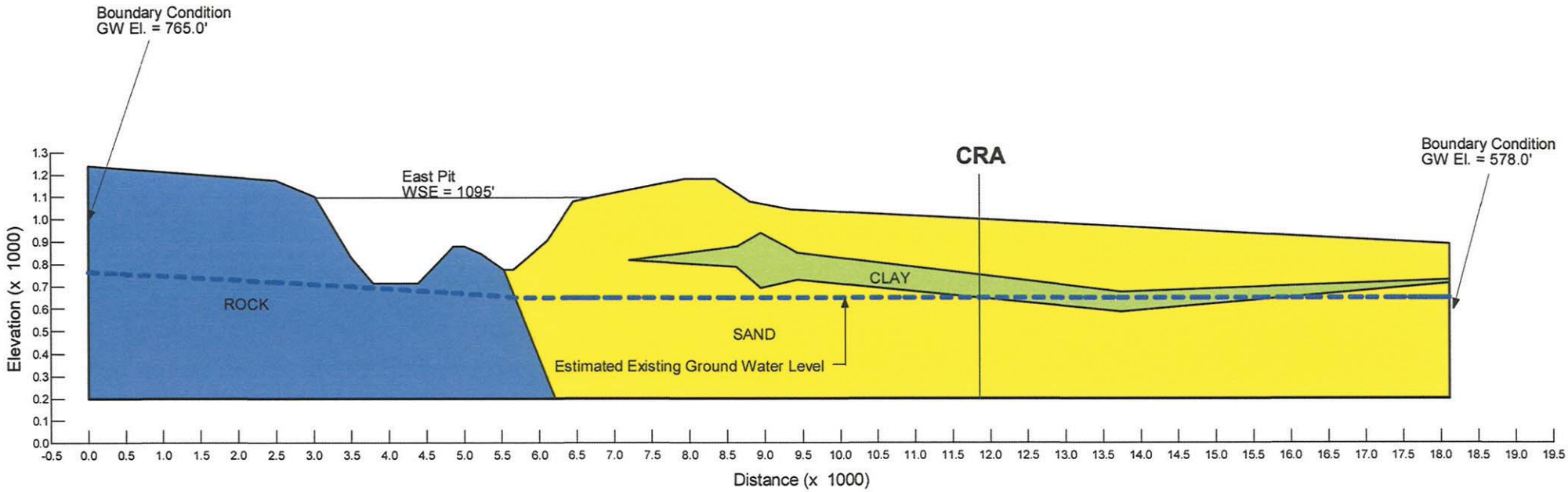
Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 200 feet of head.

Eagle Mountain Pumped Storage Project
Lower Reservoir - SEEP/W Output

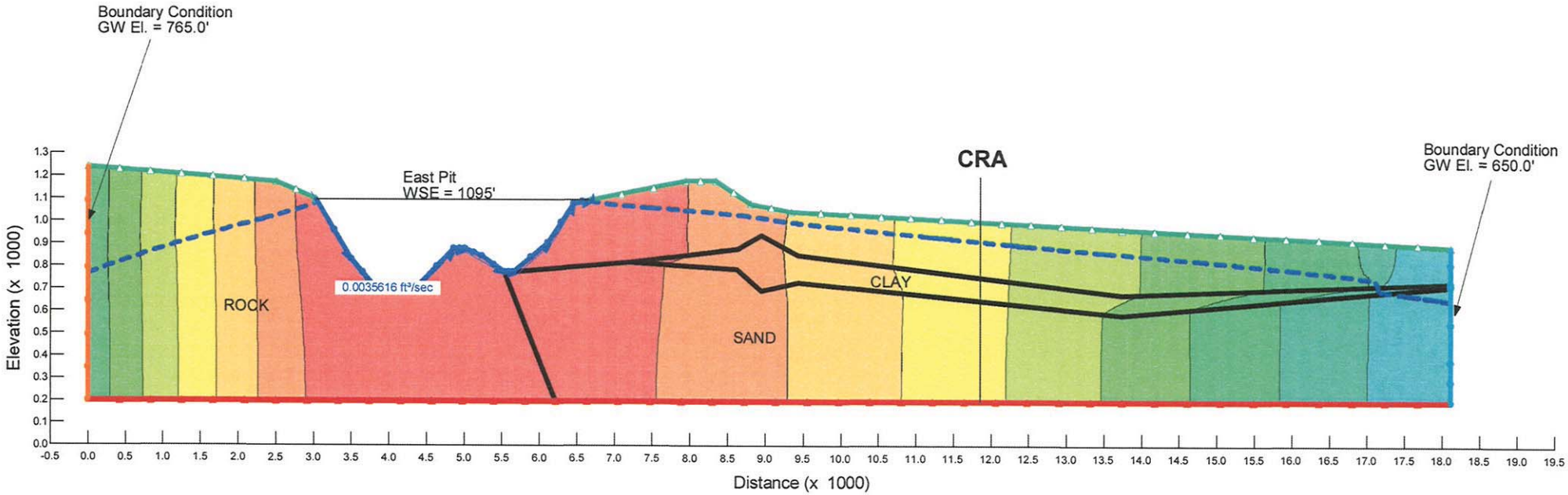
GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
1/4/2011
NDM

Model Mesh Properties - Lower Reservoir (East-West)



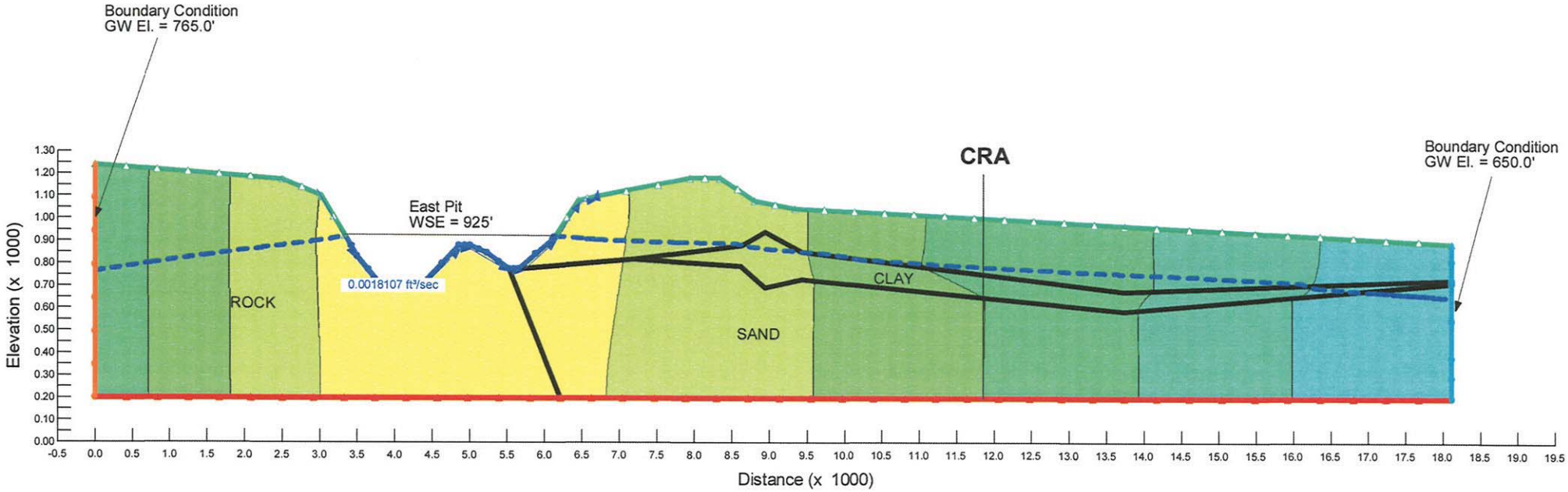


EXISTING CONDITIONS



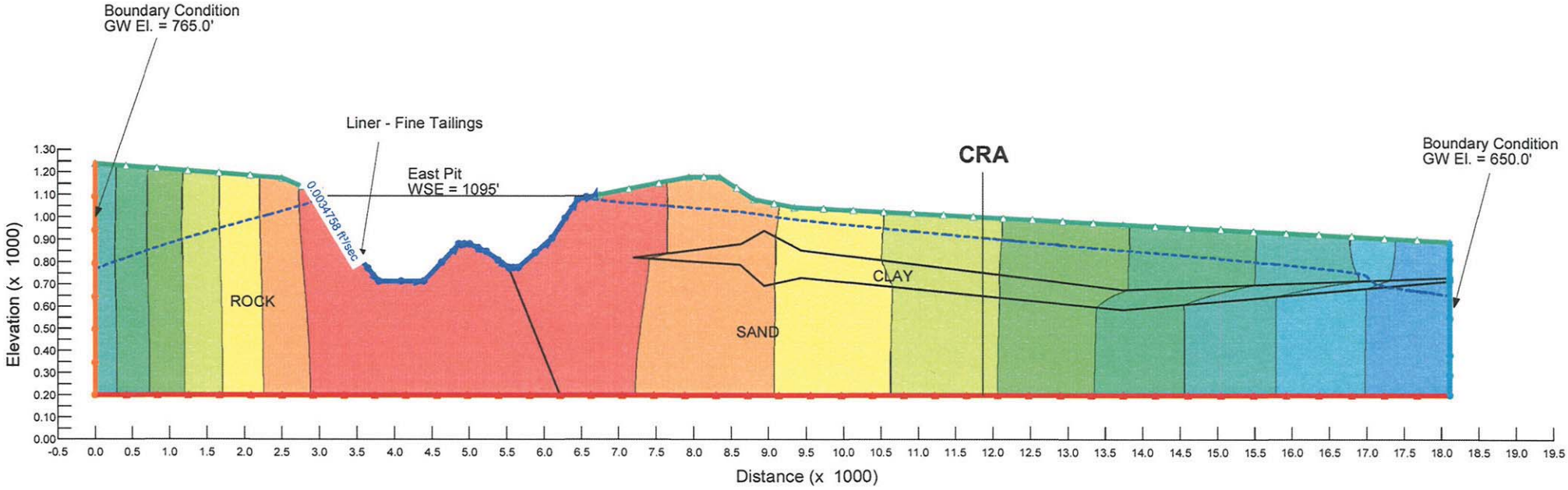
NO LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.



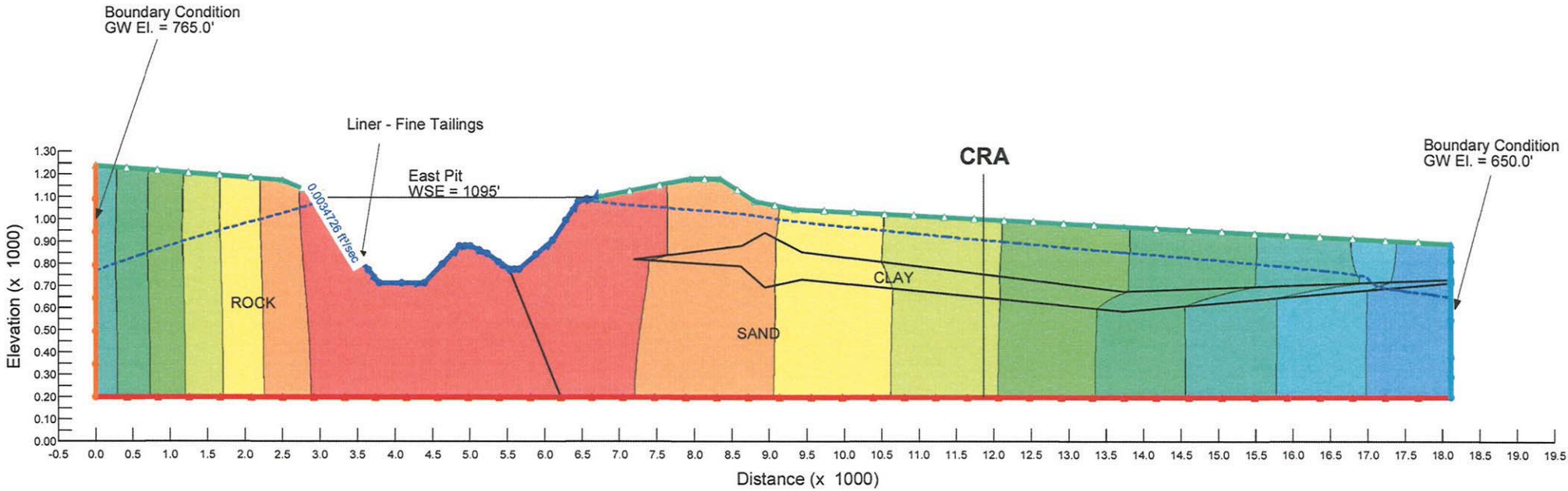
NO LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.



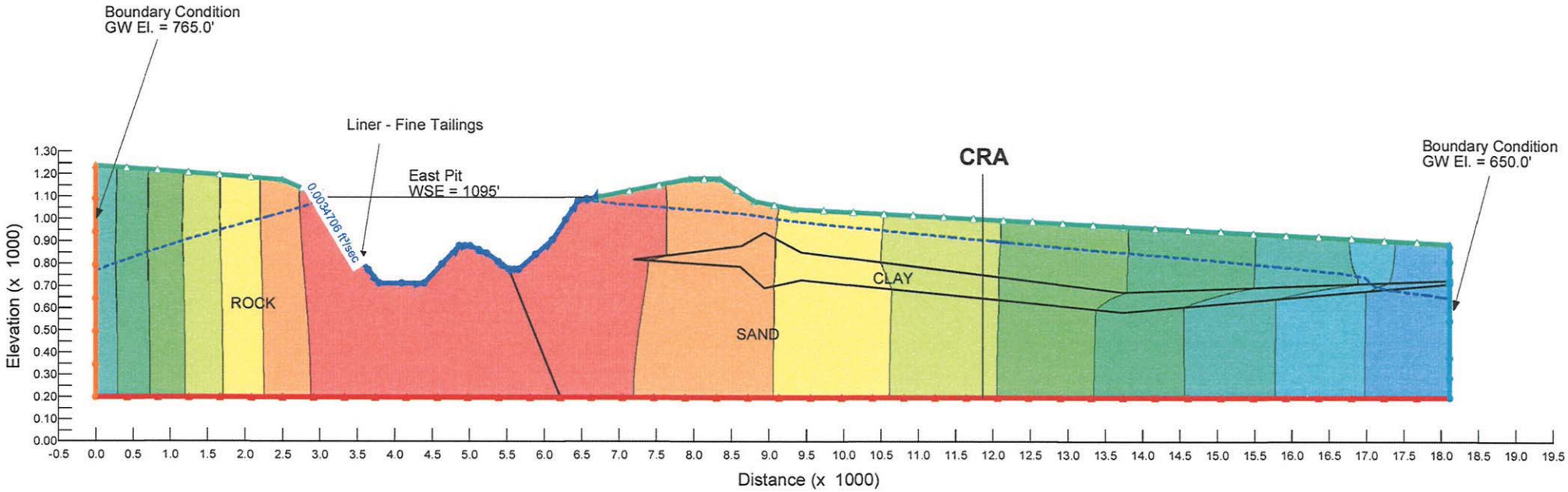
3' LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.



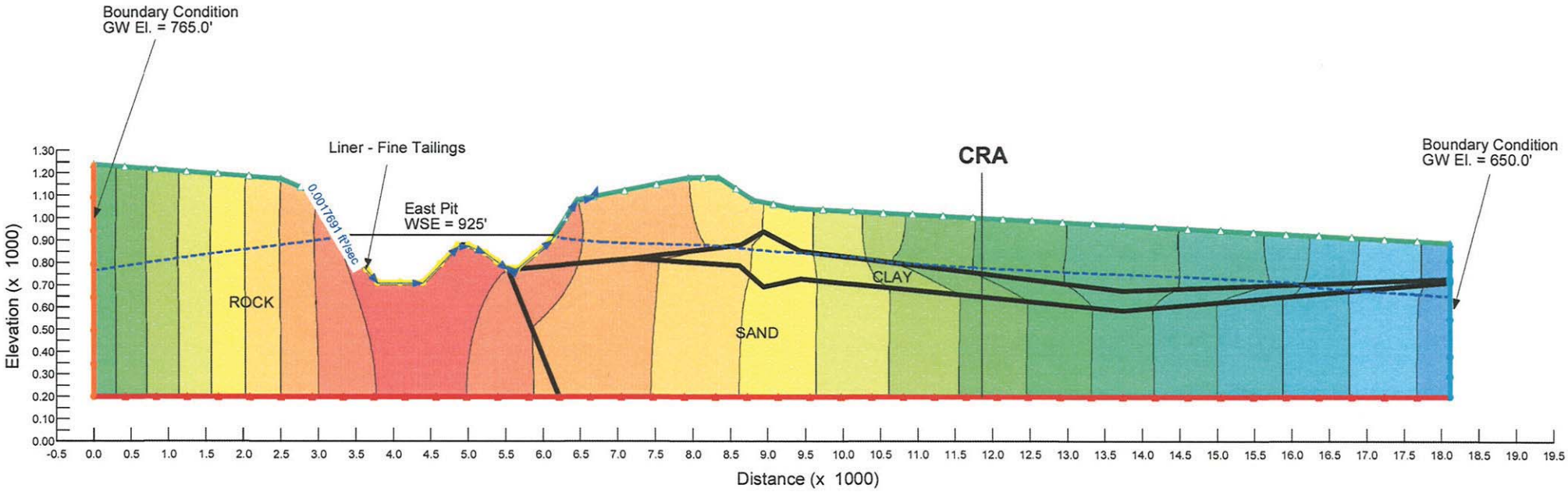
5' LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.



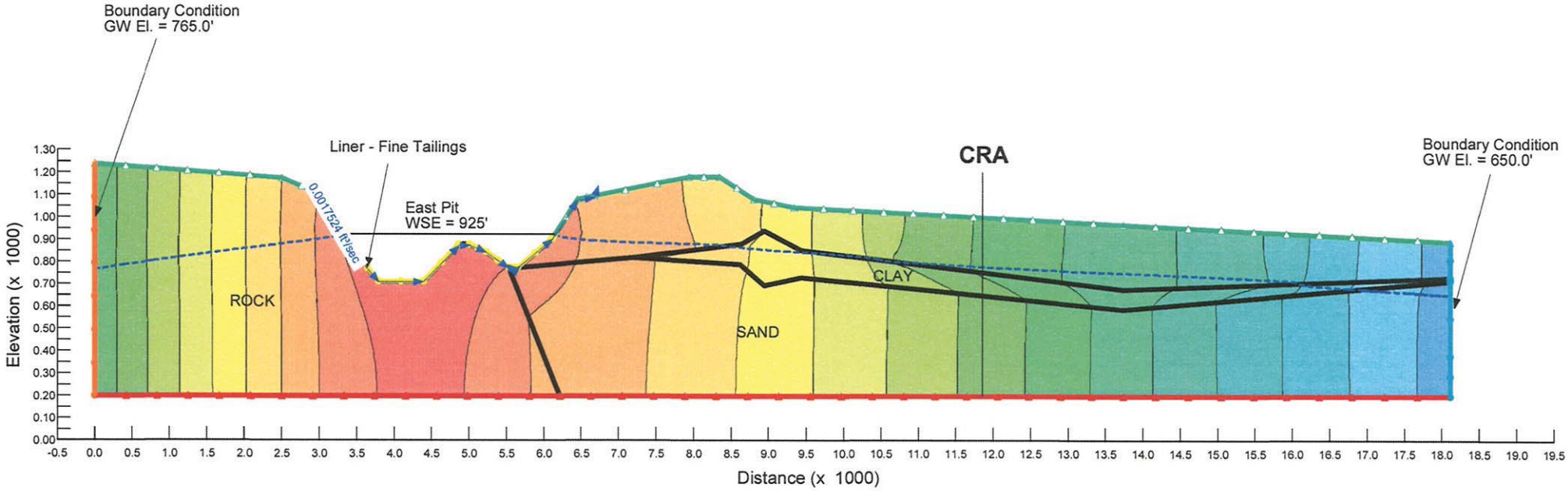
8' LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.



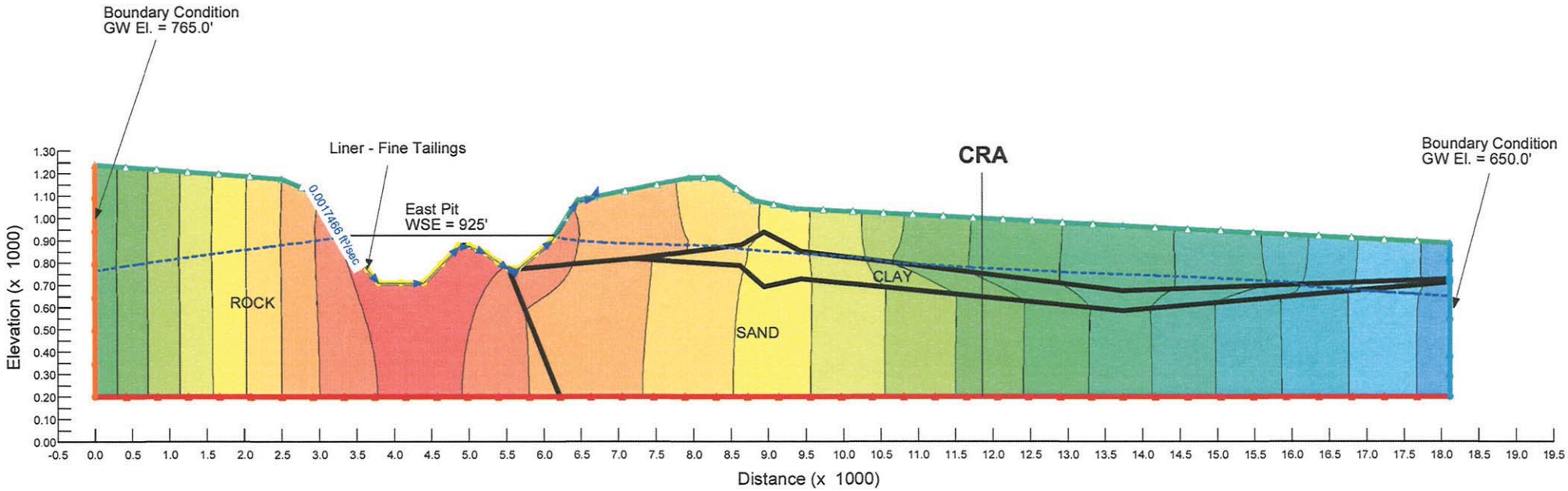
3' LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 20 feet of head.



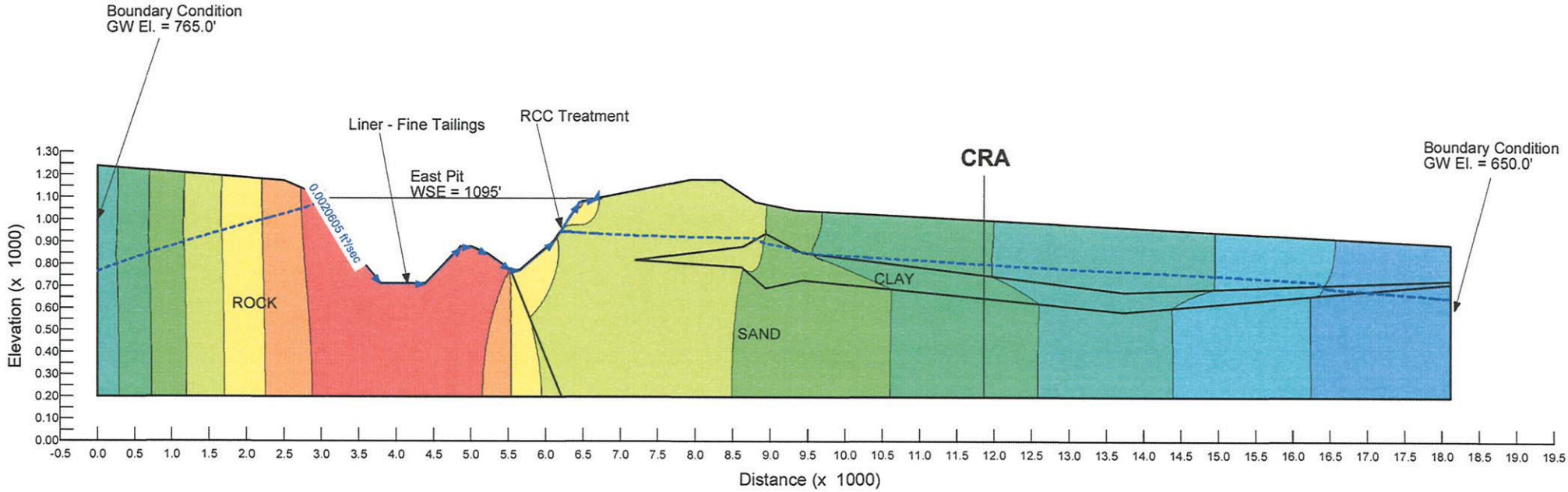
5' LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 20 feet of head.



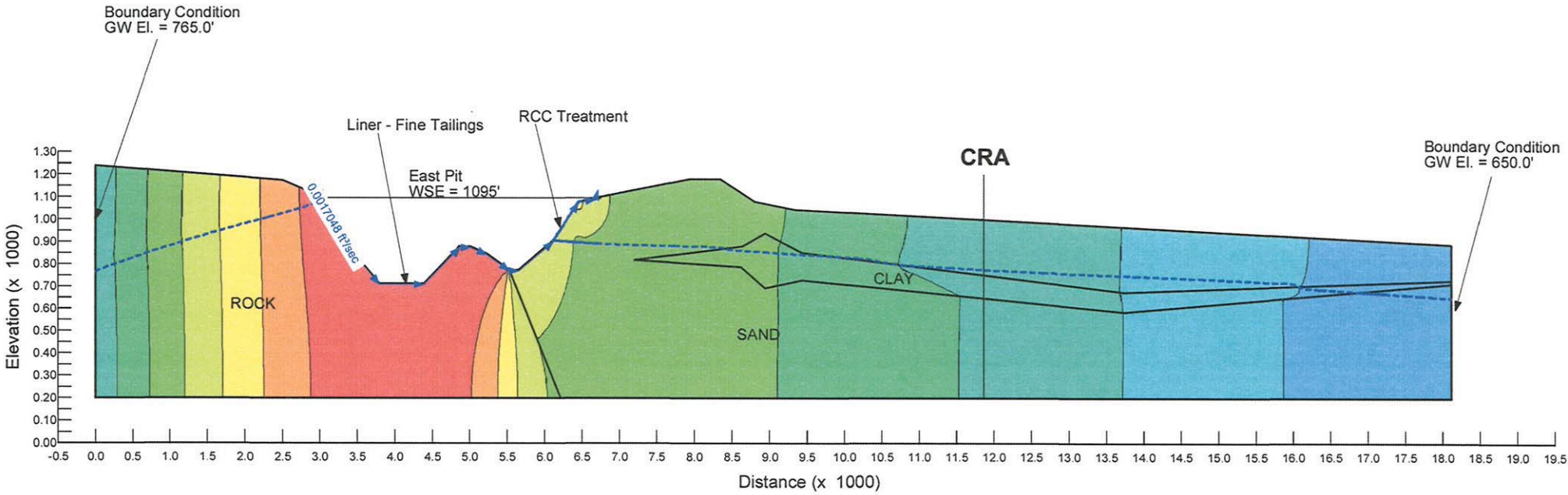
8' LINER

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 20 feet of head.



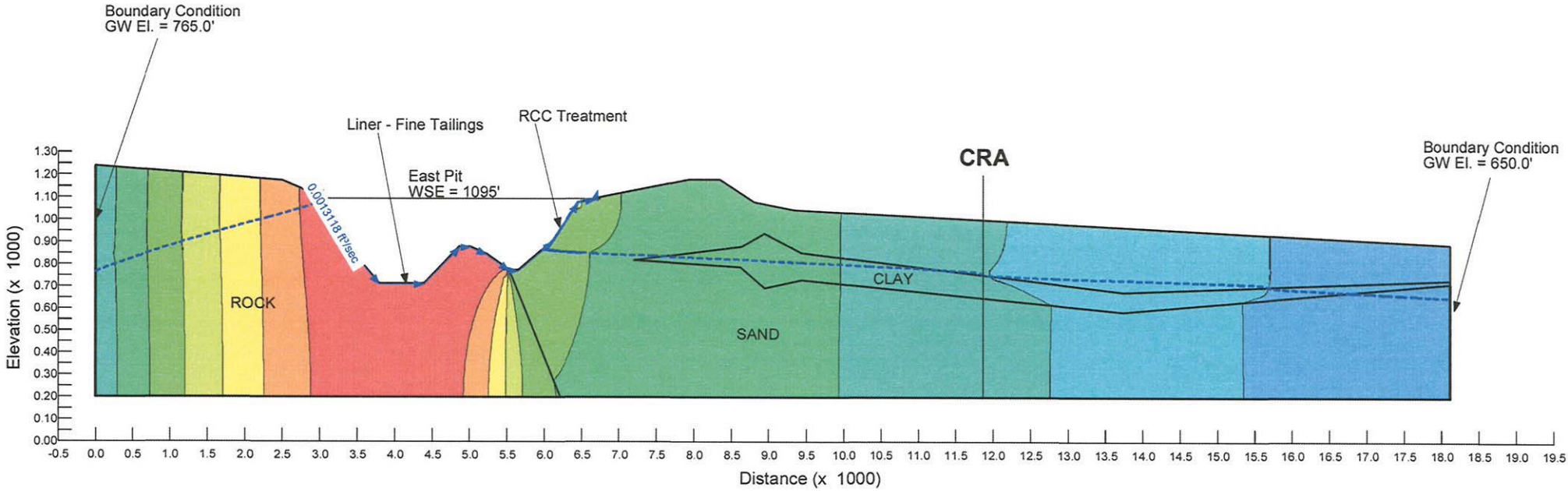
3' LINER W/ GROUTING AND RCC TREATMENT

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.



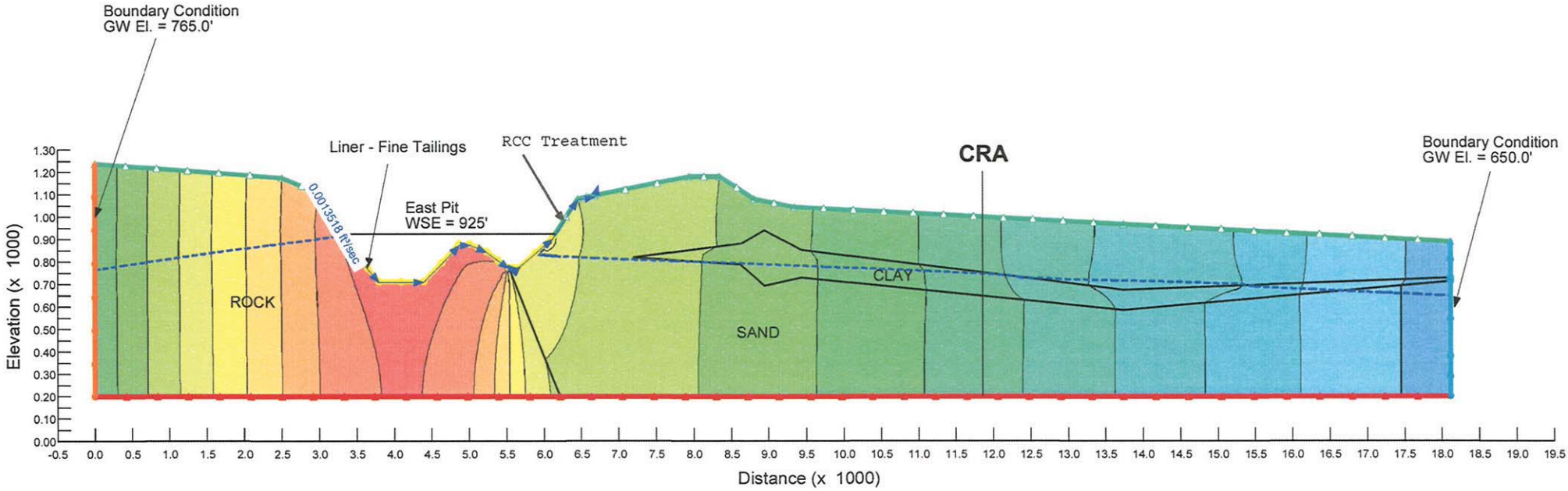
5' LINER W/ GROUTING AND RCC TREATMENT

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.



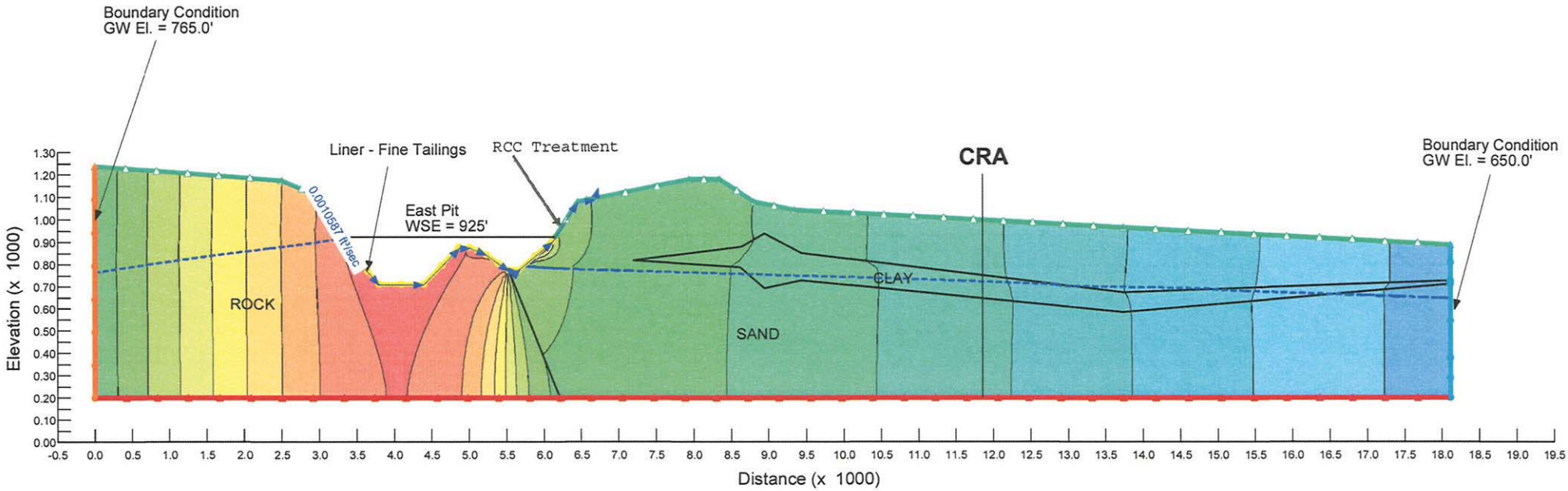
8' LINER W/ GROUTING AND RCC TREATMENT

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.



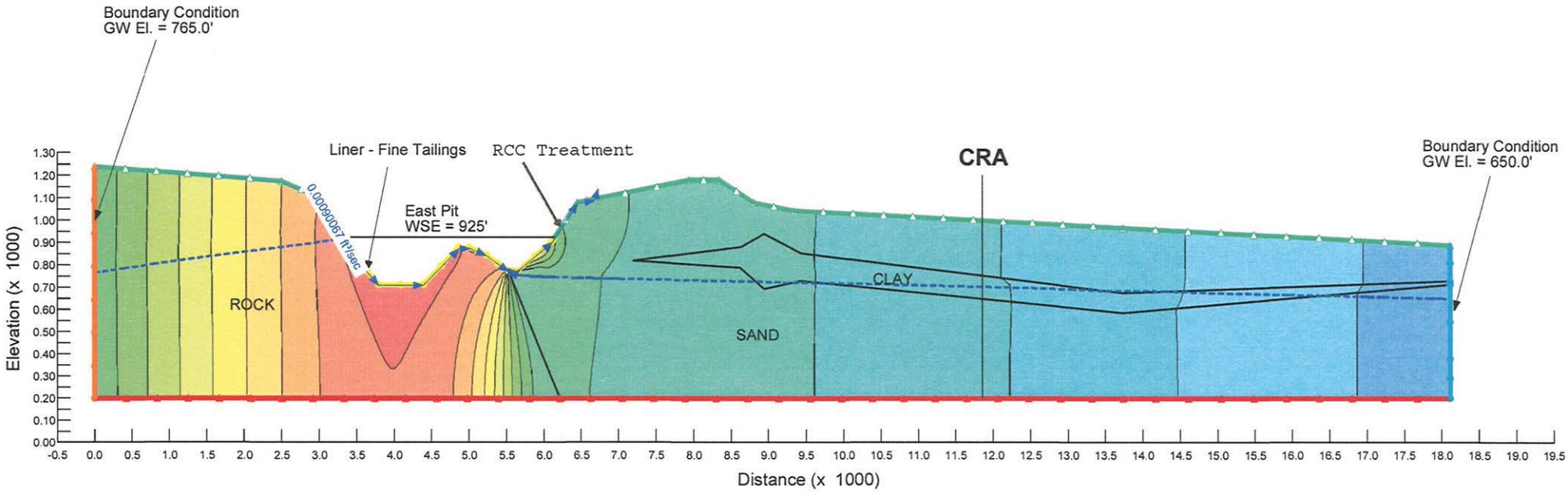
3' LINER W/ GROUTING AND RCC TREATMENT

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 20 feet of head.



5' LINER W/ GROUTING AND RCC TREATMENT

Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 20 feet of head.

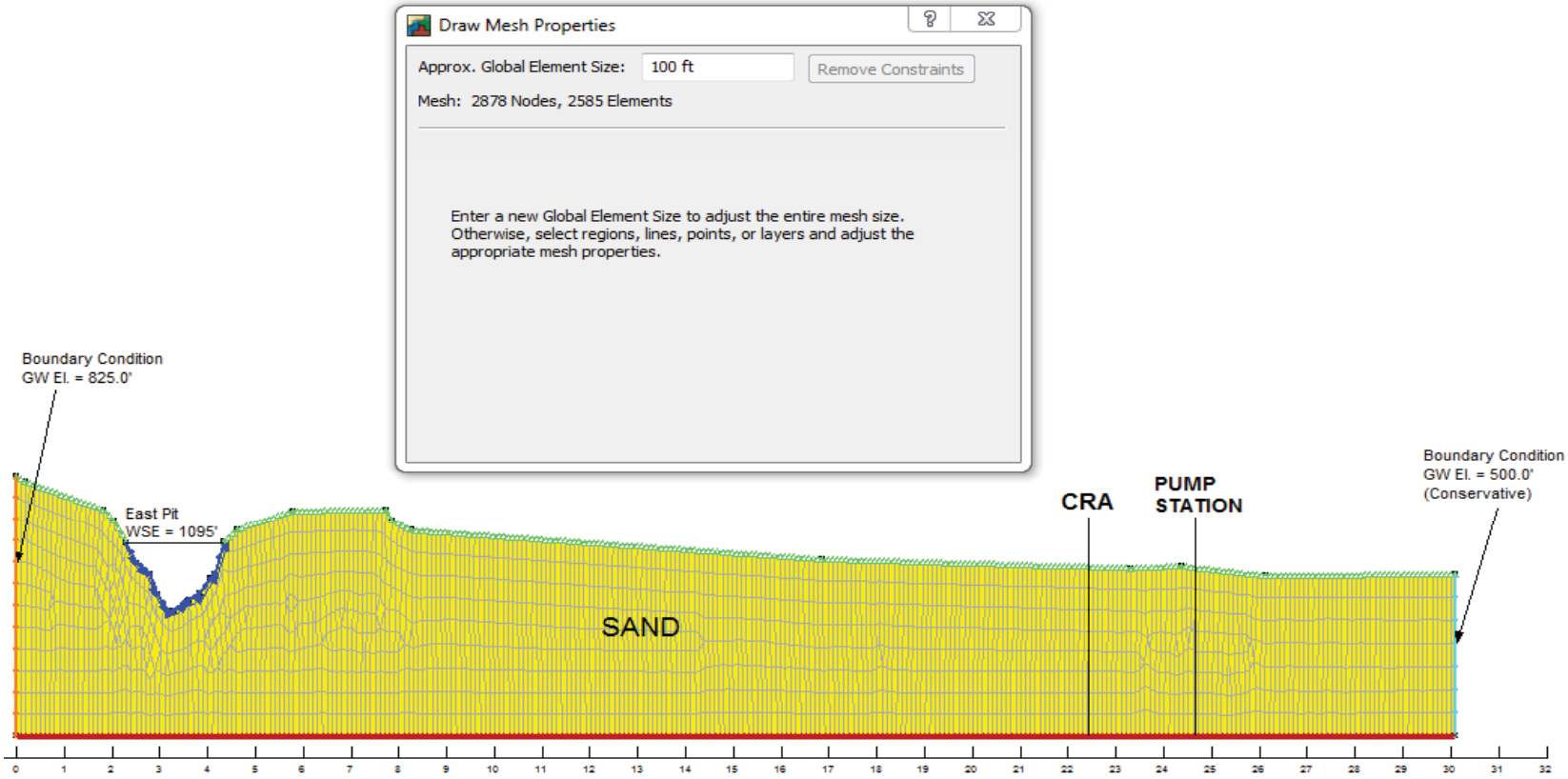


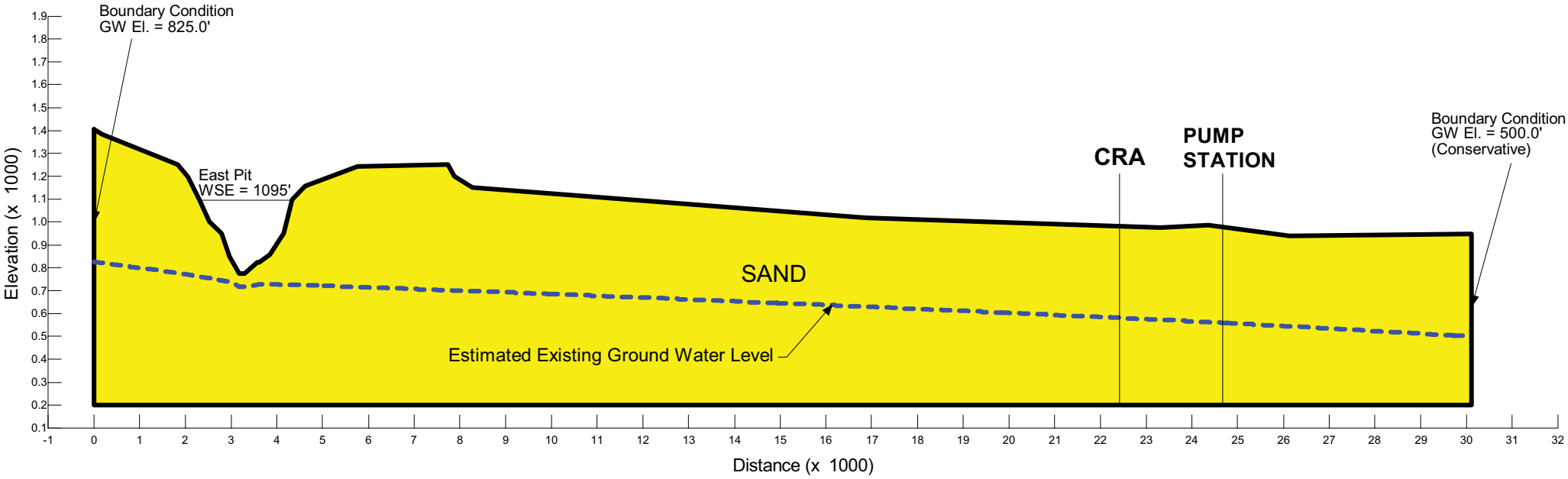
8' LINER W/ GROUTING AND RCC TREATMENT

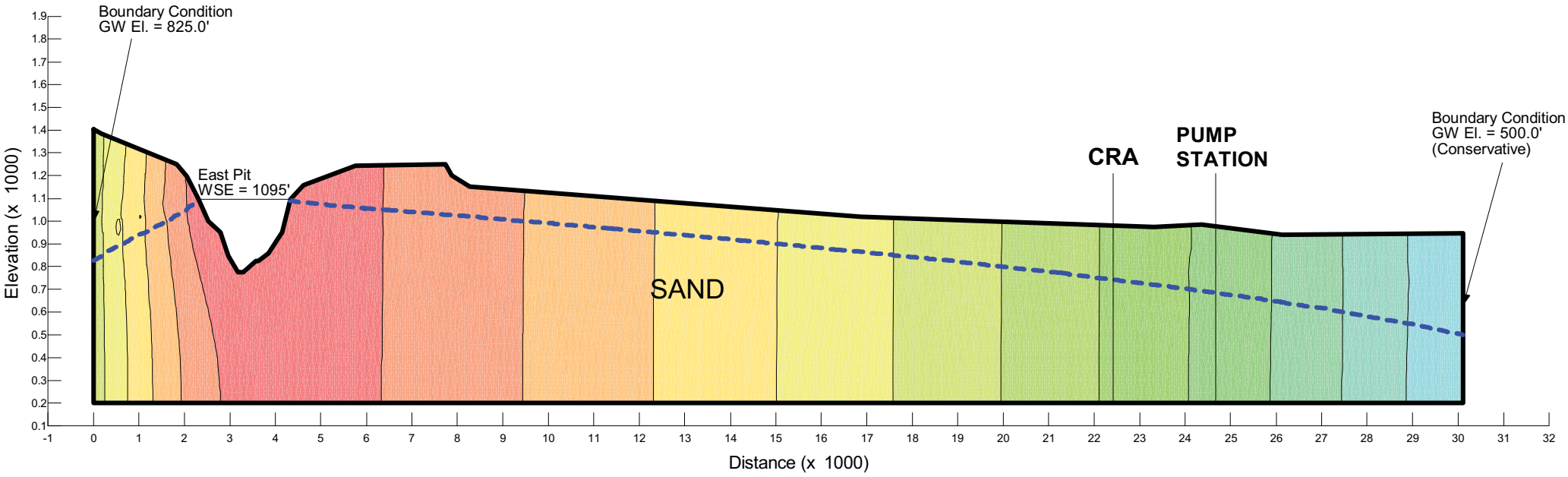
Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 20 feet of head.

GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
1/4/2011
NDM

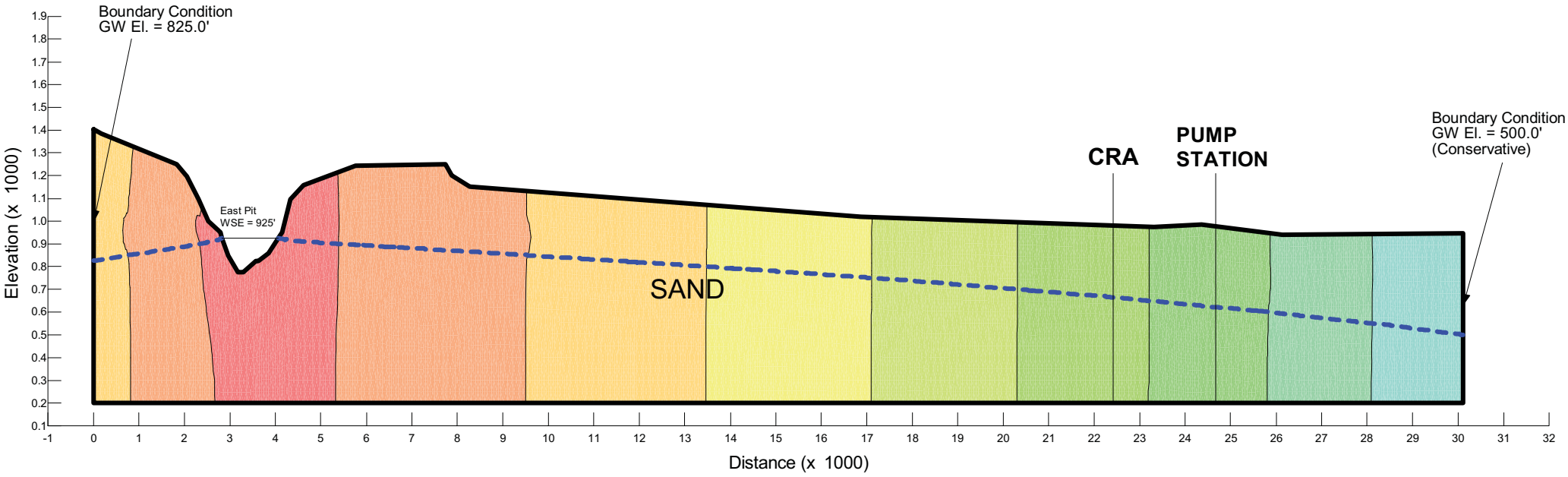
Model Mesh Properties - Lower Reservoir (North-South)




Boundary Condition
GW El. = 825.0'
East Pit
WSE = 1095'
CRA
PUMP
STATION
Boundary Condition
GW El. = 500.0'
(Conservative)
SAND
Estimated Existing Ground Water Level
Elevation (x 1000)
Distance (x 1000)



Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.



Note: The color contouring displayed on the figure illustrates the total head across the cross section. The contour intervals shown are equal to 50 feet of head.

SEEP/W Input
Materials Properties Data

GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
7/24/2008
NDM

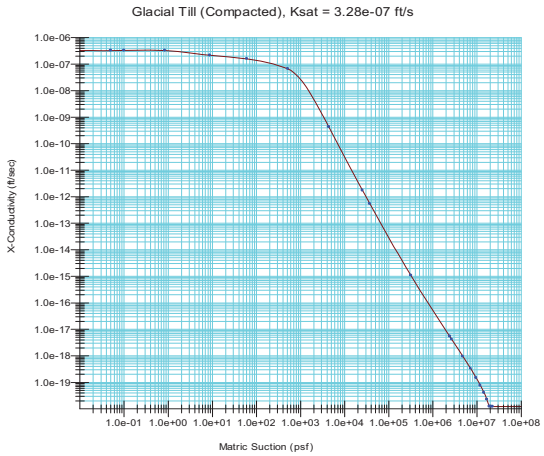
Summary of SEEP/W Material Properties

Material	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/sec)	Conductivity Ratio
Rock – Upper Reservoir (Moderately Fractured)	1.00E-04	3.28E-06	1
Rock – Lower Reservoir (Slightly Fractured)	1.00E-05	3.28E-07	1
Sand	5.00E-03	1.64E-04	0.25
Clay (sandy)	1.00E-05	3.28E-07	1.00
Liner - (fine tailings)	2.16E-06	7.09E-08	1.00
RCC Treatment	1.00E-08	3.28E-10	1.00

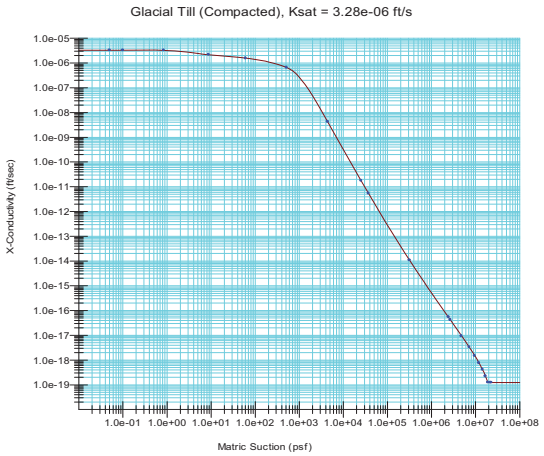
GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
1/4/2011
NDM

Material Properties - Hydrualic Conductivity Functions

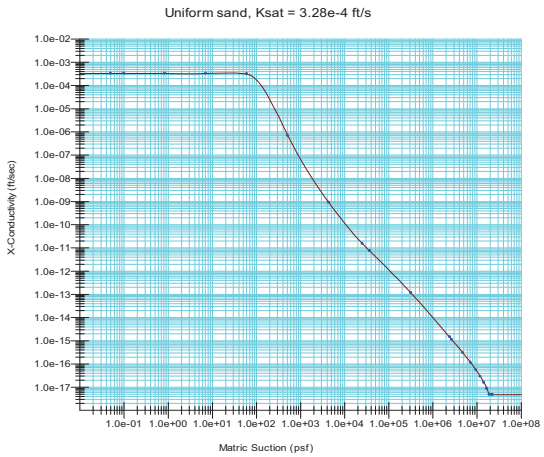
Rock - Lower Reservoir Ratio = 1.0



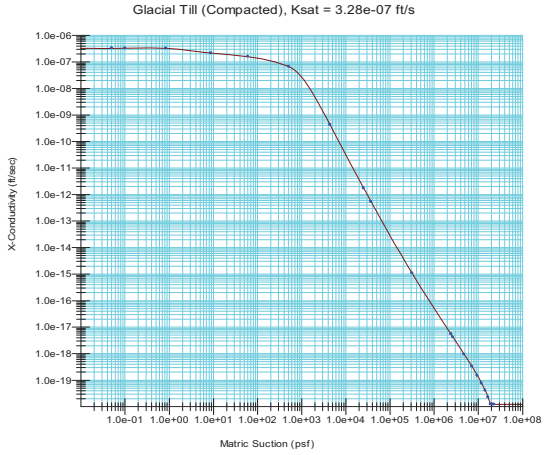
Rock - Upper Reservoir Ratio = 1.0



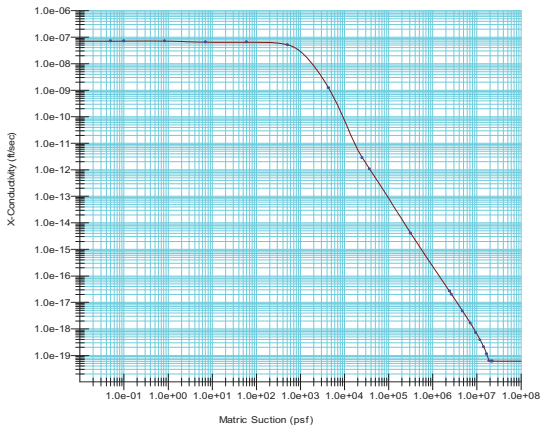
Sand Ratio = 0.25



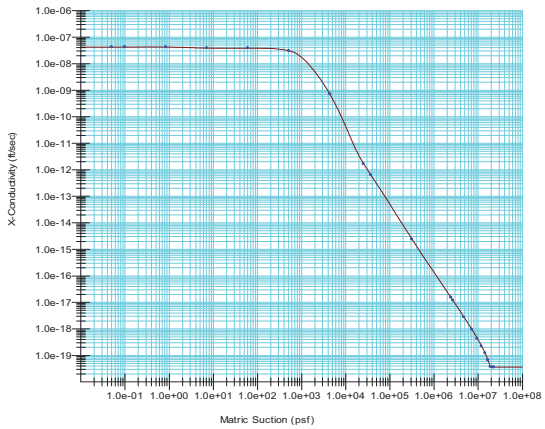
Clay Ratio = 1.0



3' Liner Ratio = 1.0



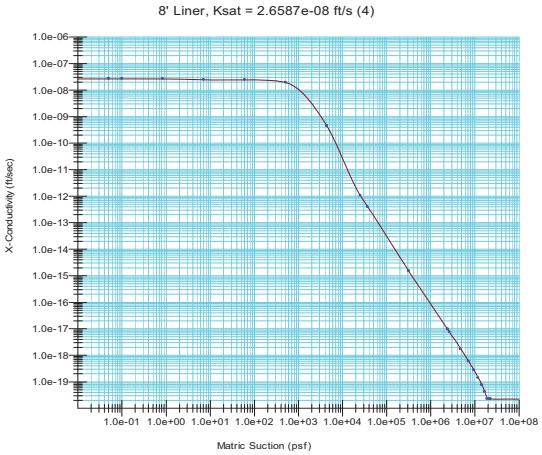
5' Liner Ratio = 1.0



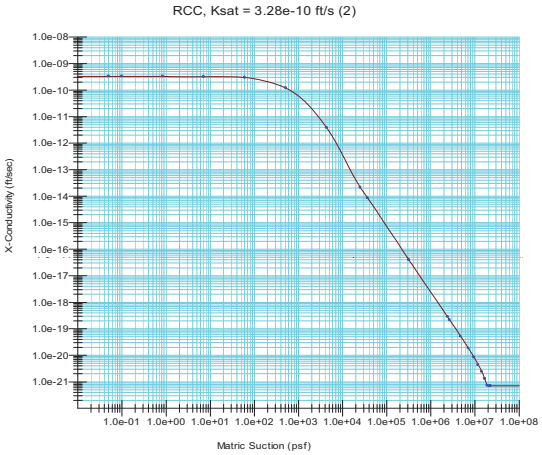
GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
1/4/2011
NDM

Material Properties - Hydrualic Conductivity Functions

8' Liner Ratio = 1.0



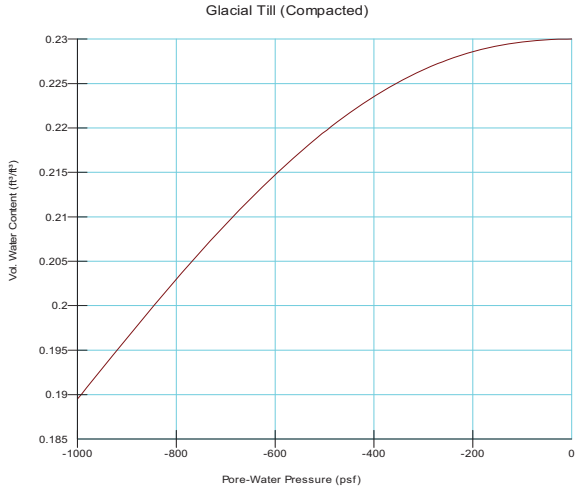
RCC Liner Ratio = 1.0



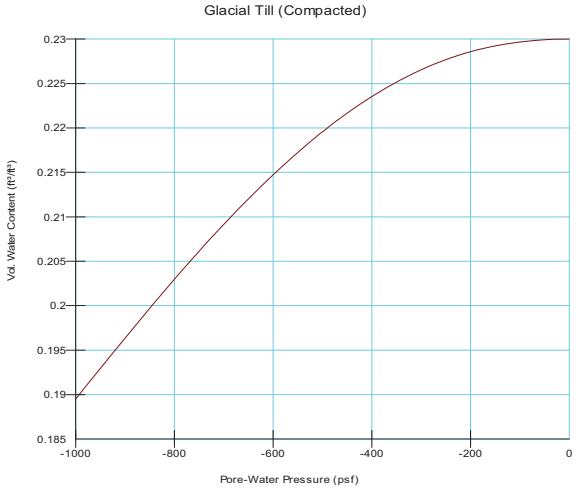
GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
1/4/2011
NDM

Material Properties - Volumetric Water Content Functions

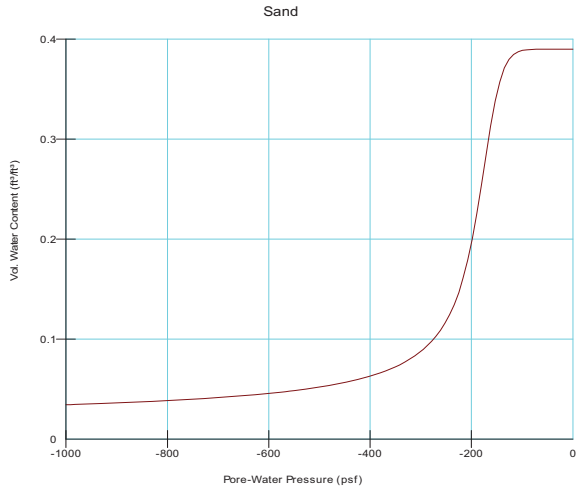
Rock - Lower Reservoir Ratio = 1.0



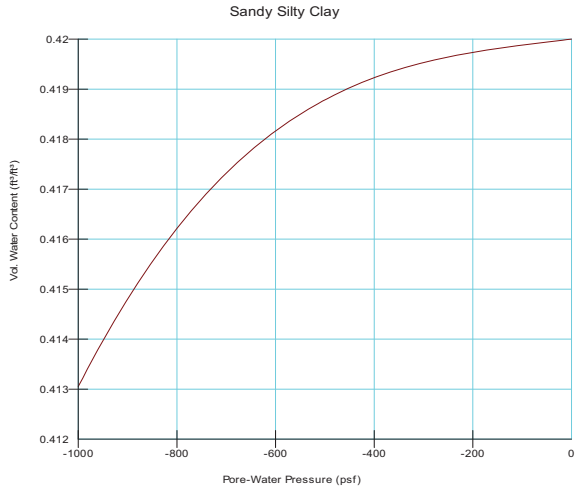
Rock - Upper Reservoir Ratio = 1.0



Sand Ratio = 0.25



Clay Ratio = 1.0



GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
7/24/2008
NDM

Chuckwalla Report, Hydraulic Conductivities Summary

Boring	Description	USCS	Depth	Hydraulic Conductivity (cm/sec)
C-1	Sand	SP	201	1.00E-05
C-1	Clayey Sand	SC	201	2.10E-05
C-1	Silty Sand	SM	322	3.00E-06
C-5	Fat Clay	CH	142	9.20E-10
C-5	Clayey Sand	SC-SM	62	2.70E-07
C-5	Silty Sand	SM	62	3.00E-07
C-9	Silty sand	SM	145	3.50E-05
TP#2	Silty Sand	SM	14	1.20E-04
TP#3	Silty Sand	SM	5	3.90E-04

	Average
SM	**9.14E-05**
SC	**1.06E-05**

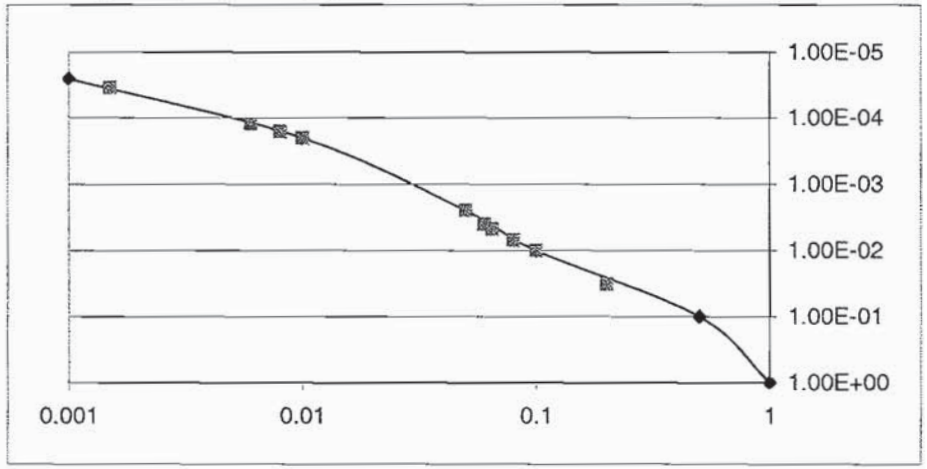
GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
7/24/2008
NDM

Emperical

Boring	Description	USCS	Depth	D5 (mm)	Hydraulic Conductivity (cm/sec)
C-1	Sand w/ Silt	SP-SM	17	0.08	7.00E-03
C-1	Sand w/ Silt	SP-SM	58	0.06	4.00E-03
C-1	Silty Sand	SM	101	0.0015	3.47E-05
C-1	Sand w/ Silt	SP-SM	110	0.0015	3.47E-05
C-1	Sand w/ Silt	SP-SM	123	0.008	1.61E-04
C-1	Sand w/ Silt	SP-SM	423	0.06	4.00E-03
C-5	Sand w/ Grave	SW	59	0.2	3.25E-02
C-5	Gravel w/ S&S	GP-GM	81	0.05	2.50E-03
C-5	Sand w/ Silt	SP-SM	101	0.1	1.00E-02
C-5	Gravel w/ S&S	GP-GM	121	0.065	4.75E-03
C-5	Sand w/ Silt	SP-SM	280	0.006	1.22E-04
C-9	Sand w/ Silt	SW-SM	17	0.05	2.50E-03
C-10	Sand w/ Silt	SP-SM	8	0.01	2.00E-04
C-10	Sand w/ Silt	SP-SM	16	0.06	4.00E-03
C-10	Sand	SP	78	0.08	7.00E-03
C-10	Sand w/ Silt	SP	130	0.05	2.50E-03
C-1	Sand	SP	201	--	1.00E-05
				Average	**4.78E-03**

Lookup Table

D5 (mm)	Hydraulic Conductivity (cm/sec)	Increment
0.001	2.50E-05	0.019444444
0.01	2.00E-04	0.057500000
0.05	2.50E-03	0.150000000
0.1	1.00E-02	0.225000000
0.5	1.00E-01	1.800000000
1	1.00E+00	1.000000000



GEI Consultants, Inc.
080470 Eagle Mountain Pumped Storage Project
Reservoir Seepage Analysis (SEEP/W)
7/24/2008
NDM

Liner - Fine Tailings

Hydraulic Conductivities - cm/sec

Test Type	Min	Max	Average	
Field	9.20E-09	4.30E-07	2.20E-07	
Lab	5.80E-09	8.20E-06	4.10E-06	
Average =	**7.50E-09**	**4.32E-06**	**2.16E-06**	cm/sec
	2.46E-10	1.42E-07	7.09E-08	ft/sec

BOREHOLE NO.	LOCATION NORTHING STATION	LOCATION EASTING OFFSET	GROUND ELEV. FT	DEPTH DRILLED FT	BOTTOM ELEV FT	DEPTH TO BEDROCK FT	CASING BOTTOM DEPTH	CASING BOTTOM ELEV.	DEPTH OF SCREENED INTERVAL FROM	DEPTH OF SCREENED INTERVAL TO	HOLE SIZE IN	DRILLING DATES BEGIN	DRILLING DATES END	HEIGHT OF CASING FT	DEPTH TO 1ST WATER FT	ELEV. OF 1ST WATER FT	5/6/92 SWL ELEV. FT	5/20/92 SWL ELEV. FT	6/3/92 SWL ELEV. FT	6/17/92 SWL ELEV. FT	7/1/92 SWL ELEV. FT	7/15/92 SWL ELEV. FT.	7/29/92 SWL ELEV. FT.	8/13/92 SWL ELEV. FT	8/28/92 SWL ELEV. FT.	BOREHOLE NO.	REMARKS
MON. WELLS																										MON. WELLS	
MW-1	619959.37	2240168.01	1045.00	420	645.00	N/A	385	660.00	325	385	10	4/21/90	5/25/90	2.29	338.24	706.79	706.15	706.37	706.57	706.57	705.78	705.95	706.63	706.44	705.15	705.15	MW-1	MUD ROTARY SEE NOTE (1)
MW-2	618081.48	2210948.20	1083.01	455	628.01	N/A	455	628.01	394	455	10	3/25/90	4/4/90	2.03	394.5	688.11	686.01	685.84	685.84	685.25	685.25	685.16	684.25	683.84	683.92	MW-2	AIR ROTARY (2)
MW-3	618977.39	2232454.20	1048.84	380	668.84	11	350	698.84	299	350	6	4/4/90	4/10/90	1.25	283.43	765.41	758.04	757.84	754.01	756.06	753.72	753.25	752.34	756.01	753.36	MW-3	REVERSE CIRC. HAMMER (3)
MW-4	618842.25	2220376.45	795.73	140	655.73	01	140	655.73	80	140	10	3/26/91	3/25/91	4.17	90.44	705.29	703.90	703.89	703.69	703.19	702.69	703.57	703.61	702.61	702.73	MW-4	REVERSE CIRC. HAMMER (3)
MW-5	618340.71	2238160.12	911.86	245	666.86	235	240	671.86	180	240	10	3/24/91	3/27/91	2.00	206.74	705.12	696.79	698.79	698.39	698.32	698.71	699.34	699.07	697.86	698.73	MW-5	REVERSE CIRC. HAMMER (3)
MW-6	618596.65	2225508.17	1347.89	640	707.89	460	620	727.89	560	620	10	3/21/91	4/9/91	2.75	566.58	781.31	772.14	772.22	772.13	771.77	768.54		769.30	768.56	771.89	MW-6	REVERSE CIRC. HAMMER (3)
MW-7	618416.89	2226597.46	1695.82	765	820.82	01					10.625	9/11/91	9/14/91	2.33	690	915.82		916.45	914.46	915.9	915.82		915.74	970.79	915.40	918.8	MW-7	AIR HAMMER (2)
MW-8(OLD)	619359.83	2220019.00	1768.54	964	804.54	1	N/A	N/A	N/A	N/A	6.25	9/20/91	9/30/91	N/A	910	858.54											MW-8(OLD)	AIR HAMMER (2) (4) (13)
MW-8(NEW)	619359.83	2220019.00	1768.54	871	897.54	11	840	928.54	781.5	843.5	13.5	3/31/92	4/21/92	4.45	868	900.54		936.53	937.56	935.8	936.84	936.08	936.75	935.82	937.04	MW-8(NEW)	AIR HAMMER (3)
MW-9	619612.02	2229356.54	2256.92	1344	752.92	1	N/A	N/A	N/A	N/A	6.5	10/12/91	10/31/91	N/A													MW-9	AIR HAMMER (2) (4)
MW-10	622825.38	2221819.48	2311.55	1213.7	1097.85	71	1170	1140.35	1069	1173	13.5	2/16/92	3/9/92	5.22	500	1825.35	1464.85	1448.44	1429.06	1427.27	1415.27	1271.26	1285.23	1285.32	1282.82	MW-10	MUD ROTARY (3)
MW-11	617755.19	2221467.83	1781.25	1130	656.25	20	1115	666.25	662.7	916.7	13.5	3/1/92	3/23/92	0.92	925	856.25		1067		944.17		943.17	915.92	918.25	942.96	MW-11	MUD ROTARY AND AIR HAMMER (3) (12)
MW-12	624274.96	2239034.83	1208.77	550	658.77	37	430	778.77	365	430	13.5	3/23/92	3/25/92	3.37	490	718.77	623.66	602.72	636.11	637.91	655.44	654.56	652.62	646.44	646.4	MW-12	AIR HAMMER (3)
MW-13	619099.2	2222350.31	1251.48	620	631.48	31	564.3	686.78	550	564.3	13.75	4/13/92	4/28/92	4.58	510.8	741.48	776.23	774.11	737.70	762.77	763.61	761.89	760.64	760.94	758.4	MW-13	AIR HAMMER (3)
BOREHOLES																										BOREHOLES	
CH-2	621283.17	2225514.91	2266.21	1179	1109.21	10	1179	1108.06	N/A	N/A	3.8	2/21/92	5/13/92	2.92	1120	1158.21				1120.33	1116.92	1115.87	1121.44		1117.79	CH-2	CORED (5) (14)
CH-3	619921.91	2228100.79	1758.67	681	1077.67	10	N/A	N/A	N/A	N/A	3.8	5/6/92	5/21/92	N/A	A	N/A										CH-3	CORED (4) (5) (15)
CH-3A	619921.91	2228100.79	1758.67	904.5	854.17	10	900	858.67	N/A	N/A	3.00-3.8	5/21/92	4/10/92	1.08	859	899.67	976.75		923.56	907.30	908.87	907.59	912.63	908.92	906.09	CH-3A	CORED TRICONE 0-122' (14)
CH-4	625160.42	2229315.46	1905.98	920	875.96	101	920	875.96	N/A	N/A	3.00-3.8	5/12/92	5/29/92	1.42	875	1030.98	1505.73	1501.73	1505.29	1496.06	1493.65	1491.65	1487.14	1487.9	1485.36	CH-4	CORED (5) (7) (14)
CH-5A	619921.91	2234444.36	1657.20	900	757.2	13	900	757.2	N/A	N/A	3.00-3.8	4/8/92	4/28/92	1.50	791	866.2										CH-5A	CORED (5) (14)
CH-10	622586.74	2221686.07	2307.76	1389	918.76	71	1389	918.76	N/A	N/A	3.8	5/13/92	5/5/92	0.25	1309	998.76				1250.58		1315.51				CH-10	CORED (5) (14)
CH-11	617737.38	2221490.64	1781.59	1100	681.59	19	1100	681.59	N/A	N/A	3.8	4/14/92	4/28/92	N/A	910	871.59										CH-11	CORED (5) (14) (15)
CH-12	624000.32	2228697.22	1207.69	545	662.69	37	525	682.69	N/A	N/A	3.8	5/12/92	5/17/92	N/A	475	732.69										CH-12	CORED (5) (14)
PECOM																										PECOM	
P-1	618311.22	2226815.26	876.70	270	606.7	15	257	619.7	207	257	5.625	3/20/92	3/22/92	2.75	200	676.7	699.37	700.22	700.49	699.45	698.24	698.79	698.41	697.37	697.66	P-1	AIR HAMMER (5)
P-2	619059.91	2229847.01	1744.16	900	784.16	20	865	789.16	805	865	6.5-6.25	3/25/92	3/28/92	2.00	856	888.16	917.49	917.49	917.52	917.7	918.91	920.25	922.10	918.33	920.01	P-2	AIR HAMMER (5)
3	615966.93	2234836.79	1241.77	675	566.77	181	663	578.77	613	663	6	3/27/92	4/22/92	1.83	560	681.77	736.49	736.21	735.4	735.19	735.27	734.97	733.52	733.02	733.51	P-3	AIR HAMMER & SWAGE (5)
4	615377.15	2230760.68	1364.50	625	759.5	34	625	759.5	575	625	5.5	4/9/92	4/28/92	1.08	554	830.5					913.25	919.25	830.24	916.83	918.87	P-4	AIR HAMMER & SWAGE (5)
P-5	614425.58	2230849.39	1367.00	625	742	37	675	712	575	625	5.5	4/11/92	4/28/92	2.00	525	842						918.08	841.75	915.75	917.75	P-5	AIR HAMMER & SWAGE (5)
P-6	619199.92	2232275.89	1052.51	425	627.51	01	409	643.51	309	409	5.5	4/22/92	4/28/92	2.83	285	767.51	791.26	790.88	786.02	782.38	779.51	775.76	772.42	769.01	766.74	P-6	AIR HAMMER (5)
P-7	619091.96	2232230.67	1050.96	425	625.96	01	423	627.5	373	423	5.5	4/24/92	4/26/92	2.42	275	775.96	756.29	765.29	755.79	752.75	754.34	753.67	750.25	754.58	751.84	P-7	AIR HAMMER (5)
P-8	619090.92	2232037.93	1050.80	400	650.8	01	373	677.5	323	373	5.5	4/25/92	4/26/92	2.29	155	895.8	779.02	780.71	774.68	767.1	765.14	764.35	763.53	753.14	762.6	P-8	AIR HAMMER (5)
P-9			1000'	525	505'		260	520	510	470	5.25	5.625	4/29/92	5/6/92	0.75	475	555'			600.*	599.56*	600.25	600.25	600.46	599.5	601.75	599.58	P-9	AIR HAMMER & SWAGE (5)
P-10			1120'	675	445'		180	675	445	625	5.625	5.625	5/1/92	5/11/92	2.33	570	550'			591*	591.21*	591.41	591.15	591.68	590.25	592.41	590.67	P-10	AIR HAMMER & SWAGE (5)
P-11			900'	485	445'	N/A		470	372	350	479	5.5	5/12/92	5/18/92	3.58	425	505'			576*	577.31*	577.66	577.67	578.57	577.8	580.34	578	P-11	AIR HAMMER & SWAGE (5)
P-12			842'	500	342'	N/A		500	342	450	500	5.625	5/20/92	6/3/92	2.69	420	422'					509.25	502.75	503.26	502.06	503.81	500.61	P-12	AIR HAMMER & SWAGE (5)
P-13			1328'	725	635'	0	725	635	675	725	5.5	6/7/92	6/8/92	2.41	650	678'						800.25	800.71	801	800.06	802.41**	801.65	P-13	AIR HAMMER (5)

NOTES:

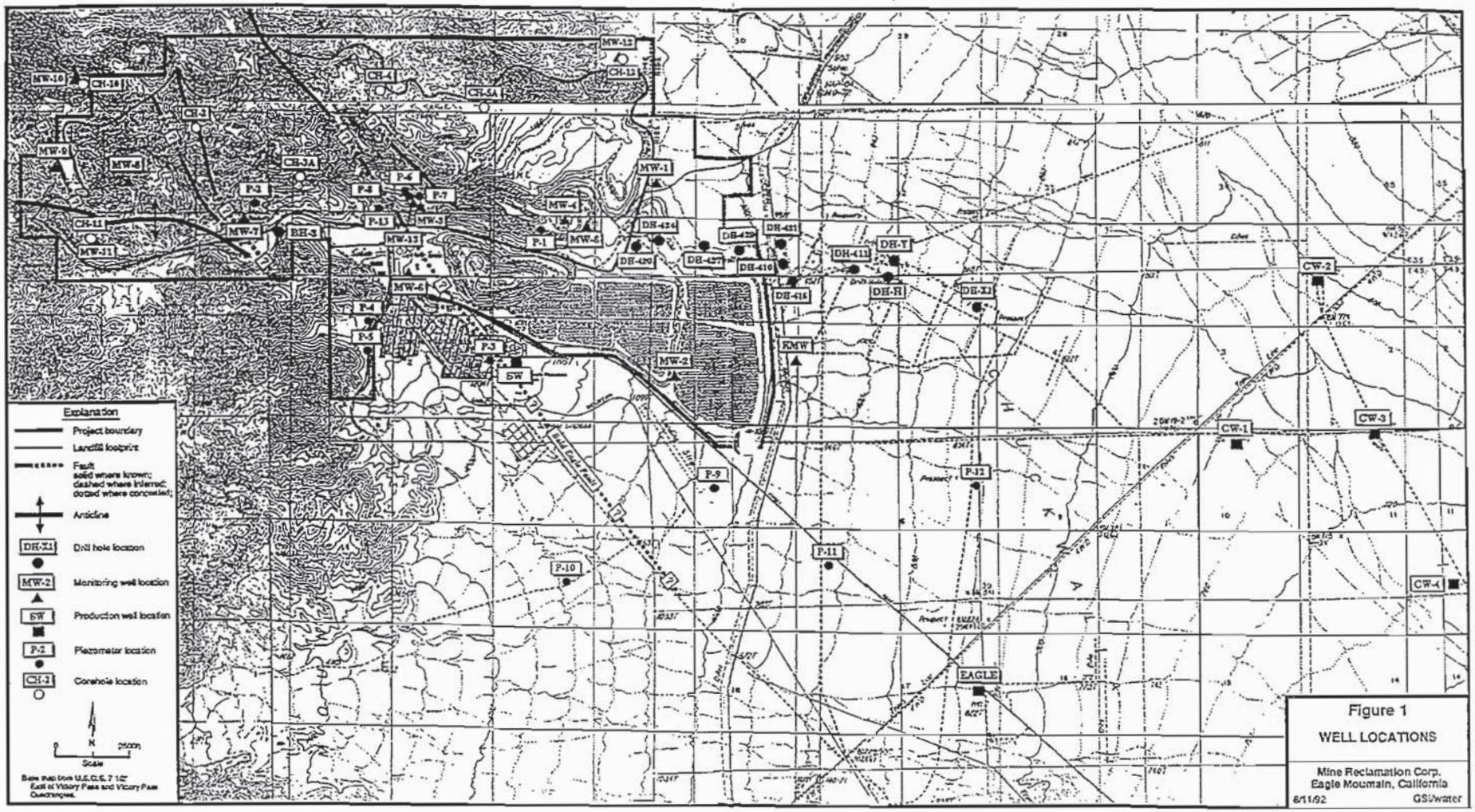
* APPROXIMATE ELEVATIONS - NOT YET SURVEYED
(1) PIONEER DRILLING
(2) BEYLIK DRILLING
(3) LAYNE ENVIRONMENTAL DRILLING
(4) NOT CONSTRUCTED
(5) TONTO DRILLING
(6) PARKS DRILLING
(7) WELL WAS ARTESIAN WHEN DRILD
(11) VIDEO LOG
(12) E-LOG, GAMMA LOG, CASPER LOG, SONIC LOG
(13) E-LOG, GAMMA LOG
(14) PHOTOS TAKEN OF CORE
(15) HOLE ABANDONED
** READING ACCURATE TO WITHIN ONE FOOT

BOREHOLE DATA SUMMARY SHEET
UPDATED 8/27/92
Eagle Mountain Landfill, Riverside County, California
MINE RECLAMATION CORPORATION
GSWater

BOREHOLE NO.	LOCATION NORTHING STATION	LOCATION EASTING OFFSET	GROUND ELEV. FT	DEPTH DRILLED FT	BOTTOM ELEV FT	DEPTH TO BEDROCK FT	CASING BOTTOM DEPTH	CASING BOTTOM ELEV.	DEPTH OF SCREENED INTERVAL FROM	DEPTH OF SCREENED INTERVAL TO	HOLE SIZE IN	DRILLING DATES BEGIN	DRILLING DATES END	HEIGHT OF CASING FT	DEPTH TO 1ST WATER FT	ELEV. OF 1ST WATER FT	5/6/92 SWL ELEV. FT	5/20/92 SWL ELEV. FT	6/3/92 SWL ELEV. FT	6/17/92 SWL ELEV. FT	7/1/92 SWL ELEV. FT	7/15/92 SWL ELEV. FT.	7/22/92 SWL ELEV. FT.	8/13/92 SWL ELEV. FT.	9/25/92 SWL ELEV. FT.	BOREHOLE NO.	REMARKS
DESERT ROCK																											
DH-420	617787.38	2240015.51	1082.73											2.11						859.9	860.11	860.44	859.44	859.44	860.38	DH-420	
DH-421	617836.42	2243332.57	975.32	107.5	-99.48	570						11/27/54	12/5/55	1.56			666.18	665.90	666.20	666.1	666.02	666.23	665.9	667.61	665.97	DH-421	
DH-411	617104.29	2246748.33	928.48											0.58			670.19	673.03	673.17	672.8	672.73	672.87	672.05	670.74	671.82	DH-411	
DH-H	616745.80	2247830.25	970.48	153.0	-618.52	661						11/23/54	12/2/55	1.06			654.73	654.98	654.94	654.71	656.29	655.6	654.66	655.31	655.05	DH-H	
DH-X1	616114.99	2250436.42	871.29	1280	-318.71	1270						1/3/55	1/24/55	1.58			645.45	645.49	643.541	645	647.04	648.45	645.29	648.85	644.21	DH-X1	
DH-Y	617346.81	2247822.56	913.68	1548.6	-633.42	1156						2/3/55	12/10/55	0.67			665.75	675.58	675.881	675.5	675.43	675.65	674.58	676.75	674.5	DH-Y	
DH-410	617075.63	2244534.30	972.41											0.65			670.12	669.62	669.921	669.65	671.29	672.86	669.04	670.54	668.46	DH-410	
DH-415	616669.21	2244550.52	978.71											0.25			622.86	682.71	683.17	682.86	683.04	682.73	682.73	684.5	682.88	DH-415	
DH-424	617792.85	2240812.57	1064.42											0.17			698.67	698.76	699.081	698.51	698.42	698 **	697.13	697.05	698.13	DH-424	
MISC. WELLS																										MISC. WELLS	
SCHOOL			1240'	748.5	491.5'	211.5	740	500'						1.75				722.'	719'	718.75'	718.08'	718.46'	718.62'	716.25	718.33	SCHOOL	ROTARY
CWell			742'	1328	-586'																					CWell	MUD ROTARY
CWell2			792'	687	-94'		535	258'	331	527				1.00						468.5'	470.42'	466'	468.34'	471.82	468.83	CWell2	MUD ROTARY
CWell3			737'	699	38'		570	167'	271	562				.5									474.07'	476.17	475.04	CWell3	MUD ROTARY
CWell4			699'	660	39'		500	199'	170	410																CWell4	MUD ROTARY
KAISER MW	614092.28	2244687.13	978.48											2.25			668.41	669.16	666.41	665.10	668.59	668.86	668.20	667.74	667.58	KAISER MW	

NOTES:
* APPROXIMATE ELEVATIONS
** READING ACCURATE TO WITHIN ONE FOOT

BOREHOLE DATA SUMMARY SHEET
UPDATED 8/27/92
Eagle Mountain Landfill, Riverside County, California
MINE RECLAMATION CORPORATION
GS/Water


Explanation
Project boundary
Landfill footprint
Fault
solid where known;
dashed where inferred;
dotted where concealed;
Anticline
DH-X1 Drill hole location
MW-2 Monitoring well location
SW Production well location
P-2 Piezometer location
CH-1 Corehole location
Scale
Base map from U.S.G.S. 7 1/2' East of Victory Pass and Victory Pass Quadrangles.
MW-10
CH-10
MW-9
MW-8
CH-3
CH-3A
CH-4
CH-5A
MW-12
CH-12
MW-1
P-6
P-7
P-8
P-13
MW-3
MW-4
MW-5
P-1
MW-7
BH-3
MW-11
CH-11
MW-13
MW-6
P-4
P-5
P-3
SW
MW-2
DH-424
DH-425
DH-421
DH-420
DH-427
DH-410
DH-411
DH-Y
DH-416
DH-H
DH-X2
KMW
CW-2
CW-1
CW-3
CW-4
P-9
P-12
P-10
P-11
EAGLE
Figure 1
WELL LOCATIONS
Mine Reclamation Corp.
Eagle Mountain, California
8/11/92
GSI/water

BORING LOG

SCS ENGINEERS

PROJECT: EAGLE MOUNTAIN
LOCATION:
JOB NUMBER: 0187073.03
GEOLOGIST / ENGINEER: B. GARBACCIO / K. USTER
DRILLER: PIONEER
DRILL RIG: FAILING F 8
DRILLING METHOD: MUD ROTARY

HOLE / WELL #: M W - 1
DIAMETER: 10 "
TOTAL DEPTH: 400 '
DATE STARTED: APRIL 27, 1989
DATE COMPLETED: MAY 16, 1989
SAMPLING DEVICE: ——
PAGE: 1 OF 7

DEPTH (FEET)	SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS / FOOT	USCS SYMBOL	DESCRIPTION
0		10" DIAMETER LOCKING MONUMENT COVER				DIRECT AIR ROTARY USED TO SET STEEL CASING
1						
2						
3						
4						LIGHT TAN SILTY FINE TO VERY COARSE SAND WITH 25% GRAVEL TO 2" (BOULDERS > 1 FOOT OBSERVED IN BOREHOLE) GRAVEL IS MOSTLY GRANITE WITH EPIDOTE, VEIN QUARTZ AND MINOR MAGNETITE - HEMATITE ORE
5		5" DIAMETER SCHEDULE 80 PVC				
6						
7		10" 10" DIAMETER STEEL CASING				
8						
9						
10						
11						
12						MUD ROTARY
13						MUD REMOVES FINES
14						
15		CONCRETE - BENTONITE GROUT				
16						
17						
18						
19						
20						

BORING LOG

PROJECT: EAGLE MOUNTAIN
JOB NUMBER: 0187073.03

HOLE / WELL #: M W - 1
PAGE: 3 OF 7

DEPTH (FEET)	SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS / FOOT	USCS SYMBOL	DESCRIPTION
90						
95						SAME AS ABOVE 40% QUARTZ, 40% FELDSPAR, 20% DARK COLORED GRAINS
100						
105		5" DIAMETER SCHEDULE 80 PVC				
110						CUTTINGS ARE COARSE SAND SIZED 50% QUARTZ, 40% FELDSPAR, 10% DARK COLORED GRAINS
115						
120		CONCRETE - BENTONITE GROUT				45% QUARTZ, 40% FELDSPAR, 15% DARK COLORED GRAINS
125						
130						
135						
140						
145						50% QUARTZ, 35% FELDSPAR, 15% DARK COLORED GRAINS
150						

BORING LOG

PROJECT: EAGLE MOUNTAIN
JOB NUMBER: 0187073.03
HOLE / WELL #: MW-1
PAGE: 4 OF 7

DEPTH (FEET)	SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS / FOOT	USCS SYMBOL	DESCRIPTION
155						
160						45% QUARTZ, 40% FELDSPAR, 15% DARK COLORED GRAINS
165						
170		5" DIAMETER SCHEDULE 80 PVC				
175						
180						
185						
190		CONCRETE - BENTONITE GROUT				190' - 245' SILT - CLAY, VERY LITTLE SAND IN CUTTINGS, SLOW DRILLING
195						
200						
205						
210						
215						

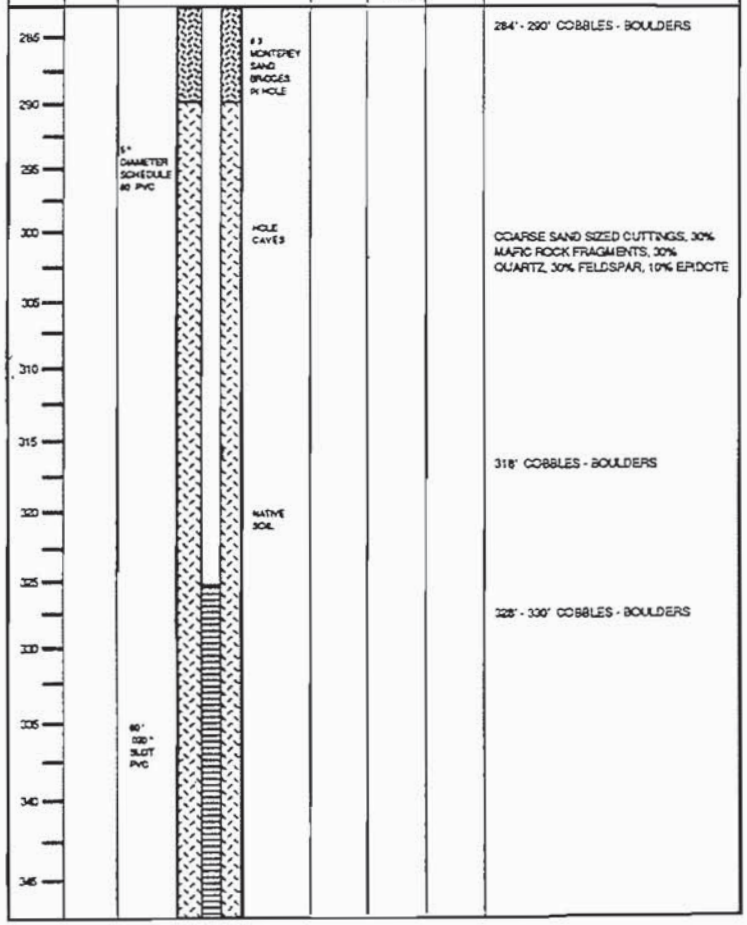
BORING LOG

PROJECT: EAGLE MOUNTAIN
JOB NUMBER: 0187073.03
HOLE / WELL #: MW-1
PAGE: 5 OF 7

DEPTH (FEET)	SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS / FOOT	USCS SYMBOL	DESCRIPTION
220						
225						
230						
235		5" DIAMETER SCHEDULE 80 PVC				
240		CONCRETE - BENTONITE GROUT				
245						COARSE SAND SIZED GRAINS, SURROUNDED TO ANGULAR, 50% QUARTZ; 25% FELDSPAR, 25% EPIDOTE, IRON ORE, GRANITE FRAGMENTS
250						
255						
260						260' COBBLES - BOULDERS
265						264' COBBLES - BOULDERS
270		BENTONITE				
275						
280		#3 MONTEREY SAND				

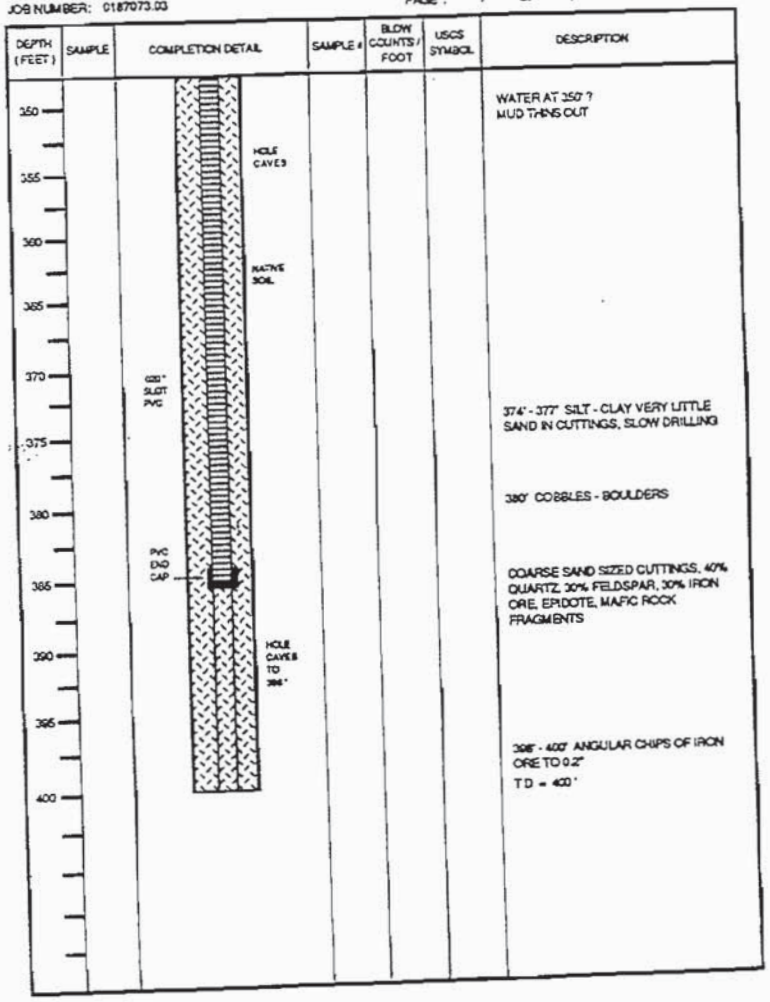
BORING LOG

PROJECT: EAGLE MOUNTAIN
JOB NUMBER: 0187073.03
HOLE / WELL #: MW-1
PAGE: 6 OF 7



BORING LOG

PROJECT: EAGLE MOUNTAIN
JOB NUMBER: 0187073.03
HOLE / WELL #: MW-1
PAGE: 7 OF 7



BORING LOG

SCS ENGINEERS

PROJECT: EAGLE MOUNTAIN
LOCATION:
JOB NUMBER: 0187073.09
GEOLOGIST / ENGINEER: B. GARBACCIO
DRILLER: BEYUK
DRILL RIG: PORTADRILL
DRILLING METHOD: AIR ROTARY / MUD ROTARY

HOLE / WELL #: BH 4 / MW 2
DIAMETER: 10"
TOTAL DEPTH: 455'
DATE STARTED: MARCH 28, 1990
DATE COMPLETED: APRIL 4, 1990
SAMPLING DEVICE: CYCLONE
PAGE: 1 OF 9

DEPTH (FEET)	SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS / FOOT	USCS SYMBOL	DESCRIPTION
0		LOCKING MONUMENT COVER				START WITH AUGER TO SET SURFACE CASING
1		15' 10" DIAMETER STEEL SURFACE CASING			SC - GC	0 - 15' - TAN - LIGHT BROWN CLAYEY SAND WITH GRAVEL, COBBLES AND BOULDERS (TO 6 " OBSERVED); SUBANGULAR TO SUBROUNDED; GRANITE, QUARTZITE, IRON ORE; DRY
2						
3						
4						
5						
6						
7						
8		CONCRETE GROUT TO SURFACE				
9						15' - 60' - DRILLED WITH 8 " DOWNHOLE HAMMER
10						
11						
12		4" DIAMETER CARBON STEEL CASING WITH WELDED COUPLINGS				CUTTINGS SEGREGATE IN CYCLONE
13						
14						
15					SP	SAND WITH GRAVEL TO 1 " OBSERVED, GRANITE WITH GREENSCHIST ALTERATION, CALC SILICATE ROCK, QUARTZITE, IRON ORE; NO CEMENT, SMALLER FRACTION IS MORE ANGULAR (FRAGMENTS OF LARGER ROCKS)
16						
17						
18						
19						
20						20' - SLIGHT CAVING

BORING

PROJECT: EAGLE MOUNTAIN
JOB NUMBER: 0187073.09

HOLE / WELL #: BH 4 / MW 2
PAGE: 2 OF 9

DEPTH (FEET)	SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS / FOOT	USCS SYMBOL	DESCRIPTION
30						
40					SP	40' - FINES ARE LOST FROM CYCLONE COARSE SAND AND GRAVEL TO 2 " OBSERVED, ANGULAR TO SUBROUNDED, GRANITE, IRON ORE, QUARTZITE; NO CEMENT OR CLAY OBSERVED
						40' - 45' - BEGIN TO GET INTO CEMENTED ZONE, SEVERAL OF THE 0.1 - 0.2 " GRAVEL GRAINS HAVE TAN CLAY COATINGS
50		4 " DIAMETER CARBON STEEL CASING WITH WELDED COUPLINGS; CONCRETE GROUT TO SURFACE				
60					SP - GW	60' - SWITCH TO 5 " TRICONE BIT
						SAND AND GRAVEL TO 1 " OBSERVED, ANGULAR TO SUBROUNDED, WHOLE CLASTS AND PIECES OF LARGER ROCKS, NO CLAY OR CEMENT; GRANITE, QUARTZITE, IRON ORE, PALE GREEN MARBLE, EPIDOTE; DRY
70						
						75' - TRACE CEMENT ON 0.1 - 0.2 " GRAVEL
80						80' - 85' - SMALL PIECES OF GRAVEL ARE PARTLY COATED WITH CLAY CEMENT, LARGE QUANTITY OF FINE BROWN CLAY IN DUST FROM CYCLONE, COHESIVE WHEN WET; DRY

BORING

PROJECT : EAGLE MOUNTAIN
JOB NUMBER: 0187073.09
HOLE / WELL # : BH 4 / MW 2
PAGE : 3 OF 9

DEPTH (FEET)	SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS / FOOT	USCS SYMBOL	DESCRIPTION
90						95 ' - GRAVEL HAS CLAY COATINGS, VERY LITTLE CLAY IN FINES
100					SP	100 ' + - COARSE SAND WITH <10% GRAVEL; FINES ARE NOT COHESIVE WHEN WET; GRAVEL HAS SAND GRAINS CEMENTED TO IT, DRY
110		4" DIAMETER CARBON STEEL CASING WITH WELDED COUPLINGS; CONCRETE GROUT TO SURFACE			SP	105 ' - 110 ' + - SAND WITH 10 - 20% GRAVEL TO 1 ", VERY LITTLE FINES; GRAVEL HAS CLAY - CEMENT COATINGS, MOSTLY SUBROUNDED; GRANITE, FINE GRAINED CALC SILICATE ROCK, EPIDOTE, WHITE QUARTZITE, RED BROWN VESICULAR VOLCANIC OR DIKE ROCK
120					SP	125 ' - SAME AS ABOVE
130					SP	135 ' - VERY LITTLE FINES, GRAVEL IS MOSTLY ANGULAR QUARTZITE FROM LARGER ROCKS; SUBROUNDED GRANITE AND FINE GRAINED CALC SILICATE ROCK HAS CLAY - CEMENT COATINGS
140					SC	145 ' - 150 ' + - CLAY RICH ZONE WITH COARSE SAND AND GRAVEL TO 0.5 "; CLAY IS LIGHT TAN (REDDISH BROWN WHEN WET), GRAVEL IS ANGULAR TO SUBROUNDED; GRANITE, QUARTZITE, BLACK FINE GRAINED MAFIC DIKE ROCK, IRON ORE; SOME PIECES HAVE CLAY COATINGS; DRY

BORING

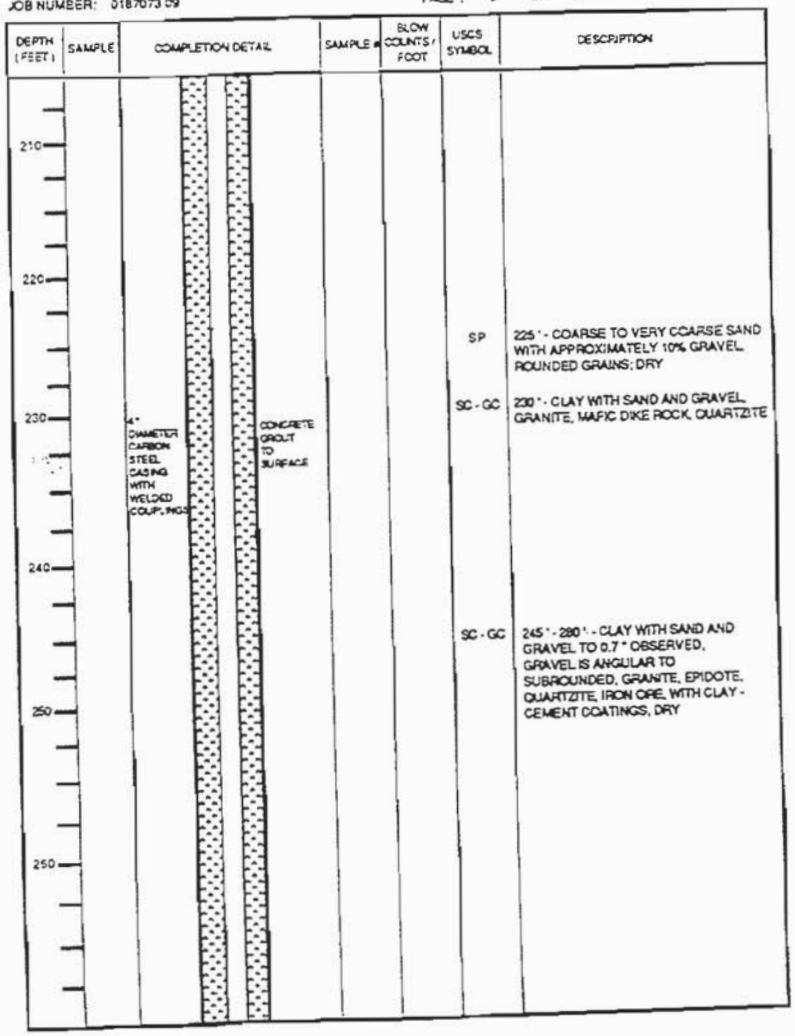
PROJECT . EAGLE MOUNTAIN
JOB NUMBER: 0187073.09
HOLE / WELL # : BH 4 / MW 2
PAGE : 4 OF 9

DEPTH (FEET)	SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS / FOOT	USCS SYMBOL	DESCRIPTION
150						
160					SC	165 ' + - CLAY RICH ZONE WITH SAND + 20% GRAVEL TO 0.5 " (MOSTLY < 0.3 ") OBSERVED, SUBANGULAR TO SUBROUNDED, CLAY COATINGS ON SOME PIECES; META- ARKOSE, GRANITE, QUARTZITE, IRON ORE; DRY
170		4" DIAMETER CARBON STEEL CASING WITH WELDED COUPLINGS; CONCRETE GROUT TO SURFACE				
180					SC - GC	180 ' - 185 ' + - CLAY RICH ZONE WITH COARSE TO VERY COARSE SAND AND GRAVEL; GRAVEL IS ANGULAR TO SUBROUNDED, GRANITE, QUARTZITE, IRON ORE; DRY
190					CL	190 ' - CLAY RICH ZONE WITH < 20% SAND AND GRAVEL, CLAY IS LIGHT TAN (MEDIUM PINK - BROWN WHEN WET), GRAVEL INCLUDES GRANITE, IRON ORE (MAGNETITE), DIORITE, QUARTZ, EPIDOTE
					SP - GW	195 ' - COARSE SAND AND GRAVEL TO 0.5 ", MOSTLY ANGULAR CHIPS OF GRANITE AND IRON ORE (MAGNETITE)
200					SC	205 ' - CLAY WITH SAND AND GRAVEL TO 0.5 " OBSERVED, ANGULAR TO SUBROUNDED, GRANITE, IRON ORE, QUARTZITE, EPIDOTE; DRY

BORING

PROJECT: EAGLE MOUNTAIN
JOB NUMBER: 0187073.09

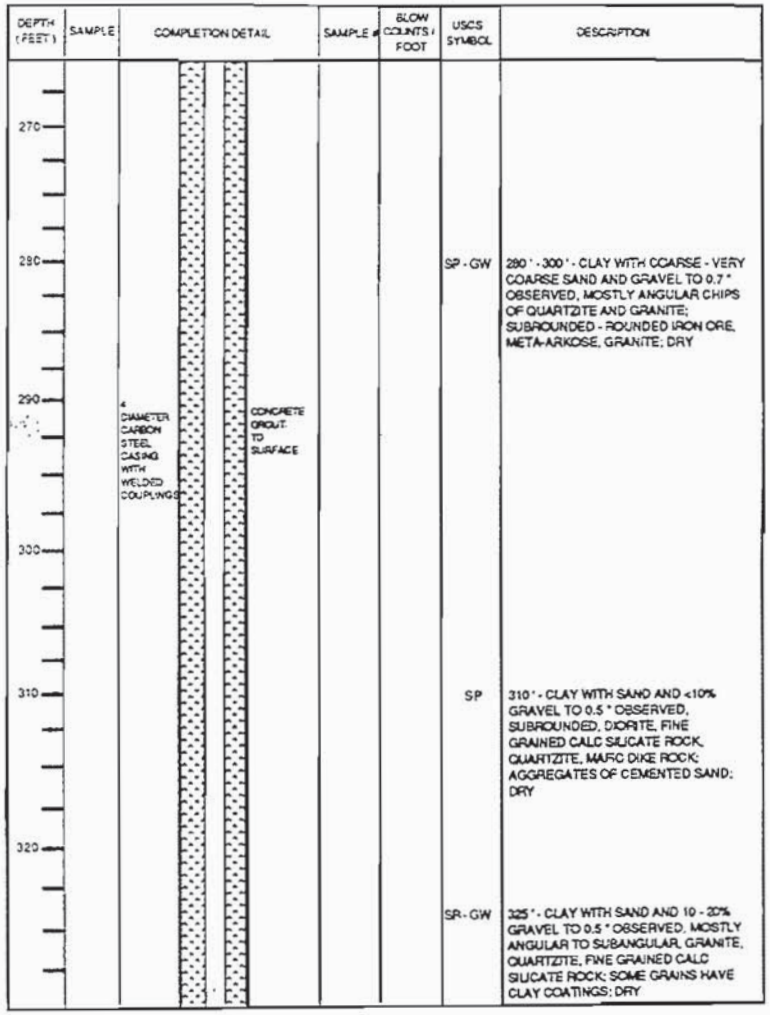
HOLE / WELL #: BH 4 / MW 2
PAGE: 5 OF 9



BORING

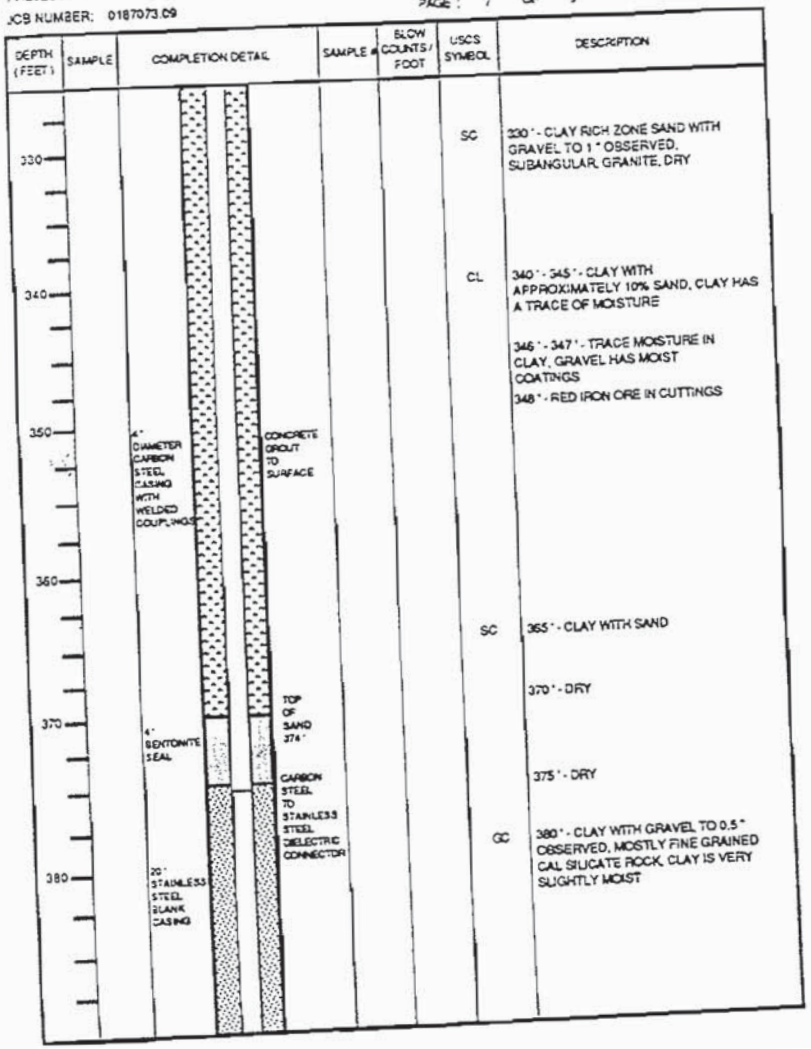
PROJECT EAGLE MOUNTAIN
JOB NUMBER: 0187073.09

HOLE / WELL #: BH 4 / MW 2
PAGE: 6 OF 9



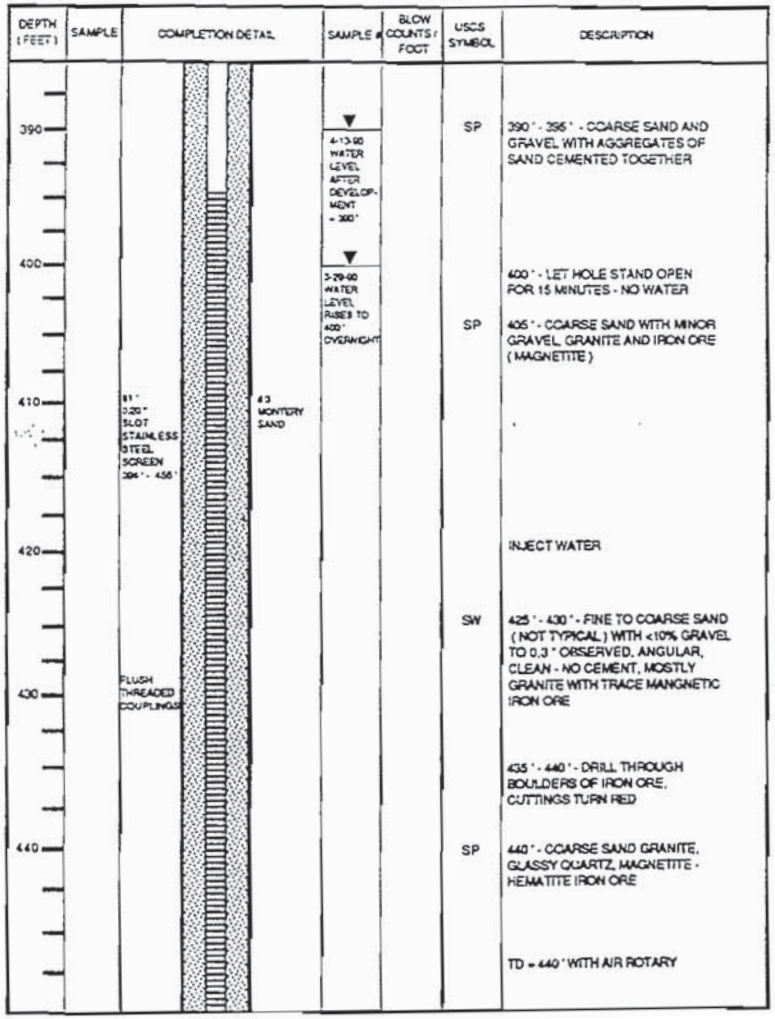
BORING

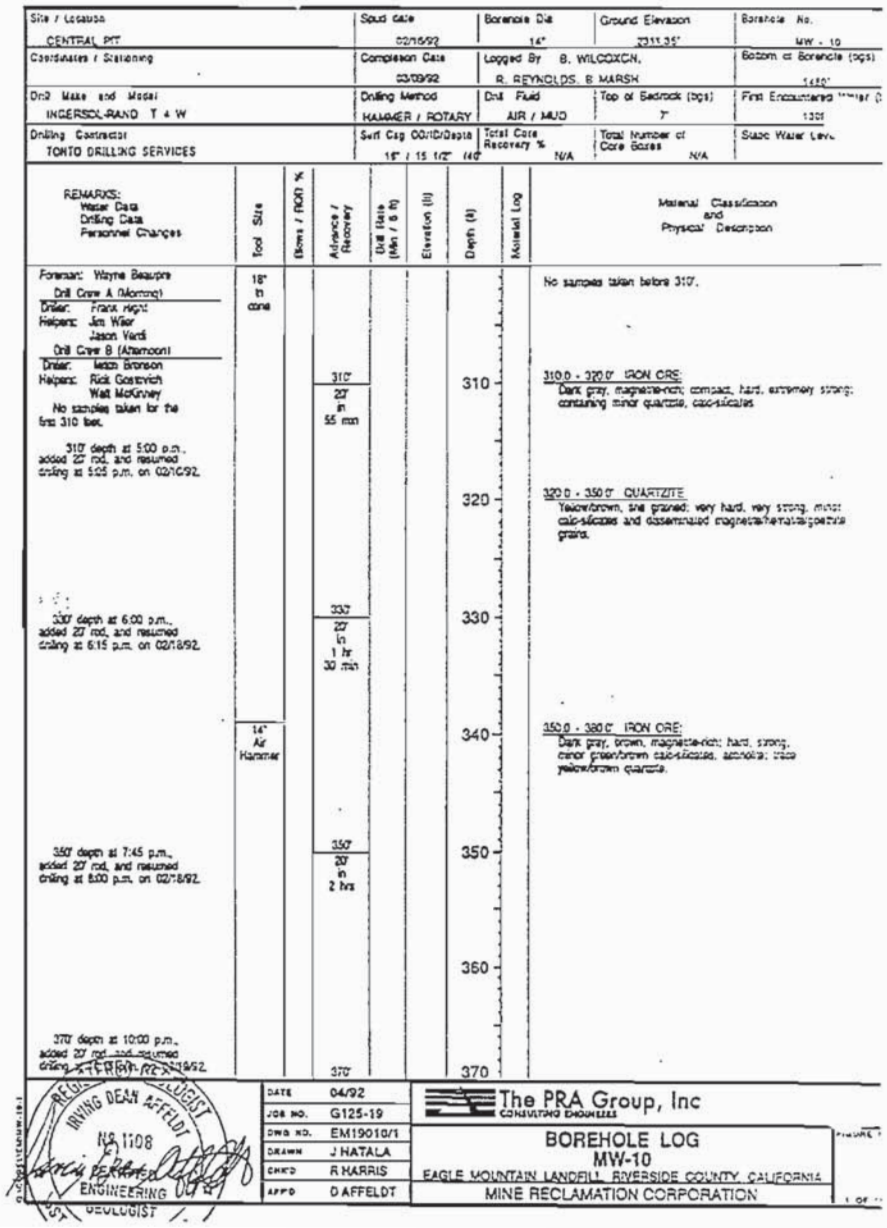
PROJECT: EAGLE MOUNTAIN
JOB NUMBER: 0187073.09
HOLE / WELL #: BH 4 / MW 2
PAGE: 7 OF 9



BORING

PROJECT: EAGLE MOUNTAIN
JOB NUMBER: 0187073.09
HOLE / WELL #: BH 4 / MW 2
PAGE: 8 OF 9





Site / Location	Spud date	Borehole Dia	Ground Elevation	Borehole No.
CENTRAL PIT	02/15/92	14"	2311.35'	MW - 10
Coordinates / Stationing	Completion Date	Logged By B. WILCOXEN,		Bottom of Borehole (bgs)
	03/09/92	R. REYNOLDS, B. MARSH		1470'
Drill Make and Model	Drilling Method	Drill Fluid	Top of Bedrock (bgs)	First Encountered Water (bgs)
INGERSOL-RAND T 4 W	HAMMER / ROTARY	AIR / MUD	7'	130'
Drilling Contractor	Surf Csg OD/ID/Depth	Total Core Recovery %	Total Number of Core Boxes	Static Water Level
TONTO DRILLING SERVICES	15" / 15 1/2" /40'	N/A	N/A	

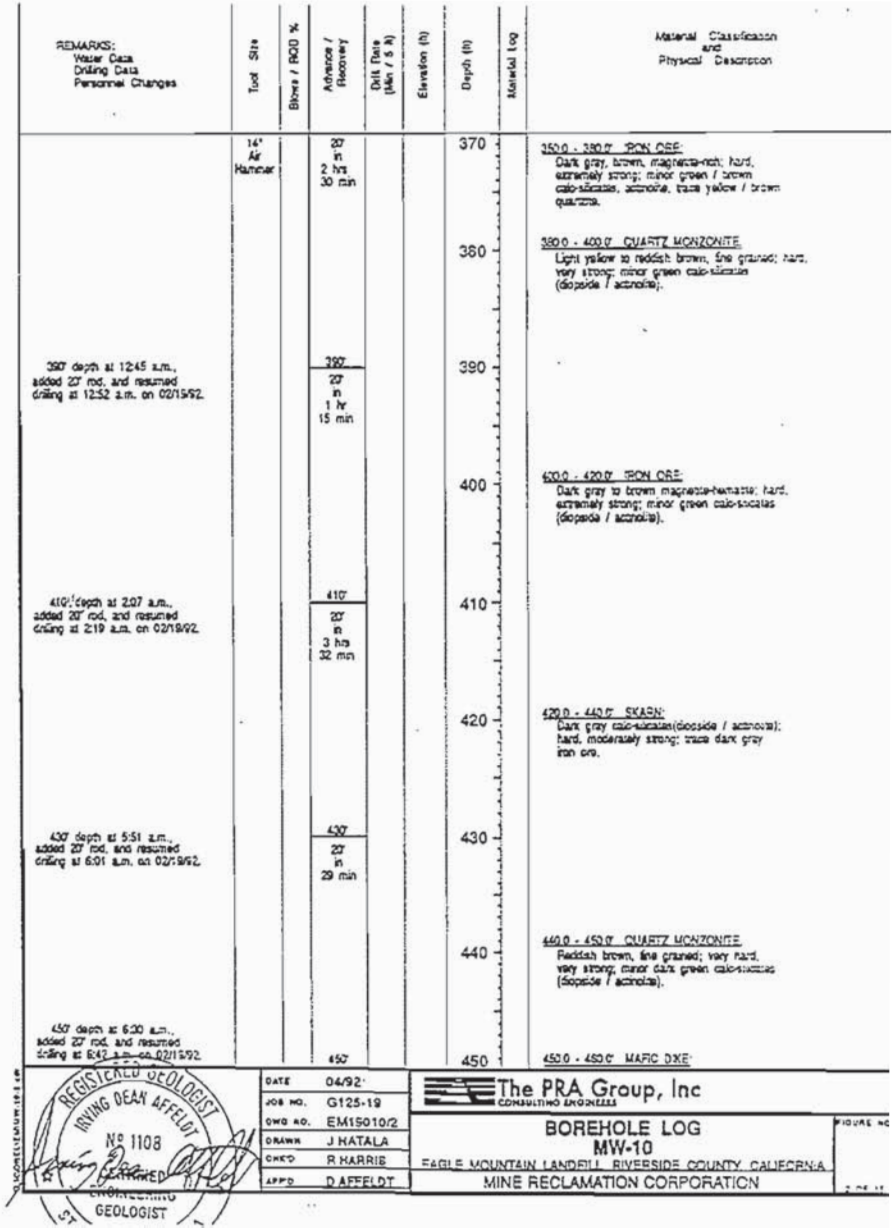
REMARKS: Water Data, Drilling Data, Personnel Changes	Tool Size	Blows / ROD %	Advance / Recovery	Drill Rate (Min / 5 ft)	Elevation (ft)	Depth (ft)	Material Log	Material Classification and Physical Description
Foreman: Wayne Beaupre Drill Crew A (Morning) Driller: Frank Hight Helpers: Jim Wier Jason Verdi Drill Crew B (Afternoon) Driller: Mitch Bronson Helpers: Rick Gostovich Walt McKinney No samples taken for the first 310 feet.	18" tri cone					310		No samples taken before 310'.
310' depth at 5:00 p.m., added 20' rod, and resumed drilling at 5:05 p.m. on 02/17/92.			310' 20' in 55 min					310.0 - 320.0' IRON ORE: Dark gray, magnetite-rich; compact, hard, extremely strong; containing minor quartzite, calc-silicates
						320		320.0 - 330.0' QUARTZITE Yellow/brown, fine grained; very hard, very strong, minor calc-silicates and disseminated magnetite/hematite/pyrite grains.
330' depth at 6:00 p.m., added 20' rod, and resumed drilling at 6:15 p.m. on 02/18/92.			330' 20' in 1 hr 30 min			330		
	14" Air Hammer					340		330.0 - 350.0' IRON ORE: Dark gray, brown, magnetite-rich; hard, strong; minor green/brown calc-silicates, actinolite; trace yellow/brown quartzite.
350' depth at 7:45 p.m., added 20' rod, and resumed drilling at 8:00 p.m. on 02/18/92.			350' 20' in 2 hrs			350		
370' depth at 10:00 p.m., added 20' rod, and resumed drilling at 10:05 p.m. on 02/18/92.			370'			360		
						370		

DATE	04/92
JOB NO.	G125-19
DWG NO.	EM19010/1
DRAWN	J HATALA
CHK'D	R HARRIS
APP'D	D AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

FIGURE 1



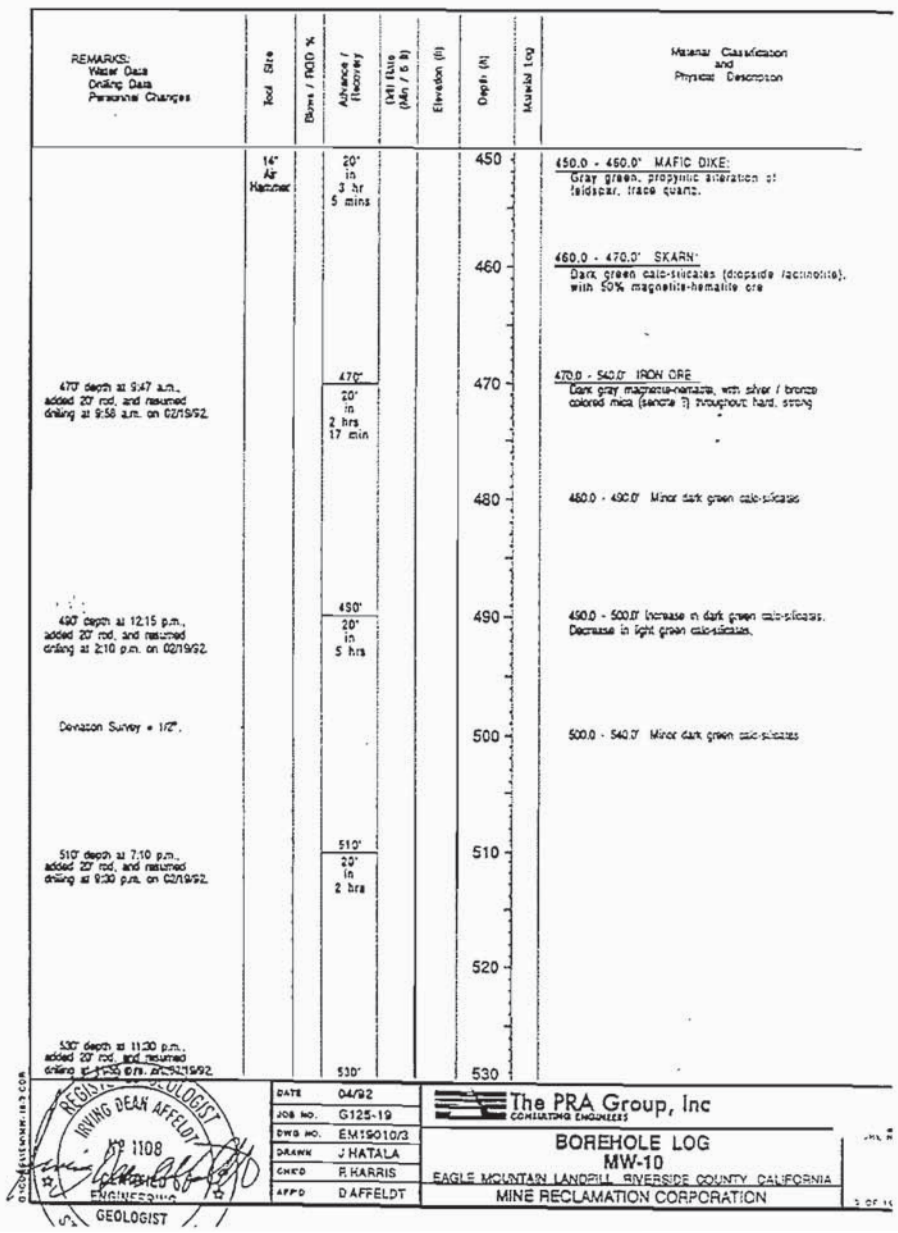
REMARKS: Water Data, Drilling Data, Personnel Changes	Tool Size	Blows / ROD %	Advance / Recovery	Drill Rate (Min / 5 ft)	Elevation (ft)	Depth (ft)	Material Log	Material Classification and Physical Description
	14" Air Hammer		20' in 2 hrs 30 min			370		350.0 - 380.0' IRON ORE: Dark gray, brown, magnetite-rich; hard, extremely strong; minor green / brown calc-silicates, actinolite, trace yellow / brown quartzite.
						380		380.0 - 400.0' QUARTZ MONZONITE Light yellow to reddish brown, fine grained; hard, very strong; minor green calc-silicates (diopside / actinolite).
390' depth at 12:45 a.m., added 20' rod, and resumed drilling at 12:52 a.m. on 02/19/92.			390' 20' in 1 hr 15 min			390		
						400		400.0 - 420.0' IRON ORE Dark gray to brown magnetite-hematite; hard, extremely strong; minor green calc-silicates (diopside / actinolite).
410' depth at 2:07 a.m., added 20' rod, and resumed drilling at 2:19 a.m. on 02/19/92.			410' 20' in 3 hrs 32 min			410		
						420		420.0 - 440.0' SKARN: Dark gray calc-silicates(diopside / actinolite); hard, moderately strong; trace dark gray iron ore.
430' depth at 5:51 a.m., added 20' rod, and resumed drilling at 6:01 a.m. on 02/19/92.			430' 20' in 29 min			430		
						440		440.0 - 450.0' QUARTZ MONZONITE Reddish brown, fine grained; very hard, very strong; minor dark green calc-silicates (diopside / actinolite).
450' depth at 6:30 a.m., added 20' rod, and resumed drilling at 6:42 a.m. on 02/19/92.			450'			450		450.0 - 460.0' MAFIC DIKE:

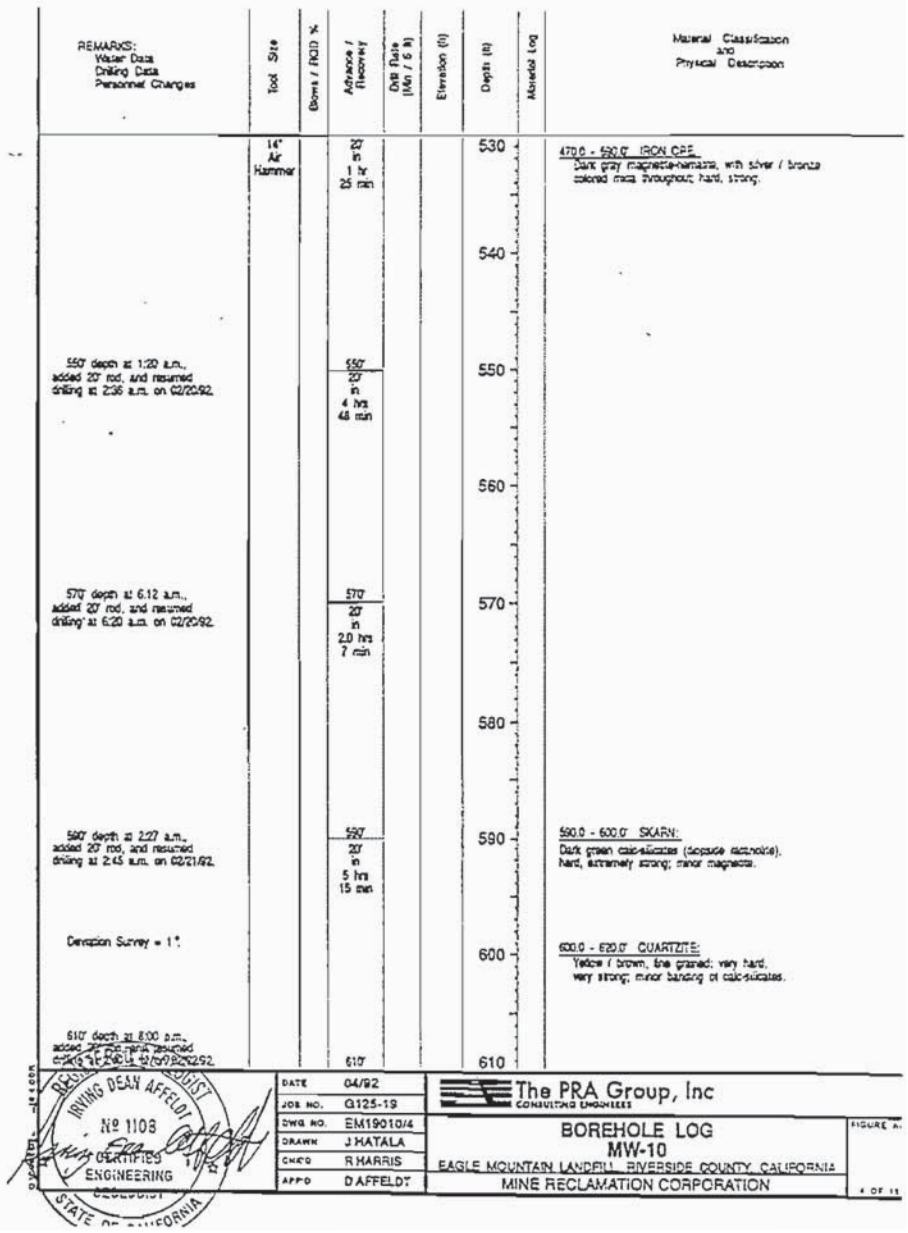
DATE	04/92
JOB NO.	G125-19
DWG NO.	EM15010/2
DRAWN	J HATALA
CHK'D	R HARRIS
APP'D	D AFFELDT

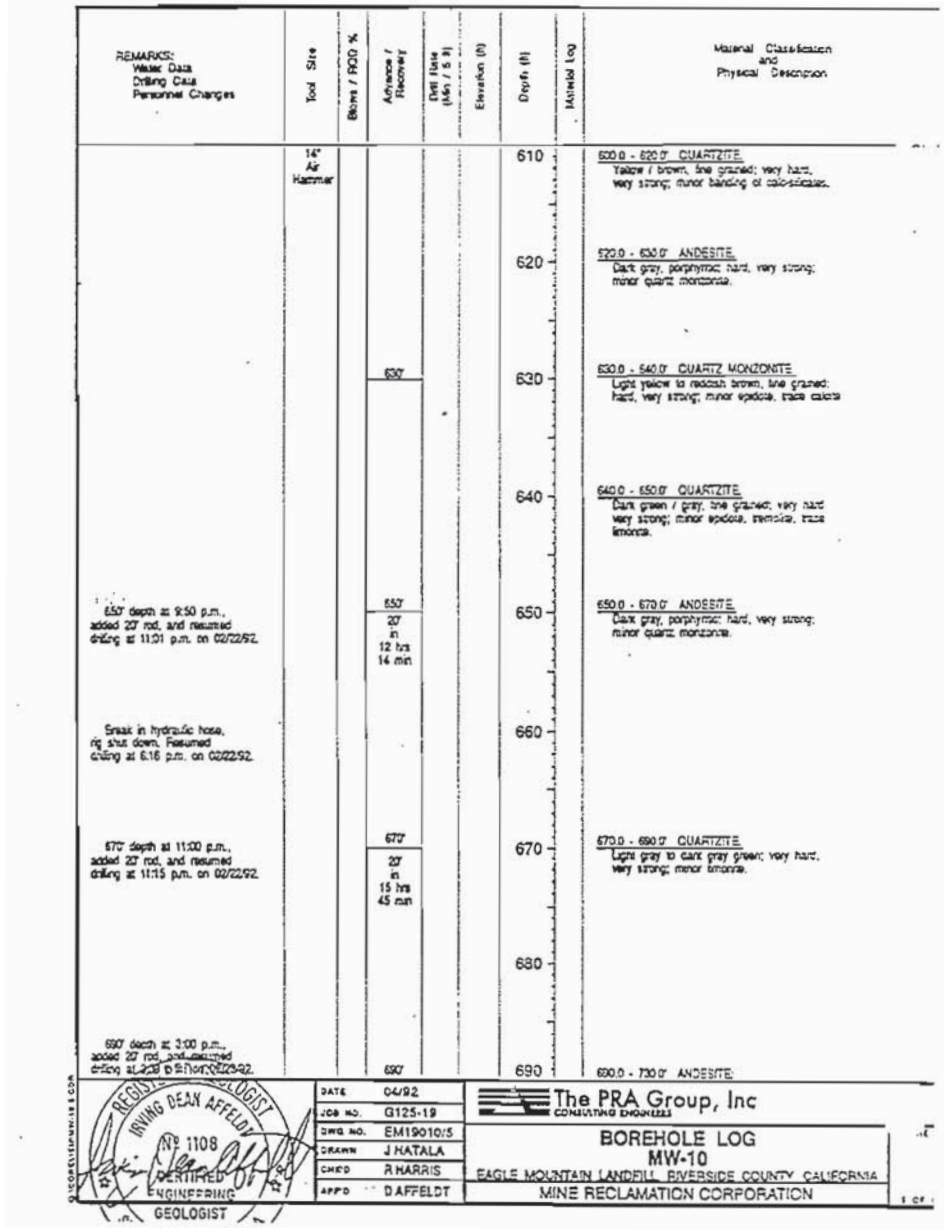
The PRA Group, Inc
CONSULTING ENGINEERS

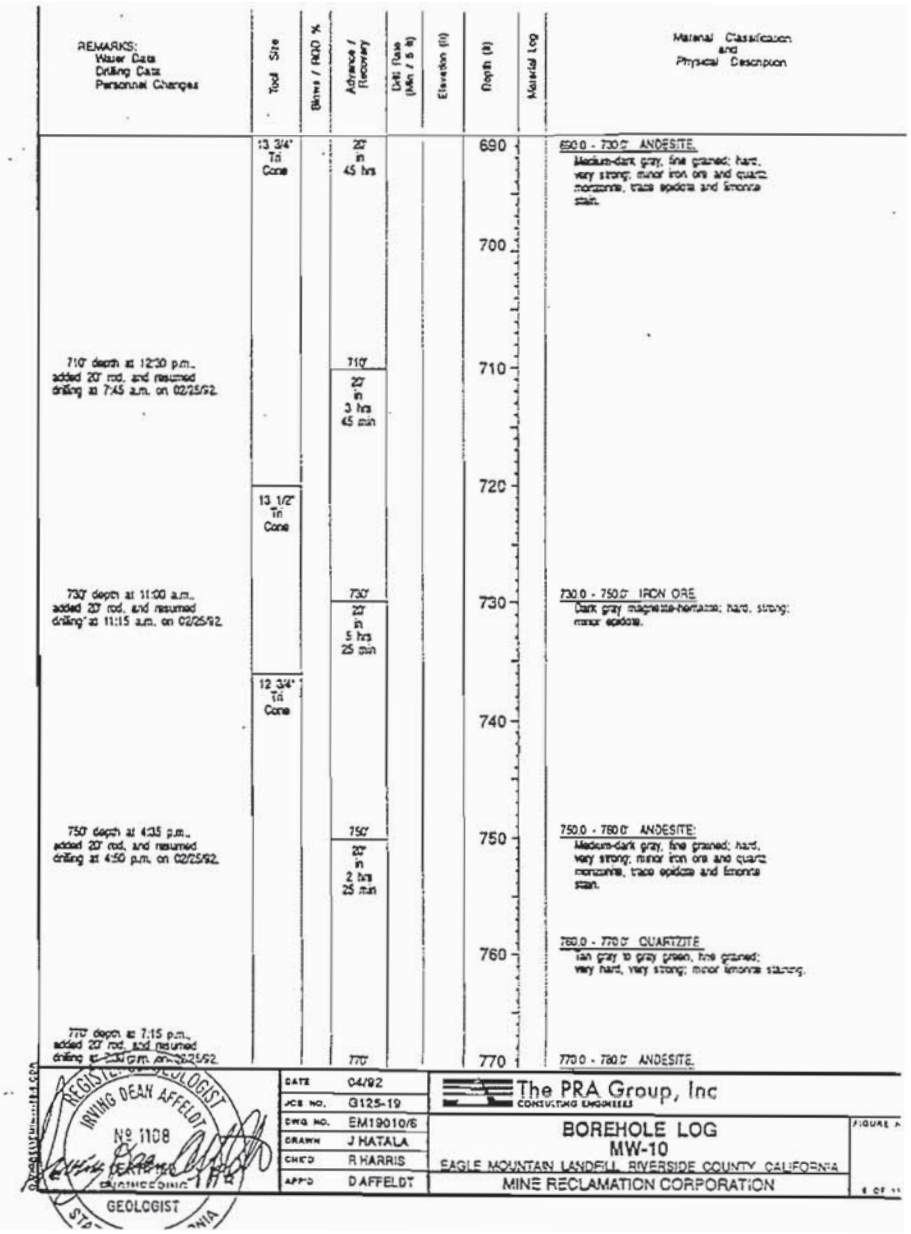
BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

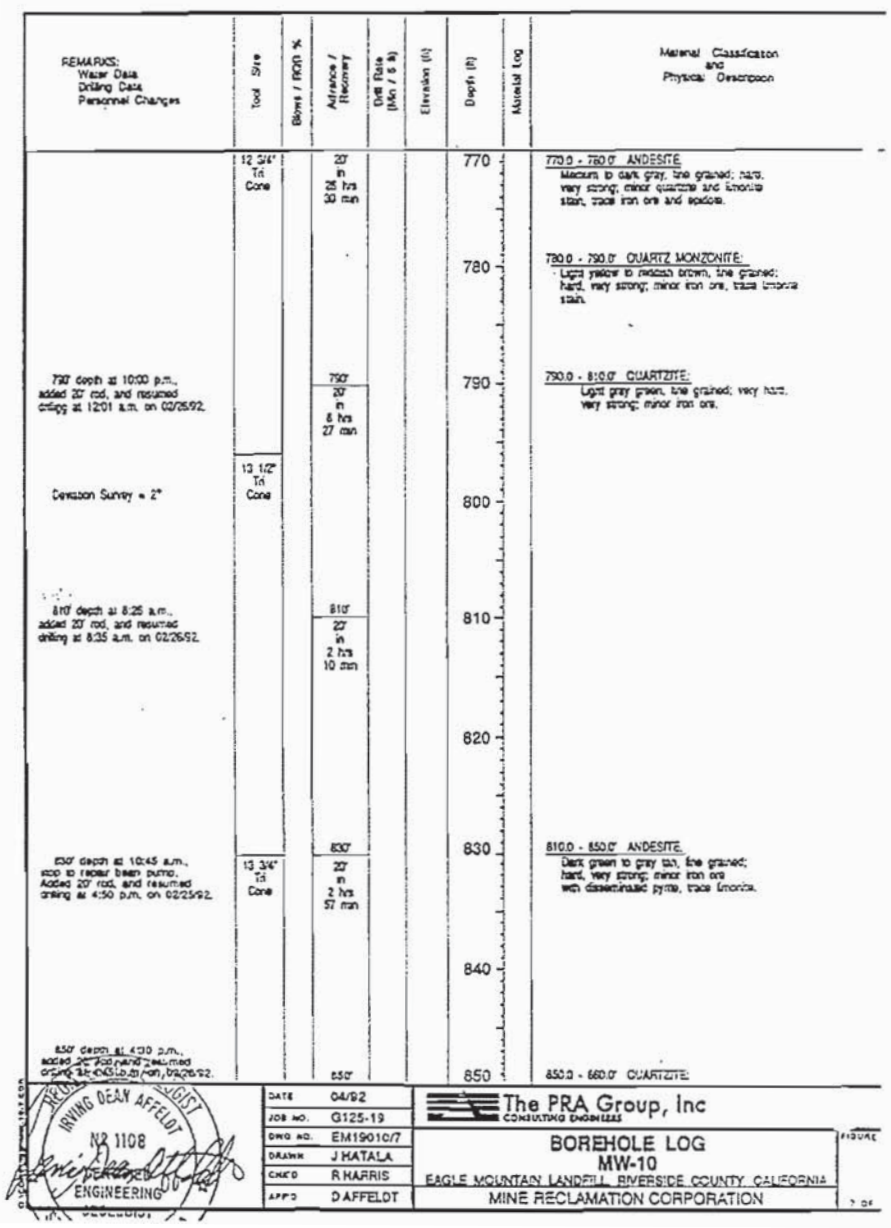
FIGURE 2

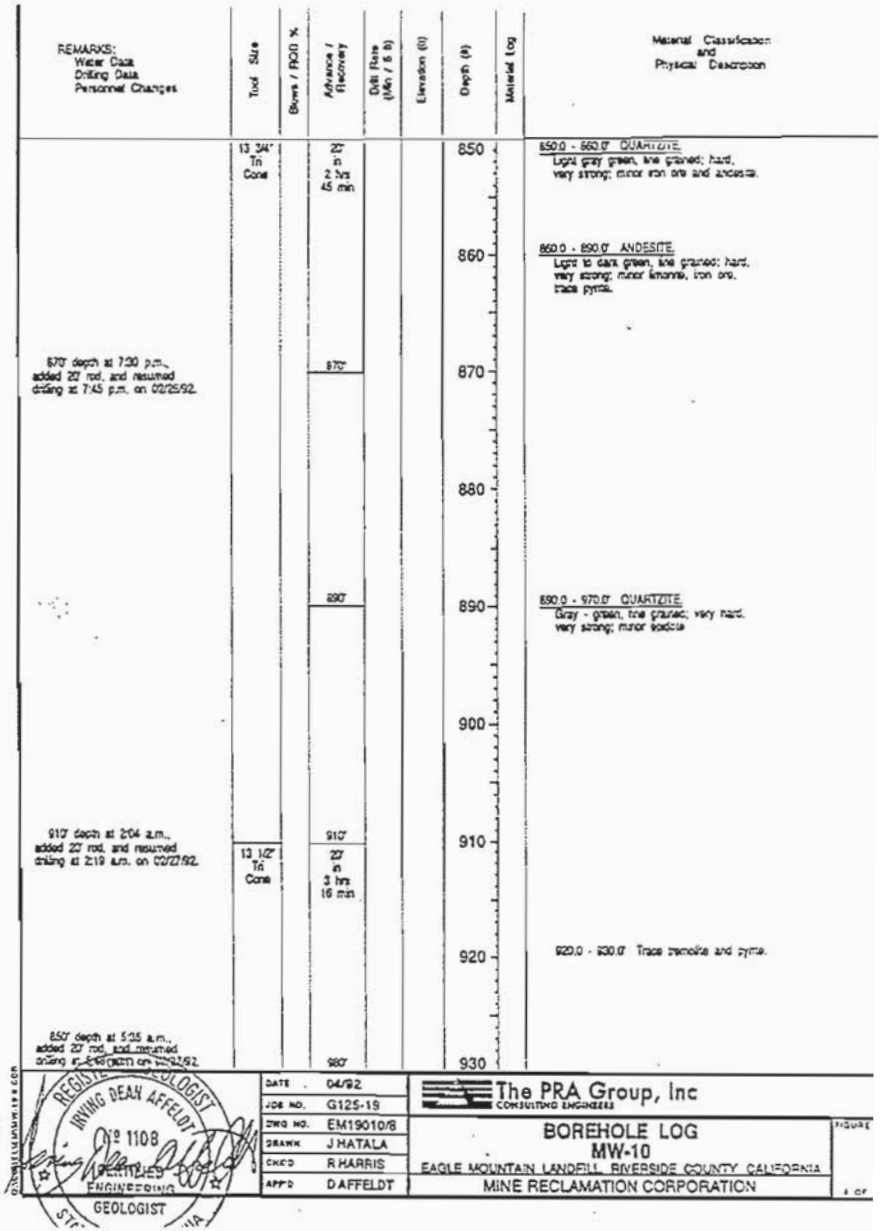

REMARKS:
Water Data
Drilling Data
Personnel Changes
Tool Size
Blows / ROD %
Advance / Recovery
Drill Rate (Min / 6 ft)
Elevation (ft)
Depth (ft)
Material Log
Material Classification and Physical Description
14" Air Hammer
20' in 3 hr 5 mins
450.0 - 460.0' MAFIC DIKE:
Gray green, propylitic alteration of feldspar, trace quartz.
460.0 - 470.0' SKARN:
Dark green calc-silicates (diopside /actinolite), with 50% magnetite-hematite ore
470' depth at 9:47 a.m., added 20' rod, and resumed drilling at 9:58 a.m. on 02/19/92.
470'
20' in 2 hrs 17 min
470.0 - 540.0' IRON ORE
Dark gray magnetite-hematite, with silver / bronze colored mica (sericite ?) throughout hard, strong
480.0 - 490.0' Minor dark green calc-silicates
490' depth at 12:15 p.m., added 20' rod, and resumed drilling at 2:10 p.m. on 02/19/92.
490'
20' in 5 hrs
490.0 - 500.0' Increase in dark green calc-silicates. Decrease in light green calc-silicates.
Deviation Survey = 1/2°.
500.0 - 540.0' Minor dark green calc-silicates
510' depth at 7:10 p.m., added 20' rod, and resumed drilling at 9:30 p.m. on 02/19/92.
510'
20' in 2 hrs
530' depth at 11:30 p.m., added 20' rod, and resumed drilling at 11:55 p.m. on 02/19/92.
530'
450
460
470
480
490
500
510
520
530
DATE 04/92
JOB NO. G125-19
DWG NO. EM19010/3
DRAWN J HATALA
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

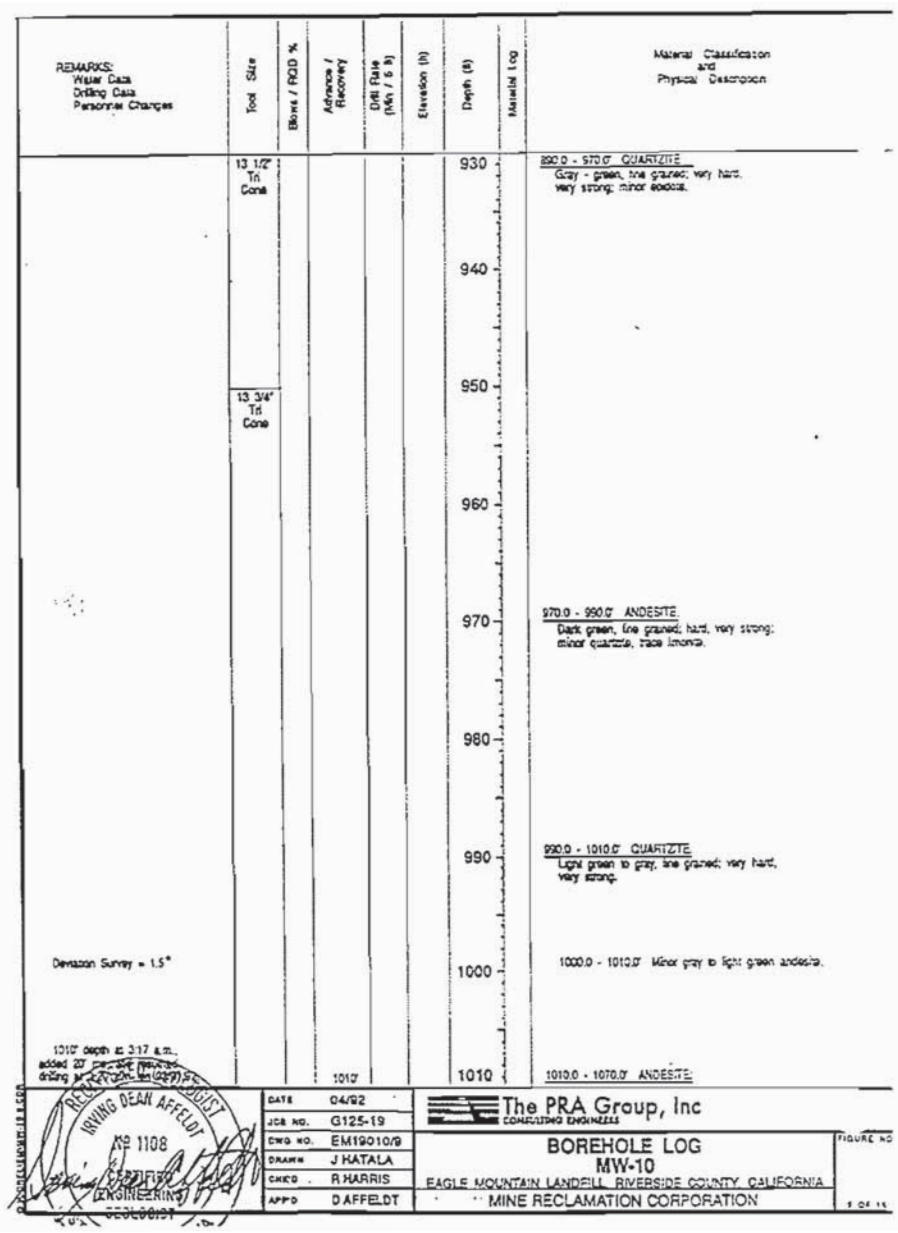

REMARKS:
Water Data
Drilling Data
Personnel Changes
Tool Size
Blows / ROD %
Advance / Recovery
Drill Rate (Min / 6 ft)
Elevation (ft)
Depth (ft)
Material Log
Material Classification and Physical Description
14" Air Hammer
20' in 1 hr 25 min
550' depth at 1:20 a.m., added 20' rod, and resumed drilling at 2:36 a.m. on 02/20/92.
550'
20' in 4 hrs 46 min
570' depth at 6:12 a.m., added 20' rod, and resumed drilling at 6:20 a.m. on 02/20/92.
570'
20' in 2.0 hrs 7 min
590' depth at 2:27 a.m., added 20' rod, and resumed drilling at 2:45 a.m. on 02/21/92.
590'
20' in 5 hrs 15 min
Deviation Survey = 1°.
610' depth at 8:00 a.m., added 20' rod, and resumed drilling at 8:20 a.m. on 02/21/92.
610'
530
540
550
560
570
580
590
600
610
470.0 - 590.0' IRON ORE
Dark gray magnetite-hematite, with silver / bronze colored mica throughout hard, strong.
590.0 - 600.0' SKARN:
Dark green calc-silicates (diopside actinolite), hard, extremely strong; minor magnetite.
600.0 - 620.0' QUARTZITE:
Yellow / brown, fine grained; very hard, very strong; minor banding of calc-silicates.
DATE 04/92
JOB NO. G125-19
DWG NO. EM19010/4
DRAWN J HATALA
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

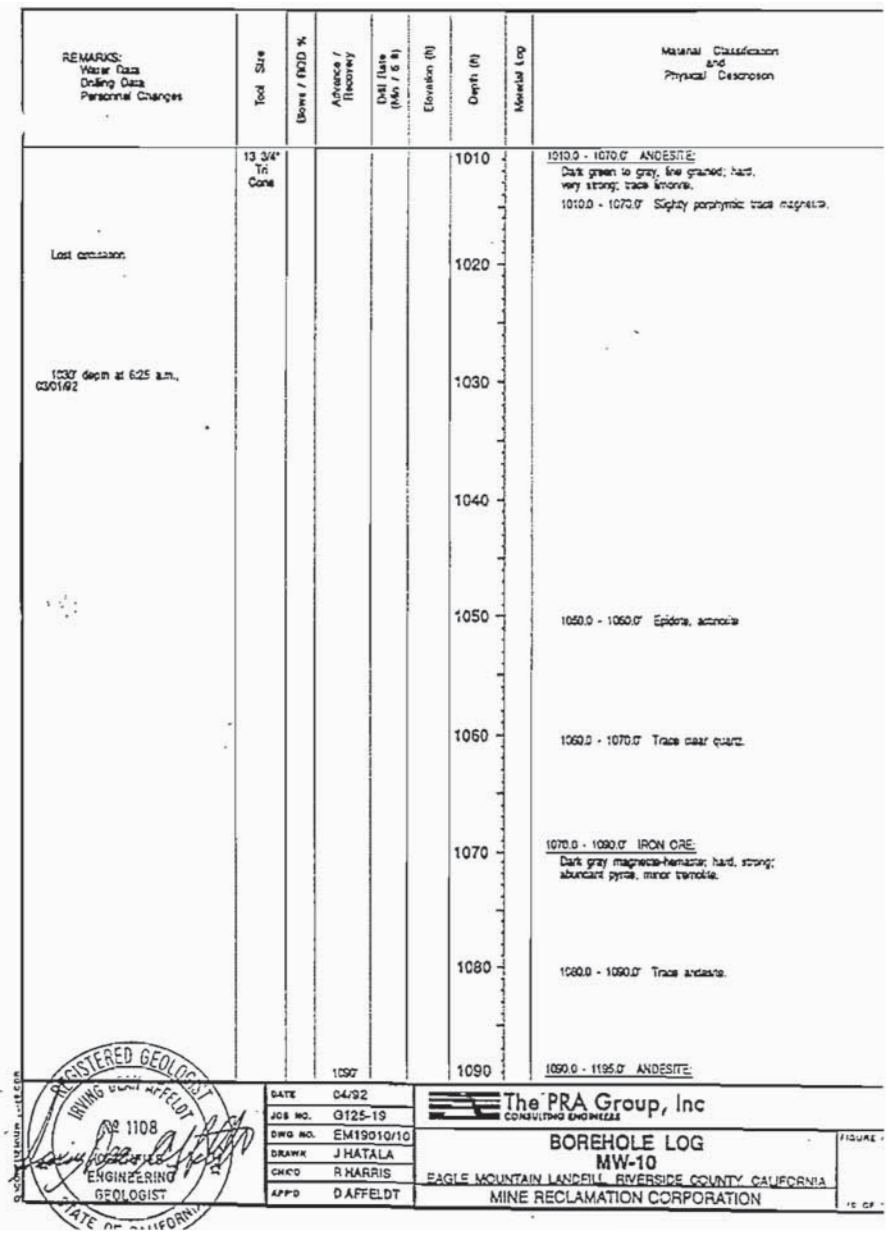

REMARKS:
Water Data
Drilling Data
Personnel Changes
Tool Size
Blows / R20 %
Advance / Recovery
Drill Rate (Min / 5 ft)
Elevation (ft)
Depth (ft)
Material Log
Material Classification and Physical Description
14" Air Hammer
610
620
630
640
650
660
670
680
690
600.0 - 620.0' QUARTZITE
Yellow / brown, fine grained; very hard, very strong; minor banding of calcsilicates.
620.0 - 630.0' ANDESITE
Dark gray, porphyritic; hard, very strong; minor quartz monzonite.
630.0 - 640.0' QUARTZ MONZONITE
Light yellow to reddish brown, fine grained; hard, very strong; minor epidote, trace calcite
640.0 - 650.0' QUARTZITE
Dark green / gray, fine grained; very hard very strong; minor epidote, hematite, trace limonite.
650.0 - 670.0' ANDESITE
Dark gray, porphyritic; hard, very strong; minor quartz monzonite.
670.0 - 690.0' QUARTZITE
Light gray to dark gray green; very hard, very strong; minor limonite.
690.0 - 730.0' ANDESITE
650'
650' depth at 9:50 p.m., added 20' rod, and resumed drilling at 11:01 p.m. on 02/22/92.
20' in 12 hrs 14 min
Snaak in hydraulic hose, rig shut down. Resumed drilling at 6:16 p.m. on 02/22/92.
670'
670' depth at 11:00 p.m., added 20' rod, and resumed drilling at 11:15 p.m. on 02/22/92.
20' in 15 hrs 45 min
690' depth at 3:00 p.m., added 20' rod, and resumed drilling at 3:30 p.m. on 02/23/92.
690'
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
DATE 04/92
JOB NO. G125-19
DWG NO. EM19010/5
DRAWN J HATALA
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

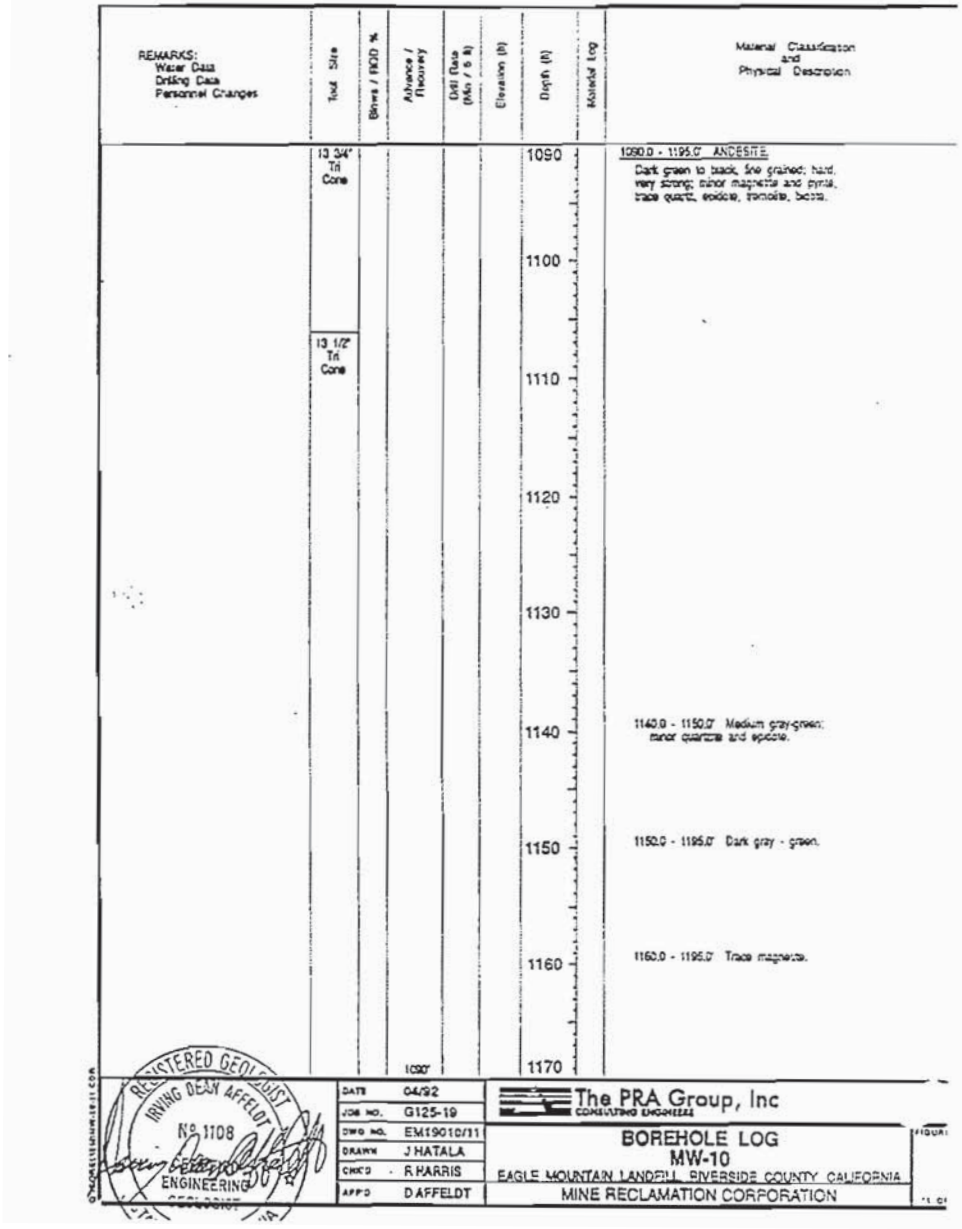

REMARKS:
Water Data
Drilling Data
Personnel Changes
Tool Size
Blows / R20 %
Advance / Recovery
Drill Rate (Min / 5 ft)
Elevation (ft)
Depth (ft)
Material Log
Material Classification and Physical Description
690
700
710
720
730
740
750
760
770
13 3/4" Tri Cone
13 1/2" Tri Cone
12 3/4" Tri Cone
20' in 45 hrs
20' in 3 hrs 45 min
20' in 5 hrs 25 min
20' in 2 hrs 25 min
650.0 - 730.0' ANDESITE
Medium-dark gray, fine grained; hard, very strong; minor iron ore and quartz monzonite, trace epidote and limonite stain.
710' depth at 12:30 p.m., added 20' rod, and resumed drilling at 7:45 a.m. on 02/25/92.
710'
730' depth at 11:00 a.m., added 20' rod, and resumed drilling at 11:15 a.m. on 02/25/92.
730'
730.0 - 750.0' IRON ORE
Dark gray magnetite-hematite; hard, strong; minor epidote.
750' depth at 4:35 p.m., added 20' rod, and resumed drilling at 4:50 p.m. on 02/25/92.
750'
750.0 - 760.0' ANDESITE
Medium-dark gray, fine grained; hard, very strong; minor iron ore and quartz monzonite, trace epidote and limonite stain.
760.0 - 770.0' QUARTZITE
Tan gray to gray green, fine grained; very hard, very strong; minor limonite staining.
770' depth at 7:15 p.m., added 20' rod, and resumed drilling at 7:30 p.m. on 02/25/92.
770'
770.0 - 780.0' ANDESITE
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
DATE 04/92
JOB NO. G125-19
DWG NO. EM19010/6
DRAWN J HATALA
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

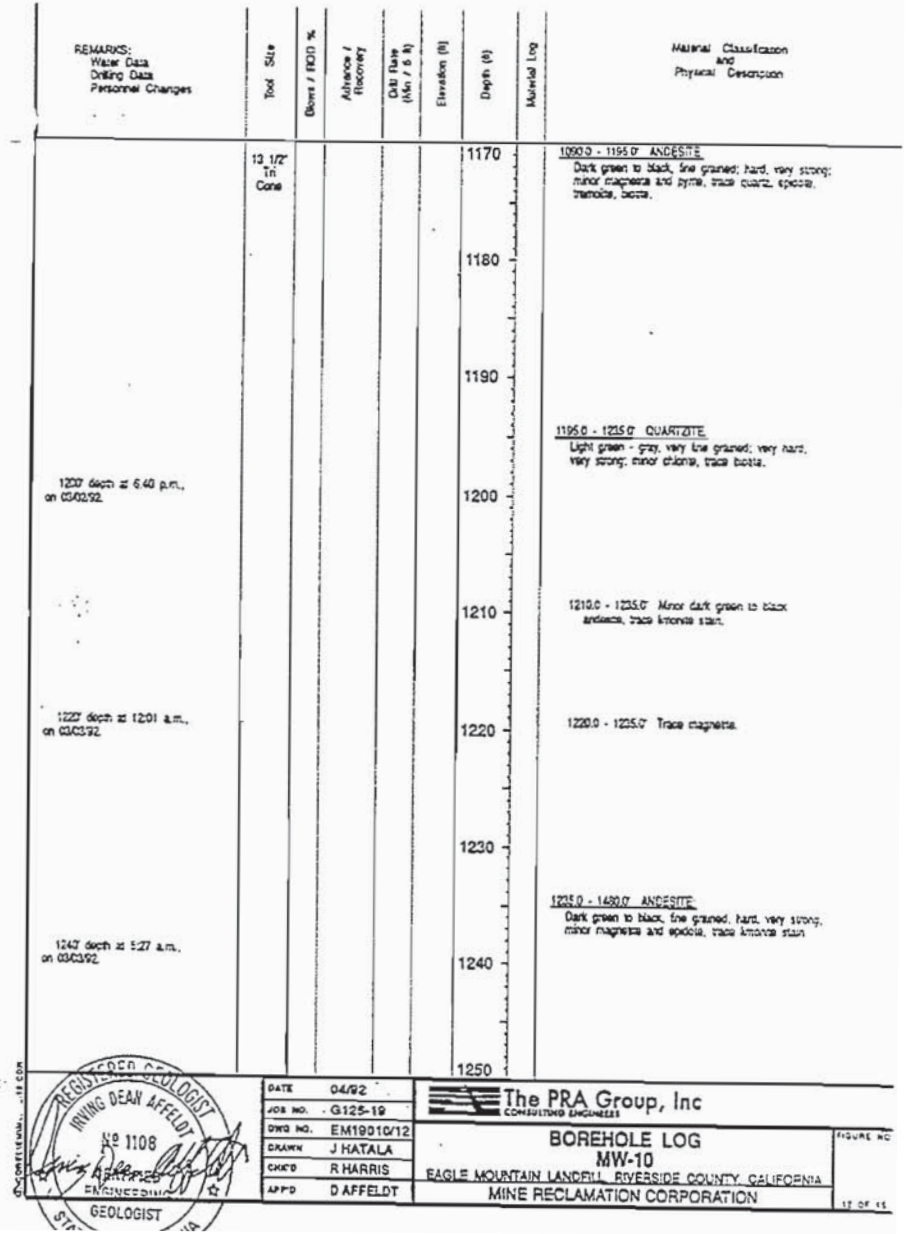

REMARKS:
Water Data
Drilling Data
Personnel Changes
Tool Size
Blows / RQD %
Advance / Recovery
Drill Rate (Min. / 5 ft)
Elevation (ft)
Depth (ft)
Material Log
Material Classification and Physical Description
12 3/4" Tri Cone
13 1/2" Tri Cone
13 3/4" Tri Cone
20' in 30 hrs 30 min
20' in 6 hrs 27 min
20' in 2 hrs 10 min
20' in 3 hrs 57 min
770
780
790
800
810
820
830
840
850
770.0 - 780.0' ANDESITE
Medium to dark gray, fine grained; hard, very strong; minor quartzite and limonite stain, trace iron ore and epidote.
780.0 - 790.0' QUARTZ MONZONITE
Light yellow to reddish brown, fine grained; hard, very strong; minor iron ore, trace limonite stain.
790.0 - 810.0' QUARTZITE
Light gray green, fine grained; very hard, very strong; minor iron ore.
810.0 - 850.0' ANDESITE
Dark green to gray tan, fine grained; hard, very strong; minor iron ore with disseminated pyrite, trace limonite.
850.0 - 860.0' QUARTZITE
790' depth at 10:00 p.m., added 20' rod, and resumed drilling at 12:01 a.m. on 02/26/92.
Deviation Survey = 2°
810' depth at 8:25 a.m., added 20' rod, and resumed drilling at 8:35 a.m. on 02/26/92.
830' depth at 10:45 a.m., stop to repair bean pump. Added 20' rod, and resumed drilling at 4:50 p.m. on 02/25/92.
850' depth at 4:30 p.m., added 20' rod and resumed drilling at 4:40 p.m. on 02/26/92.
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
ENGINEERING GEOLOGIST
DATE 04/92
JOB NO. G125-19
DWG NO. EM19010/7
DRAWN J HATALA
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
FIGURE
7 OF


REMARKS:
Water Data
Drilling Data
Personnel Changes
Tool Size
Blows / RQD %
Advance / Recovery
Drill Rate (Min. / 5 ft)
Elevation (ft)
Depth (ft)
Material Log
Material Classification and Physical Description
13 3/4" Tri Cone
13 1/2" Tri Cone
27' in 2 hrs 45 min
27' in 3 hrs 16 min
850
860
870
880
890
900
910
920
930
850.0 - 860.0' QUARTZITE
Light gray green, fine grained; hard, very strong; minor iron ore and andesite.
860.0 - 890.0' ANDESITE
Light to dark green, fine grained; hard, very strong; minor limonite, iron ore, trace pyrite.
890.0 - 970.0' QUARTZITE
Gray - green, fine grained; very hard, very strong; minor epidote
920.0 - 930.0' Trace limonite and pyrite.
870' depth at 7:30 p.m., added 20' rod, and resumed drilling at 7:45 p.m. on 02/25/92.
910' depth at 2:04 a.m., added 20' rod, and resumed drilling at 2:19 a.m. on 02/27/92.
930' depth at 5:35 a.m., added 20' rod, and resumed drilling at 5:50 a.m. on 02/27/92.
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
DATE 04/92
JOB NO. G125-19
DWG NO. EM19010/8
DRAWN J HATALA
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
FIGURE
8 OF


REMARKS:
Water Data
Drilling Data
Personnel Changes
Tool Size
Blows / ROD %
Advance / Recovery
Drill Rate (Min / 5 ft)
Elevation (ft)
Depth (ft)
Material Log
Material Classification and Physical Description
13 1/2" Tri Cone
13 3/4" Tri Cone
930
940
950
960
970
980
990
1000
1010
890.0 - 970.0' QUARTZITE:
Gray - green, fine grained; very hard, very strong; minor exotics.
970.0 - 990.0' ANDESITE:
Dark green, fine grained; hard, very strong; minor quartzite, trace limonite.
990.0 - 1010.0' QUARTZITE:
Light green to gray, fine grained; very hard, very strong.
1000.0 - 1010.0' Minor gray to light green andesite.
1010.0 - 1070.0' ANDESITE:
Deviation Survey = 1.5°
1010' depth at 3:17 a.m., added 20' per hour
1010'
DATE 04/92
JOB NO. G125-19
DWG NO. EM19010/9
DRAWN J HATALA
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL RIVERSIDE COUNTY CALIFORNIA
MINE RECLAMATION CORPORATION
FIGURE NO
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA


REMARKS:
Water Data
Drilling Data
Personnel Changes
Tool Size
Blows / ROD %
Advance / Recovery
Drill Rate (Min / 5 ft)
Elevation (ft)
Depth (ft)
Material Log
Material Classification and Physical Description
13 3/4" Tri Cone
1010
1020
1030
1040
1050
1060
1070
1080
1090
1010.0 - 1070.0' ANDESITE:
Dark green to gray, fine grained; hard, very strong; trace limonite.
1010.0 - 1070.0' Slightly porphyritic trace magnetite.
Lost circulation
1030' depth at 6:25 a.m., 03/01/92
1050.0 - 1060.0' Epidote, actinolite
1060.0 - 1070.0' Trace clear quartz.
1070.0 - 1090.0' IRON ORE:
Dark gray magnesio-hematite; hard, strong; abundant pyrite, minor tremolite.
1080.0 - 1090.0' Trace andesite.
1090.0 - 1195.0' ANDESITE:
1090'
DATE 04/92
JOB NO. G125-19
DWG NO. EM19010/10
DRAWN J HATALA
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL RIVERSIDE COUNTY CALIFORNIA
MINE RECLAMATION CORPORATION
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA


REMARKS:
Water Data
Drilling Data
Personnel Changes
Tool Size
Blows / ROD %
Advance / Recovery
Drill Rate (Min / 6 ft)
Elevation (ft)
Depth (ft)
Material Log
Material Classification and Physical Description
13 3/4" Tri Cone
13 1/2" Tri Cone
1090
1100
1110
1120
1130
1140
1150
1160
1170
1090.0 - 1195.0' ANDESITE:
Dark green to black, fine grained; hard, very strong; minor magnetite and pyrite, trace quartz, epidote, tremolite, biotite.
1140.0 - 1150.0' Medium gray-green; minor quartzite and epidote.
1150.0 - 1195.0' Dark gray - green.
1160.0 - 1195.0' Trace magnetite.
1090'
DATE 04/92
JOB NO. G125-19
DWG NO. EM19010/11
DRAWN J HATALA
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
FIGURE
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No. 1108
ENGINEERING GEOLOGIST


REMARKS:
Water Data
Drilling Data
Personnel Changes
Tool Size
Blows / ROD %
Advance / Recovery
Drill Rate (Min / 6 ft)
Elevation (ft)
Depth (ft)
Material Log
Material Classification and Physical Description
13 1/2" Tri Cone
1170
1180
1190
1200
1210
1220
1230
1240
1250
1090.0 - 1195.0' ANDESITE:
Dark green to black, fine grained; hard, very strong; minor magnetite and pyrite, trace quartz, epidote, tremolite, biotite.
1195.0 - 1235.0' QUARTZITE:
Light green - gray, very fine grained; very hard, very strong; minor chlorite, trace biotite.
1207 depth at 6:40 p.m., on 03/02/92.
1210.0 - 1235.0' Minor dark green to black andesite, trace limonite stain.
1227 depth at 12:01 a.m., on 03/03/92.
1230.0 - 1235.0' Trace magnetite.
1235.0 - 1480.0' ANDESITE:
Dark green to black, fine grained, hard, very strong, minor magnetite and epidote, trace limonite stain
1247 depth at 5:27 a.m., on 03/03/92.
DATE 04/92
JOB NO. G125-19
DWG NO. EM19010/12
DRAWN J HATALA
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
FIGURE NO.
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No. 1108
ENGINEERING GEOLOGIST

REMARKS: Water Data, Drilling Data, Personnel Changes	Tool Size	Blows / ROD %	Advance / Recovery	Drill Rate (Min / 5 ft)	Elevation (ft)	Depth (ft)	Material Log	Material Classification and Physical Description
	13 1/2" Tri Cone					1250		1235.0 - 1460.0' ANDESITE Dark green to black, fine grained; hard, very strong; minor magnetite and epidote, trace limonite. 1250.0 - 1260.0' Minor quartzite, trace crystal calcite
1262' depth at 8:00 a.m., on 03/03/92.						1260		1260.0 - 1270.0' Abundant pink calcite, minor pink vein quartz.
						1270		1270.0 - 1280.0' Abundant pale green quartzite, minor amphibole, calcite.
1287' depth at 4:00 p.m., on 03/03/92.						1280		
						1290		1290.0 - 1300.0' 15% magnetite, trace pyrite.
1307' depth at 5:54 a.m., on 03/04/92.						1300		
						1310		
						1320		
						1330		

REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
GEOLOGIST

DATE	04/92
JOB NO.	G125-19
DWG NO.	EM19010/13
DRAWN	J HATALA
CHK'D	R HARRIS
APP'D	D AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

13 OF 15

REMARKS: Water Data, Drilling Data, Personnel Changes	Tool Size	Blows / ROD %	Advance / Recovery	Drill Rate (Min / 5 ft)	Elevation (ft)	Depth (ft)	Material Log	Material Classification and Physical Description
	13 1/2" Tri Cone					1330		1235.0 - 1460.0' ANDESITE Dark green to black, fine grained; hard, very strong; minor magnetite and epidote, trace limonite stain.
						1340		1340.0 - 1350.0' Trace pyrite, actinolite.
						1350		
						1360		
						1370		1370.0 - 1390.0' Abundant limonite, trace calcite.
						1380		
						1390		1390.0 - 1400.0' Abundant amphibole.
						1400		1400.0 - 1410.0' Trace pyrite, rare calc-silicates.
						1410		

REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST

DATE	04/92
JOB NO.	G125-19
DWG NO.	EM19010/14
DRAWN	J HATALA
CHK'D	R HARRIS
APP'D	D AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
MW-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

FIGURE

Project Site / Drill Site	Spud Date	Borehole Dia	Ground Elevation	Borehole No
WEST END OF EAST PIT	04/13/92	13 3/4"	1251.42'	MW-13
Coordinates / Stationing	**Completion Date**	**Logged By**		**Bottom of Borehole (bgs)**
	04/17/92	C. L TRANTHAM		420'
Drill Rig Make and Model	**Drilling Method**	**Drilling Fluid**	**Top of Bedrock (bgs)**	**First Encountered Water (bgs)**
INGERSOLL RAND T4	Air Hammer	Air	3.0'	315'
Drilling Contractor	**Surf Csg OD/ID/Depth**	**Total Core Recovery %**	**Total Number of Core Boxes**	**Static Water Level (bgs)**
TONTO DRILLING SERVICES, INC	16"OD / 15 1/2"ID / 19'	N/A	N/A	

REMARKS: Water Data, Drilling Data, Personnel Changes	Tool Size	RQD (%)	Fractures / Foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
Night Shift Crew: Driller: Mitch Bronson Helpers: Jason Verde Shawn Barsi Day Shift Crew: Driller: Rick Gostovich Helpers: Chris Fike Dave Cozo	16" Tri Cone						10		0 - 3.0' ARTIFICIAL FILL: Gray, dense, dry, angular, mainly 3/4 - 1/4" crushed road surface material. 3.0 - 142.0' QUARTZITE: Gray, fine-grained, scattered veins and vesicles of quartz, hematite, serpentine, magnesite and white diopside (?). Scattered thin fracture fillings of white and clear gypsum. Locally lineation present with black FeMg minerals. Barely weathered, very hard, very strong.
19.0' Bottom of conductor casing.	19.0' 13 3/4" Air Hammer						20		
							30		
							40		
							50		
Casing reset to 70'. Resume drilling on [illegible] 04/15/92.							70		

DATE	06/92
JOB NO.	G125-19
DWG NO.	EM19013/1
DRAWN	J HATALA
CHKD	R HARRIS
APPD	D AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
MW-13
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

1 of 6

REGISTERED GEOLOGIST IRVING DEAN AFFELDT No. 708 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

REMARKS: Water Data, Drilling Data, Personnel Changes	Tool Size	RQD (%)	Fractures / Foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
	13 3/4" Air Hammer						70		3.0 - 142.0' QUARTZITE: Gray, fine-grained, scattered veins and vesicles of quartz, hematite, serpentine, magnesite and white diopside (?). Scattered thin fracture fillings of white and clear gypsum. Locally lineation present with black FeMg minerals. Barely weathered, very hard, very strong.
							80		
90.0 - 110' Cuttings to 3/4".							90		85.0 - 100.0' Darker gray.
							100		
120.0 - 142' Cuttings to 3/4".							120		
							130		135.0 - 142.0' Light gray.
142.0 - 155' Cuttings mainly fine sand sizes.							140		142.0 - 155.0' HEMATITE AND QUARTZITE: Red and gray, fine-grained with magnesite, hematite and mica grains; barely weathered, very hard, very strong.
							150		

DATE	06/92
JOB NO.	G125-19
DWG NO.	EM19013/2
DRAWN	J HATALA
CHKD	R HARRIS
APPD	D AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
MW-13
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

2 of 6

REGISTERED GEOLOGIST IRVING DEAN AFFELDT No. 708 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

REMARKS (Water Data, Drilling Data, Personnel Changes)	Tool Size	RQD (%)	Fractures / foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
	13 3/4" Air Hammer						150		142.0 - 155.0' HEMATITE QUARTZITE. Red and gray, fine-grained.
155-210' Cuttings are mainly fine and medium-grained sand sizes.									155.0 - 210.0' QUARTZITE. Gray, fine-grained, scattered seams/layers and veinlets of magnetite, hematite, mica, actinolite, tremolite, white quartz, talc. Barely weathered, very hard, very strong
							160		
							170		
							180		180.0 - 190.0' Increased percent of magnetite in cuttings.
							190		190.0 - 210.0' Approximately 40% of cuttings are magnetite; trace mica and serpentine. Increased percent of magnetite with depth.
							200		
210-225' Cuttings are mostly fine and medium-grained sand sizes.							210		210.0 - 2750.0' MAGNETITE, HEMATITE QUARTZITE INTERMIXED: Dark gray, fine-grained, metallic black magnetite, reddish hematite and gray quartzite. Minor veinlets and fracture fillings of milky quartz, mica, actinolite, and serpentine. Barely weathered, moderately hard, very strong, brittle. Scattered iron stained fractures.
							220		
225-227' Cuttings are fine through coarse sand sizes.							230		

REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No. 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

DATE	06/92
JOB NO.	G125-19
DWG NO.	EM19013/3
DRAWN	J HATALA
CHKD	R. HARRIS
APPD	D AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
MW-13
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY CALIFORNIA
MINE RECLAMATION CORPORATION

FIGURE NO [illegible]

REMARKS (Water Data, Drilling Data, Personnel Changes)	Tool Size	RQD (%)	Fractures / foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
230' Cuttings predominantly fine and medium sand sizes.	13 3/4" Air Hammer						230		210.0 - 2750.0' MAGNETITE, HEMATITE, QUARTZITE INTERMIXED: Dark gray, fine-grained, brittle. 230.0 - 275.0' Mostly magnetite. 230.0 - 250.0' Pyrite fragments in cuttings.
							240		
							250		250.0 - 260.0' Decrease in percent magnetite and increase in percent hematite.
							260		
							270		275.0 - 420.0' QUARTZITE: Gray, fine-grained, scattered veinlets of magnetite. Some fracture filling with gypsum. Few brecciated pieces with quartz, feldspar and mica. Locally banding and lineation in the quartzite. Barely weathered, very hard, very strong. chlorite, epidote, calcite fd
							280		
							290		
							300		
310.0' Depth at end of night shift on 04/15/92. Encountered [illegible] water at 310'. [illegible] 04/17/92.							310		

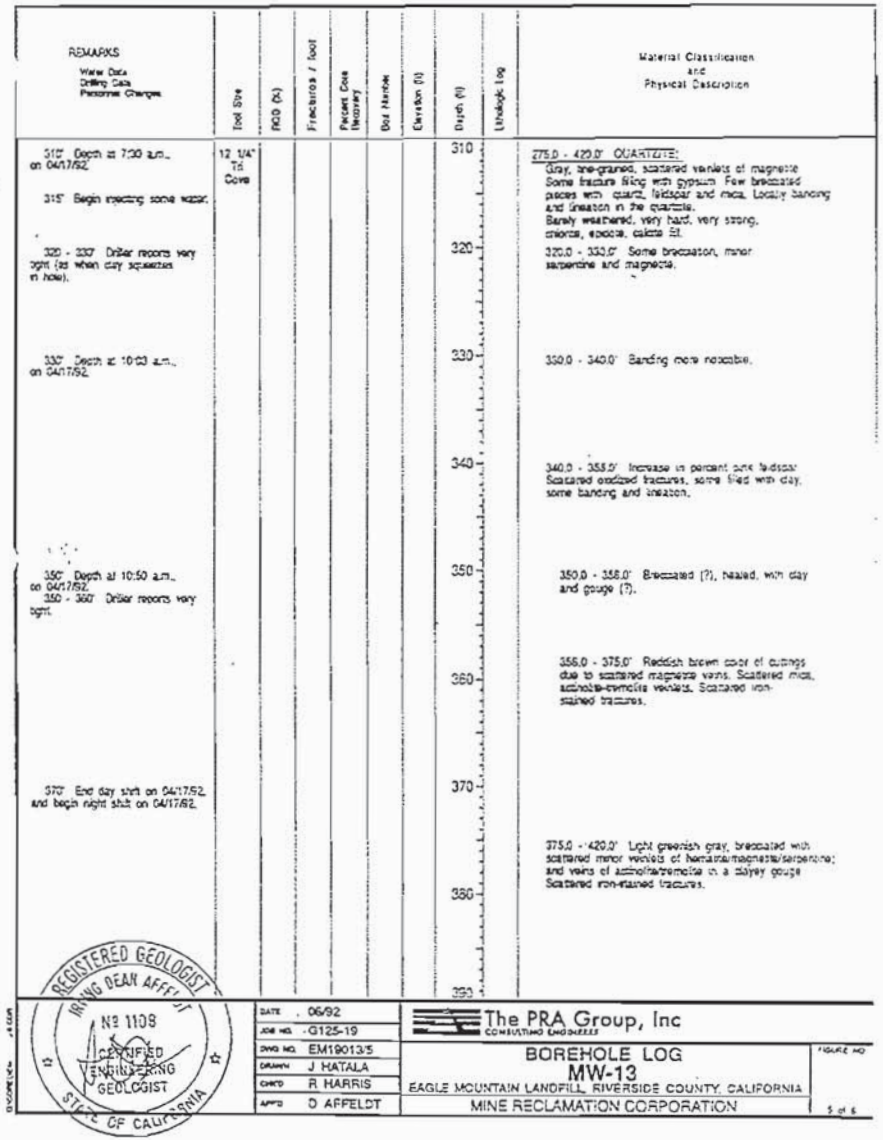
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No. 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

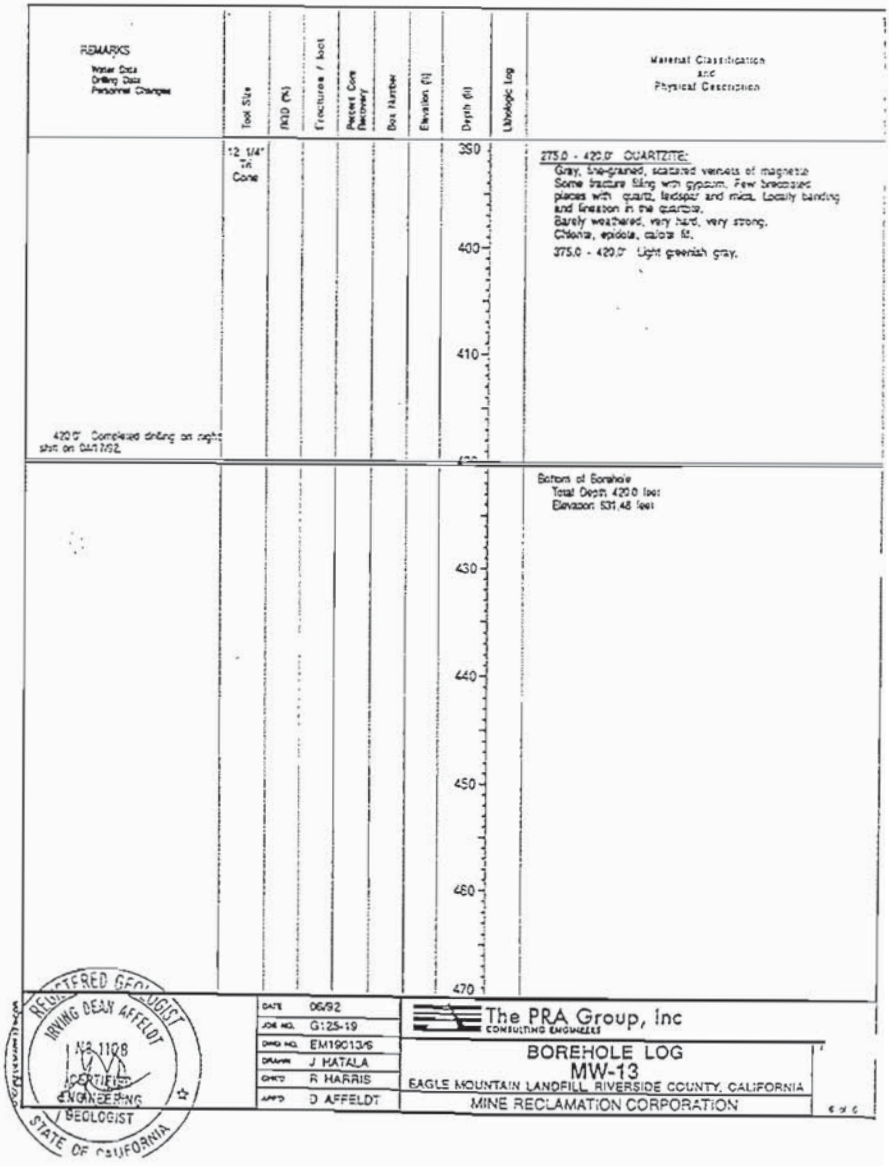
DATE	06/92
JOB NO.	G125-19
DWG NO.	EM19013/4
DRAWN	J HATALA
CHKD	R HARRIS
APPD	D AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
MW-13
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY CALIFORNIA
MINE RECLAMATION CORPORATION

[illegible]


REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures / foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
310' Depth at 7:00 a.m. on 04/17/92.
315' Begin injecting some water.
320 - 330' Driller reports very tight (as when clay squeezes in hole).
330' Depth at 10:03 a.m. on 04/17/92.
350' Depth at 10:50 a.m. on 04/17/92.
350 - 360' Driller reports very tight.
370' End day shift on 04/17/92 and begin night shift on 04/17/92.
12 1/4" Tri Cone
310
320
330
340
350
360
370
380
390
275.0 - 420.0' QUARTZITE:
Gray, fine-grained, scattered veinlets of magnetite. Some fracture filling with gypsum. Few brecciated places with quartz, feldspar and mica. Locally banding and lineation in the quartzite. Barely weathered, very hard, very strong. chlorite, epidote, calcite fill.
320.0 - 330.0' Some brecciation, minor serpentine and magnetite.
330.0 - 340.0' Banding more noticable.
340.0 - 350.0' Increase in percent pink feldspar. Scattered oxidized fractures, some filled with clay, some banding and lineation.
350.0 - 356.0' Brecciated (?), healed, with clay and gouge (?).
356.0 - 375.0' Reddish brown color of cuttings due to scattered magnetite veins. Scattered mica, actinolite-tremolite veinlets. Scattered iron-stained fractures.
375.0 - 420.0' Light greenish gray, brecciated with scattered minor veinlets of hematite/magnetite/serpentine; and veins of actinolite/tremolite in a clayey gouge. Scattered iron-stained fractures.
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA
DATE 06/92
JOB NO. G125-19
DWG NO. EM19013/5
DRAWN J HATALA
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
MW-13
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
FIGURE NO
5 of 6


REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures / foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
12 1/4" Tri Cone
350
400
410
420
430
440
450
460
470
275.0 - 420.0' QUARTZITE:
Gray, fine-grained, scattered veinlets of magnetite. Some fracture filling with gypsum. Few brecciated places with quartz, feldspar and mica. Locally banding and lineation in the quartzite. Barely weathered, very hard, very strong. Chlorite, epidote, calcite fill.
375.0 - 420.0' Light greenish gray.
420.0' Completed drilling on night shift on 04/17/92.
Bottom of Borehole
Total Depth: 420.0 feet
Elevation: 531.48 feet
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA
DATE 06/92
JOB NO. G125-19
DWG NO. EM19013/5
DRAWN J HATALA
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
MW-13
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
6 of 6

APPENDIX A

LITHOLOGIC DESCRIPTION

Eagle Mountain Piezometer No. 1

0 - 15ft	ARTIFICIAL FILL
15 - 25ft	QUARTZITE
25 - 45ft	QUARTZITE AND QUARTZ MONZONITE
45 - 65ft	QUARTZITE
65 - 80ft	QUARTZ MONZONITE
80 - 196ft	QUARTZITE
196 - 200ft	QUARTZ MONZONITE WITH SOME QUARTZITE
200 - 205ft	QUARTZITE WITH SOME QUARTZ MONZONITE
205 - 270ft	QUARTZ MONZONITE

APPENDIX A

LITHOLOGIC DESCRIPTION

Eagle Mountain Piezometer No. 11

0- 10ft POORLY GRADED SAND (SP) : Trace coarse, angular to subrounded gravel; 10% fine, angular to subrounded gravel; 25% coarse, angular to subrounded sand; 60% medium, angular to subrounded sand; 5% fine, subangular to subrounded sand; brown, dry, maximum size = 25mm

10 - 20ft POORLY GRADED SAND WITH GRAVEL (SP) : 20% coarse, angular to subangular gravel; 15% fine, angular to subangular gravel; 30% coarse, angular to subrounded sand; 35% medium, angular to subrounded sand; trace fine sand; brown, dry, maximum size = 30mm

20 - 75ft POORLY GRADED SAND WITH GRAVEL (SP) : 5% coarse, angular to subangular gravel; 10% fine, angular to subangular gravel; 40% coarse, angular to subangular sand; 45% medium, angular to subangular sand; trace fine, subangular to subrounded sand; brown, dry, maximum size = 35mm

75 - 135ft POORLY GRADED GRAVEL WITH SAND (GP) : 25% coarse, angular to subrounded gravel; 35% fine, angular to subrounded gravel; 20% coarse, angular to subrounded sand; 20% medium, angular to subrounded sand; trace fine sand; brown, dry, maximum size = 43mm

135 - 205ft POORLY GRADED SAND WITH GRAVEL (SP) : 10% coarse, angular to subrounded gravel; 15% fine, angular to subrounded gravel; 30% coarse, angular to subrounded sand; 40% medium, angular to subrounded sand; 5% fine, subangular to subrounded sand; brown, moist (due to injection of water during drilling), maximum size = 37mm

205 - 210ft POORLY GRADED GRAVEL (GP) : 80% coarse, subangular to subrounded gravel; 20% fine, subangular to subrounded gravel; trace coarse, subangular to subrounded sand; trace medium, subangular to subrounded sand; trace fine, subangular to subrounded sand; trace fines; no dilatancy, medium toughness, medium plasticity, medium dry strength; brown, moist (due to injection of water during drilling), maximum size = 40mm

210- 255ft POORLY GRADED SAND (SP) : Trace coarse, subangular to subrounded gravel; trace fine, subangular to subrounded gravel; 15% coarse, subangular to subrounded sand; 85% medium, subangular to subrounded sand; trace fine, subangular to subrounded sand; brown, dry, maximum size = 39mm

LITHOLOGIC DESCRIPTION - Piezometer No. 11 (cont.)

255- 270ft SANDY LEAN CLAY (CL) : Trace fine, angular to subrounded gravel; trace coarse, angular to subrounded sand; 10% medium, angular to subrounded sand; 20% fine, subangular to subrounded sand; 70% fines; no dilatancy, medium toughness, medium plasticity, medium dry strength; brown, moist (due to injection of water during drilling)

270- 310ft CLAYEY SAND (SC) : Trace fine, angular to subrounded gravel; 5% coarse, angular to subrounded sand; 30% medium, angular to subrounded sand; 35% fine, subangular to subrounded sand; 30% fines; no dilatancy, medium toughness, medium plasticity, medium dry strength; brown, moist (due to injection of water during drilling)

310- 345ft SANDY LEAN CLAY (CL) : Trace fine, angular to subrounded gravel; trace coarse, angular to subrounded sand; 10% medium, subangular to subrounded sand; 30% fine, subangular to subrounded sand; 60% fines; no dilatancy, medium toughness, medium plasticity, medium dry strength; brown, moist (due to injection of water during drilling)

345- 365ft CLAYEY SAND (SC) : Trace fine, angular to subangular gravel; 10% coarse, angular to subangular sand; 40% medium, angular to subrounded sand; 30% fine, subangular to subrounded sand; 20% fines no dilatancy, medium toughness, medium plasticity, medium dry strength; brown, moist (due to injection of water during drilling)

365- 485ft POORLY GRADED SAND (SP) : 5% fine, angular to subrounded gravel; 40% coarse, angular to subrounded sand; 55% medium, angular to subrounded sand; trace fine, subangular to subrounded sand; trace fines; brown, dry

APPENDIX A

LITHOLOGIC DESCRIPTION

Eagle Mountain Piezometer No. 12

0- 10ft	POORLY GRADED SAND (SP) : 10% coarse, angular to subrounded gravel; 10% fine, angular to subrounded gravel; 45% coarse, angular to subrounded sand; 35% medium, angular to subrounded sand; trace fine sand; brown, dry, maximum size = 38mm
10 - 15ft	POORLY GRADED GRAVEL WITH SAND (GP) : 25% coarse, angular to subrounded gravel; 35% fine, angular to subrounded gravel; 25% coarse, angular to subrounded sand; 15% medium, angular to subrounded sand; trace fine sand; brown, dry, maximum size = 40mm
15 - 30ft	POORLY GRADED SAND WITH GRAVEL (SP) : 5% coarse, angular to subrounded gravel; 20% fine, angular to subrounded gravel; 40% coarse, angular to subrounded sand; 35% medium, angular to subrounded sand; trace fine sand; brown, dry, maximum size = 22mm
30 - 60ft	POORLY GRADED GRAVEL WITH SAND (GP) : 30% coarse, angular to subrounded gravel; 35% fine, angular to subrounded gravel; 25% coarse, subangular to subrounded sand; 10% medium, subangular to subrounded sand; trace fine sand; brown, dry, maximum size = 31mm
60 - 115ft	POORLY GRADED SAND WITH GRAVEL (SP) : 10% coarse, angular to subangular gravel; 20% fine, angular to subrounded gravel; 40% coarse, angular to subrounded sand; 30% medium, subangular to subrounded sand; trace fine sand; brown, dry, maximum size = 30mm
115 - 130ft	ELASTIC SILT (ML) : 10% fine, subangular to subrounded sand; 90% fines; slow dilatancy, medium toughness, low plasticity, low dry strength; brown, dry
130- 155ft	POORLY GRADED SAND (SP) : Trace coarse, subangular to subrounded gravel; 10% fine, angular to subrounded gravel; 35% coarse, angular to subrounded sand; 50% medium, subangular to subrounded sand; 5% fine, subangular to subrounded sand; brown, dry, maximum size = 32mm
155- 370ft	POORLY GRADED SAND (SP) : Trace fine, subangular to subrounded gravel; trace coarse, subangular to subrounded sand; 60% medium, subangular to subrounded sand; 40% fine, subangular to subrounded sand; brown, dry
370- 500ft	POORLY GRADED SAND (SP) : Trace fine, subangular to subrounded gravel; 20% coarse, subangular to subrounded sand; 70% medium, subangular to subrounded sand; 10% fine, subangular to rounded sand; trace to 5% fines; slow dilatancy, medium toughness, medium plasticity, low dry strength; brown, dry

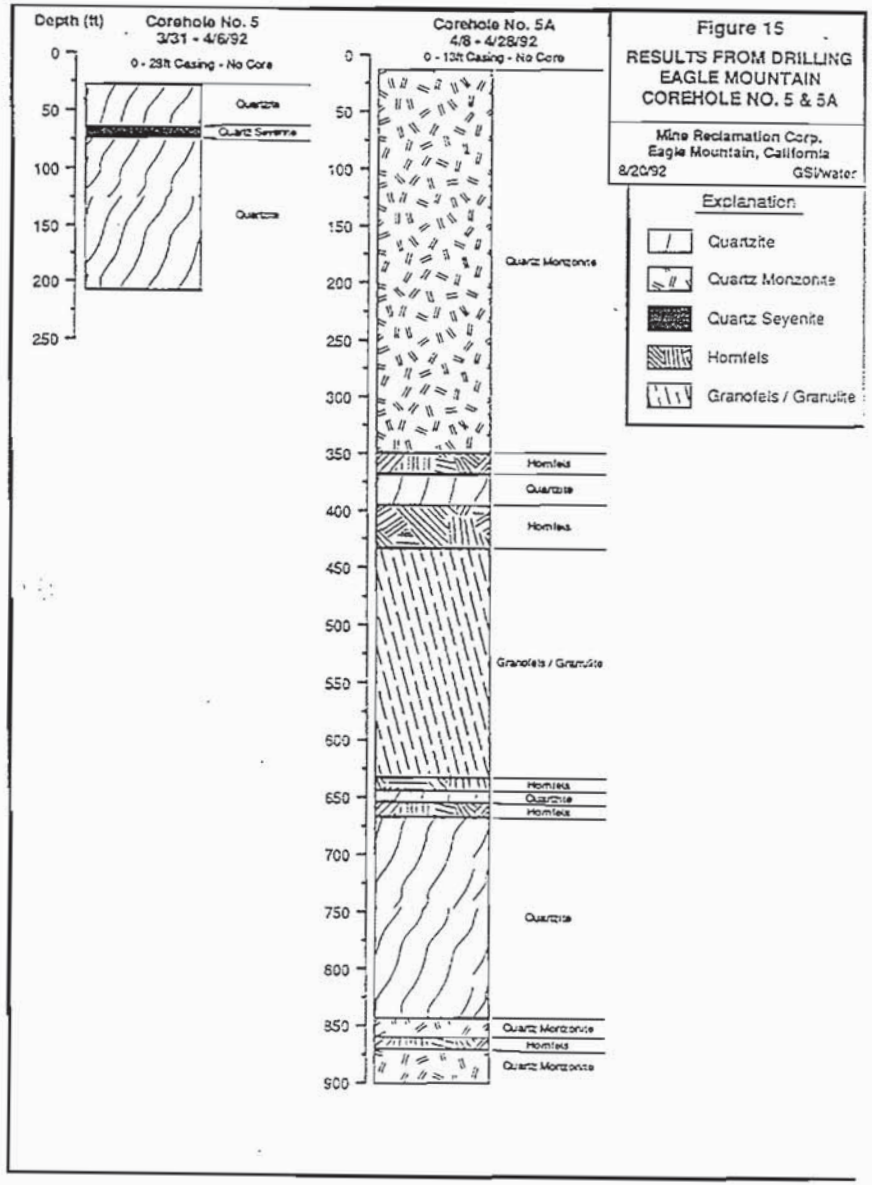


Figure 15

RESULTS FROM DRILLING
EAGLE MOUNTAIN
COREHOLE NO. 5 & 5A

Mine Reclamation Corp.
Eagle Mountain, California
8/20/92 GSI/water

Project Site / Drill Site: NORTH OF EAST PIT				Spud Date: 4/2/92	Borehole Dia: 3.85"	Ground Elevation: 1557.2'		Borehole No.: CH-5	
Coordinates / Stationing				Completion Date: 4/25/92	Logged By: R. REYNOLDS, J. SUTHARD			Bottom of Borehole (bgs): 206'	
Drill Rig Make and Model: BOYLES 56				Drilling Method: CORE	Drilling Fluid: MUD	Top of Bedrock (bgs): 29'		First Encountered Water (bgs): /	
Drilling Contractor: TONTO DRILLING SERVICES, INC.				Surf. Csg OD/ID/Depth: 4 1/2" / 4" / 28'	Total Core Recovery %:	Total Number of Core Boxes: 20		Static Water Level (bgs): /	
REMARKS: Water Data, Drilling Data, Personnel Changes	Tool Size	RQD (%)	Fractures / foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
	5 5/8" TRI CONE								0' - 29.0' CASING - NO CORE
						28.0'			
30' depth at 10:10 am, 4/2/92	HQ	0	6	100	BOX 1		30		28.0' - 65.0' QUARTZITE. Variegated light to dark green-gray, fine-grained. Some-inch banding 10-40 degrees to axis. Slightly to moderately fractured, fractures smooth, slightly open.
		0	6	100					
Geologist: R. Reynolds	3.85" HOLE 2.405" CORE	31	3	100					
						36.5'			
47' depth at 2:00 pm, 4/2/92		74	1	100	BOX 2		40		
		62	1	100					
						46.5'			
57' depth at 3:45 pm, 4/2/92		67	1	100	BOX 3		50		
		57	2	100					
						55.0'			
67' depth at 7:00 pm, 4/2/92		73	<1	100	BOX 4		60		
		47	2	100					
						64.5'			65.0' - 74.0' QUARTZ SYENITE. Pink-gray, coarse-grained. Mostly K-feldspar, with minor interstitial quartz and pyroxene. Fractures hackly, slightly open, MnOx coating. Rock is massive, hard, strong.
70' depth at 8:45 am, 4/3/92		72	<1	100	BOX 5		70		

REGISTERED GEOLOGIST IRVING DEAN AFFELDT No. 1108 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

DATE	7/92
JOB NO.	G125-18
DWG NO.	EM 19004-1
DRAWN	R. HARRIS
CHKD	D. MERIT
APPD	D. AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
CH-5
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

FIGURE NO. 1 of 2

REMARKS Water Loss Drilling Aids Personnel Changes	Tool Size	RQD (%)	Fractures per foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
70' depth at 9:15 pm, 4/02/92	HQ 3.85" HOLE 2.406" CORE	20	4	100	5 73.0'		70		55.0' - 74.0' QUARTZ SYENITE Pink-gray, coarse-grained, mossy K-feldspar, with minor interstitial quartz and pyroxene. Fractures blocky, slightly open, MnOx coating. Rock is massive, hard, strong.
80' depth at 10:35 pm, 4/02/92		32	3	100	B O X 6 82.0'		80		74.0' - 208.0' QUARTZITE Light to dark green, fine-grained, weak bedding banding. Hard, strong, slightly to moderately fractured. Fractures mostly 40-50 and 70-90 degrees to axis, smooth, minor calcite fill
Geologist: J. Suthard		27	6	100	B O X 7 90.0'		90		
90' depth at 3:13 am, 4/03/92		45	2	100	B O X 8 100.0'				
100' depth at 6:12 am, 4/03/92 Geologist: R. Reynolds Drilling down for repair		48	2	100	B O X 8 108.5'		100		100' - 107' dikelets of syenite to 1" common
		45	1	100					
110' depth at 9:30 pm, 4/03/92		60	1	100	B O X 9 118.0'		110		115' - 120' minor syenite dikelets
		25	2	100					
120' depth at 10:25 pm, 4/03/92		42	2	100	B O X 10 127.0'		120		
		48	2	100					
130' depth at 2:00 am, 4/04/92		52	2	100	B O X 11 137.0'		130		130'- 135' fault zone, breccia/clay
Problems retrieving core barrel all night Geologist: R. Reynolds		30	4	100					
140' depth at 2:00 pm, 4/04/92		0	>5	20	B O X 12 139.0'		140		
		23	6	100					
150' depth at 3:45 pm, 4/04/92		98	<1	100	B O X 13 148.0'		150		
		67	1	100					
					14				

DATE	7/92
JOB NO.	G125-19
DWG NO.	EM 19004-2
DRAWN	R. HARRIS
CHK'D	D. MERIT
APP'D	D. AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
CH-5
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

2 of 3

REMARKS Water Loss Drilling Aids Personnel Changes	Tool Size	RQD (%)	Fractures per foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
150' depth at 3:45 pm, 4/04/92	HQ 3.85" HOLE 2.406" CORE	40	5	100	B O X 14 157.0'		150		74.0' - 208.0' QUARTZITE Light to dark green, fine-grained, weak bedding banding. Hard, strong, slightly to moderately fractured. Fractures mostly 40-50 and 70-90 degrees to axis smooth, minor calcite fill
160' depth at 5:15 pm, 4/04/92		32	2	100					
		37	2	100	B O X 15 166.5'		160		150.0' - 160.0' minor syenite dikelets
		68	1	100					
170' depth at 11:00 pm, 4/04/92		64	<1	100	B O X 16 175.0'		170		
Geologist: J. Suthard		20	4	100					
180' depth at 12:55 am, 4/05/92		76	<1	100	B O X 17 185.0'		180		
		82	<1	100					
190' depth at 9:25 am, 4/05/92		92	1	100	B O X 18 193.5'		190		
		60	3	100					
		44	3	95	B O X 19 202.0'				197.0' - 208.0' hydrothermal alteration bleaching
200' depth at 12:30 pm, 4/05/92 Deviation survey = <2 degrees		16	>5	100			200		
Geologist: R. Reynolds		7	5	95	B O X 20				TOTAL DEPTH 208.0 FEET
208' stopped drilling due to severe vibration and loss of circulation, 1:40 pm, 4/04/92							210		
							220		
							230		

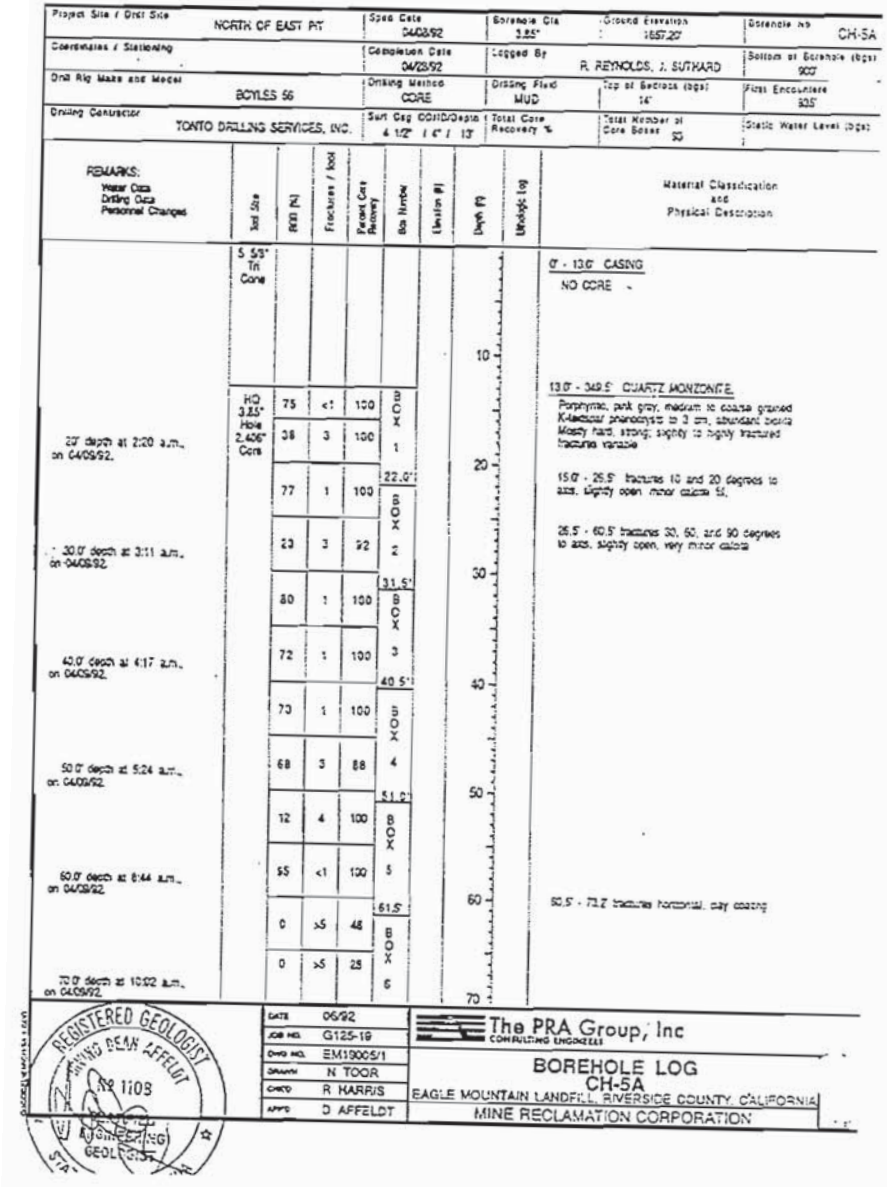
DATE	7/92
JOB NO.	G125-19
DWG NO.	EM 19004-3
DRAWN	R. HARRIS
CHK'D	D. MERIT
APP'D	D. AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
CH-5
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

FIGURE NO.

3 of 3



Project Site / Drill Site: NORTH OF EAST PIT	Spud Date: 04/03/92	Borehole Dia: 3.85"	Ground Elevation: 1657.20'	Borehole No: CH-5A
Coordinates / Stationing:	Completion Date: 04/28/92	Logged By: R. REYNOLDS, J. SUTHARD		Bottom of Borehole (bgs): 907'
Drill Rig Make and Model: BOYLES 56	Drilling Method: CORE	Drilling Fluid: MUD	Top of Bedrock (bgs): 14'	Fines Encountered: 935'
Drilling Contractor: TONTO DRILLING SERVICES, INC.	Surf Csg OD/ID/Depth: 4 1/2" / 4" / 13'	Total Core Recovery %:	Total Number of Core Boxes: 93	Static Water Level (bgs):

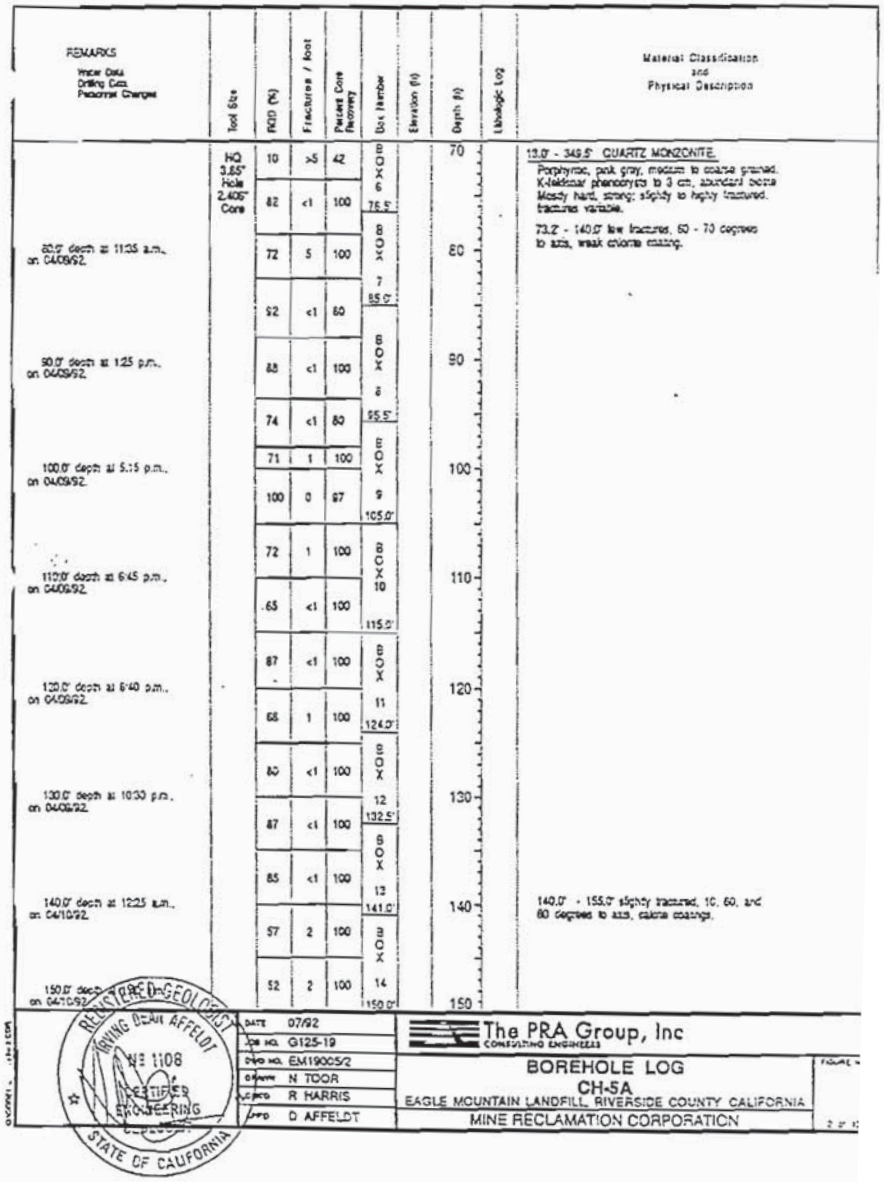
REMARKS: Water Data, Drilling Data, Personnel Changes	Tool Size	RQD (%)	Fractures / foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
	5 5/8" Tri Cone						10		0' - 13.0' CASING NO CORE
20' depth at 2:20 a.m. on 04/09/92.	HQ 3.85" Hole 2.405" Core	75	<1	100	BOX 1		20		13.0' - 349.5' QUARTZ MONZONITE. Porphyritic, pink gray, medium to coarse grained. K-feldspar phenocrysts to 3 cm, abundant biotite. Mostly hard, strong; slightly to highly fractured. fractures variable.
30.0' depth at 3:11 a.m. on 04/09/92.		38	3	100	22.0'				15.0' - 25.5' fractures 10 and 20 degrees to axis, slightly open, minor calcite ss.
40.0' depth at 4:17 a.m. on 04/09/92.		77	1	100	BOX 2		30		26.5' - 60.5' fractures 30, 60, and 90 degrees to axis, slightly open, very minor calcite
50.0' depth at 5:24 a.m. on 04/09/92.		23	3	92	31.5'				
60.0' depth at 6:44 a.m. on 04/09/92.		80	1	100	BOX 3		40		
70.0' depth at 10:02 a.m. on 04/09/92.		72	1	100	40.5'				
		70	1	100	BOX 4		50		
		68	3	88	51.0'				
		12	4	100	BOX 5		60		60.5' - 73.2' fractures horizontal, clay coating
		55	<1	100	61.5'				
		0	>5	48	BOX 6		70		
		0	>5	25					

REGISTERED GEOLOGIST IRVING DEAN AFFELDT NO 1108 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

DATE	06/92
JOB NO.	G125-19
DWG NO.	EM19005/1
DRAWN	N TOOR
CHKD	R HARRIS
APPD	D AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
CH-5A
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION



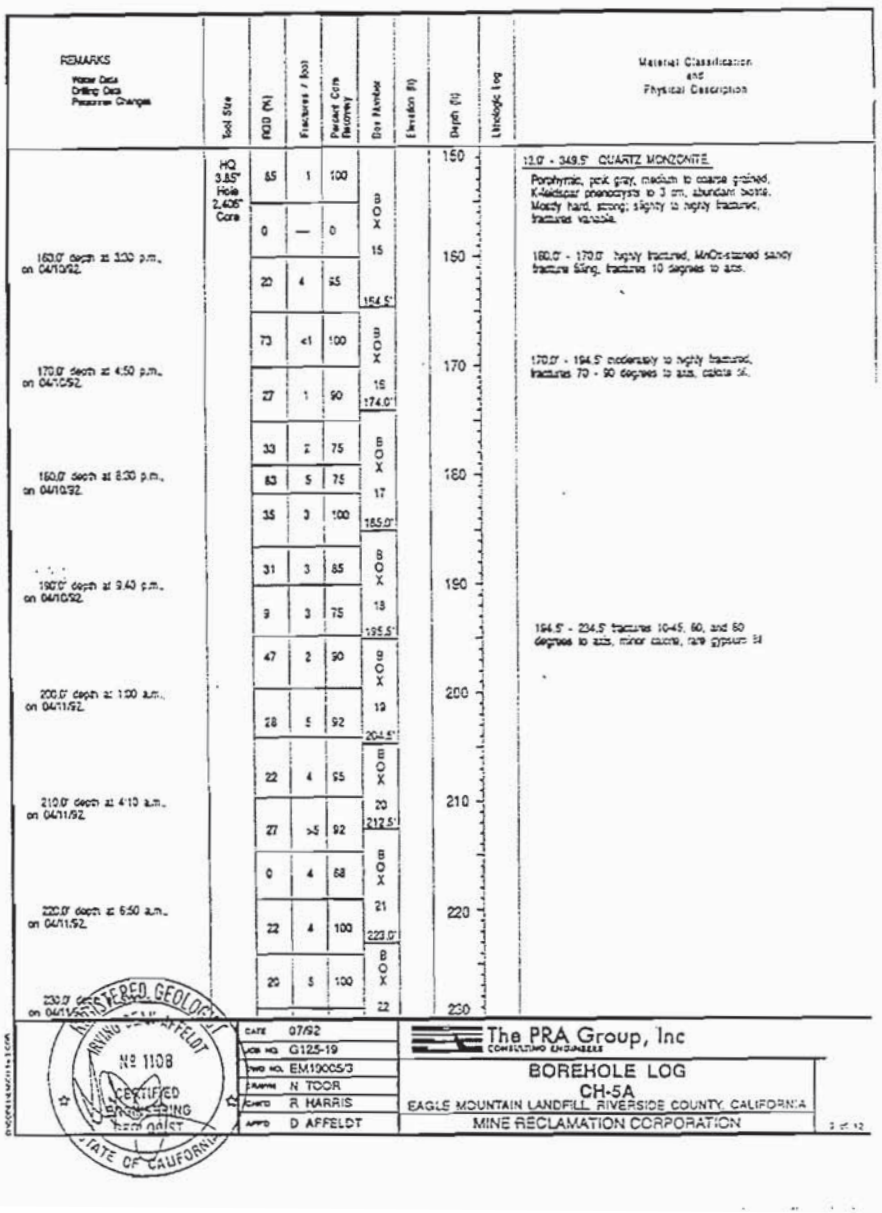
REMARKS: Water Data, Drilling Data, Personnel Changes	Tool Size	RQD (%)	Fractures / foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
	HQ 3.85" Hole 2.405" Core	10	>5	42	BOX 6		70		13.0' - 349.5' QUARTZ MONZONITE. Porphyritic, pink gray, medium to coarse grained. K-feldspar phenocrysts to 3 cm, abundant biotite. Mostly hard, strong; slightly to highly fractured. fractures variable.
80.0' depth at 11:35 a.m. on 04/09/92.		82	<1	100	76.5'				73.2' - 140.0' few fractures, 60 - 70 degrees to axis, weak chlorite coating.
90.0' depth at 1:25 p.m. on 04/09/92.		72	5	100	BOX 7		80		
100.0' depth at 5:15 p.m. on 04/09/92.		52	<1	60	85.0'				
110.0' depth at 6:45 p.m. on 04/09/92.		88	<1	100	BOX 8		90		
120.0' depth at 8:40 p.m. on 04/09/92.		74	<1	80	95.5'				
130.0' depth at 10:00 p.m. on 04/09/92.		71	1	100	BOX 9		100		
140.0' depth at 12:25 a.m. on 04/10/92.		100	0	97	105.0'				
150.0' depth at 04/10/92		72	1	100	BOX 10		110		
		65	<1	100	115.0'				
		87	<1	100	BOX 11		120		
		68	1	100	124.0'				
		80	<1	100	BOX 12		130		
		87	<1	100	132.5'				
		85	<1	100	BOX 13		140		140.0' - 155.0' slightly fractured, 10, 60, and 80 degrees to axis, calcite coatings.
		57	2	100	141.0'				
		52	2	100	BOX 14		150		
					150.0'				

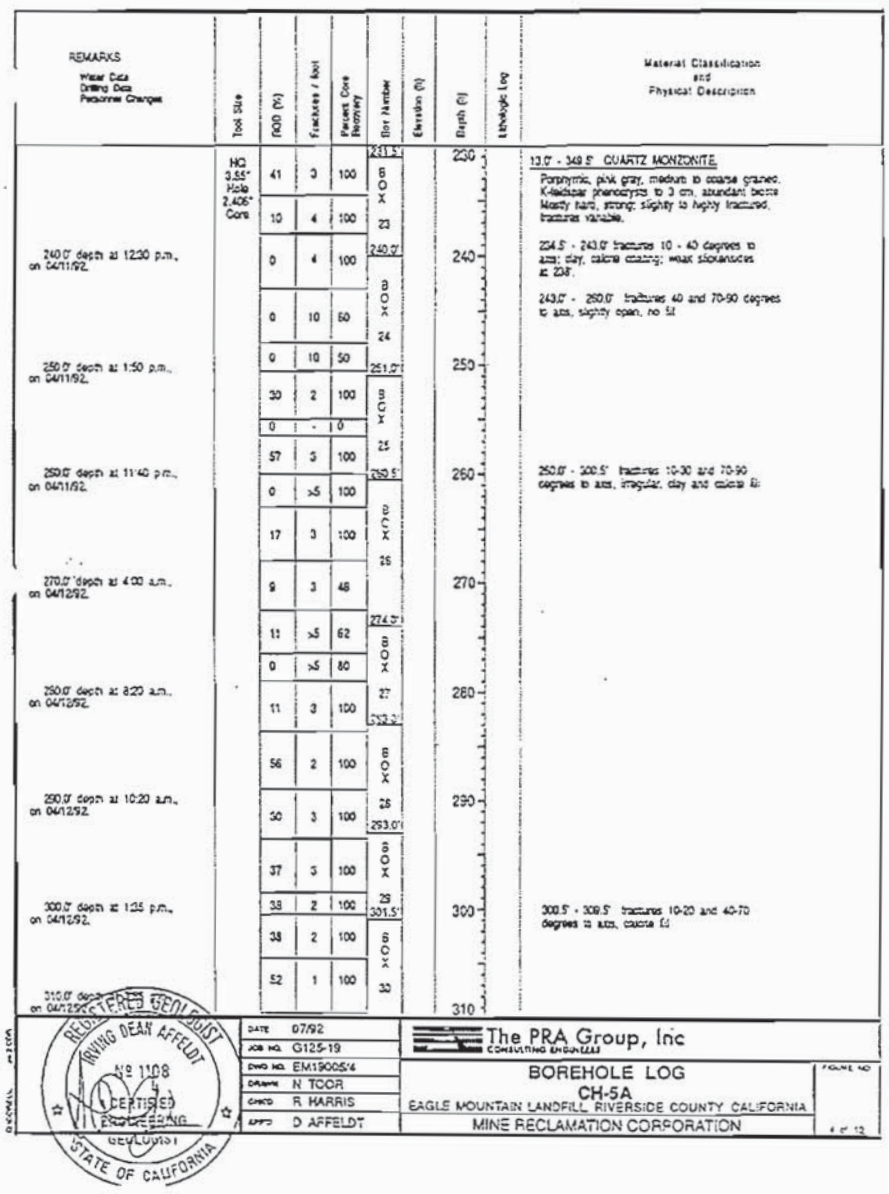
REGISTERED GEOLOGIST IRVING DEAN AFFELDT NO 1108 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

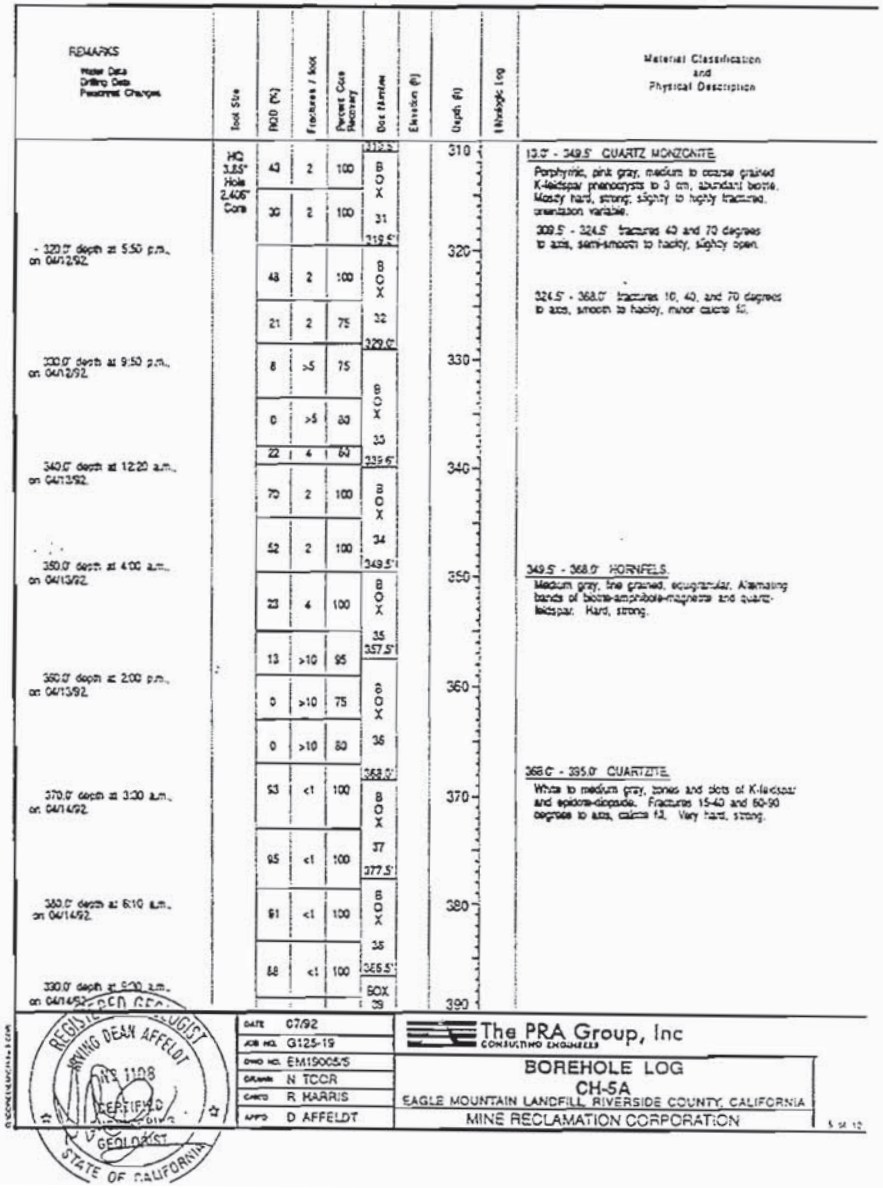
DATE	07/92
JOB NO.	G125-19
DWG NO.	EM19005/2
DRAWN	N TOOR
CHKD	R HARRIS
APPD	D AFFELDT

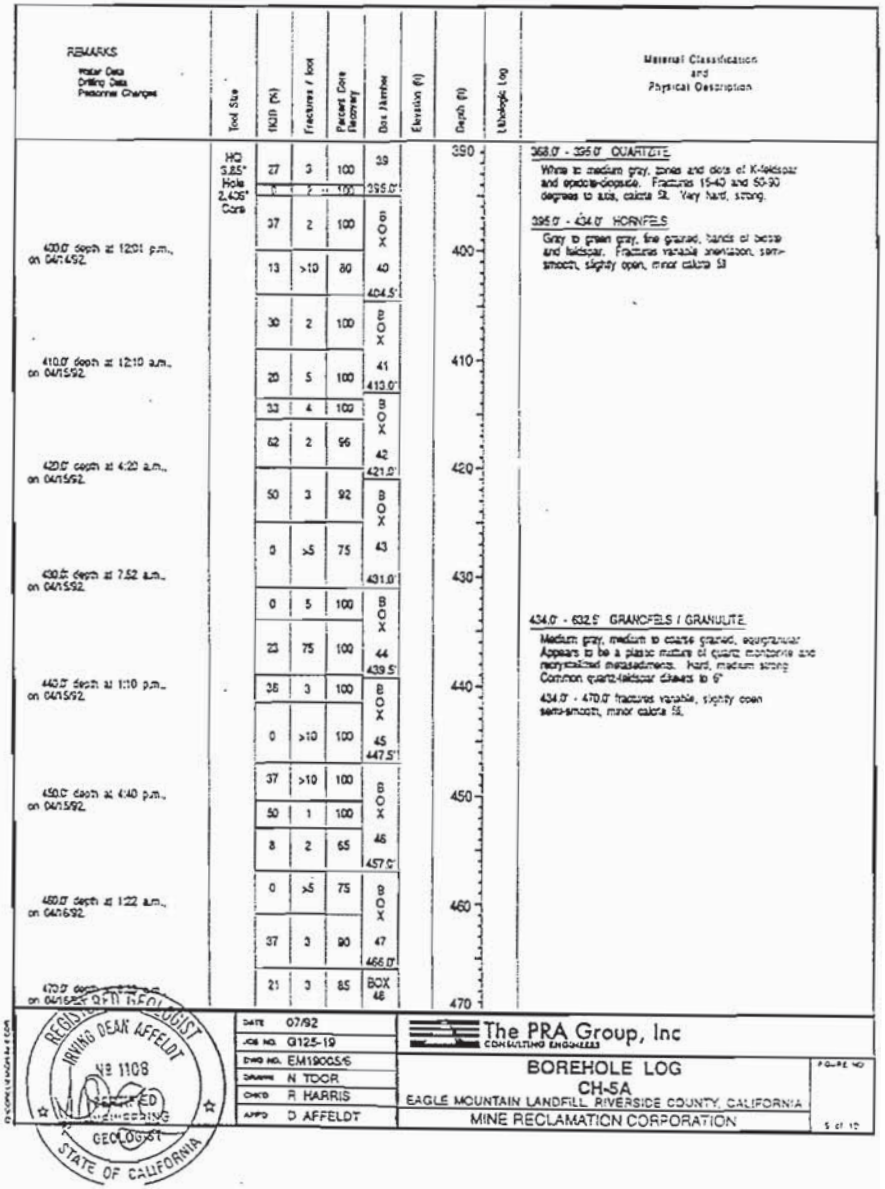
The PRA Group, Inc
CONSULTING ENGINEERS

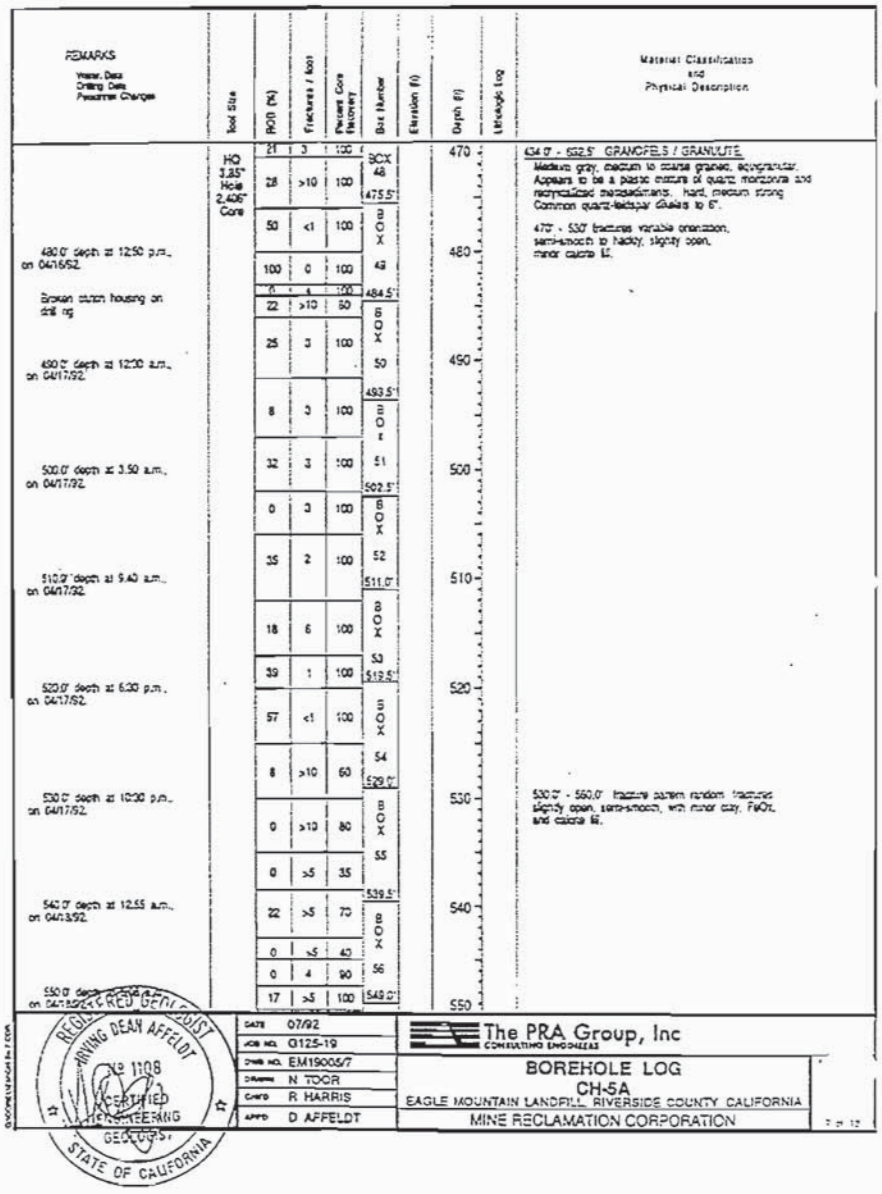
BOREHOLE LOG
CH-5A
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

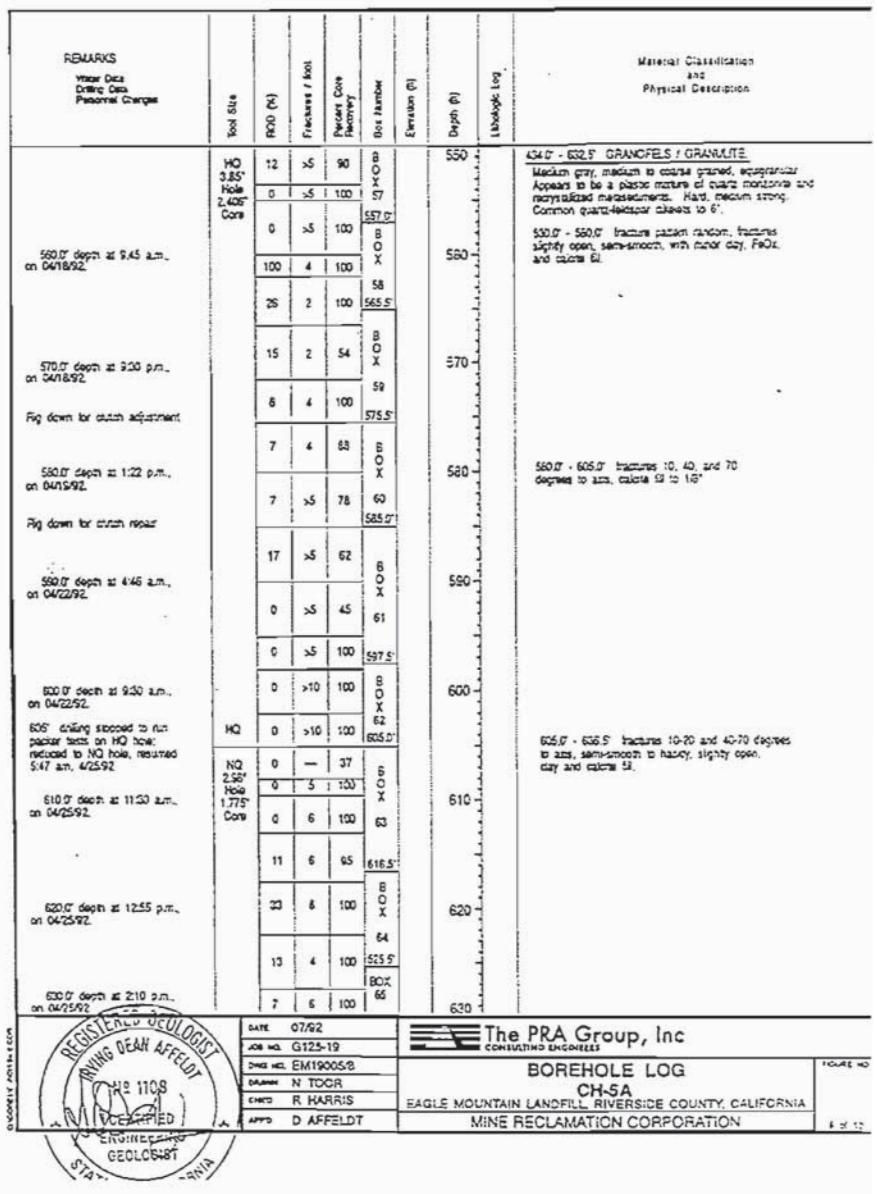

REMARKS
Water Data
Drilling Data
Pressmeter Changes
Tool Size
RQD (%)
Fractures / foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
HQ 3.85" Hole 2.405" Core
13.0' - 349.5' QUARTZ MONZONITE.
Porphyritic, pink gray, medium to coarse grained, K-feldspar phenocrysts to 3 cm, abundant biotite. Mostly hard, strong; slightly to highly fractured, fractures variable.
160.0' depth at 3:00 p.m. on 04/10/92.
160.0' - 170.0' highly fractured, MnOx-stained sandy fracture filling, fractures 10 degrees to axis.
170.0' depth at 4:50 p.m. on 04/10/92.
170.0' - 194.5' moderately to highly fractured, fractures 70 - 90 degrees to axis, calcite fill.
180.0' depth at 8:30 p.m. on 04/10/92.
190.0' depth at 9:40 p.m. on 04/10/92.
194.5' - 234.5' fractures 10-45, 60, and 80 degrees to axis, minor calcite, rare gypsum fill
200.0' depth at 1:00 a.m. on 04/11/92.
210.0' depth at 4:10 a.m. on 04/11/92.
220.0' depth at 6:50 a.m. on 04/11/92.
230.0' depth at 04/11/92
150
160
170
180
190
200
210
220
230
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
№ 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA
DATE 07/92
JOB NO. G125-19
DWG NO. EM19005/3
DRAWN N TOOR
CHKD R HARRIS
APPD D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-5A
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

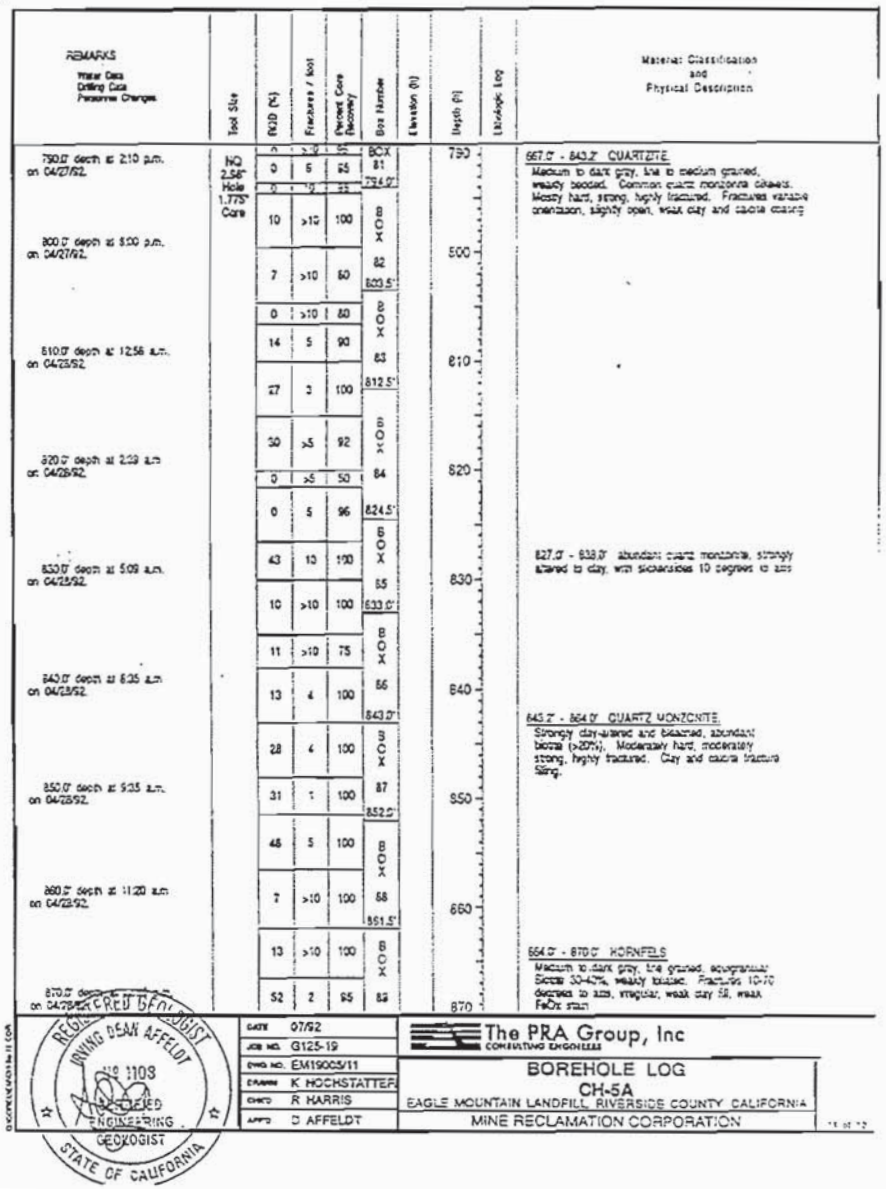

REMARKS
Water Data
Drilling Data
Pressmeter Changes
Tool Size
RQD (%)
Fractures / foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
HQ 3.85" Hole 2.405" Core
13.0' - 349.5' QUARTZ MONZONITE.
Porphyritic, pink gray, medium to coarse grained, K-feldspar phenocrysts to 3 cm, abundant biotite. Mostly hard, strong; slightly to highly fractured, fractures variable.
234.5' - 243.0' fractures 10 - 40 degrees to axis; clay, calcite coating; weak slickensides at 236'.
240.0' depth at 12:30 p.m. on 04/11/92.
243.0' - 260.0' fractures 40 and 70-90 degrees to axis, slightly open, no fill
250.0' depth at 1:50 p.m. on 04/11/92.
250.0' depth at 11:40 p.m. on 04/11/92.
250.0' - 300.5' fractures 10-30 and 70-90 degrees to axis, irregular, clay and calcite fill
270.0' depth at 4:00 a.m. on 04/12/92.
280.0' depth at 8:20 a.m. on 04/12/92.
290.0' depth at 10:20 a.m. on 04/12/92.
300.0' depth at 1:35 p.m. on 04/12/92.
300.5' - 309.5' fractures 10-20 and 40-70 degrees to axis, calcite fill
310.0' depth at 04/12/92
230
240
250
260
270
280
290
300
310
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
№ 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA
DATE 07/92
JOB NO. G125-19
DWG NO. EM19005/4
DRAWN N TOOR
CHKD R HARRIS
APPD D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-5A
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

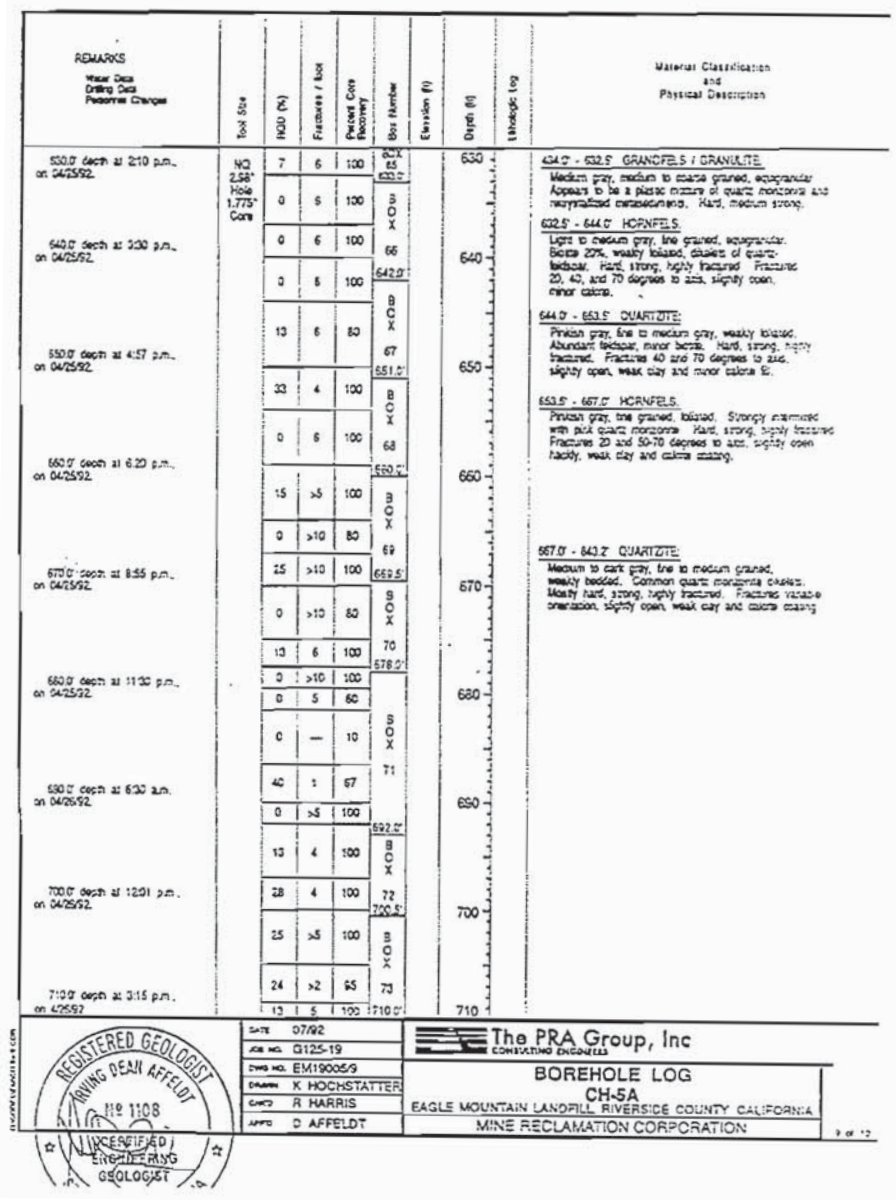

REMARKS
Water Data
Drilling Data
Pressmeter Changes
Tool Size
RQD (%)
Fractures / foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
HQ 3.85" Hole 2.406" Core
- 320.0' depth at 5:50 p.m., on 04/12/92.
330.0' depth at 9:50 p.m., on 04/12/92.
340.0' depth at 12:20 a.m., on 04/13/92.
350.0' depth at 4:00 a.m., on 04/13/92.
360.0' depth at 2:00 p.m., on 04/13/92.
370.0' depth at 3:00 a.m., on 04/14/92.
380.0' depth at 6:10 a.m., on 04/14/92.
390.0' depth at 8:00 a.m., on 04/14/92.
13.0' - 349.5' QUARTZ MONZONITE
Porphyritic, pink gray, medium to coarse grained K-feldspar phenocrysts to 3 cm, abundant biotite. Mostly hard, strong; slightly to highly fractured, orientation variable.
309.5' - 324.5' fractures 40 and 70 degrees to axis, semi-smooth to hackly, slightly open.
324.5' - 368.0' fractures 10, 40, and 70 degrees to axis, smooth to hackly, minor calcite fill.
349.5' - 368.0' HORNFELS
Medium gray, fine grained, equigranular. Alternating bands of biotite-amphibole-magnetite and quartz-feldspar. Hard, strong.
368.0' - 395.0' QUARTZITE
White to medium gray, zones and dots of K-feldspar and epidote-diopside. Fractures 15-40 and 60-90 degrees to axis, calcite fill. Very hard, strong.
DATE 07/92
JOB NO. G125-19
DWG NO. EM19005/5
DRAWN N TOOR
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-5A
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

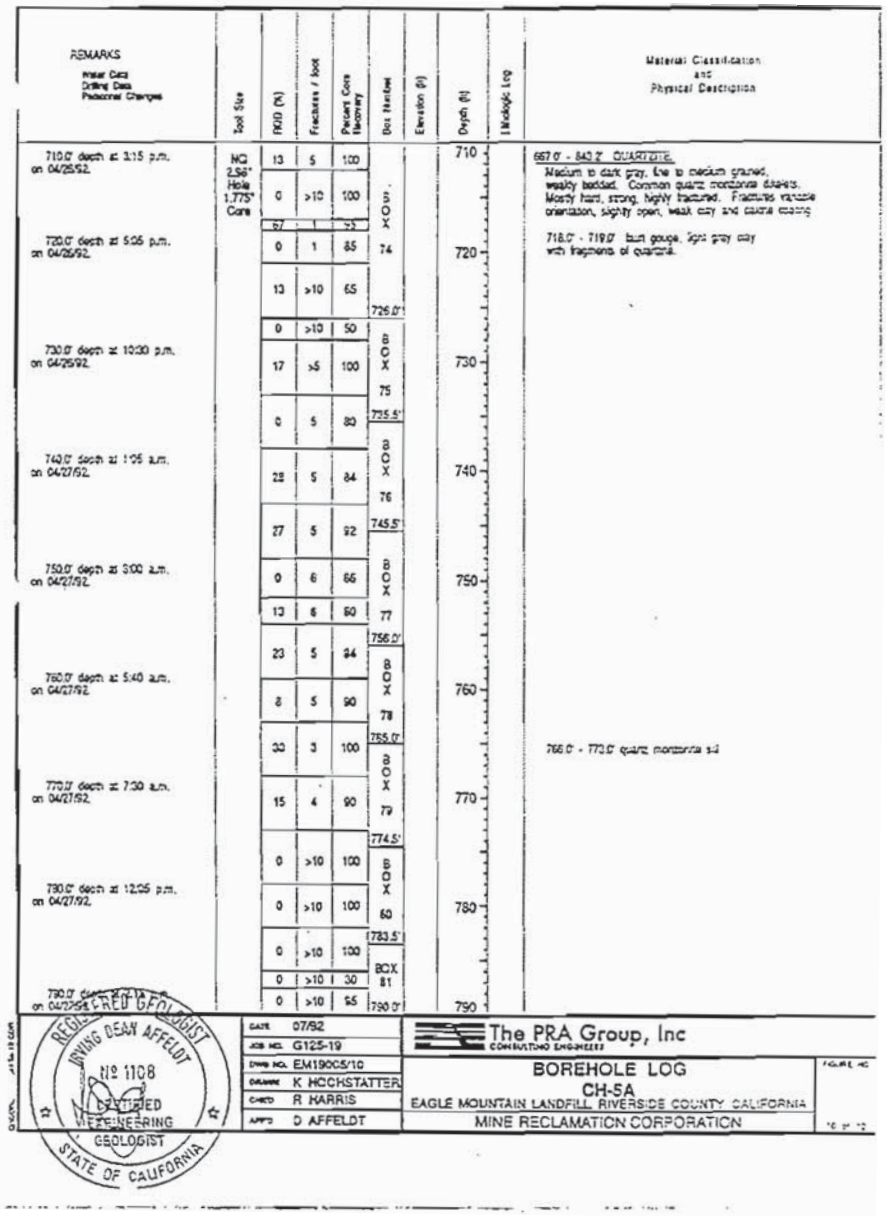

REMARKS
Water Data
Drilling Data
Pressmeter Changes
Tool Size
RQD (%)
Fractures / foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
HQ 3.85" Hole 2.406" Core
420.0' depth at 12:01 p.m., on 04/14/92.
410.0' depth at 12:10 a.m., on 04/15/92.
420.0' depth at 4:20 a.m., on 04/15/92.
430.0' depth at 7:52 a.m., on 04/15/92.
440.0' depth at 1:10 p.m., on 04/15/92.
450.0' depth at 4:40 p.m., on 04/15/92.
460.0' depth at 1:22 a.m., on 04/16/92.
470.0' depth at 9:11 a.m., on 04/16/92.
368.0' - 395.0' QUARTZITE
White to medium gray, zones and dots of K-feldspar and epidote-diopside. Fractures 15-40 and 60-90 degrees to axis, calcite fill. Very hard, strong.
395.0' - 434.0' HORNFELS
Gray to green gray, fine grained, bands of biotite and feldspar. Fractures variable orientation, semi-smooth, slightly open, minor calcite fill
434.0' - 632.5' GRANOFELS / GRANULITE
Medium gray, medium to coarse grained, equigranular. Appears to be a plastic mixture of quartz monzonite and recrystallized metasediments. Hard, medium strong. Common quartz-feldspar dikelets to 9"
434.0' - 470.0' fractures variable, slightly open semi-smooth, minor calcite fill.
DATE 07/92
JOB NO. G125-19
DWG NO. EM19005/5
DRAWN N TOOR
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-5A
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
FIGURE NO
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA


REMARKS
Water Data
Drilling Data
Pressure Changes
Tool Size
RQD (%)
Fractures / foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
434.0' - 532.5' GRANOFELS / GRANULITE.
Medium gray, medium to coarse grained, equigranular. Appears to be a plastic mixture of quartz monzonite and recrystallized metasediments. Hard, medium strong. Common quartz-feldspar dikelets to 6".
470' - 530' fractures variable orientation, semi-smooth to hacky, slightly open, minor calcite fill.
480.0' depth at 12:50 p.m., on 04/16/92.
Broken clutch housing on drill rig
490.0' depth at 12:00 a.m., on 04/17/92.
500.0' depth at 3:50 a.m., on 04/17/92.
510.0' depth at 9:40 a.m., on 04/17/92.
520.0' depth at 6:30 p.m., on 04/17/92.
530.0' depth at 10:00 p.m., on 04/17/92.
530.0' - 560.0' fracture pattern random, fractures slightly open, semi-smooth, with minor clay, FeOx, and calcite fill.
540.0' depth at 12:55 a.m., on 04/13/92.
550.0' depth at 04/18/92
HQ 3.85" Hole 2.405" Core
BOX 48 475.5'
BOX 49 484.5'
BOX 50 493.5'
BOX 51 502.5'
BOX 52 511.0'
BOX 53 519.5'
BOX 54 529.0'
BOX 55 539.5'
BOX 56 549.0'
BOX 57
DATE 07/92
JOB NO. G125-19
DWG NO. EM19005/7
DRAWN N TOOR
CHKD R HARRIS
APPD D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-5A
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA


REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures / foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
434.0' - 532.5' GRANOFELS / GRANULITE.
Medium gray, medium to coarse grained, equigranular. Appears to be a plastic mixture of quartz monzonite and recrystallized metasediments. Hard, medium strong. Common quartz-feldspar dikelets to 6".
530.0' - 560.0' fracture pattern random, fractures slightly open, semi-smooth, with minor clay, FeOx, and calcite fill.
560.0' depth at 9:45 a.m., on 04/18/92.
570.0' depth at 9:00 p.m., on 04/18/92.
Rig down for clutch adjustment
580.0' depth at 1:22 p.m., on 04/15/92.
Rig down for clutch repair
590.0' depth at 4:46 a.m., on 04/22/92.
600.0' depth at 9:30 a.m., on 04/22/92.
605' drilling stopped to run packer tests on HQ hole; reduced to NQ hole, resumed 5:47 a.m. 4/25/92
610.0' depth at 11:50 a.m., on 04/25/92.
620.0' depth at 12:55 p.m., on 04/25/92.
630.0' depth at 2:10 p.m., on 04/25/92.
560.0' - 605.0' fractures 10, 40, and 70 degrees to axis, calcite fill to 1/8"
605.0' - 636.5' fractures 10-20 and 40-70 degrees to axis, semi-smooth to hacky, slightly open, clay and calcite fill.
HQ 3.85" Hole 2.405" Core
NQ 2.56" Hole 1.775" Core
BOX 57 557.0'
BOX 58 565.5'
BOX 59 575.5'
BOX 60 585.0'
BOX 61 597.5'
BOX 62 605.0'
BOX 63 616.5'
BOX 64 625.5'
BOX 65
DATE 07/92
JOB NO. G125-19
DWG NO. EM19005/8
DRAWN N TOOR
CHKD R HARRIS
APPD D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-5A
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST


REMARKS
Water Data
Drilling Data
Pressure Changes
Tool Size
RQD (%)
Fractures / foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
790.0' depth at 2:10 p.m. on 04/27/92.
800.0' depth at 8:00 p.m. on 04/27/92.
810.0' depth at 12:56 a.m. on 04/28/92.
820.0' depth at 2:39 a.m. on 04/28/92.
830.0' depth at 5:09 a.m. on 04/28/92.
840.0' depth at 8:35 a.m. on 04/28/92.
850.0' depth at 9:35 a.m. on 04/28/92.
860.0' depth at 11:20 a.m. on 04/28/92.
870.0' depth at 12:55 p.m. on 04/28/92.
880.0' depth at 2:30 p.m. on 04/28/92.
890.0' depth at 4:05 p.m. on 04/28/92.
900.0' total depth at 5:50 p.m. on 04/28/92.
NQ 2.98" Hole 1.775" Core
667.0' - 843.2' QUARTZITE
Medium to dark gray, fine to medium grained, weakly bedded. Common quartz monzonite stringers. Mostly hard, strong, highly fractured. Fractures variable orientation, slightly open, weak clay and calcite coating
827.0' - 838.0' abundant quartz monzonite, strongly stained to clay, with slickensides 10 degrees to axis
843.2' - 864.0' QUARTZ MONZONITE
Strongly clay-stained and bleached, abundant biotite (>20%). Moderately hard, moderately strong, highly fractured. Clay and calcite fracture filling.
864.0' - 870.0' HORNFELS
Medium to dark gray, fine grained, equigranular. Biotite 30-40%, weakly foliated. Fractures 10-70 degrees to axis, irregular, weak clay fill, weak FeOx stain
870.0' - 900.0' QUARTZ MONZONITE
Intensely clay-stained, weakly to strongly bleached. Abundant hornfels xenoliths. Moderately hard, moderately strong, highly fractured to brecciated. Fractures variable, clay and calcite fill.
880.0' - 883.0' fault breccia: quartzite and quartz monzonite clasts in matrix of calcite-cemented clay
885.0' - 890.0' fault breccia, strong calcite cement.
895.0' - 900.0' fault breccia, clay-rich matrix
TOTAL DEPTH 900'
DATE 07/92
JOB NO. G125-19
DWG NO. EM19005/11
DRAWN K HOCHSTATTER
CHK'D R HARRIS
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-5A
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No. 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA


REMARKS
Water Data
Drilling Data
Personnel Changes
Test Size
RQD (%)
Fractures / foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
530.0' depth at 2:10 p.m. on 04/25/92.
640.0' depth at 3:30 p.m. on 04/25/92.
650.0' depth at 4:57 p.m. on 04/25/92.
660.0' depth at 6:20 p.m. on 04/25/92.
670.0' depth at 8:55 p.m. on 04/25/92.
680.0' depth at 11:30 p.m. on 04/25/92.
690.0' depth at 6:30 a.m. on 04/26/92.
700.0' depth at 12:01 p.m. on 04/26/92.
710.0' depth at 3:15 p.m. on 4/26/92
NQ 2.98" Hole 1.775" Core
634.0' - 632.5' GRANOFELS / GRANULITE:
Medium gray, medium to coarse grained, equigranular. Appears to be a plastic mixture of quartz monzonite and recrystallized metasediments. Hard, medium strong.
632.5' - 644.0' HORNFELS:
Light to medium gray, fine grained, equigranular. Biotite 20%, weakly foliated, clasts of quartz-feldspar. Hard, strong, highly fractured. Fractures 20, 40, and 70 degrees to axis, slightly open, minor calcite.
644.0' - 653.5' QUARTZITE:
Pinkish gray, fine to medium gray, weakly foliated. Abundant feldspar, minor biotite. Hard, strong, highly fractured. Fractures 40 and 70 degrees to axis, slightly open, weak clay and minor calcite fill.
653.5' - 667.0' HORNFELS:
Pinkish gray, fine grained, foliated. Strongly interlaced with pink quartz monzonite. Hard, strong, highly fractured. Fractures 20 and 50-70 degrees to axis, slightly open, rocky, weak clay and calcite coating.
667.0' - 843.2' QUARTZITE:
Medium to dark gray, fine to medium grained, weakly bedded. Common quartz monzonite dikelets. Mostly hard, strong, highly fractured. Fractures variable orientation, slightly open, weak clay and calcite coating
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
№ 1108
CERTIFIED ENGINEERING GEOLOGIST
DATE 07/92
JOB NO. G125-19
DWG NO. EM19005/9
DRAWN K HOCHSTATTER
CHKD R HARRIS
APPD D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-5A
EAGLE MOUNTAIN LANDFILL RIVERSIDE COUNTY CALIFORNIA
MINE RECLAMATION CORPORATION


REMARKS
Water Data
Drilling Data
Personnel Changes
Test Size
RQD (%)
Fractures / foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
710.0' depth at 3:15 p.m. on 04/25/92.
720.0' depth at 5:05 p.m. on 04/26/92.
730.0' depth at 10:20 p.m. on 04/26/92.
740.0' depth at 1:05 a.m. on 04/27/92.
750.0' depth at 3:00 a.m. on 04/27/92.
760.0' depth at 5:40 a.m. on 04/27/92.
770.0' depth at 7:30 a.m. on 04/27/92.
780.0' depth at 12:05 p.m. on 04/27/92.
790.0' depth at 04/27/92
NQ 2.98" Hole 1.775" Core
667.0' - 843.2' QUARTZITE:
Medium to dark gray, fine to medium grained, weakly bedded. Common quartz monzonite dikelets. Mostly hard, strong, highly fractured. Fractures variable orientation, slightly open, weak clay and calcite coating
718.0' - 719.0' blue gouge, light gray clay with fragments of quartzite.
766.0' - 772.0' quartz monzonite sill
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
№ 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA
DATE 07/92
JOB NO. G125-19
DWG NO. EM19005/10
DRAWN K HOCHSTATTER
CHKD R HARRIS
APPD D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-5A
EAGLE MOUNTAIN LANDFILL RIVERSIDE COUNTY CALIFORNIA
MINE RECLAMATION CORPORATION

Project Site / Drill Site: CENTRAL PIT	Spud Date: 02/13/92	Borehole Dia: 3.85 INCHES	Ground Elevation: 2307.76 FEET	Borehole No: CH-10	
Coordinates / Stationing:	Completion Date: 02/25/92	Logged By: R. HARRIS, R. USREY, J. SUTHARD, D. VOLTURNO	Bottom of Borehole (bgs): 1388 feet		
Drill Rig Make and Model: BOYLES 56-6	Drilling Method: CORE	Drilling Fluid: MUD	Top of Bedrock (bgs): SURFACE	First Encountered Water (bgs): 1309 feet	
Drilling Contractor: TONTO DRILLING SERVICES, INC.	Sett Csg OD/ID/Depth: 6" / 5.5" / 17'	Total Core Recovery %: >95%	Total Number of Core Boxes: 161	Static Water Level (bgs):	

REMARKS:
Water Data
Drilling Data
Personnel Changes

FOREMAN: WAYNE BEAUPRE
DRILL CREW A: (7am-7pm)
Driller: Shawn Arnold
Helpers: Eric Owens
John Cross

DRILL CREW B: (7pm-7am)
Driller: Jeff Riley
Helpers: Bill Kerton
Grant Williams
Geologist: D. Volturno

Casing set at 7.0 feet
Began coring at 4:30 pm on 02/13/92

Geologist: R Harris

Stopped drilling at 17' - problems retrieving core. Replaced casing to 17'

23.5' depth at 11:40 pm, 2/13/92

Driller noted that hole made minor amount of water

Tool Size	ROD (%)	Fractures per foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
5.25" TRI CONE	\	\	\					0.0 - 7.0' SET CASING No sample taken
HQ 3.850" HOLE	\	>10	40	BOX 0		10		7.0' - 15.4' QUARTZITE Light gray, fine-grained, sandy weathered
2.406" CORE	\	>10	90	BOX 1				15.4' - 59.0' IRON ORE Dark brown, highly fractured very hard. Minor mica.
	\	\	\	14.5' BOX 2		20		23.5' Ore with irregular inclusions of light colored minerals (not calcite)
	90	\	98	27.5' BOX 3				
	90	\	100	34.0' BOX 4		30		
	47	\	74	44.5' BOX 5				
	82	>10	80			40		
	39	4	65					
	0	5	80	BOX 6		50		
	0	>10	\	56.0'				
	19	>10	65					
	19	>10	75	BOX 7		60		59.0' - 66.3' IRON ORE BRECCIA Light rust colored fragments (30%) in ore matrix (70%). Fragments up to 2" Fractures dipping 30-60 degrees
	13	4	84	65.0'				66.3' - 67.8' DIORITE DIKE Medium green, medium coarse-grained, with orthoclase phenocrysts. Fractures with slickensides Contact highly altered to chlorite
	46	3	86	BOX 8				
	40	3	96	67.0'		70		

REGISTERED GEOLOGIST IRVING DEAN AFFELDT No. 1108 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

DATE	3/92
JOB NO.	G125-19
DWG NO.	EM 19006-1
DRAWN	R. HARRIS
CHK'D	D. MERIT
APP'D	D. AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

FIGURE NO: 1 of 18

REMARKS
Water Data
Drilling Data
Personnel Changes

Geologist: D. Volturno

120' depth at 4:55 pm, 2/14/92

130' depth at 5:55 pm, 2/14/92

140' depth at 6:40 pm, 2/14/92

Tool Size	ROD (%)	Fractures per foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
HQ 3.850" HOLE	40	3	96	BOX 7		70		69.5' - 75.5' ORE BRECCIA Light rust colored fragments in ore, with weathered chunks of limonite-stained diorite 76.0' to 76.5' highly fractured, with clay gouge
2.406" CORE	47	2	84	74.0' BOX 8				75.5' - 92.5' DIORITE Gray, fine-grained matrix. Hard, strong, healed fractures
	85	<1	100	83.0'		80		Veiny zone with healed fractures
	92	2	100	BOX 9				
	17	3	100	92.5'		90		92.5' - 119.6' PORPHYRY DIKE Green, aphanitic. Fine-grained plagioclase phenocrysts. 2 - 5%, altering to chlorite. Limonite stain in fractures. Hard Most fractures dipping 30 - 50 degrees.
	50	4	100	BOX 10				
	0	>10	100	102.0'		100		
	25	5	100	BOX 11				
	50	3	100	110.5'		110		highly altered zone - dark green epidote and chlorite
	47	4	100	BOX 12				brecciated, traces of calcite in veins
	13	6	100	120.0'		120		119.6' - 129.2' ORE BRECCIA Tan to light green angular fragments. 40-50% fragments 1-6cm in black ore matrix Fractures dip 20-60 degrees. Very hard, very strong. Apertures tight, some limonite staining
	46	3	100	BOX 13				
	69	3	100	129.2'		130		129.2' - 133.0' SKARN ZONE Increasing green alteration. Fractures with soft to medium hard fill.
	54	4	100	BOX 14				133.0' - 138.6' DIORITE PORPHYRY DIKE Gray, with feldspar phenocryst (60%). Fractures dip steeply. Healed fractures with ore filling
	25	4	100	137.6'				138.6' - 140.2' SKARN ZONE Green alteration, soft to medium hard
	37	5	100	BOX 15		140		140.2' - 155.0' ORE BRECCIA Tan to light gray angular fragments 40-50% fragments 1-6mm in black ore matrix Magnetite/ hematite matrix, with swirled green alteration bands. Fractures tight, dipping 20-60 degrees Slightly hard, moderately strong
	48	3	95	145.5' BOX 16				
						150		

REGISTERED GEOLOGIST IRVING DEAN AFFELDT No. 1108 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

DATE	3/92
JOB NO.	G125-19
DWG NO.	EM 19006-2
DRAWN	R. HARRIS
CHK'D	D. MERIT
APP'D	D. AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

2 of 18

REMARKS Water Data Drilling Data Personnel Changes	Tool Size	RQD (%)	Fractures per foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
	HQ	32	5	100	BOX 16 154.2'		150		140.2' - 155.0' IRON ORE BRECCIA: Tan to light green, angular fragments. 40-50 % fragments 1- 6 cm in black ore matrix. Fragments dip 20 -40 degrees. Slightly hard, mod strong.
155' depth at 10:00 pm, 2/14/92	3.850" HOLE								155.0' - 157.0' IRON ORE: Rust black. Highly fractured, nearly vertical cc limonite stained SI, not well-healed.
	2.406" CORE	18	8	100	BOX 17 162.7'				157.0' - 164.9' QUARTZITE Light green, very fine-grained. Steeply dipping banding. Highly fractured.
		42	6	100	BOX 18 171.0'		160		164.9' - 173.0' SCHISTOSE META-ARKOSE Light green with bands of black, pink, green. Bands dip 60 degrees. Fractures mostly parallel bands. Moderately hard, moderately strong.
Geologist: J. Suthard 170' depth at 11:20 pm, 2/14/92		12	ca	100					
		53	1	90	BOX 19 180.0'		170		173.0' - 176.0' IRON ORE Rusty black, highly fractured. Magnetite rich.
		77	2	100					176.0' - 178.0' ORE BRECCIA: Fragments of meta-arkose in magnetite ore
180' depth at 1:00 am, 2/15/92		85	2	100	BOX 20 189.2'		180		178.0' - 185.5' IRON ORE Magnetite-rich. Light to dark green alteration zones, steeply dipping veins of calcite, abundant calcite.
		63	2	100					185.5' - 187.0' QUARTZITE Greenish white, very fine-grained. Very hard, very strong.
190' depth at 2:07 am, 2/15/92		96	<1	100	BOX 21 197.5'		190		187.0' - 229.5' IRON ORE: Magnetite-rich, mixed with white calc-silicates or quartzite to 190.8'.
		85	1	100					
200' depth at 4:16 am, 2/15/92		82	1	100	BOX 22 206.0'		200		190.8' - 214.5' ore with veins of white calc-silicate, 20-30 degrees from vertical. Magnetite with pyrite, serpentine, minor chlorite. Moderately hard, moderately strong. Very fractured, brecciated, numerous healed fractures.
		68	1	100	BOX 23 214.5'				
210' depth at 5:18 am, 2/15/92		58	3	100			210		
		71	1	100	BOX 24 223.8'				
220' depth at 6:27 am, 2/15/92		83	<1	100			220		
		37	5	100	BOX 25				229.5' - 231.0' QUARTZITE:
							230		

REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
№ 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

DATE	3/92
JOB NO.	G125-19
DWG NO.	EM 19006-3
DRAWN	R. HARRIS
CHK'D	D. MERIT
APP'D	D. AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

FIGURE NO.
3 of 12

REMARKS Water Data Drilling Data Personnel Changes	Tool Size	RQD	Fractures per foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
Geologist: D. Volturno 230' depth at 8:00 am, 2/15/92 Problems with mud cake. Geologist: R Harris.	HQ	0	6	100	BOX 227.5'		230		229' - 237.0' QUARTZITE Light gray, fine-grained. Very hard, very strong, fresh. Highly fractured, fractures dipping 30 - 90 degrees, tight, with hematite-limonite stain.
	3.850" HOLE	16	2	100	BOX 26 241.5'				237.0' - 245.5' QUARTZ MONZONITE DIKE Light pink-brown, fine-grained. Moderately hard moderately strong
	2.406" CORE	0	8	100					
247' depth at 8:00 pm 2/15/92		0	8	100			240		
		0	>10	56	BOX 27 256.0'				245.5' - 275.5' IRON ORE Magnetite rich, rusty black, slightly vuggy. Moderately hard, slightly weathered. Scattered zones and veins of skarn minerals.
		28	1	80					247.2' - 247.9' Green alteration zone (skarn, calc-silicate minerals)
250' depth at 8:00 pm, 2/15/92		14	2	92	BOX 28 259.0'		250		258.0 - 275.5 Skarn: dark green to yellow-green, some steeply dipping banding
		65	1	88					
260' depth at 9:00 pm, 2/15/92		28	3	100	BOX 29 267.0'		260		nearly vertical veins of calcite
Geologist: J. Suthard		22	3	92	BOX 30 275.5'				266.0' - 267.0' magnesite vein, slightly vuggy
		32	2	98			270		
		24	3	98	BOX 31 283.2'				275.5' - 284.0' QUARTZ MONZONITE DIKE Fine-grained, pink-brown. Highly fractured fractures slightly open, with limonite-hematite stain. Very hard, very strong, fresh
		0	5	81			280		282.0' increasing alteration, veins of ore
		33	2	82	BOX 32 292.5'				
		42	2	100					291.0' - 294.0' Gouge light to dark green crumbly
		46	2	98	BOX 33 301.5'				294.0' - 319.7' IRON ORE Black, fresh, hard, very strong. Abundant fresh pyrite. Minor fractures. Hairl veins to 1/2" of tremolite and calcite.
300' depth at 5:47 am, 2/16/92 Deviation survey = 0.75 degrees Geologist: D. Volturno		100	<1	100			300		
		92	<1	100	BOX 34				
		100	<1	100			310		

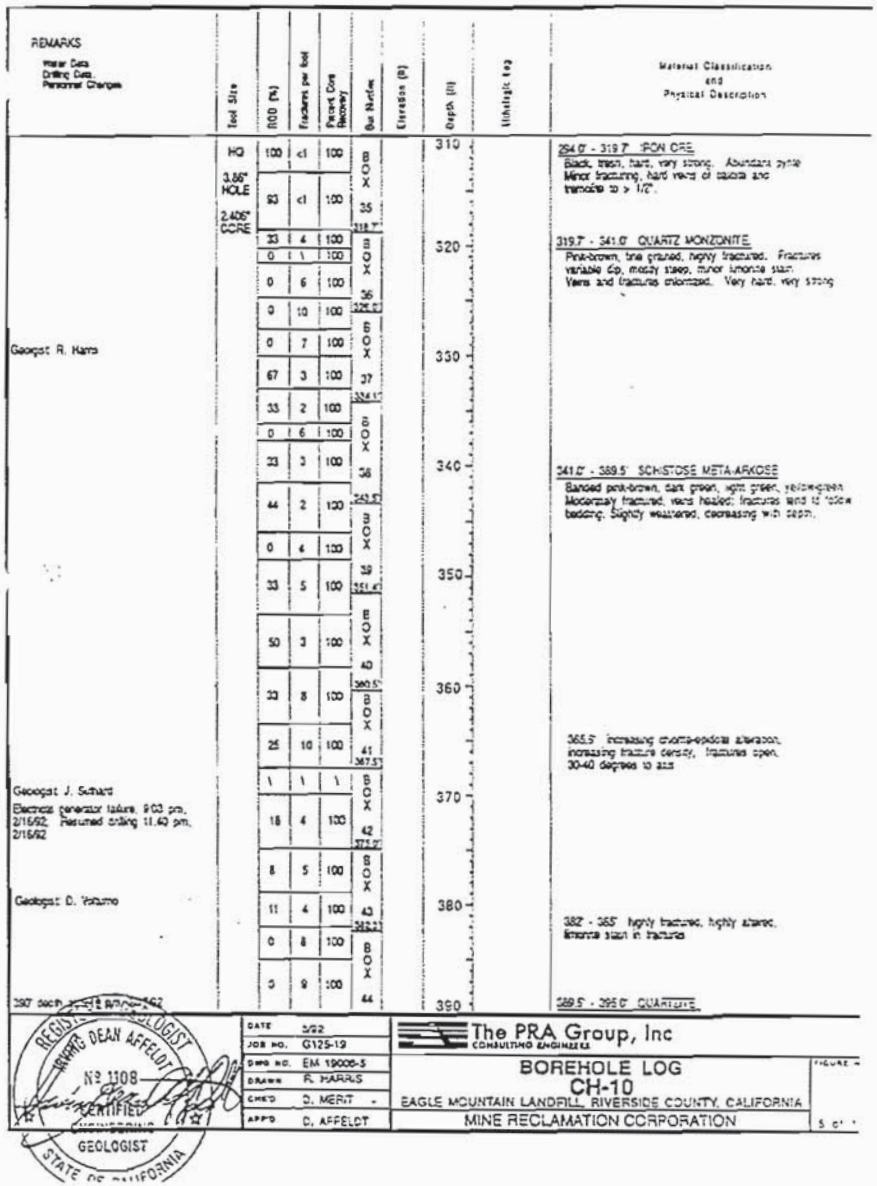
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
№ 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

DATE	3/92
JOB NO.	G125-19
DWG NO.	EM 19006-4
DRAWN	R. HARRIS
CHK'D	D. MERIT
APP'D	D. AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

4 of 12



REMARKS Water Data Drilling Data Personnel Changes	Tool Size	RQD (%)	Fractures per foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
	HQ 3.86" HOLE 2.406" CORE	100	<1	100	BOX		310		294.0' - 319.7' IRON ORE Black, fresh, hard, very strong. Abundant pyrite. Minor fracturing, hard veins of calcite and hematite to > 1/2".
		93	<1	100	BOX 35				
		33	4	100	318.7'				
		0	\	100	BOX		320		319.7' - 341.0' QUARTZ MONZONITE Pink-brown, fine grained, highly fractured. Fractures variable dip, mostly steep, minor limonite stain. Veins and fractures chloritized. Very hard, very strong
		0	6	100	36				
		0	10	100	326.6'				
Geologist: R. Harris		0	7	100	BOX		330		
		67	3	100	37				
		33	2	100	334.1'				
		0	6	100	BOX				
		33	3	100	38		340		341.0' - 389.5' SCHISTOSE META-ARKOSE Banded pink-brown, dark green, light green, yellow-green. Moderately fractured, veins healed; fractures tend to follow bedding. Slightly weathered, decreasing with depth.
		44	2	100	343.5'				
		0	4	100	BOX				
		33	5	100	39		350		
		50	3	100	351.4' BOX 40				
		33	8	100	360.5' BOX		360		
		25	10	100	41				365.5' Increasing chlorite-epidote alteration, increasing fracture density, fractures open, 30-40 degrees to axis
Geologist: J. Sothard Electrical generator failure, 9:03 pm, 2/16/92. Resumed drilling 11:40 pm, 2/16/92		\	\	\	367.5' BOX				
		18	4	100	42		370		
		8	5	100	373.2' BOX				
Geologist: D. Yokumo		11	4	100	43		380		
		0	8	100	383.2' BOX				382' - 385' highly fractured, highly altered, limonite stain in fractures
390' depth at 5:15 pm on 2/16/92		0	9	100	44		390		389.5' - 395.0' QUARTZITE

DATE	3/92
JOB NO.	G125-19
DWG NO.	EM 19006-5
DRAWN	R. HARRIS
CHK'D	D. MERIT
APP'D	D. AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

FIGURE 5 of 12

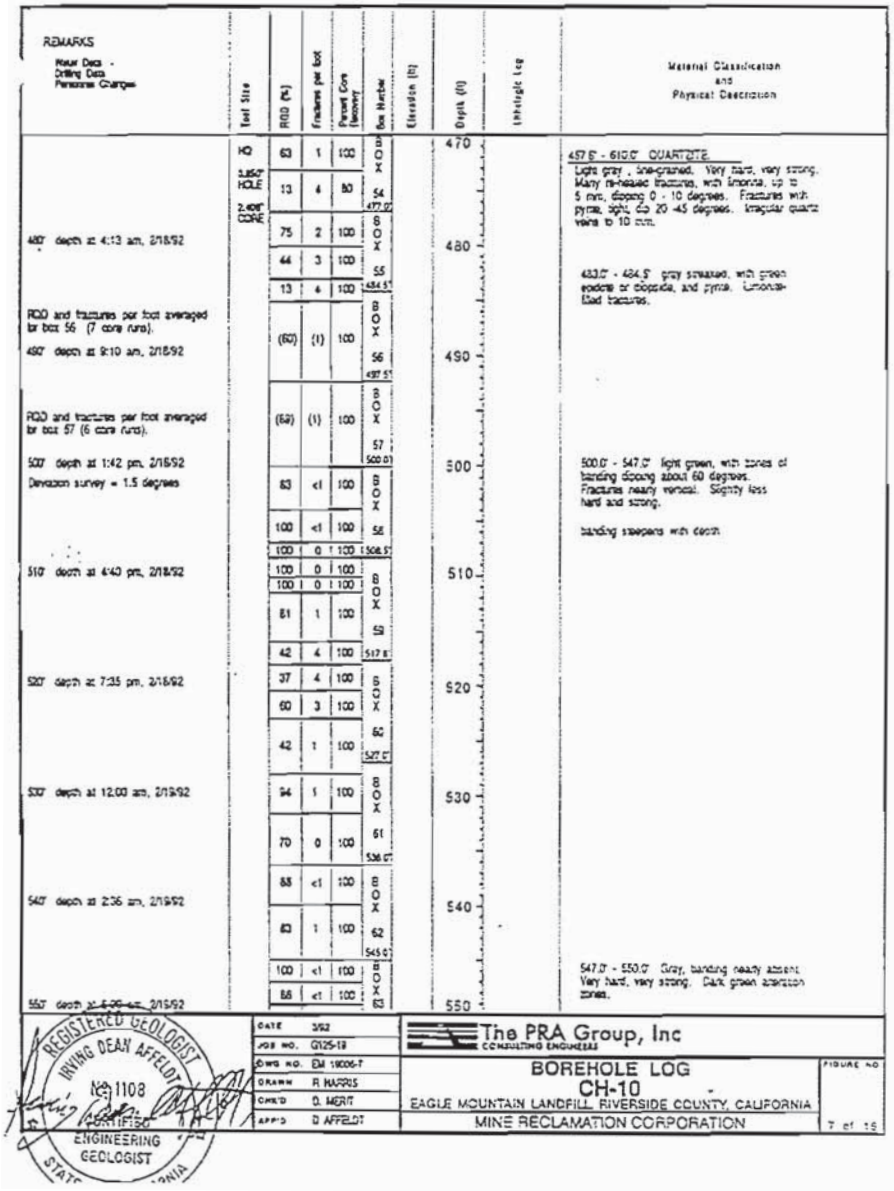
REMARKS Water Data Drilling Data Personnel Changes	Tool Size	RQD (%)	Fractures per foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
	HQ 3.86" HOLE	49	5	100	390.4' BOX		390		389' - 395.0' QUARTZITE Rust yellow to red hematite stain, moderately weathered moderately hard, moderately fractured, fractures variable orientation. Zones of pyroxene-chlorite-epidote alteration
	2.406" CORE	47	4	100	45				395.0' - 402.5' SKARN Fine grained, studded with K-feldspar-epidote-biotite-quartz-pyroxene. Hard, strong
400' depth at 1:00 pm on 2/17/92 Deviation survey = 0.75 degrees		53	1	100	400.6' BOX		400		402.5' - 428.0' IRON ORE Abundant fresh pyrite zones up to 2" Moderately fractured; fractures tight, dipping up to 60 degrees. Hard, strong, slightly weathered limonite stained.
		60	1	100	46				
410' depth at 1:30 pm on 2/17/92		80	1	100	408.6' BOX		410		412.8' - 415.7' moderately weathered zone, abundant limonite stain. Vugs of remnant pyrite filled with quartz.
		93	<1	100	47				
420' depth at 1:48 pm on 2/17/92		80	<1	100	417.5' BOX		420		423.7' - 425.0' slightly fractured with limonite-hematite stain. Slightly weathered
		87	<1	100	48				428.0' - 436.2' QUARTZ MONZONITE Pink-brown, coarse-grained. Abundant K-feldspar alteration and pyrite in healed fractures. Fractured, minor limonite stain, shallow dip.
430' depth at 2:41 pm on 2/17/92		47	1	100	425.5' BOX		430		
		63	3	100	49				436.2' - 452.0' IRON ORE Abundant pyrite. Very hard, very strong, fresh. Numerous vertical fractures with pyrite filling
440' depth at 2:55 pm on 2/17/92		69	2	100	434.7' BOX		440		
Geologist: R. Harris		43	4	100	50				
					443.2' BOX				
450' depth at 5:00 pm on 2/17/92		60	4	100	51		450		452.0' - 457.6' ANDESITE DIKE Greenish gray, fine-grained. Moderately altered, hard strong to 456.4, becoming brecciated softer more altered.
					452.0' BOX				
460' depth at 5:55 pm on 2/17/92		38	4	100	52		460		457.6' - 510.0' QUARTZITE Light gray, fine-grained. Very hard, very strong. Many re-healed fractures with limonite up to 5 mm dipping 0 - 10 degrees. Fractures tight, with pyrite, dipping 30 - 45 degrees. Irregular veins to 10 mm
		32	4	100	460.5' BOX				
		100	0	100	53				
		100	0	100	466.5'				
470' depth at 6:18 pm on 2/16/92		63	1	100	54		470		

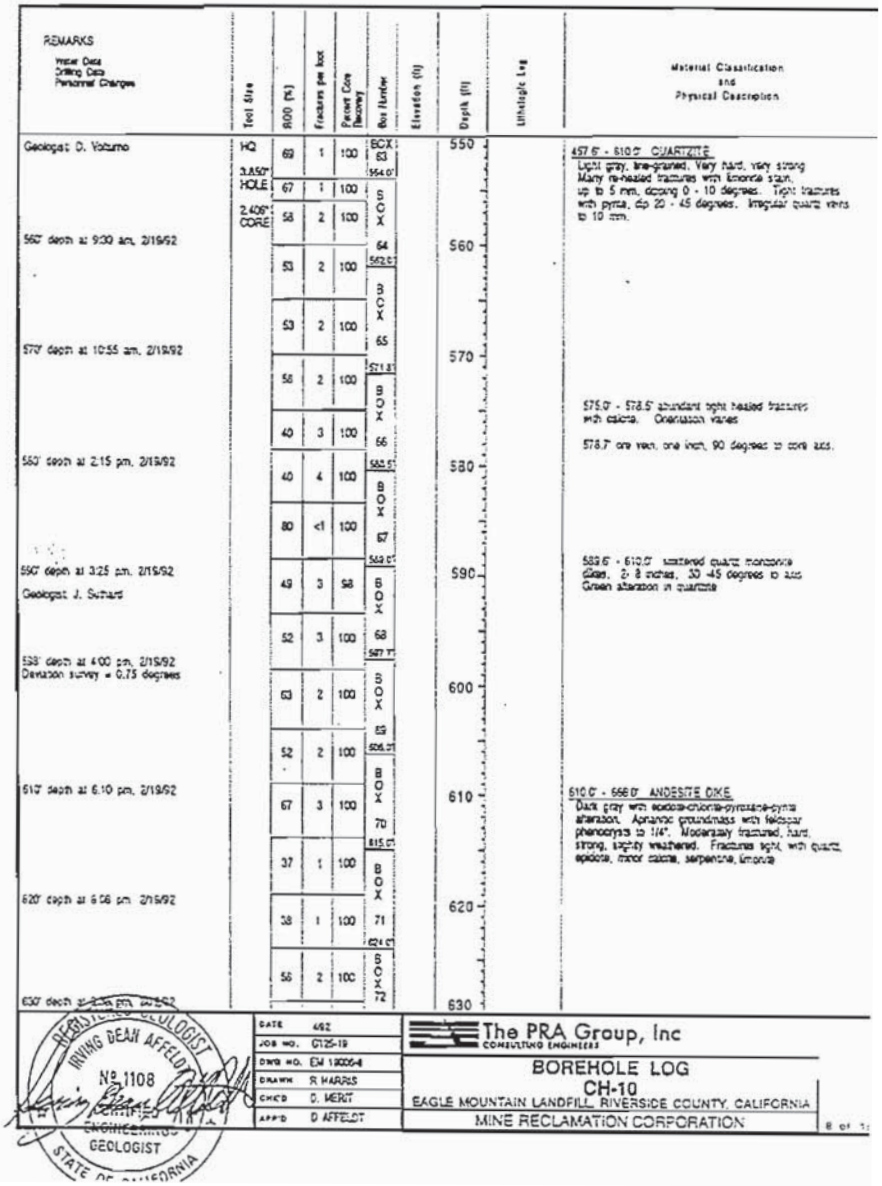
DATE	3/92
JOB NO.	G125-19
DWG NO.	EM 19006-6
DRAWN	R. HARRIS
CHK'D	D. MERIT
APP'D	D. AFFELDT

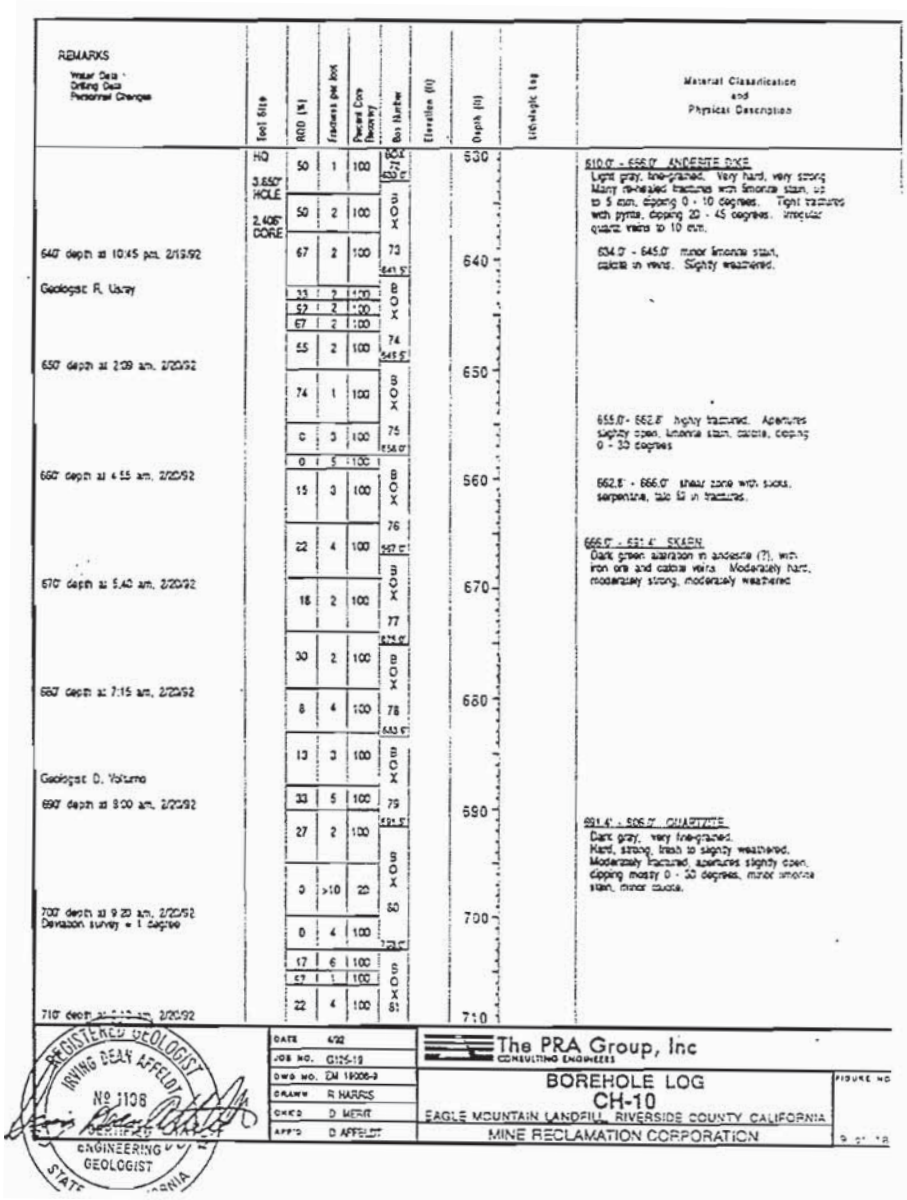
The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

5 of 12


REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures per foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
HQ
3.850" HOLE
2.406" CORE
480' depth at 4:13 am, 2/18/92
RQD and fractures per foot averaged for box 56 (7 core runs).
490' depth at 9:10 am, 2/18/92
RQD and fractures per foot averaged for box 57 (6 core runs).
500' depth at 1:42 pm, 2/18/92
Deviation survey = 1.5 degrees
510' depth at 4:40 pm, 2/18/92
520' depth at 7:35 pm, 2/18/92
530' depth at 12:00 am, 2/19/92
540' depth at 2:36 am, 2/19/92
550' depth at 4:26 am, 2/19/92
457.6' - 610.0' QUARTZITE
Light gray, fine-grained. Very hard, very strong. Many re-healed fractures, with limonite, up to 5 mm, dipping 0 - 10 degrees. Fractures with pyrite, tight, dip 20 -45 degrees. Irregular quartz veins to 10 mm.
483.0' - 484.5' gray streaked, with green epidote or diopside, and pyrite. Limonite-lined fractures.
500.0' - 547.0' light green, with zones of banding dipping about 60 degrees. Fractures nearly vertical. Slightly less hard and strong.
banding steepens with depth
547.0' - 550.0' Gray, banding nearly absent. Very hard, very strong. Dark green alteration zones.
DATE 3/92
JOB NO. G125-18
DWG NO. EM 19006-7
DRAWN R. HARRIS
CHK'D D. MERIT
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
FIGURE NO.
7 of 15
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No. 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA


REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures per foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
Geologist D. Voturno
HQ
3.850" HOLE
2.406" CORE
560' depth at 9:30 am, 2/19/92
570' depth at 10:55 am, 2/19/92
580' depth at 2:15 pm, 2/19/92
590' depth at 3:25 pm, 2/19/92
Geologist J. Suhard
598' depth at 4:00 pm, 2/19/92
Deviation survey = 0.75 degrees
610' depth at 6:10 pm, 2/19/92
620' depth at 8:56 pm, 2/19/92
630' depth at 2:04 pm, 2/20/92
457.6' - 610.0' QUARTZITE
Light gray, fine-grained. Very hard, very strong. Many re-healed fractures with limonite stain, up to 5 mm, dipping 0 - 10 degrees. Tight fractures with pyrite, dip 20 - 45 degrees. Irregular quartz veins to 10 mm.
575.0' - 578.5' abundant tight healed fractures with calcite. Orientation varies
578.7' one vein, one inch, 90 degrees to core axis.
589.6' - 610.0' scattered quartz monzonite dikes, 2- 8 inches, 30 -45 degrees to axis. Green alteration in quartzite
610.0' - 666.0' ANDESITE DIKE
Dark gray with sericite-chlorite-pyroxene-pyrite alteration. Aphanitic groundmass with feldspar phenocrysts to 1/4". Moderately fractured, hard, strong, slightly weathered. Fractures tight, with quartz, epidote, minor calcite, serpentine, limonite
DATE 4/92
JOB NO. G125-19
DWG NO. EM 19006-8
DRAWN R. HARRIS
CHK'D D. MERIT
APP'D D AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No. 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA



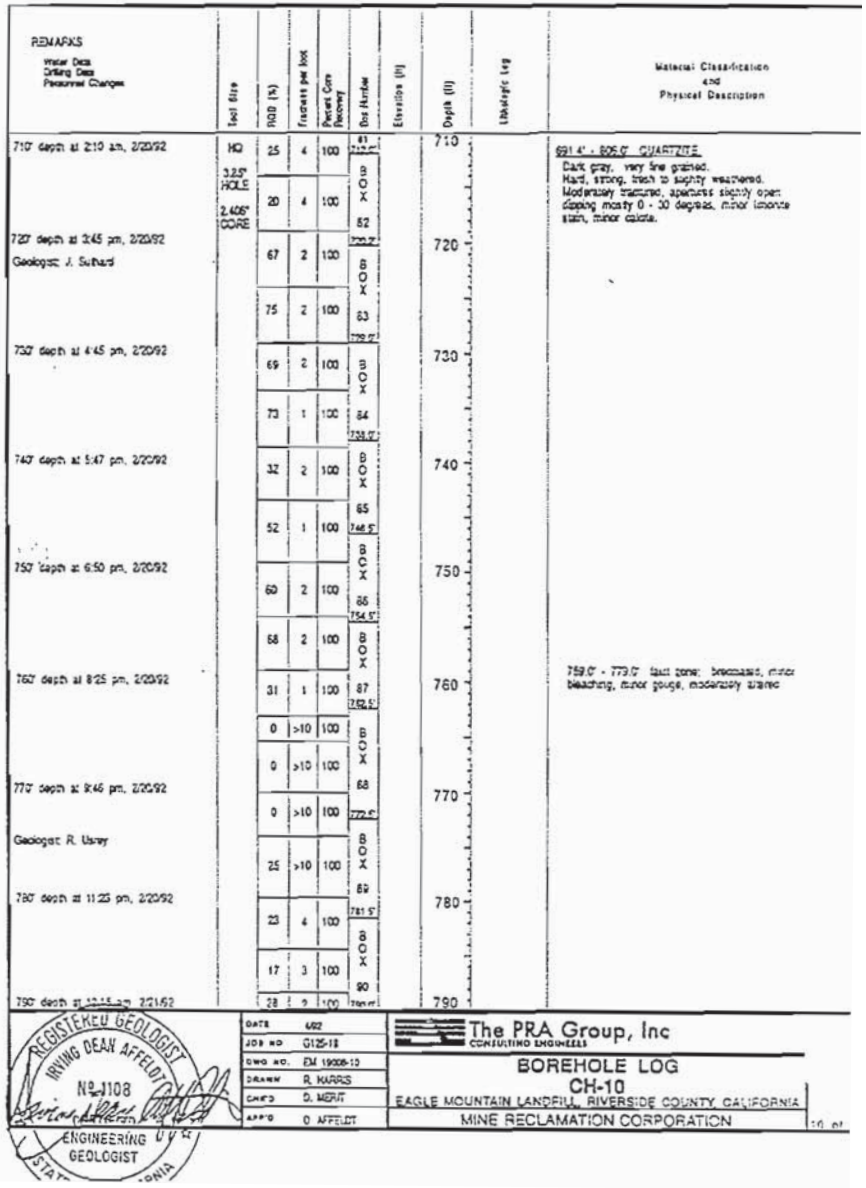
REMARKS Water Data Drilling Data Personnel Changes	Tool Size	RQD (%)	Fractures per foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
	HQ 3.650" HOLE 2.406" CORE	50	1	100	BOX 75 (430.5')		630		610.0' - 656.0' ANDESITE DIKE Light gray, fine-grained. Very hard, very strong. Many re-healed fractures with limonite stain, up to 5 mm, dipping 0 - 10 degrees. Tight fractures with pyrite, dipping 20 - 45 degrees. Irregular quartz veins to 10 mm.
		50	2	100	BOX 73 (641.5')				
640' depth at 10:45 pm, 2/19/92		67	2	100			640		634.0' - 645.0' minor limonite stain, calcite in veins. Slightly weathered.
Geologist: R. Usrey		33	2	100	BOX 74 (645.5')				
		59	2	100					
		67	2	100					
		55	2	100					
650' depth at 2:09 am, 2/20/92		74	1	100	BOX 75 (656.0')		650		655.0' - 662.8' highly fractured. Apertures slightly open, limonite stain, calcite, dipping 0 - 30 degrees
		0	3	100					
		0	5	>100					
660' depth at 4:55 am, 2/20/92		15	3	100	BOX 76 (667.0')		660		662.8' - 666.0' shear zone with slicks, serpentine, talc fill in fractures.
		22	4	100					666.0' - 691.4' SKARN Dark green alteration in andesite (?), with iron ore and calcite veins. Moderately hard, moderately strong, moderately weathered
670' depth at 5:40 am, 2/20/92		18	2	100	BOX 77 (675.0')		670		
		30	2	100					
680' depth at 7:15 am, 2/20/92		8	4	100	BOX 78 (683.5')		680		
		13	3	100					
Geologist: D. Yokumo		33	5	100	BOX 79 (691.5')				
690' depth at 8:00 am, 2/20/92		27	2	100			690		691.4' - 806.0' QUARTZITE Dark gray, very fine-grained. Hard, strong, fresh to slightly weathered. Moderately fractured, apertures slightly open, dipping mostly 0 - 30 degrees, minor limonite stain, minor calcite.
		0	>10	25	BOX 80 (700.5')				
700' depth at 9:20 am, 2/20/92 Deviation survey = 1 degree		0	4	100			700		
		17	6	100	BOX 81 (710.5')				
		67	1	100					
710' depth at 2:10 am, 2/20/92		22	4	100			710		

DATE	4/92
JOB NO.	G125-18
DWG NO.	EM 19006-9
DRAWN	R. HARRIS
CHK'D	D. MERIT
APP'D	D. AFFELDT

The PRA Group, Inc
CONSULTING ENGINEERS

BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

FIGURE NO. 9 of 18



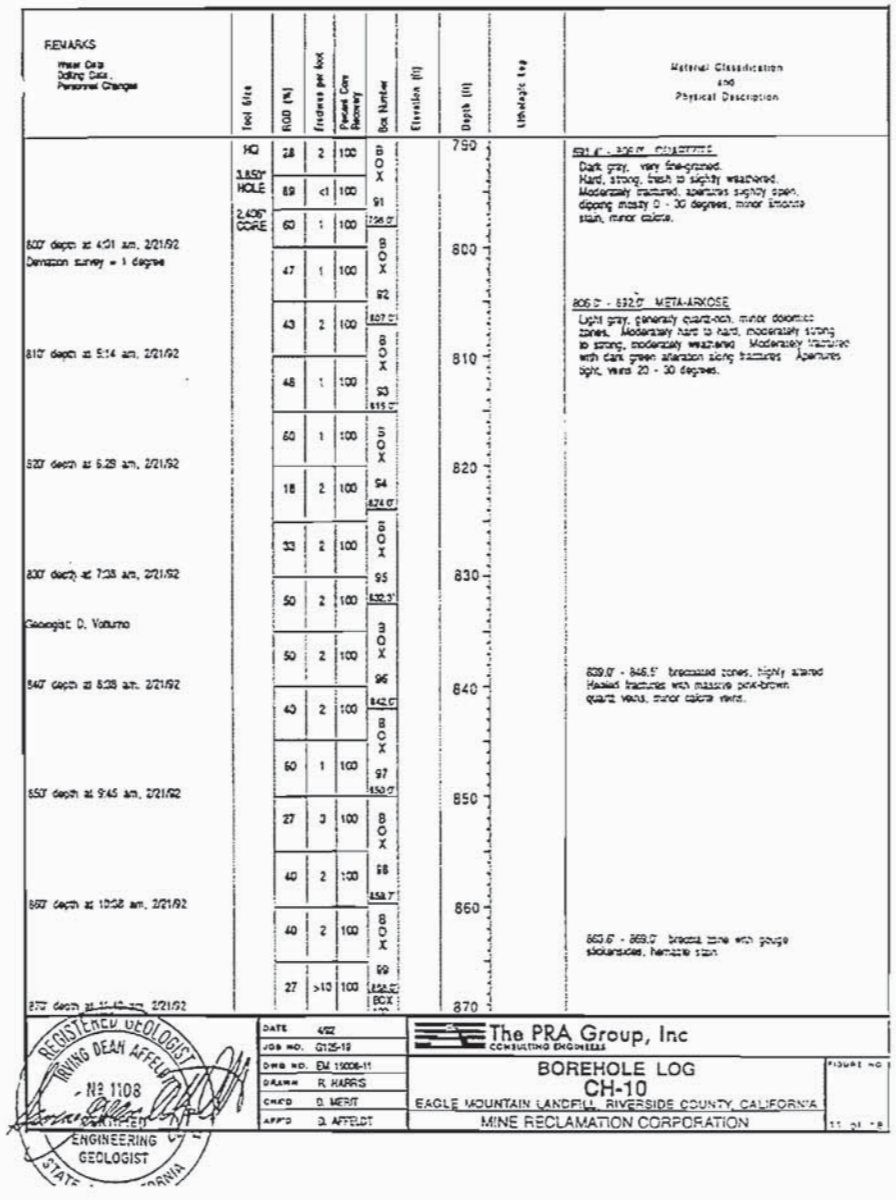
REMARKS Water Data Drilling Data Personnel Changes	Tool Size	RQD (%)	Fractures per foot	Percent Core Recovery	Box Number	Elevation (ft)	Depth (ft)	Lithologic Log	Material Classification and Physical Description
710' depth at 2:10 am, 2/20/92	HQ 3.65" HOLE 2.406" CORE	25	4	100	81 (710.5')		710		691.4' - 806.0' QUARTZITE Dark gray, very fine grained. Hard, strong, fresh to slightly weathered. Moderately fractured, apertures slightly open dipping mostly 0 - 30 degrees, minor limonite stain, minor calcite.
		20	4	100	BOX 82 (720.5')				
720' depth at 2:45 pm, 2/20/92		67	2	100			720		
Geologist: J. Suthard		75	2	100	BOX 83 (730.5')				
730' depth at 4:45 pm, 2/20/92		69	2	100	BOX 84 (738.5')		730		
		73	1	100					
740' depth at 5:47 pm, 2/20/92		32	2	100	BOX 85 (746.5')		740		
		52	1	100					
750' depth at 6:50 pm, 2/20/92		60	2	100	BOX 86 (754.5')		750		
		58	2	100					
760' depth at 8:25 pm, 2/20/92		31	1	100	BOX 87 (762.5')		760		759.0' - 773.0' fault zone: brecciated, minor bleaching, minor gouge, moderately strained
		0	>10	100					
		0	>10	100	BOX 88 (772.5')				
770' depth at 9:45 pm, 2/20/92		0	>10	100			770		
Geologist: R. Usrey		25	>10	100	BOX 89 (781.5')				
780' depth at 11:25 pm, 2/20/92		23	4	100			780		
		17	3	100	BOX 90 (790.5')				
790' depth at 12:15 am, 2/21/92		28	9	100			790		

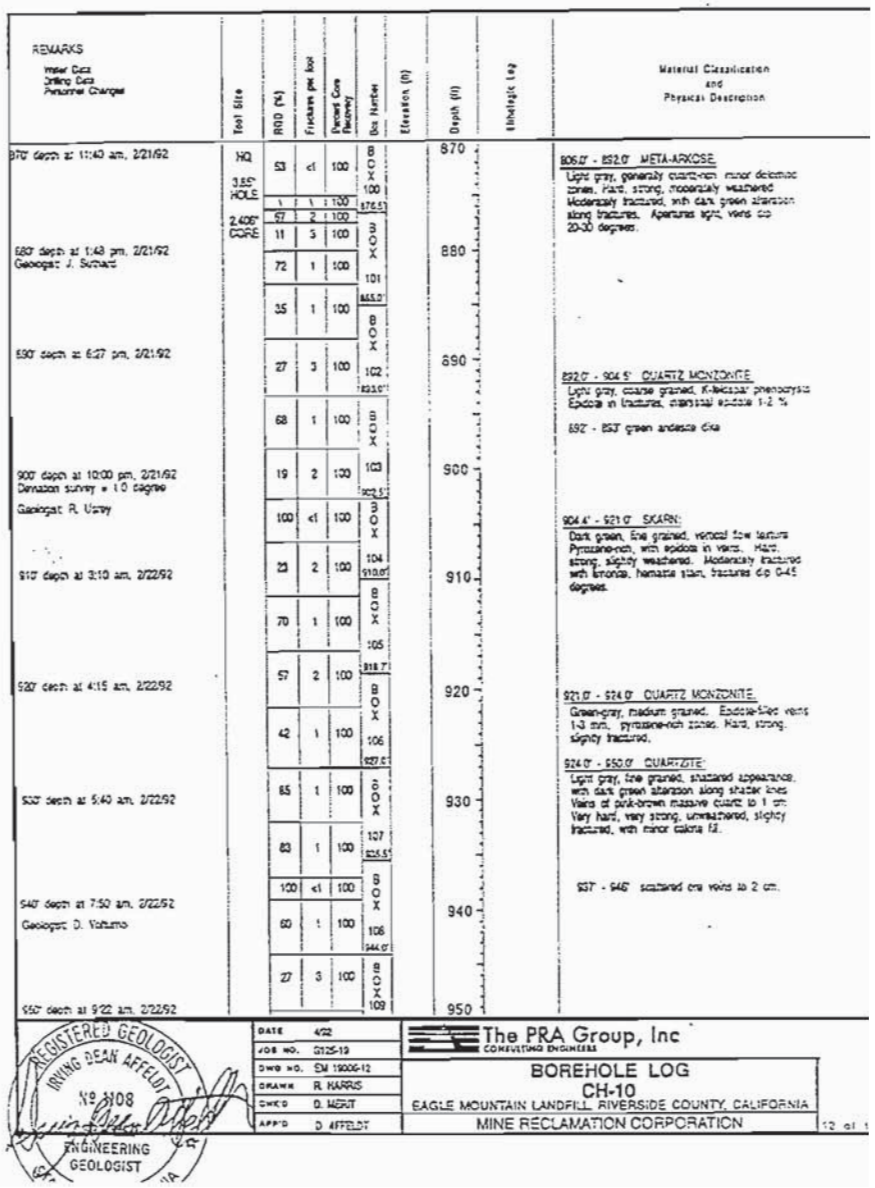
DATE	4/92
JOB NO.	G125-18
DWG NO.	EM 19006-10
DRAWN	R. HARRIS
CHK'D	D. MERIT
APP'D	D. AFFELDT

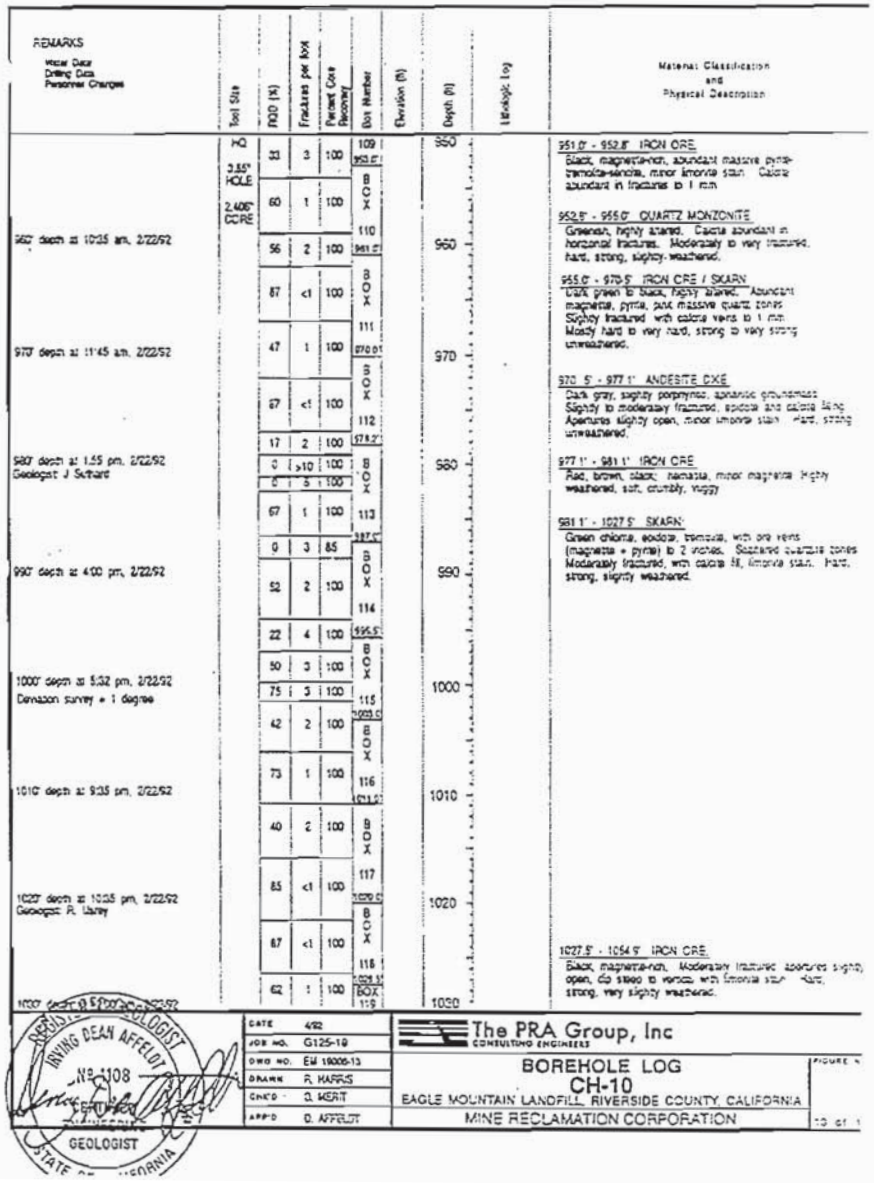
The PRA Group, Inc
CONSULTING ENGINEERS

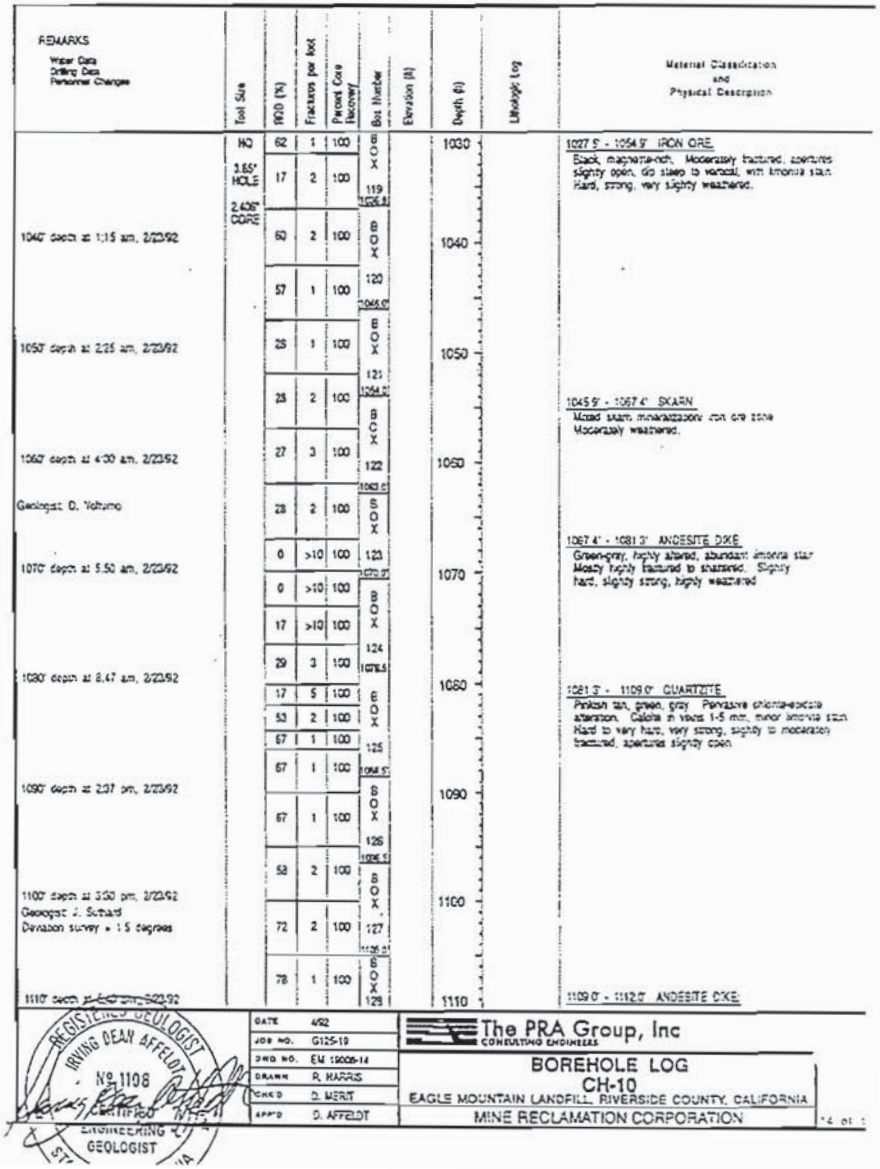
BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION

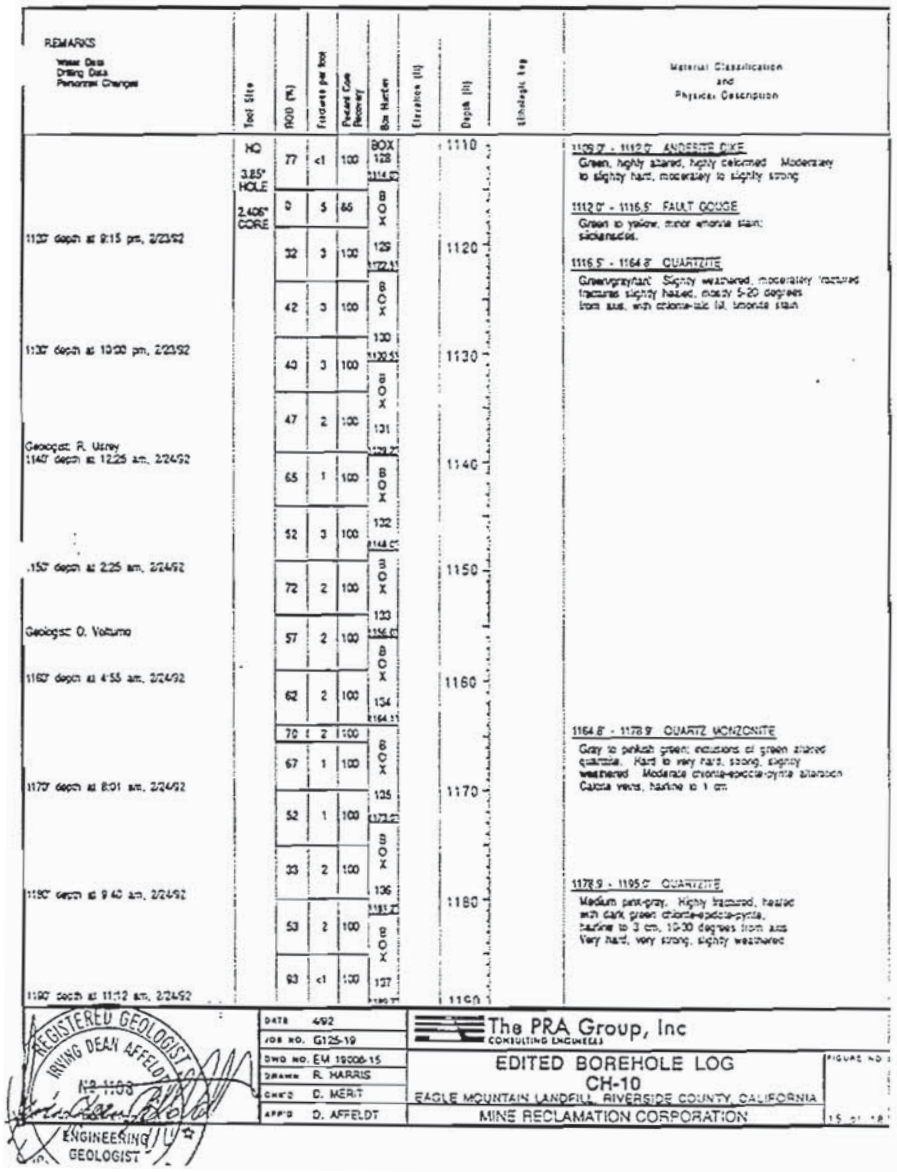
10 of

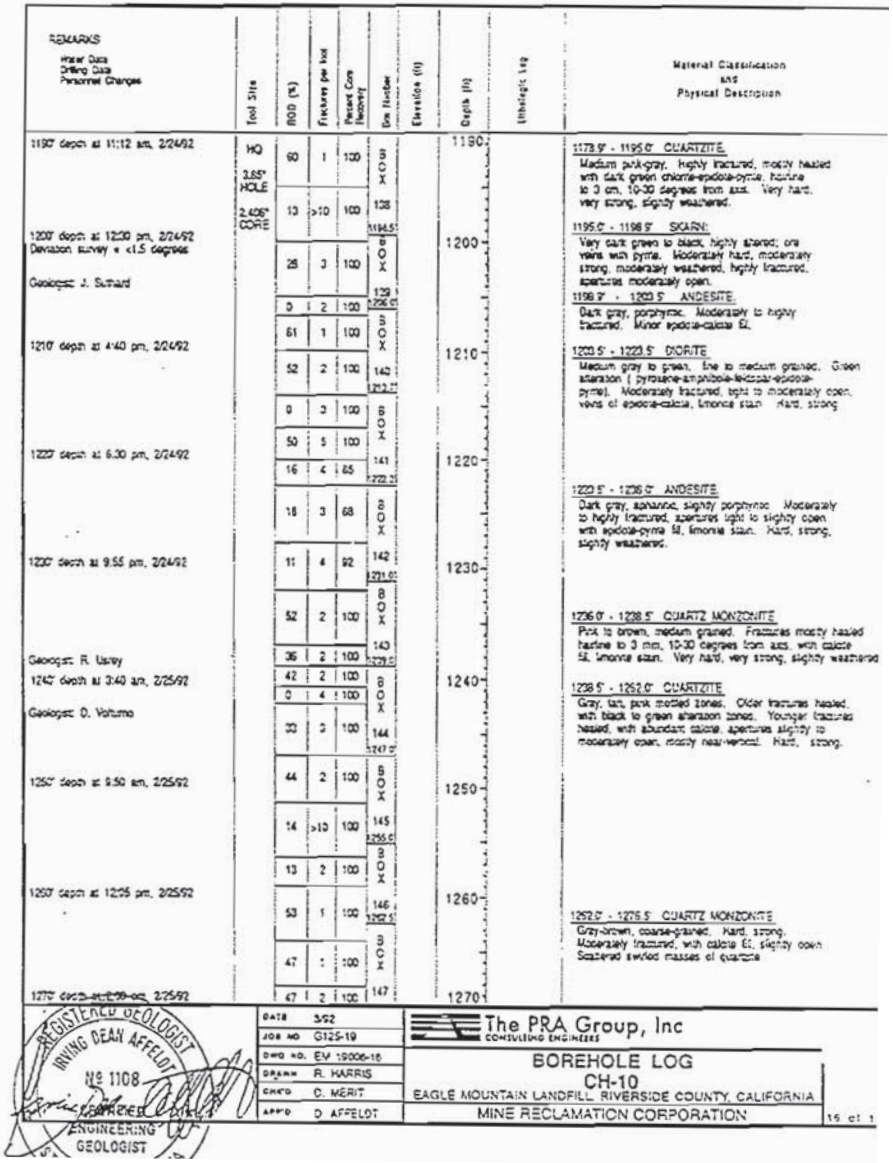

REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures per foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
HQ
3.855" HOLE
2.405" CORE
807' depth at 4:01 am, 2/21/92
Deviation survey = 1 degree
817' depth at 5:14 am, 2/21/92
827' depth at 6:28 am, 2/21/92
837' depth at 7:38 am, 2/21/92
Geologist: D. Voturno
847' depth at 8:28 am, 2/21/92
857' depth at 9:45 am, 2/21/92
867' depth at 10:58 am, 2/21/92
877' depth at 11:40 am, 2/21/92
750
800
810
820
830
840
850
860
870
821.4' - 806.0' QUARTZITE
Dark gray, very fine-grained. Hard, strong, fresh to slightly weathered. Moderately fractured, apertures slightly open, dipping mostly 0 - 30 degrees, minor limonite stain, minor calcite.
806.0' - 852.0' META-ARKOSE
Light gray, generally quartz-rich, minor dolomitic zones. Moderately hard to hard, moderately strong to strong, moderately weathered. Moderately fractured with dark green alteration along fractures. Apertures tight, veins 20 - 30 degrees.
839.0' - 846.5' brecciated zones, highly altered. Healed fractures with massive pink-brown quartz veins, minor calcite veins.
863.6' - 869.0' breccia zone with gouge slickensides, hematite stain.
DATE 4/92
JOB NO. G125-19
DWG NO. EM 19006-11
DRAWN R. HARRIS
CHK'D D. MERIT
APP'D D. AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
FIGURE NO.
11 of 18
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

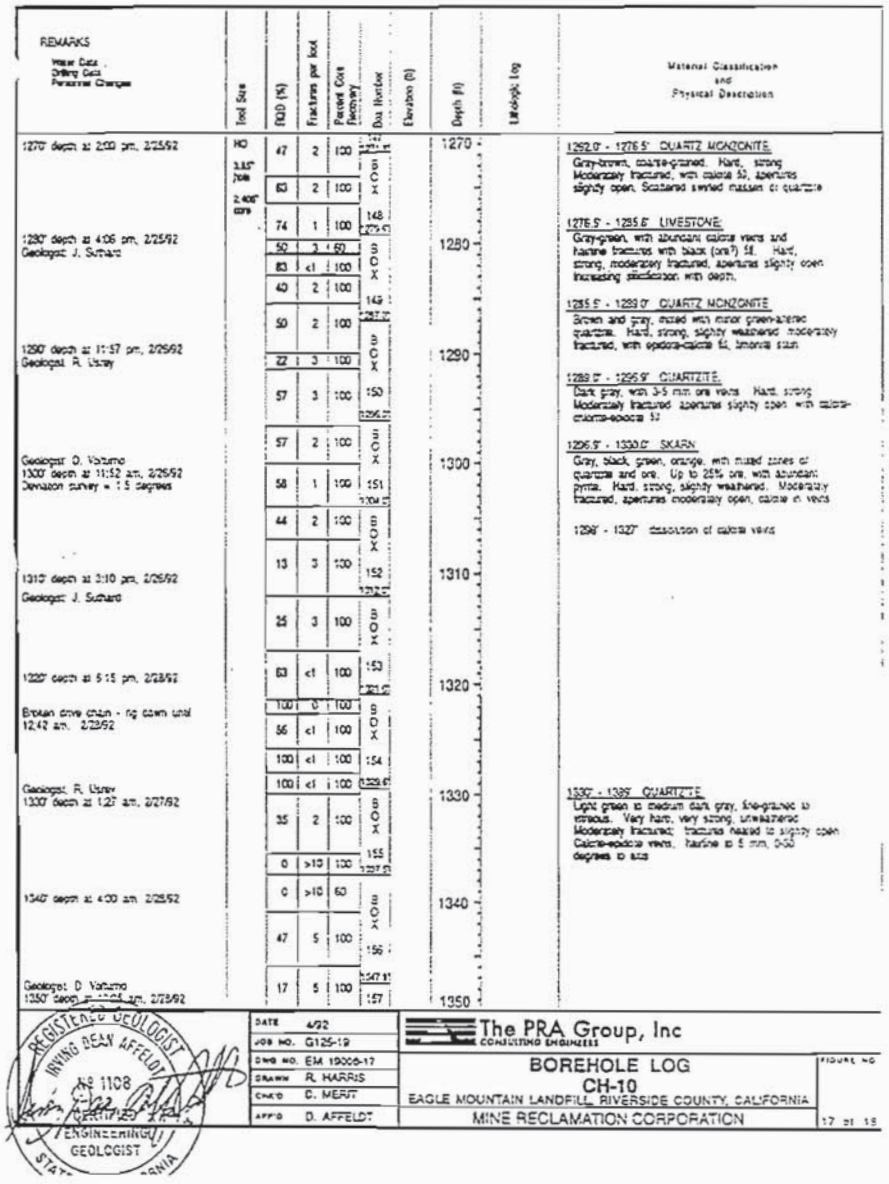

REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures per foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
HQ
3.855" HOLE
2.405" CORE
870' depth at 11:40 am, 2/21/92
880' depth at 1:48 pm, 2/21/92
Geologist: J. Sunard
890' depth at 6:27 pm, 2/21/92
900' depth at 10:00 pm, 2/21/92
Deviation survey = 1.0 degree
Geologist: R. Varley
910' depth at 3:10 am, 2/22/92
920' depth at 4:15 am, 2/22/92
930' depth at 5:40 am, 2/22/92
940' depth at 7:50 am, 2/22/92
Geologist: D. Voturno
950' depth at 9:22 am, 2/22/92
870
880
890
900
910
920
930
940
950
806.0' - 852.0' META-ARKOSE
Light gray, generally quartz-rich, minor dolomitic zones, hard, strong, moderately weathered. Moderately fractured, with dark green alteration along fractures. Apertures tight, veins 20-30 degrees.
852.0' - 904.5' QUARTZ MONZONITE
Light gray, coarse grained, K-feldspar phenocrysts. Epidote in fractures, chalcocite epidote 1-2 %
892' - 897' green andesite dike
904.4' - 921.0' SKARN
Dark green, fine grained, vertical flow texture. Pyroxene-rich, with epidote in veins. Hard, strong, slightly weathered. Moderately fractured with bronzite, hematite stain, fractures dip 0-45 degrees.
921.0' - 924.0' QUARTZ MONZONITE
Green-gray, medium grained. Epidote-filled veins 1-3 mm, pyroxene-rich zones. Hard, strong, slightly fractured.
924.0' - 950.0' QUARTZITE
Light gray, fine grained, sheared appearance, with dark green alteration along shatter lines. Veins of pink-brown massive quartz to 1 cm. Very hard, very strong, unweathered, slightly fractured, with minor calcite fill.
937' - 946' scattered ore veins to 2 cm.
DATE 4/92
JOB NO. G125-19
DWG NO. EM 19006-12
DRAWN R. HARRIS
CHK'D D. MERIT
APP'D D. AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
12 of 1
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
ENGINEERING GEOLOGIST

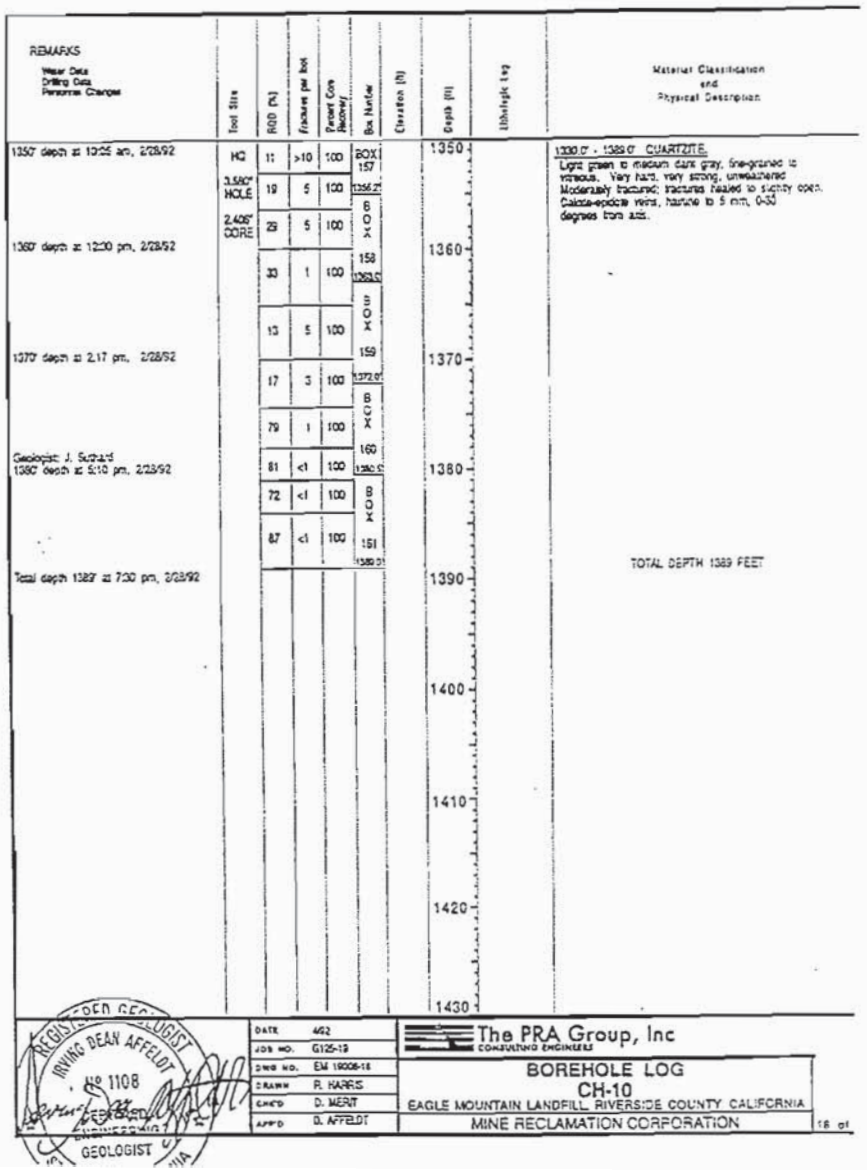

REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures per foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
HQ
3.85" HOLE
2.406" CORE
952' depth at 10:05 am, 2/22/92
970' depth at 11:45 am, 2/22/92
980' depth at 1:55 pm, 2/22/92
Geologist: J. Suttard
990' depth at 4:00 pm, 2/22/92
1000' depth at 5:32 pm, 2/22/92
Deviation survey = 1 degree
1010' depth at 9:05 pm, 2/22/92
1027' depth at 10:05 pm, 2/22/92
Geologist: R. Ubrey
951.0' - 952.8' IRON ORE
Black, magnetite-rich, abundant massive pyrite-tremolite-sericite, minor limonite stain. Calcite abundant in fractures to 1 mm.
952.8' - 955.0' QUARTZ MONZONITE
Greenish, highly altered. Calcite abundant in horizontal fractures. Moderately to very fractured, hard, strong, slightly weathered.
955.0' - 970.5' IRON ORE / SKARN
Dark green to black, highly altered. Abundant magnetite, pyrite, and massive quartz zones. Slightly fractured with calcite veins to 1 mm. Mostly hard to very hard, strong to very strong unweathered.
970.5' - 977.1' ANDESITE DIKE
Dark gray, slightly porphyritic, aphanitic groundmass. Slightly to moderately fractured, epidote and calcite filling. Apertures slightly open, minor limonite stain. Hard, strong unweathered.
977.1' - 981.1' IRON ORE
Red, brown, black, hematite, minor magnetite. Highly weathered, soft, crumbly, vuggy.
981.1' - 1027.5' SKARN
Green chlorite, epidote, tremolite, with ore veins (magnetite + pyrite) to 2 inches. Scattered quartzite zones. Moderately fractured, with calcite fill, limonite stain. Hard, strong, slightly weathered.
1027.5' - 1054.9' IRON ORE
Black, magnetite-rich. Moderately fractured, apertures slightly open, dip steep to vertical, with limonite stain. Hard, strong, very slightly weathered.
DATE 4/92
JOB NO. G125-19
DWG NO. EM 19006-13
DRAWN R. HARRIS
CHK'D D. MERIT
APP'D D. AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
FIGURE 4
3 of 4
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No. 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

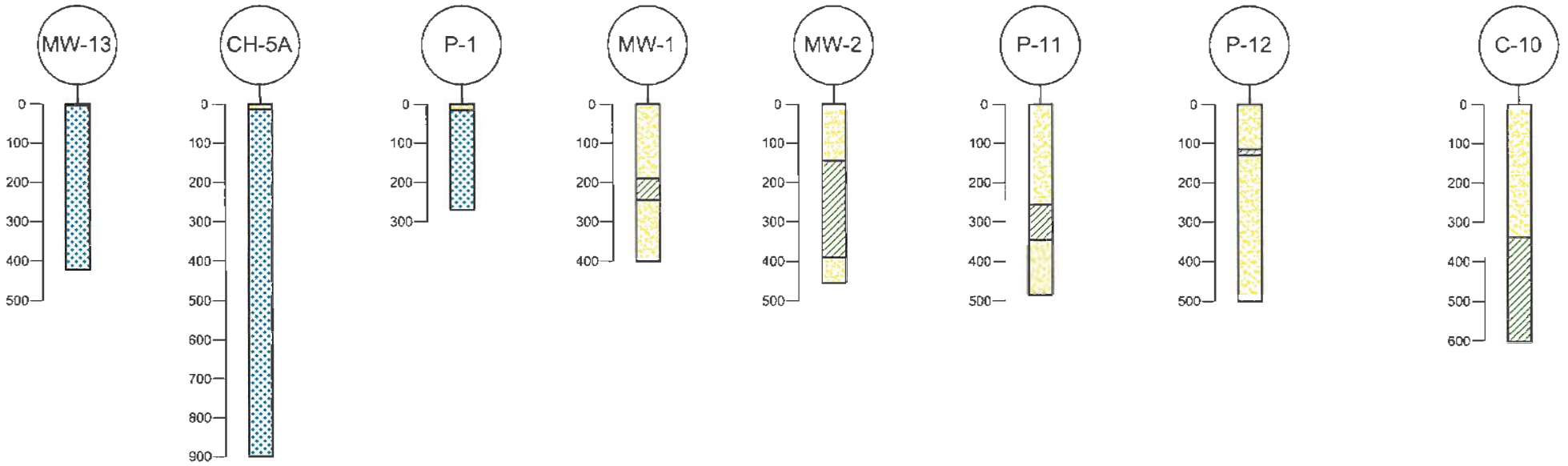

REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures per foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
HQ
3.85" HOLE
2.406" CORE
1040' depth at 1:15 am, 2/23/92
1050' depth at 2:25 am, 2/23/92
1060' depth at 4:00 am, 2/23/92
Geologist: D. Yohumo
1070' depth at 5:50 am, 2/23/92
1080' depth at 8:47 am, 2/23/92
1090' depth at 2:37 pm, 2/23/92
1100' depth at 3:50 pm, 2/23/92
Geologist: J. Suttard
Deviation survey = 1.5 degrees
1110' depth at 5:00 pm, 2/23/92
1027.5' - 1054.9' IRON ORE
Black, magnetite-rich. Moderately fractured, apertures slightly open, dip steep to vertical, with limonite stain. Hard, strong, very slightly weathered.
1045.9' - 1067.4' SKARN
Mixed skarn mineralization: iron ore zone. Moderately weathered.
1067.4' - 1081.3' ANDESITE DIKE
Green-gray, highly altered, abundant limonite stain. Mostly highly fractured to shattered. Slightly hard, slightly strong, highly weathered.
1081.3' - 1109.0' QUARTZITE
Pinkish tan, green, gray. Pervasive chlorite-sericite alteration. Calcite in veins 1-5 mm, minor limonite stain. Hard to very hard, very strong, slightly to moderately fractured, apertures slightly open.
1109.0' - 1112.0' ANDESITE DIKE
DATE 4/92
JOB NO. G125-19
DWG NO. EM 19006-14
DRAWN R. HARRIS
CHK'D D. MERIT
APP'D D. AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
4 of 4
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No. 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA


REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures per foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
HQ
3.85" HOLE
2.405" CORE
1107' depth at 9:15 am, 2/23/92
1137' depth at 10:00 pm, 2/23/92
Geologist: R. Usrey
1147' depth at 12:25 am, 2/24/92
1157' depth at 2:25 am, 2/24/92
Geologist: D. Voltumo
1167' depth at 4:55 am, 2/24/92
1177' depth at 8:01 am, 2/24/92
1187' depth at 9:40 am, 2/24/92
1197' depth at 11:12 am, 2/24/92
1109.0' - 1112.0' ANDESITE DIKE
Green, highly altered, highly deformed. Moderately to slightly hard, moderately to slightly strong
1112.0' - 1116.5' FAULT GOUGE
Green to yellow, minor limonite stain; slickensides.
1116.5' - 1164.8' QUARTZITE
Green/gray/tan; Slightly weathered, moderately fractured. Fractures slightly healed, mostly 5-20 degrees from axis, with chlorite-talc fill, limonite stain
1164.8' - 1178.9' QUARTZ MONZONITE
Gray to pinkish green; inclusions of green altered quartzite. Hard to very hard, strong, slightly weathered. Moderate chlorite-epidote-pyrite alteration. Calcite veins, hairline to 1 cm
1178.9' - 1195.0' QUARTZITE
Medium pink-gray. Highly fractured, healed with dark green chlorite-epidote-pyrite, hairline to 3 cm, 10-30 degrees from axis. Very hard, very strong, slightly weathered
DATE 4/92
JOB NO. G125-19
DWG NO. EM 19006-15
DRAWN R. HARRIS
CHK'D D. MERIT
APP'D D. AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
EDITED BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
FIGURE NO.
15 of 18
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
ENGINEERING GEOLOGIST


REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures per foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
HQ
3.85" HOLE
2.405" CORE
1197' depth at 11:12 am, 2/24/92
1207' depth at 12:30 pm, 2/24/92
Deviation survey = <1.5 degrees
Geologist: J. Suhard
1217' depth at 4:40 pm, 2/24/92
1227' depth at 6:30 pm, 2/24/92
1237' depth at 9:55 pm, 2/24/92
Geologist: R. Usrey
1247' depth at 3:40 am, 2/25/92
Geologist: D. Voltumo
1257' depth at 9:50 am, 2/25/92
1267' depth at 12:05 pm, 2/25/92
1277' depth at 2:20 pm, 2/25/92
1173.9' - 1195.0' QUARTZITE
Medium pink-gray, highly fractured, mostly healed with dark green chlorite-epidote-pyrite, hairline to 3 cm, 10-30 degrees from axis. Very hard, very strong, slightly weathered.
1195.0' - 1198.9' SKARN
Very dark green to black, highly altered; ore veins with pyrite. Moderately hard, moderately strong, moderately weathered, highly fractured, apertures moderately open.
1198.9' - 1203.5' ANDESITE
Dark gray, porphyritic. Moderately to highly fractured. Minor epidote-calcite fill.
1203.5' - 1223.5' DIORITE
Medium gray to green, fine to medium grained. Green alteration (pyroxene-amphibole-feldspar-epidote-pyrite). Moderately fractured, tight to moderately open, veins of epidote-calcite, limonite stain. Hard, strong
1220.5' - 1236.0' ANDESITE
Dark gray, aphanitic, slightly porphyritic. Moderately to highly fractured, apertures tight to slightly open with epidote-pyrite fill, limonite stain. Hard, strong, slightly weathered.
1236.0' - 1238.5' QUARTZ MONZONITE
Pink to brown, medium grained. Fractures mostly healed hairline to 3 mm, 10-30 degrees from axis, with calcite fill, limonite stain. Very hard, very strong, slightly weathered
1238.5' - 1252.0' QUARTZITE
Gray, tan, pink mottled zones. Older fractures healed, with black to green alteration zones. Younger fractures healed, with abundant calcite, apertures slightly to moderately open, mostly near-vertical. Hard, strong.
1252.0' - 1275.5' QUARTZ MONZONITE
Gray-brown, coarse-grained. Hard, strong. Moderately fractured, with calcite fill, slightly open. Scattered swirled masses of quartzite
DATE 3/92
JOB NO. G125-19
DWG NO. EM 19006-16
DRAWN R. HARRIS
CHK'D C. MERIT
APP'D D. AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
16 of 1
REGISTERED GEOLOGIST
IRVING DEAN AFFELDT
No 1108
ENGINEERING GEOLOGIST


REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures per foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
1270' depth at 2:00 pm, 2/25/92
HQ
3.85" Tricone
2.405" core
1280' depth at 4:05 pm, 2/25/92
Geologist: J. Suthard
1290' depth at 11:57 pm, 2/25/92
Geologist: R. Usrey
Geologist: D. Vaturro
1300' depth at 11:52 am, 2/26/92
Deviation survey = 1.5 degrees
1310' depth at 3:10 pm, 2/26/92
Geologist: J. Suthard
1320' depth at 5:15 pm, 2/26/92
Broken drive chain - rig down until 12:42 am, 2/28/92
Geologist: R. Usrey
1330' depth at 1:27 am, 2/27/92
1340' depth at 4:00 am, 2/28/92
Geologist: D. Vaturro
1350' depth at 10:05 am, 2/28/92
1270
1280
1290
1300
1310
1320
1330
1340
1350
1292.0' - 1276.5' QUARTZ MONZONITE
Gray-brown, coarse-grained. Hard, strong. Moderately fractured, with calcite 50, apertures slightly open. Scattered swirled mussen of quartzite
1276.5' - 1255.6' LIMESTONE
Gray-green, with abundant calcite veins and hairline fractures with black (ore?) fill. Hard, strong, moderately fractured, apertures slightly open increasing silicification with depth.
1255.5' - 1289.0' QUARTZ MONZONITE
Brown and gray, mixed with minor green-altered quartzite. Hard, strong, slightly weathered moderately fractured, with epidote-calcite fill, limonite stain
1289.0' - 1256.9' QUARTZITE
Dark gray, with 3-5 mm ore veins. Hard, strong. Moderately fractured apertures slightly open with calcite-chlorite-epidote fill
1256.9' - 1330.0' SKARN
Gray, black, green, orange, with mixed zones of quartzite and ore. Up to 25% ore, with abundant pyrite. Hard, strong, slightly weathered. Moderately fractured; apertures moderately open, calcite in veins
1298' - 1327' dissolution of calcite veins
1330' - 1389' QUARTZITE
Light green to medium dark gray, fine-grained to vitreous. Very hard, very strong, unweathered Moderately fractured; fractures healed to slightly open Calcite-epidote veins, hairline to 5 mm, 0-30 degrees to axis
REGISTERED GEOLOGIST
IRVING BEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA
DATE 4/92
JOB NO. G125-19
DWG NO. EM 19006-17
DRAWN R. HARRIS
CHK'D C. MERIT
APP'D D. AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
FIGURE NO
17 of 18


REMARKS
Water Data
Drilling Data
Personnel Changes
Tool Size
RQD (%)
Fractures per foot
Percent Core Recovery
Box Number
Elevation (ft)
Depth (ft)
Lithologic Log
Material Classification and Physical Description
1350' depth at 10:05 am, 2/28/92
HQ
3.580" HOLE
2.405" CORE
1360' depth at 12:00 pm, 2/28/92
1370' depth at 2:17 pm, 2/28/92
Geologist: J. Suthard
1380' depth at 5:10 pm, 2/28/92
Total depth 1389' at 7:00 pm, 2/28/92
1350
1360
1370
1380
1390
1400
1410
1420
1430
1330.0' - 1389.0' QUARTZITE
Light green to medium dark gray, fine-grained to vitreous. Very hard, very strong, unweathered Moderately fractured; fractures healed to slightly open. Calcite-epidote veins, hairline to 5 mm, 0-30 degrees from axis.
TOTAL DEPTH 1389 FEET
REGISTERED GEOLOGIST
IRVING BEAN AFFELDT
No 1108
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA
DATE 4/92
JOB NO. G125-19
DWG NO. EM 19006-18
DRAWN R. HARRIS
CHK'D D. MERIT
APP'D D. AFFELDT
The PRA Group, Inc
CONSULTING ENGINEERS
BOREHOLE LOG
CH-10
EAGLE MOUNTAIN LANDFILL, RIVERSIDE COUNTY, CALIFORNIA
MINE RECLAMATION CORPORATION
18 of


MW-13
0
100
200
300
400
500
CH-5A
0
100
200
300
400
500
600
700
800
900
P-1
0
100
200
300
MW-1
0
100
200
300
400
MW-2
0
100
200
300
400
500
P-11
0
100
200
300
400
500
P-12
0
100
200
300
400
500
C-10
0
100
200
300
400
500
600

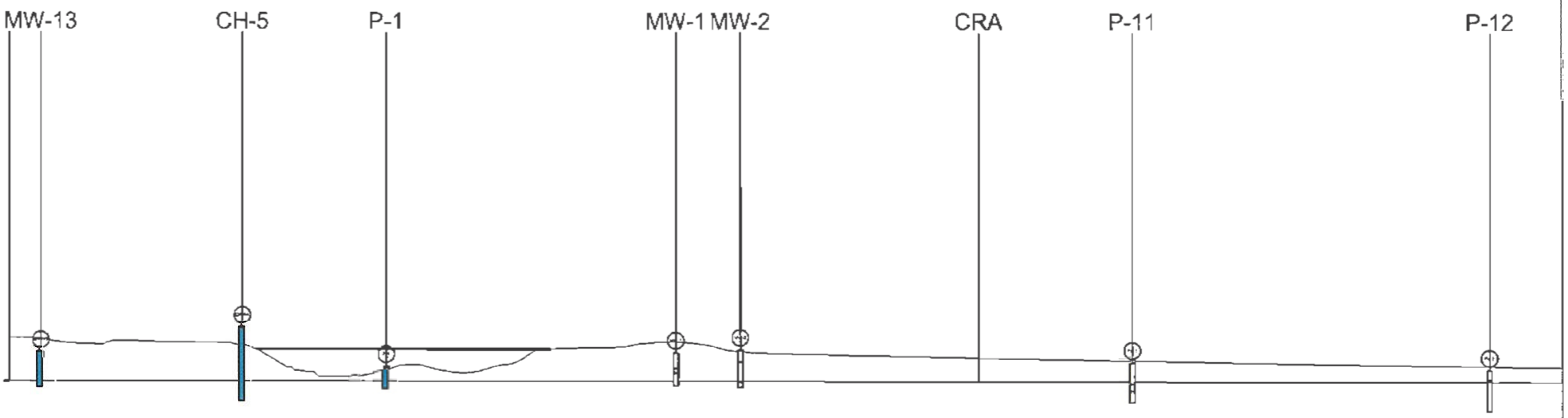

MW-13
CH-5
P-1
MW-1
MW-2
CRA
P-11
P-12

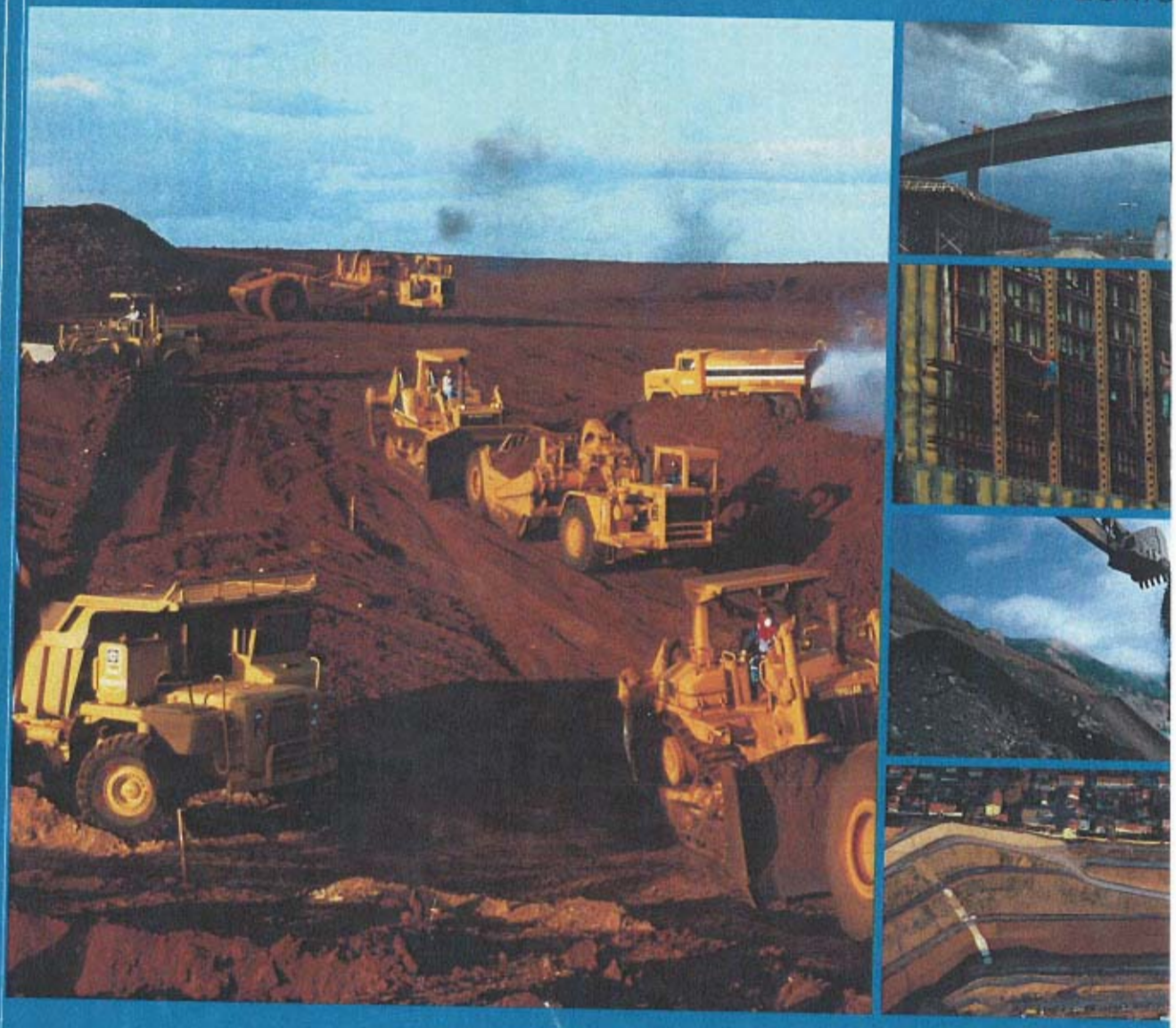
Table E.1 Summary of Soil Laboratory Testing

Sample Information			In-situ Water Content, %	In-situ Dry Unit Weight, pcf	Atterberg Limits		Sieve/Hydrometer			USCS Group Symbol	Hydraulic Conductivity
Boring	Sample No	Depth (ft)			LL	PI	#4 (%)	#200 (%)	(< 5μm) (%)		(cm/s)
C-1	3	17	1.7	112.4		-	91	8.3	-	SP-SM	
	7	58	1.1	111.5		-	97.3	9.3	-	SP-SM	
	12	801	2.8	111.6	NP	NP	98.3	14.6	8	SM	
	13	810	-	-	-	-	99.8	11.7	6	SP-SM	
	14	120-125*	-	-	-	-	83.6	8.7	3	(SP-SM)g	
	15	841	-	-	-	-	99.4	25.4	19	SM-SC	
	16	860	-	-	-	-	92.5	16.5	10	SM-SC	
	17	877	-	-	-	-	65.4	13.1	-	(SM)g	
	18	199	-	-	-	-	99.7	27.9	16	SC	
	19	201	5.3	109.9	31	9	94.1	18.8	11	SC	
	21	210-220*	-	-	NP	NP	-	-	-		
	24	240-250*	-	-	-	-	97.9	23.3	13	SM-SC	
	26	262	7.7	104.8	24	4	-	-	-	SC-SM	
	27	263-272*	-	-	-	-	96.7	19	8	SM	
	28	265-275*	-	-	-	-	77.9	14.9	7	(SM)g	
	29	280-295*	-	-	-	-	98.3	16.4	-	SM	
	32	322	5.6	126.1	-	-	94.7	26.1	13	SM	
	36-2	380	-	-	21	3	-	-	-	SM	
	37	400-420*	-	-	40	26	-	-	-	CL	
	38	420-426*	-	-	-	-	99.9	8.1	-		
	42-2	460	15.3	113.8	23	5	-	-	-	SC-SM	
	42-3	460	-	-	22	6	-	-	-	SC-SM	
C-5	1	n/a	-	-	-	-	97.6	19	15	SC-SM	
	2	n/a	-	-	-	-	92.4	14.4	11		
	4-2	20	2.6	124.2	-	-	74.6	13.3	7	(SM)g	
	8	n/a	-	-	-	-	99.7	16	13	SM	
	9	59	-	-	-	-	58.6	2.8	-	(SW)g	
	10-3	62	2.9	132.4	-	-	98.9	22	16	SC-SM	2.70E-07
	11	n/a	-	-	-	-	83.6	14.5	9	(SM)g	
	12-3	81	2	133.7	-	-	45	9.8	-	(GP-GM)s	
	13	101	-	-	-	-	98.3	4.8	-	SP-SM	
	14	121	-	-	-	-	52.7	6.7	-	(GP-GM)s	
	16	142	23.5	93.2	58	35	100	91.2	70	CH	9.20E-10
	19	n/a	-	-	-	-	100	96.2	53	MH/CL	
	23	206	15.3	109.8	36	10	100	75.6	17	(ML)s	
	25	241	-	-	-	-	99.7	42.3	18	SM	
	28	276	-	-	-	-	100	33.4	-	SM	
	29	280	-	-	-	-	100	8.2	7.4	SP-SM	
	30	300	-	-	-	-	100	41.5	18	SM-SC	
	MC-1	344**	31.4	92	100	58		98.7	-	CH	
C-9	3	17	9.4	102.4			90.4	9.2	-	SW-SM	
	6	35-45*	-	-	-	-	98.6	16.6	-	SM	
	11	59-77*	-	-	49	32	-	-	-	CL	
	13	82	23.6	90.5	41	24	100	68.6	30	s(CL)	
	15	87-94*	-	-	-	-	86.8	12.7	6	SM	
	17	95-105*	-	-	-	-	87.1	10.2	4	SP-SM	
	MC-1	145	5.9	107.9			94.6	23	-	SM	3.50E-05
C-10	1	0-15.5*	-	-	-	-	93.5	7.9	5	SP-SM	
	2	16	3.9	115.6			93.2	7.8	-	SP-SM	
	3	17-30	-	-	-	-	97.5	10.8	7	SP-SM	
	4	30-63*	-	-	-	-	97.1	5.8	-	SP-SM	
	5	63-93*	-	-	-	-	91.2	3.7	3	SP	
	9	95	-	-	-	-	98.4	12.4	8	SP-SM	
	10	100	2.1	115.8			91.3	9.5	-	SP-SM	
	12	104-121*	-	-	-	-	98	16.2	11	SM	
	13	122-139*	-	-	-	-	78.4	9	5	(SP-SM)g	
	14	175-191*	-	-	-	-	99.6	8.4	7	SP-SM	
	17	191-198*	-	-	-	-	73.4	8	6	(SP-SM)g	
	18	198	2.8	100.5			66.9	5.6	-	(SP-SM)g	
	20	207-240*	-	-	-	-	94.5	15.7	8	SM	
	21	240-260*	-	-	-	-	93.7	12.1	6	SP-SM	
	22	260-280*	-	-	-	-	99	10.5	-	SP-SM	
	29	359	0.4	110.3	47	24	100	63.6	53	(CL)s	
	34	428-442*	-	-	61	31	100	91.3	50	CH	
	35	442-453*	-	-	59	32	100	48.3	35	CH	
	37	469-470*	-	-	59	37	99.6	86.7	70	CH	
	39	500-520	-	-	51	29	98.2	80.4	59	(CH)s	

*grab sample
**Shelby Tube sample

Principles of Geotechnical Engineering

Fifth Edition



Braja M. Das

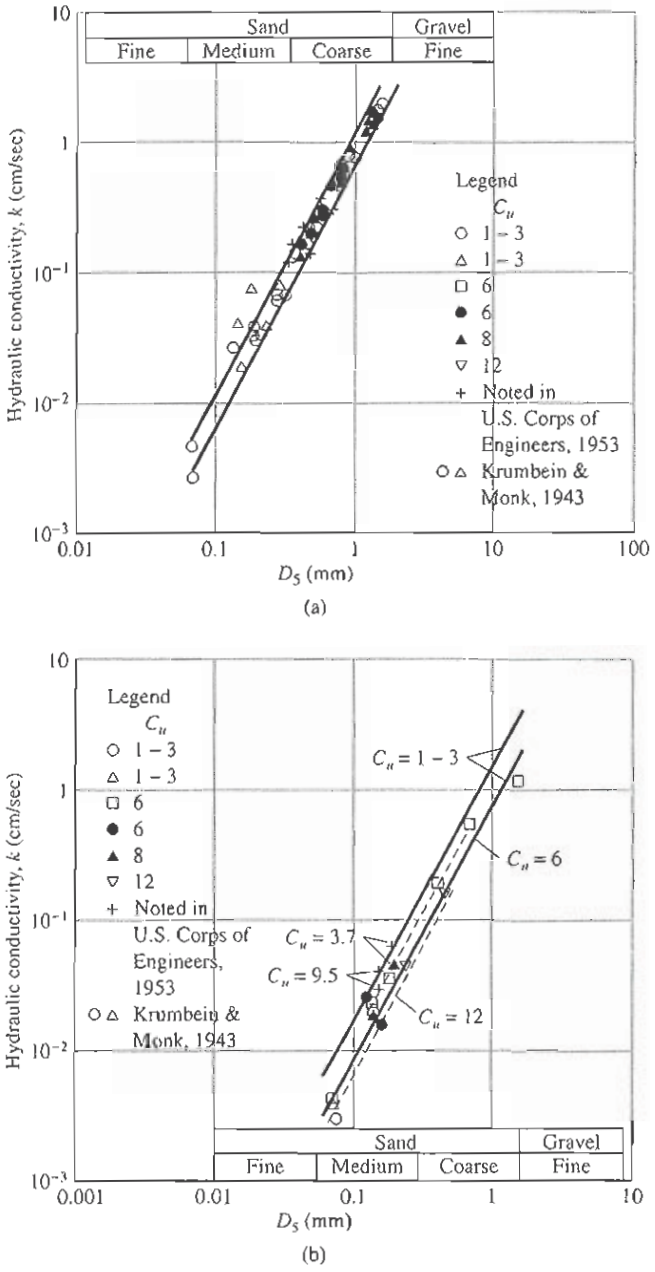


Figure 6.8
Results of permeability tests on which Eq. (6.27) is based: (a) results for $C_u = 1$–3; (b) results for $C_u > 3$ (after Kenney, Lau, and Ofoegbu, 1984)

where D_5 = diameter (mm) through which 5% of soil passes. Figures 6.8a and 6.8b show the results on which Eq. (6.27) is based.

On the basis of laboratory experiments, the U.S. Department of Navy (1971) provided an empirical correlation between k (ft/min) and D_{10} (mm) for granular soils with the uniformity coefficient varying between 2 and 12 and $D_{10}/D_5 < 1.4$. This correlation is shown in Figure 6.9.

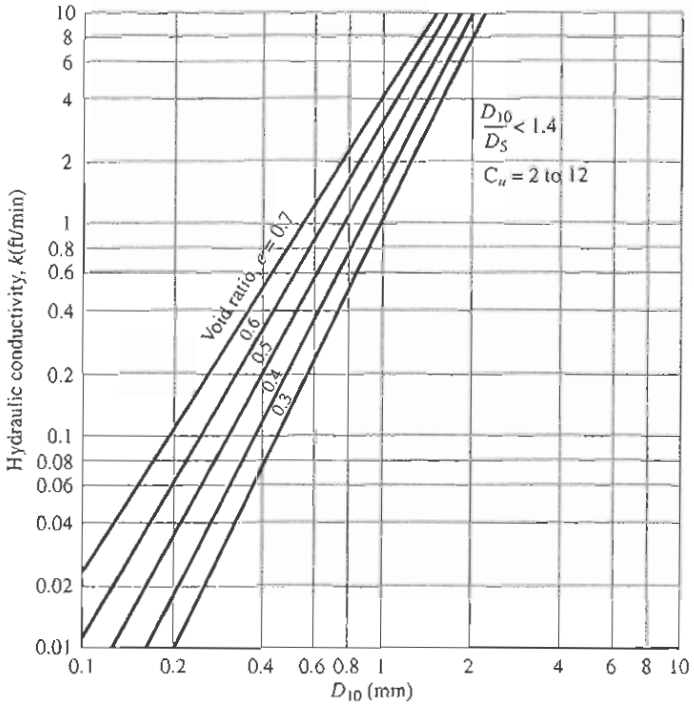


Figure 6.9 Permeability of granular soils (after U.S. Department of Navy, 1971)

According to their experimental observations, Samarasinghe, Huang, and Drnevich (1982) suggested that the hydraulic conductivity of normally consolidated clays (see Chapter 10 for definition) can be given by

$$k = C_3 \left(\frac{e^n}{1 + e} \right) \tag{6.28}$$

where C_3 and n are constants to be determined experimentally. This equation can be rewritten as

$$\log[k(1 + e)] = \log C_3 + n \log e \tag{6.29}$$

Hence, for any given clayey soil, if the variation of k with the void ratio is known, a log-log graph can be plotted with $k(1 + e)$ against e to determine the values of C_3 and n.

Some other empirical relationships for estimating the hydraulic conductivity in sand and clayey soils are given in Table 6.3. One should keep in mind, however, that any empirical relationship of this type is for estimation only, because the magnitude of k is a highly variable parameter and depends on several factors.

Tavenas et al. (1983) also gave a correlation between the void ratio and the hydraulic conductivity of clayey soil. This correlation is shown in Figure 6.10. An important point to note, however, is that in Figure 6.10, *PI,* the plasticity index, and *CF,* the clay-size fraction in the soil, are in *fraction* (decimal) form.

Table 6.3 Empirical Relationships for Estimating Hydraulic Conductivity

Type of Soil	Source	Relationship[a]	Comments
Sand	Amer and Awad (1974)	$k = C_2 D_{10}^{2.32} C_u^{0.6} \frac{e^3}{1+e}$	
	Shahabi, Das, Tarquin (1984)	$k = 1.2 C_2^{0.735} D_{10}^{0.89} \frac{e^3}{1+e}$	Medium to fine sand
Clay	Mesri and Olson (1971)	$\log k = A' \log e + B'$	
	Taylor (1948)	$\log k = \log k_0 - \frac{e_0 - e}{C_k}$ $C_k \approx 0.5 e_0$	For $e < 2.5$,

[a] D_{10} = effective size
C_u = uniformity coefficient
C_2 = a constant
k_0 = *in situ* hydraulic conductivity at void ratio e_0
k = hydraulic conductivity at void ratio e
C_k = permeability change index

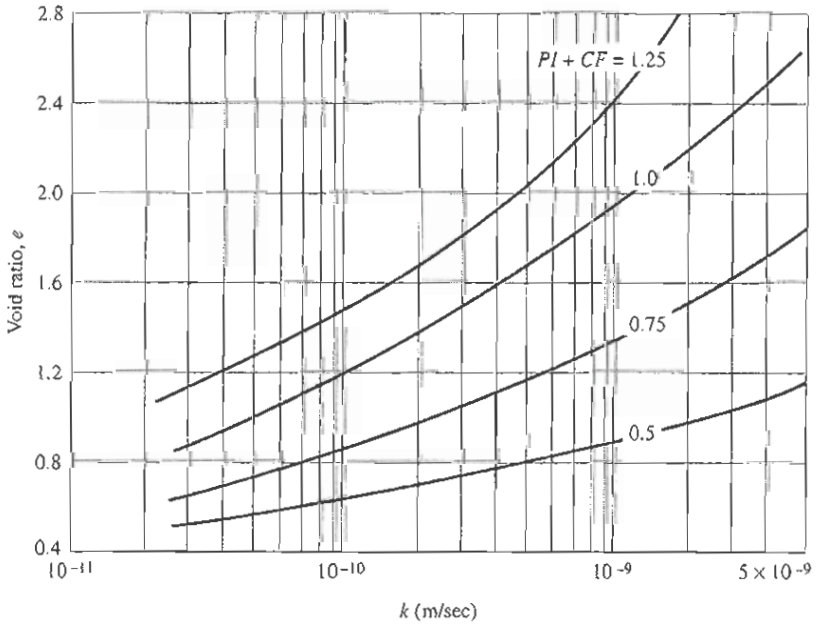


Figure 6.10 Variation of void ratio with hydraulic conductivity of clayey soils (based on Tavenas et al., 1983)